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CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Susan M. Cischke, Vice President
Vehicle Certification, Compliance and Safety Affairs
DaimlerChrysler Corporation - CIMS 482-00-91
800 Chrysler Drive
Auburn Hills, MI 48326-2757

NSA-122jlq
EA99-013

Dear Ms Cischke:

This letter is to request additional information regarding NHTSA's investigation of crash-induced fuel filler neck assembly failure in 1996 through 2000 DaimlerChrysler NS-minivan vehicles. As you know, a second NHTSA crash test of a subject vehicle has resulted in a failure of the fuel filler neck assembly. On January 6, 2000, a left-side impact test (NHTSA No. MY0303) of a 2000 Dodge Caravan for NHTSA's New Car Assessment Program (NCAP) resulted in the fuel filler neck hose separating from the fuel tank spud and most of the tank contents spilling onto the ground.

Unless otherwise stated in the text, the following definitions apply to this information request:

- **Subject vehicles**: all 1996 through current model year DaimlerChrysler NS-minivans.

- **Subject fuel tank assembly**: all fuel storage tanks used in the subject vehicles.

- **Subject tank spud**: all fill spuds used in subject fuel tank assemblies.

- **Subject hose joint**: the clamped joint between the filler neck hose and the subject tank spud, including the hose, the clamp, and the tank fill spud, or any or all of the components thereof.

- **DaimlerChrysler**: DaimlerChrysler Corporation and Chrysler Corporation, all of its past and present officers and employees, whether assigned to its principal offices or any of its field or other locations, including all of its divisions, subsidiaries (whether or not incorporated) and affiliated enterprises and all of their headquarters, regional, zone and other offices and their employees, and all agents, contractors, consultants, attorneys and

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law firms and other persons engaged directly or indirectly (e.g., employee of a consultant) by or under the control of DaimlerChrysler (including all business units and persons previously referred to), who are or, in or after January 1994, were involved in any way with any of the following related to the alleged defect in the subject vehicles:

a. design, engineering, analysis, modification or production (e.g. quality control);
b. testing, assessment or evaluation;
c. consideration, or recognition of potential or actual defects, reporting, record-keeping and information management, (e.g., complaints, field reports, warranty information, part sales), analysis, claims, or lawsuits; or
d. communication to, from or intended for zone representatives, fleets, dealers, or other field locations, including but not limited to people who have the capacity to obtain information from dealers.

- **Alleged defect**: shall refer to crash-induced fuel filler neck separation from the fuel tank.

- **Documents**: "Document(s)" is used in the broadest sense of the word and shall mean all original written, printed, typed, recorded, or graphic matter whatsoever, however produced or reproduced, of every kind, nature, and description, and all nonidentical copies of both sides thereof, including, but not limited to, papers, letters, memoranda, correspondence, communications, electronic mail (e-mail) messages (existing in hard copy and/or in electronic storage), faxes, mailgrams, telegrams, cables, telex messages, notes, annotations, working papers, drafts, minutes, records, audio and video recordings, data, databases, other information bases, summaries, charts, tables, graphics, other visual displays, photographs, statements, interviews, opinions, reports, newspaper articles, studies, analyses, evaluations, interpretations, contracts, agreements, jottings, agendas, bulletins, notices, announcements, instructions, blueprints, drawings, as-builts, changes, manuals, publications, work schedules, journals, statistical data, desk, portable and computer calendars, appointment books, diaries, travel reports, lists, tabulations, computer printouts, data processing program libraries, data processing inputs and outputs, microfilms, microfiches, statements for services, resolutions, financial statements, governmental records, business records, personnel records, work orders, pleadings, discovery in any form, affidavits, motions, responses to discovery, all transcripts, administrative filings and all mechanical, magnetic, photographic and electronic records or recordings of any kind, including any storage media associated with computers, including, but not limited to, information on hard drives, floppy disks, backup tapes, and zip drives, electronic communications, including but not limited to, the Internet and shall include any drafts or revisions pertaining to any of the foregoing, all other things similar to any of the foregoing, however denominated by DaimlerChrysler, any other data compilations from which information can be obtained, translated if necessary, into a usable form and any other documents. For purposes of this request, any document which contains any note, comment, addition, deletion, insertion, annotation, or otherwise comprises a nonidentical copy of another document shall be treated as a separate document subject to production.

In all cases where original and any non-identical copies are not available, "document(s)" also means any identical copies of the original and all non-identical copies thereof. Any document, record, graph, chart, film or photograph originally produced in color must be provided in color. Furnish all documents whether verified by the manufacturer or not. If a document is not in the English language, provide both the original document and an English translation of the document.

In order for my staff to evaluate the alleged defect, certain information is required. Pursuant to 49 U.S.C. § 30166, please provide numbered responses to the following information requests. Please repeat the applicable request verbatim above each response. After DaimlerChrysler's response to each request, identify the source of the information and indicate the last date the source updated the information prior to the preparation of the response. Insofar as DaimlerChrysler has previously provided a document to ODI, DaimlerChrysler may either produce it again, or identify the document, the document submission to ODI in which it was included and the precise location in that submission where the document is located. Previously submitted complaints and field reports in PE99-010 and EA99-013 do not need to be provided. When documents are produced, the documents shall be produced in an identified, organized manner that corresponds with the Information Request letter (including the subparts). When documents are produced and the documents would not, standing alone, be self-explanatory, the production of documents shall be supplemented and accompanied by explanation.

If DaimlerChrysler cannot respond to any specific request or subpart thereof, please state the reason why it is unable to do so. If DaimlerChrysler claims that any document or other information or material responsive to any of the following items need not be provided to NHTSA because it is privileged or the work product of an attorney, separately by information request number, for each such document or other information or material, state the nature of that information or material and identify any document in which it is found by date, subject or title, name and position of the person from, and the person to whom it was sent, and the name and position of any other recipient. DaimlerChrysler must also describe the basis for the claim, and explain why DaimlerChrysler believes it applies.

1. Provide an update of the number of subject vehicles DaimlerChrysler has sold in the United States by model, wheel base, door option, and model year.

2. State the number and provide copies of all of the following, from all sources, of which DaimlerChrysler is aware and which allege incidents of crash-induced fuel spillage or fire originating in the vicinity of the fuel tank assembly of the subject vehicles [Please note that this question concerns all such incidents, and is not limited to specific allegations of filler neck assembly failure]. For each such incident provided, state the crash mode, impact speed (if known), and alleged fuel system failure mode:

   a. owner/fleet complaints;
   b. field reports;

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c. fire incident claims;
d. subrogation claims;
e. lawsuits; and
f. third-party arbitration proceedings (where DaimlerChrysler is a party to the arbitration).

Please list and collate your responses for each category ("a" through "f") by model year and date of claim. Please provide for each item in this response the incident date, mileage of vehicle at time of incident (if known), vehicle date of build, disposition of matter, and, where a fleet vehicle is involved, the name of the fleet, and the name and telephone number of a contact person at that fleet. For items "a" through "d," please provide all related information and reports whether or not DaimlerChrysler has verified each one. For items "e" and "f," summaries are acceptable. Please identify in the summary the caption, court, docket number, and filing date of each lawsuit if a copy of the Complaint initiating the lawsuit is not provided.

3. Describe, and provide copies of all documents related to, each and every investigation and other analyses conducted by, or for, DaimlerChrysler of left-side impact crash incidents involving subject vehicles. This should include:

   a. all incidents identified in DaimlerChrysler's November 26, 1999, letter concerning this investigation;
   b. the Roseburg, Oregon crash identified in a December 13, 1999, letter from NHTSA to DaimlerChrysler; and
   c. any other incident or allegation of filler tube assembly leakage or post-crash fire involving a subject vehicle of which DaimlerChrysler is aware.

4. Provide copies of all documents in DaimlerChrysler's possession or control which are related to NHTSA's January 6, 2000, side-impact test (MY0303) of a 2000 Dodge Caravan vehicle for the New Car Assessment Program (the SINCAP test).

5. Question 13.d of NHTSA's October 20, 1999, letter to DaimlerChrysler requested an assessment of the reasons for the differences in average pull-off forces between the subject hose joint and the metal filler tube end hose joint in test data that had been furnished by DaimlerChrysler, as follows:

   Provide DaimlerChrysler's assessment of the factors responsible for the disparity in pull-off performance between the subject hose joint and the metal filler tube end hose joint in the test data furnished in Enclosure 7 of DaimlerChrysler's April 9, 1999 response to PE99-010 (Test Report No. 200-99).

   DaimlerChrysler did not answer this question in its December 20, 1999, response to NHTSA. Provide a complete response to this question. Also, rank and weigh (by the

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approximate percentage of contribution) the factors identified in descending order of importance.

6. Enclosure 18 to DaimlerChrysler's January 7, 2000, letter responding to EA99-013 contains several meeting notices. The most recent notice, regarding a December 10, 1999 meeting, had the following subject and purpose:

   Subject: Contigency* [sic] *Options for Actions

   Purpose: Brainstorm alternatives to improve system performance in SINCAP test

   Provide the following information regarding the meetings held by DaimlerChrysler regarding the alleged defect in the subject vehicles:

   a. List the date and subject matter of every meeting that DaimlerChrysler has conducted and state the agenda for each such meeting;
   b. Describe all "contingency options," "actions," and "alternatives" that have been considered or discussed by DaimlerChrysler;
   c. State the name, title, company, and division/group affiliation of each individual present at each of the meetings identified in Enclosure 18 of the January 7, 2000, letter or in response to Item 6.a of this letter; and
   d. Provide copies of all documents related in any way to the December 10, 1999, meeting or otherwise related to the crash integrity or design of the subject hose joint from each of the individuals invited to the meeting. Furnish the information in separate enclosures for each individual.

7. In its January 7, 2000, response to EA99-013, DaimlerChrysler stated that it has consulted with its suppliers concerning the subject hose joint and that the suppliers "agreed" that the subject hose joint design was "appropriate." However, DaimlerChrysler stated that no "relevant documents [were] available concerning clamped hose joint design beyond the design drawing and specification information supplied in portions of [the January 7, 2000] response:"

   DaimlerChrysler did consult with suppliers of the hose clamp, the hose (which is supplied to DaimlerChrysler in assembly with the fuel filler tube), and the fuel tank as part of the normal design and development process for the minivan. Discussions have also occurred with these suppliers through the course of responding to ODI's investigation. DaimlerChrysler's suppliers agree that the ranges of interference fit and other aspects of the clamped hose joint design are appropriate. No relevant documents are available concerning clamped hose joint design beyond the design drawing and specification

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information supplied in portions of this response. No descriptions of oral discussions are available.

Provide the following information regarding DaimlerChrysler's communications with its fuel tank, fuel filler tube assembly, hose, or hose clamp suppliers, or any other entity, regarding the alleged defect in the subject vehicles:

a. Identify by company name, address, and contact person (name and telephone number) each supplier/entity with whom DaimlerChrysler has communicated regarding the alleged defect in the subject vehicles since January 5, 1999;
b. Identify each DaimlerChrysler employee who has engaged in any such communication, by name of company contacted and name, title, and group affiliation of employee;
c. For each company contacted provide a chronology of communications, by date (state approximate month and year if actual date is not known), name(s) of DaimlerChrysler employee(s) involved, name(s) of supplier employee(s) involved, the nature the communication (i.e., written, electronic, telephone contact, meeting, etc.), and a summary of the issues discussed; and
d. Provide copies of all documents relating in any way to such communications, including employee desk calendars and/or other contemporaneous notations.

8. Provide the design specifications for the filler tube assembly hose fitting, including bead diameter, bead back angle, bead ramp angle, and fitting diameter.

9. Complete the survey form provided in Enclosure 10 of DaimlerChrysler's December 20, 1999, letter to NHTSA (copy enclosed), for the short wheelbase and long wheelbase subject vehicles.

10. State whether there have ever been any pull-off standards or specifications for the fuel filler hose joints and/or filler neck assemblies of any model year 1996 or later motor vehicles sold by DaimlerChrysler. If the answer is affirmative, provide copies of all relevant standards, specifications, and related documents (e.g., design verification testing).

11. Provide copies of all other DaimlerChrysler documents relating to the design, pull-off resistance, or crash performance of the subject hose joint and/or subject filler neck assembly.

12. Provide DaimlerChrysler's assessment of all factors contributing to the filler hose separation incidents in the 1999 and 2000 Dodge Caravan vehicles crash-tested in NHTSA tests CX0305 and MY0303. Include in your response the following information:

a. a description of all loads applied to the filler tube assembly, ranked in order of magnitude (i.e., state the approximate magnitude - based on tube deformation and direction of each load and identify the component applying each load); and

b. state the lateral, longitudinal, and vertical movement of the fuel filler tube assembly (lower end connected to the filler hose).

This letter is being sent to DaimlerChrysler pursuant to 49 U.S.C. § 30166, which authorizes NHTSA to conduct any investigation that may be necessary to enforce Chapter 301 of Title 49. DaimlerChrysler's failure to respond promptly and fully to this letter could subject DaimlerChrysler to civil penalties pursuant to 49 U.S.C. § 30165 or lead to an action for injunctive relief pursuant to 49 U.S.C. § 30163. Other remedies and sanctions are available as well.

DaimlerChrysler's response to this letter, in duplicate, must be submitted to this office by April 28, 2000. Please include in DaimlerChrysler's response the identification codes referenced on page one of this letter. If DaimlerChrysler finds that it is unable to provide all of the information requested within the time allotted, DaimlerChrysler must request an extension from Mr. Thomas Z. Cooper at (202) 366-5218 no later than five business days before the response due date. If DaimlerChrysler is unable to provide all of the information requested by the original deadline, it must submit a partial response by the original deadline with whatever information DaimlerChrysler then has available, even if DaimlerChrysler has received an extension.

If DaimlerChrysler considers any portion of its response to be confidential information, 49 CFR Part 512, "Confidential Business Information," requires that DaimlerChrysler submit two copies of those document(s) containing allegedly confidential information (except only one copy of blueprints) and one copy of the documents from which information claimed to be confidential has been deleted, to the Office of Chief Counsel, National Highway Traffic Safety Administration, Room 5219 (NCC-30), 400 Seventh Street, SW, Washington, D.C. 20590. In addition, DaimlerChrysler must provide supporting information for the request for confidential treatment in accordance with 49 CFR Section 512.4(b) and (e) and include the name, address, and telephone number of a representative to receive a response from the Chief Counsel.

If you have any technical questions concerning this matter, please call Mr. Jeff Quandt of my staff at (202) 366-5207. If you have any questions concerning confidentiality claims, please contact Ms. Heidi Coleman, Assistant Chief Counsel for General Law, at (202) 366-1834.

Sincerely,

/S/

Kathleen C. DeMeter, Director
Office of Defects Investigation
Safety Assurance

Enclosure

Vehicle Identification - Make, Model, Model Year, options. Date of Inspection.

Wheel base of vehicle		
Rated fuel capacity		
Location of fuel fill tube (right or left side)		
Location of fill opening CntrLine on sheet metal		
Fore-Aft position of opening to rear axle CntrLine (in 'Y')		
Up_Down position of opening to top of rear wheel opening (above axle CntrLine, in 'Z')		
Description of fuel tank location in vehicle		
Position of rear edge of tank to rear axle CntrLine		
Position of front edge of tank to rear axle CntrLine		
Position of left outboard edge to outboard side of left sill		
Position of right outboard edge to outboard side of right sill		
Position of left outboard edge to inboard side of left rail		
Position of right outboard edge to inboard side of right rail		
Any additional comments ?		
Fill venting and valving		
ORVR, internal/external		
Location on tank and fill tube		
Material, attachment, size, valving		
Fuel tank material type (metal or plastic)		
Unique suspension or other chassis interface ?		
Fuel tank		
Location of fuel filler tube entry (Rear, side, top?)		
Submerged fill (yes or no?)		
Any tank shields ? Note if thermal or impact (skid plate), attached to tank, body or exhaust.		
Any additional comments ?		
Fuel tank straps		
How many straps ?		
Fore/aft or lateral ?		
Any additional comments ?		
Are they fastened to fixed dimension or to torque?		
Fill Pipe		
Housing at body side: Fixed or breakaway ?		
Approximate overall length		
Number of bends		
Pipe Material		
Pipe OD		
Routed above rail, below rail, through rail?		
Connection type to tank		
Pipe attachment to BIW structure (yes or no)		
Comments pertaining to venting hoses		
Unique rollover valves or plumbing ?		
Any shielding? For impact? (yes or no)		
Any additional comments ?		
Fill Pipe Hose		
Hose OD		
Length		
Number of bends		
Corrugated or not		

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Hose reinforced (yes or no)		
Any additional comments ?		
Fill pipe attachment to tank		
Type: Spud ? Note material, how attached to tank, length, diameter, diameter of bead.		
Clamp ? Style of clamp ?		
Bead type on spud		
Any additional comments ?		
Fuel cap		
Type (screw-on, quick-on, etc.)		
Valving		
Cap attachment - metal/plastic?		
Vehicle Attitude - Vertical from top of wheel opening above axle CntrLine (As received, no additional loading)		
Left Front		
Left Rear		
Right Front		
Right Rear		

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CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Louis Camp, Director
Automobile Safety and Engineering Standards Office
Ford Motor Company
Fairlane Plaza South
330 Town Center Drive, Suite 400
Dearborn, MI 48126

NSA-122jlq
EA99-013

Dear Mr. Camp:

This letter is to request peer vehicle information to assist NHTSA in its investigation of crash-induced fuel filler neck failure in 1996 through current production DaimlerChrysler NS-minivan vehicles (EA99-013).

Unless otherwise stated in the text, the following definitions apply to this information request:

- **Subject peer vehicles**: all Ford Windstar minivans.
- **Subject peer fuel filler neck assembly**: the fuel filler neck assembly used in the subject vehicles.
- **Subject peer tank spud**: all tank fill spuds used in subject fuel tank assemblies, whether molded with the tank, hot-plate welded to the tank, or joined by other means.
- **Subject peer hose joint**: the clamped joint between the filler neck hose and the fuel tank spud, including the hose, the clamp, and the tank fill spud, or any or all of the components thereof.
- **Ford**: Ford Motor Corporation, all of its past and present officers and employees, whether assigned to its principal offices or any of its field or other locations, including all of its divisions, subsidiaries (whether or not incorporated) and affiliated enterprises and all of their headquarters, regional, zone and other offices and their employees, and all agents, contractors, consultants, attorneys and law firms and other persons engaged directly or indirectly (e.g., employee of a consultant) by or under the control of Ford (including all

business units and persons previously referred to), who are or, in or after January 1994, were involved in any way with any of the following related to the alleged defect in the subject vehicles:

a. design, engineering, analysis, modification or production (e.g. quality control);
b. testing, assessment or evaluation;
c. consideration, or recognition of potential or actual defects, reporting, record-keeping and information management, (e.g., complaints, field reports, warranty information, part sales), analysis, claims, or lawsuits; or
d. communication to, from or intended for zone representatives, fleets, dealers, or other field locations, including but not limited to individuals who have the capacity to obtain information from dealers.

- **Alleged defect**: shall refer to crash-induced fuel filler neck separation from the fuel tank.

- **Documents**: "Document(s)" is used in the broadest sense of the word and shall mean all original written, printed, typed, recorded, or graphic matter whatsoever, however produced or reproduced, of every kind, nature, and description, and all nonidentical copies of both sides thereof, including, but not limited to, papers, letters, memoranda, correspondence, communications, electronic mail (e-mail) messages (existing in hard copy and/or in electronic storage), faxes, mailgrams, telegrams, cables, telex messages, notes, annotations, working papers, drafts, minutes, records, audio and video recordings, data, databases, other information bases, summaries, charts, tables, graphics, other visual displays, photographs, statements, interviews, opinions, reports, newspaper articles, studies, analyses, evaluations, interpretations, contracts, agreements, jottings, agendas, bulletins, notices, announcements, instructions, blueprints, drawings, as-builts, changes, manuals, publications, work schedules, journals, statistical data, desk, portable and computer calendars, appointment books, diaries, travel reports, lists, tabulations, computer printouts, data processing program libraries, data processing inputs and outputs, microfilms, microfiches, statements for services, resolutions, financial statements, governmental records, business records, personnel records, work orders, pleadings, discovery in any form, affidavits, motions, responses to discovery, all transcripts, administrative filings and all mechanical, magnetic, photographic and electronic records or recordings of any kind, including any storage media associated with computers, including, but not limited to, information on hard drives, floppy disks, backup tapes, and zip drives, electronic communications, including but not limited to, the Internet and shall include any drafts or revisions pertaining to any of the foregoing, all other things similar to any of the foregoing, however denominated by Ford, any other data compilations from which information can be obtained, translated if necessary, into a usable form and any other documents. For purposes of this request, any document which contains any note, comment, addition, deletion, insertion, annotation, or otherwise comprises a nonidentical copy of another document shall be treated as a separate document subject to production. In all cases where original and any non-identical copies are not available, "document(s)" also means any identical copies of the original and all non-identical copies thereof. Any document, record, graph, chart, film or photograph originally produced in color must be provided in color. Furnish all documents whether verified by the manufacturer or not. If a document is not in the English language, provide both the original document and an English translation of the document.

In order for my staff to evaluate the alleged defect, certain information is required. Pursuant to 49 U.S.C. § 30166, please provide numbered responses to the following information requests. Please repeat the applicable request verbatim above each response. After Ford's response to each request, identify the source of the information and indicate the last date the source updated the information prior to the preparation of the response. When documents are produced, the documents shall be produced in an identified, organized manner that corresponds with the Information Request letter (including the subparts). When documents are produced and the documents would not, standing alone, be self-explanatory, the production of documents shall be supplemented and accompanied by explanation.

If Ford cannot respond to any specific request or subpart thereof, please state the reason why it is unable to do so. If Ford claims that any document or other information or material responsive to any of the following items need not be provided to NHTSA because it is privileged or the work product of an attorney, separately by information request number, for each such document or other information or material, state the nature of that information or material and identify any document in which it is found by date, subject or title, name and position of the person from, and the person to whom it was sent, and the name and position of any other recipient. Ford must also describe the basis for the claim, and explain why Ford believes it applies.

1. Provide copies of all specifications or standards related to the fuel system crash performance of the subject peer vehicles.

2. Provide copies of all specifications or standards related to the design or pull-off performance (i.e., resistance to separation from external forces) of the hose joints used in the subject peer filler neck assemblies.

3. Provide copies of all test reports, data sheets, and/or other documents relating to pull-off testing of subject peer hose joints, or any of the components used therein. For each pull-off test conducted, state both the force, displacement, and hose elongation (%) corresponding to the beginning of hose slippage on the fitting and hose separation from the joint.

4. Provide the following information regarding the design and assembly of the subject peer fuel filler neck assemblies and tank spuds. All design dimensions should include both the nominal value and the allowed tolerances.

   a. filler hose inner diameter, wall thickness, and length;
   b. tank spud fitting outer diameter, wall thickness, and length;

c. tank spud bead diameter, back angle, and ramp angle;
d. clamp description, supplier, and torque range;
e. lubricants allowed for use as assembly aids; and
f. any reinforcement sleeves/ferrules used in the tank spud.

5. Provide Ford's assessment of which aspects of the design and manufacture of clamped hose joints are factors in the pull-off resistance of the joint. Rank and weigh the contribution of each factor to the pull-off resistance of the joint and state Ford's specified parameters for each factor in the subject peer hose joint (if not already stated in response to Item 4).

6. Provide the following information regarding the design of all fuel tanks and fuel tank spuds used in the subject peer vehicles:

   a. the total tank volume based on an SAE reference fill;
   b. the height of the lowermost portion of the subject peer tank spud opening above/below (state which) the SAE reference fill level; and
   c. if the height stated in 6.b is below the SAE fill level, state the equivalent volume of fuel represented by the stated height difference.

7. In a December 20, 1999, letter DaimlerChrysler provided a document to NHTSA which had been developed for a proposed peer vehicle study that was never conducted. The document (copy enclosed) is a worksheet of various vehicle and fuel system design factors. Complete the enclosed worksheet for the subject peer vehicles.

8. Provide two samples of each variation of filler hose and fuel tank spud used in the subject peer vehicles.

This letter is being sent to Ford pursuant to 49 U.S.C. § 30166, which authorizes NHTSA to conduct any investigation that may be necessary to enforce Chapter 301 of Title 49. Ford's failure to respond promptly and fully to this letter could subject Ford to civil penalties pursuant to 49 U.S.C. § 30165 or lead to an action for injunctive relief pursuant to 49 U.S.C. § 30163. Other remedies and sanctions are available as well.

Ford's response to this letter, in duplicate, must be submitted to this office by April 14, 2000. Please include in Ford's response the identification codes referenced on page one of this letter. If Ford finds that it is unable to provide all of the information requested within the time allotted, Ford must request an extension from Mr. Thomas Z. Cooper at (202) 366-5218 no later than five business days before the response due date. If Ford is unable to provide all of the information requested by the original deadline, it must submit a partial response by the original deadline with whatever information Ford then has available, even if Ford has received an extension.

If Ford considers any portion of its response to be confidential information, 49 CFR Part 512, "Confidential Business Information," requires that Ford submit two copies of those document(s) containing allegedly confidential information (except only one copy of blueprints) and one copy of the documents from which information claimed to be confidential has been deleted, to the Office of Chief Counsel, National Highway Traffic Safety Administration, Room 5219 (NCC-30), 400 Seventh Street, SW, Washington, D.C. 20590. In addition, Ford must provide supporting information for the request for confidential treatment in accordance with 49 CFR Section 512.4(b) and (e) and include the name, address, and telephone number of a representative to receive a response from the Chief Counsel.

If you have any technical questions concerning this matter, please call Mr. Jeff Quandt of my staff at (202) 366-5207. If you have any questions concerning confidentiality claims, please contact Ms. Heidi Coleman, Assistant Chief Counsel for General Law, at (202) 366-1834.

Sincerely,

Kathleen C. DeMeter, Director
Office of Defects Investigation
Safety Assurance

Enclosure

Vehicle Identification - Make, Model, Model Year, options. Date of Inspection.

Wheel base of vehicle		
Rated fuel capacity		
Location of fuel fill tube (right or left side)		
Location of fill opening CntrLine on sheet metal		
Fore-Aft position of opening to rear axle CntrLine (in 'Y')		
Up_Down position of opening to top of rear wheel opening (above axle CntrLine, in 'Z')		
Description of fuel tank location in vehicle		
Position of rear edge of tank to rear axle CntrLine		
Position of front edge of tank to rear axle CntrLine		
Position of left outboard edge to outboard side of left sill		
Position of right outboard edge to outboard side of right sill		
Position of left outboard edge to inboard side of left rail		
Position of right outboard edge to inboard side of right rail		
Any additional comments ?		
Fill venting and valving		
ORVR, internal/external		
Location on tank and fill tube		
Material, attachment, size, valving		
Fuel tank material type (metal or plastic)		
Unique suspension or other chassis interface ?		
Fuel tank		
Location of fuel filler tube entry (Rear, side, top?)		
Submerged fill (yes or no?)		
Any tank shields ? Note if thermal or impact (skid plate), attached to tank, body or exhaust.		
Any additional comments ?		
Fuel tank straps		
How many straps ?		
Fore/aft or lateral ?		
Any additional comments ?		
Are they fastened to fixed dimension or to torque?		
Fill Pipe		
Housing at body side: Fixed or breakaway ?		
Approximate overall length		
Number of bends		
Pipe Material		
Pipe OD		
Routed above rail, below rail, through rail?		
Connection type to tank		
Pipe attachment to BIW structure (yes or no)		
Comments pertaining to venting hoses		
Unique rollover valves or plumbing ?		
Any shielding? For impact? (yes or no)		
Any additional comments ?		
Fill Pipe Hose		
Hose OD		
Length		
Number of bends		
Corrugated or not		

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Hose reinforced (yes or no)		
Any additional comments ?		
Fill pipe attachment to tank		
Type: Spud ? Note material, how attached to tank, length, diameter, diameter of bead.		
Clamp ? Style of clamp ?		
Bead type on spud		
Any additional comments ?		
Fuel cap		
Type (screw-on, quick-on, etc.)		
Valving		
Cap attachment - metal/plastic?		
Vehicle Attitude - Vertical from top of wheel opening above axle CntrLine (As received, no additional loading)		
Left Front		
Left Rear		
Right Front		
Right Rear		

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CERTIFIED MAIL
RETURN RECEIPT REQUESTED

NSA-122jlq
EA99-013

Frank C. Sonye, Director
Product Investigations
General Motors Corporation
30500 Mound Road
Warren, MI 48090-9055

Dear Mr. Sonye:

This letter is to request peer vehicle information to assist NHTSA in its investigation of crash-induced fuel filler neck failure in 1996 through current production DaimlerChrysler NS-minivan vehicles (EA99-013).

Unless otherwise stated in the text, the following definitions apply to this information request:

- **Subject peer vehicles**: all Chevrolet U- and X-Series minivans (Chevrolet Venture, Pontiac Montana, and Oldsmobile Silhouette).

- **Subject peer fuel filler neck assembly**: the fuel filler neck assembly used in the subject vehicles.

- **Subject peer tank spud**: all tank fill spuds used in subject fuel tank assemblies, whether molded with the tank, hot-plate welded to the tank, or joined by other means.

- **Subject peer hose joint**: the clamped joint between the filler neck hose and the fuel tank spud, including the hose, the clamp, and the tank fill spud, or any or all of the components thereof.

- **GM**: General Motors Corporation, all of its past and present officers and employees, whether assigned to its principal offices or any of its field or other locations, including all of its divisions, subsidiaries (whether or not incorporated) and affiliated enterprises and all of their headquarters, regional, zone and other offices and their employees, and all agents, contractors, consultants, attorneys and law firms and other persons engaged directly or indirectly (e.g., employee of a consultant) by or under the control of GM (including all

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business units and persons previously referred to), who are or, in or after January 1994, were involved in any way with any of the following related to the alleged defect in the subject vehicles:

a. design, engineering, analysis, modification or production (e.g. quality control);
b. testing, assessment or evaluation;
c. consideration, or recognition of potential or actual defects, reporting, record-keeping and information management, (e.g., complaints, field reports, warranty information, part sales), analysis, claims, or lawsuits; or
d. communication to, from or intended for zone representatives, fleets, dealers, or other field locations, including but not limited to people who have the capacity to obtain information from dealers.

- **Alleged defect**: shall refer to crash-induced fuel filler neck separation from the fuel tank.

- **Documents**: "Document(s)" is used in the broadest sense of the word and shall mean all original written, printed, typed, recorded, or graphic matter whatsoever, however produced or reproduced, of every kind, nature, and description, and all nonidentical copies of both sides thereof, including, but not limited to, papers, letters, memoranda, correspondence, communications, electronic mail (e-mail) messages (existing in hard copy and/or in electronic storage), faxes, mailgrams, telegrams, cables, telex messages, notes, annotations, working papers, drafts, minutes, records, audio and video recordings, data, databases, other information bases, summaries, charts, tables, graphics, other visual displays, photographs, statements, interviews, opinions, reports, newspaper articles, studies, analyses, evaluations, interpretations, contracts, agreements, jottings, agendas, bulletins, notices, announcements, instructions, blueprints, drawings, as-builts, changes, manuals, publications, work schedules, journals, statistical data, desk, portable and computer calendars, appointment books, diaries, travel reports, lists, tabulations, computer printouts, data processing program libraries, data processing inputs and outputs, microfilms, microfiches, statements for services, resolutions, financial statements, governmental records, business records, personnel records, work orders, pleadings, discovery in any form, affidavits, motions, responses to discovery, all transcripts, administrative filings and all mechanical, magnetic, photographic and electronic records or recordings of any kind, including any storage media associated with computers, including, but not limited to, information on hard drives, floppy disks, backup tapes, and zip drives, electronic communications, including but not limited to, the Internet and shall include any drafts or revisions pertaining to any of the foregoing, all other things similar to any of the foregoing, however denominated by GM, any other data compilations from which information can be obtained, translated if necessary, into a usable form and any other documents. For purposes of this request, any document which contains any note, comment, addition, deletion, insertion, annotation, or otherwise comprises a nonidentical copy of another document shall be treated as a separate document subject to production. In all cases where original and any non-identical copies are not available, "document(s)" also means any identical copies of the original and all non-identical copies thereof. Any document, record, graph, chart, film or photograph originally produced in color must be provided in color. Furnish all documents whether verified by the manufacturer or not. If a document is not in the English language, provide both the original document and an English translation of the document.

In order for my staff to evaluate the alleged defect, certain information is required. Pursuant to 49 U.S.C. § 30166, please provide numbered responses to the following information requests. Please repeat the applicable request verbatim above each response. After GM's response to each request, identify the source of the information and indicate the last date the source updated the information prior to the preparation of the response. When documents are produced, the documents shall be produced in an identified, organized manner that corresponds with the Information Request letter (including the subparts). When documents are produced and the documents would not, standing alone, be self-explanatory, the production of documents shall be supplemented and accompanied by explanation.

If GM cannot respond to any specific request or subpart thereof, please state the reason why it is unable to do so. If GM claims that any document or other information or material responsive to any of the following items need not be provided to NHTSA because it is privileged or the work product of an attorney, separately by information request number, for each such document or other information or material, state the nature of that information or material and identify any document in which it is found by date, subject or title, name and position of the person from, and the person to whom it was sent, and the name and position of any other recipient. GM must also describe the basis for the claim, and explain why GM believes it applies.

1. Provide copies of all specifications or standards related to the fuel system crash performance of the subject peer vehicles.

2. Provide copies of all specifications or standards related to the design or pull-off performance (i.e., resistance to separation from external forces) of the hose joints used in the subject peer filler neck assemblies.

3. Provide copies of all test reports, data sheets, and/or other documents relating to pull-off testing of subject peer hose joints, or any of the components used therein. For each pull-off test conducted, state both the force, displacement, and hose elongation (%) corresponding to the beginning of hose slippage on the fitting and hose separation from the joint.

4. Provide the following information regarding the design and assembly of the subject peer fuel filler neck assemblies and tank spuds. All design dimensions should include both the nominal value and the allowed tolerances.

   a. filler hose inner diameter, wall thickness, and length;
   b. tank spud fitting outer diameter, wall thickness, and length;

c. tank spud bead diameter, back angle, and ramp angle;
d. clamp description, supplier, and torque range;
e. lubricants allowed for use as assembly aids; and
f. any reinforcement sleeves/ferrules used in the tank spud.

5. Provide GM's assessment of which aspects of the design and manufacture of clamped hose joints are factors in the pull-off resistance of the joint. Rank and weigh the contribution of each factor to the pull-off resistance of the joint and state GM's specified parameters for each factor in the subject peer hose joint (if not already stated in response to Item 4).

6. Provide the following information regarding the design of all fuel tanks and fuel tank spuds used in the subject peer vehicles:

   a. the total tank volume based on an SAE reference fill;
   b. the height of the lowermost portion of the subject peer tank spud opening above/below (state which) the SAE reference fill level; and
   c. if the height stated in 6.b is below the SAE fill level, state the equivalent volume of fuel represented by the stated height difference.

7. In a December 20, 1999, letter DaimlerChrysler provided a document to NHTSA which had been developed for a proposed peer vehicle study that was never conducted. The document (copy enclosed) is a worksheet of various vehicle and fuel system design factors. Complete the enclosed worksheet for the subject peer vehicles.

8. Provide two samples of each variation of filler hose and fuel tank spud used in the subject peer vehicles.

This letter is being sent to GM pursuant to 49 U.S.C. § 30166, which authorizes NHTSA to conduct any investigation that may be necessary to enforce Chapter 301 of Title 49. GM's failure to respond promptly and fully to this letter could subject GM to civil penalties pursuant to 49 U.S.C. § 30165 or lead to an action for injunctive relief pursuant to 49 U.S.C. § 30163. Other remedies and sanctions are available as well.

GM's response to this letter, in duplicate, must be submitted to this office by April 14, 2000. Please include in GM's response the identification codes referenced on page one of this letter. If GM finds that it is unable to provide all of the information requested within the time allotted, GM must request an extension from Mr. Thomas Z. Cooper at (202) 366-5218 no later than five business days before the response due date. If GM is unable to provide all of the information requested by the original deadline, it must submit a partial response by the original deadline with whatever information GM then has available, even if GM has received an extension.

If GM considers any portion of its response to be confidential information, 49 CFR Part 512, "Confidential Business Information," requires that GM submit two copies of those document(s) containing allegedly confidential information (except only one copy of blueprints) and one copy of the documents from which information claimed to be confidential has been deleted, to the Office of Chief Counsel, National Highway Traffic Safety Administration, Room 5219 (NCC-30), 400 Seventh Street, SW, Washington, D.C. 20590. In addition, GM must provide supporting information for the request for confidential treatment in accordance with 49 CFR Section 512.4(b) and (e) and include the name, address, and telephone number of a representative to receive a response from the Chief Counsel.

If you have any technical questions concerning this matter, please call Mr. Jeff Quandt of my staff at (202) 366-5207. If you have any questions concerning confidentiality claims, please contact Ms. Heidi Coleman, Assistant Chief Counsel for General Law, at (202) 366-1834.

Sincerely,

Kathleen C. DeMeter, Director
Office of Defects Investigation
Safety Assurance

Enclosure

Vehicle Identification - Make, Model, Model Year, options. Date of Inspection.

Wheel base of vehicle		
Rated fuel capacity		
Location of fuel fill tube (right or left side)		
Location of fill opening CntrLine on sheet metal		
Fore-Aft position of opening to rear axle CntrLine (in 'Y')		
Up_Down position of opening to top of rear wheel opening (above axle CntrLine, in 'Z')		
Description of fuel tank location in vehicle		
Position of rear edge of tank to rear axle CntrLine		
Position of front edge of tank to rear axle CntrLine		
Position of left outboard edge to outboard side of left sill		
Position of right outboard edge to outboard side of right sill		
Position of left outboard edge to inboard side of left rail		
Position of right outboard edge to inboard side of right rail		
Any additional comments ?		
Fill venting and valving		
ORVR, internal/external		
Location on tank and fill tube		
Material, attachment, size, valving		
Fuel tank material type (metal or plastic)		
Unique suspension or other chassis interface ?		
Fuel tank		
Location of fuel filler tube entry (Rear, side, top?)		
Submerged fill (yes or no?)		
Any tank shields ? Note if thermal or impact (skid plate), attached to tank, body or exhaust.		
Any additional comments ?		
Fuel tank straps		
How many straps ?		
Fore/aft or lateral ?		
Any additional comments ?		
Are they fastened to fixed dimension or to torque?		
Fill Pipe		
Housing at body side: Fixed or breakaway ?		
Approximate overall length		
Number of bends		
Pipe Material		
Pipe OD		
Routed above rail, below rail, through rail?		
Connection type to tank		
Pipe attachment to BIW structure (yes or no)		
Comments pertaining to venting hoses		
Unique rollover valves or plumbing ?		
Any shielding? For impact? (yes or no)		
Any additional comments ?		
Fill Pipe Hose		
Hose OD		
Length		
Number of bends		
Corrugated or not		

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	Hose reinforced (yes or no)		
	Any additional comments ?		
Fill pipe attachment to tank			
	Type: Spud ? Note material, how attached to tank, length, diameter, diameter of bead.		
	Clamp ? Style of clamp ?		
	Bead type on spud		
	Any additional comments ?		
Fuel cap			
	Type (screw-on, quick-on, etc.)		
	Valving		
	Cap attachment - metal/plastic?		
Vehicle Attitude - Vertical from top of wheel opening above axle CntrLine (As received, no additional loading)			
	Left Front		
	Left Rear		
	Right Front		
	Right Rear		

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CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. William R. Willen
American Honda Motor Co., Inc.
1919 Torrance Boulevard
Torrance, CA 90501-2746

NSA-12jlq
EA99-013

Dear Mr. Willen:

This letter is to request peer vehicle information to assist NHTSA in its investigation of crash-induced fuel filler neck failure in 1996 through current production DaimlerChrysler NS-minivan vehicles (EA99-013).

Unless otherwise stated in the text, the following definitions apply to this information request:

- **Subject peer vehicles**: all Honda Odyssey minivans.

- **Subject peer fuel filler neck assembly**: the fuel filler neck assembly used in the subject vehicles.

- **Subject peer tank spud**: all tank fill spuds used in subject fuel tank assemblies, whether molded with the tank, hot-plate welded to the tank, or joined by other means.

- **Subject peer hose joint**: the clamped joint between the filler neck hose and the fuel tank spud, including the hose, the clamp, and the tank fill spud, or any or all of the components thereof.

- **Honda**: Honda Motor Corporation, all of its past and present officers and employees, whether assigned to its principal offices or any of its field or other locations, including all of its divisions, subsidiaries (whether or not incorporated) and affiliated enterprises and all of their headquarters, regional, zone and other offices and their employees, and all agents, contractors, consultants, attorneys and law firms and other persons engaged directly or indirectly (e.g., employee of a consultant) by or under the control of Honda (including all business units and persons previously referred to), who are or, in or after January 1994,

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were involved in any way with any of the following related to the alleged defect in the subject vehicles:

a. design, engineering, analysis, modification or production (e.g. quality control);
b. testing, assessment or evaluation;
c. consideration, or recognition of potential or actual defects, reporting, record-keeping and information management, (e.g., complaints, field reports, warranty information, part sales), analysis, claims, or lawsuits; or
d. communication to, from or intended for zone representatives, fleets, dealers, or other field locations, including but not limited to people who have the capacity to obtain information from dealers.

- **Alleged defect**: shall refer to crash-induced fuel filler neck separation from the fuel tank.

- **Documents**: "Document(s)" is used in the broadest sense of the word and shall mean all original written, printed, typed, recorded, or graphic matter whatsoever, however produced or reproduced, of every kind, nature, and description, and all nonidentical copies of both sides thereof, including, but not limited to, papers, letters, memoranda, correspondence, communications, electronic mail (e-mail) messages (existing in hard copy and/or in electronic storage), faxes, mailgrams, telegrams, cables, telex messages, notes, annotations, working papers, drafts, minutes, records, audio and video recordings, data, databases, other information bases, summaries, charts, tables, graphics, other visual displays, photographs, statements, interviews, opinions, reports, newspaper articles, studies, analyses, evaluations, interpretations, contracts, agreements, jottings, agendas, bulletins, notices, announcements, instructions, blueprints, drawings, as-builts, changes, manuals, publications, work schedules, journals, statistical data, desk, portable and computer calendars, appointment books, diaries, travel reports, lists, tabulations, computer printouts, data processing program libraries, data processing inputs and outputs, microfilms, microfiches, statements for services, resolutions, financial statements, governmental records, business records, personnel records, work orders, pleadings, discovery in any form, affidavits, motions, responses to discovery, all transcripts, administrative filings and all mechanical, magnetic, photographic and electronic records or recordings of any kind, including any storage media associated with computers, including, but not limited to, information on hard drives, floppy disks, backup tapes, and zip drives, electronic communications, including but not limited to, the Internet and shall include any drafts or revisions pertaining to any of the foregoing, all other things similar to any of the foregoing, however denominated by Honda, any other data compilations from which information can be obtained, translated if necessary, into a usable form and any other documents. For purposes of this request, any document which contains any note, comment, addition, deletion, insertion, annotation, or otherwise comprises a nonidentical copy of another document shall be treated as a separate document subject to production. In all cases where original and any non-identical copies are not available, "document(s)" also means any identical copies of the original and all non-identical copies thereof. Any

document, record, graph, chart, film or photograph originally produced in color must be provided in color. Furnish all documents whether verified by the manufacturer or not. If a document is not in the English language, provide both the original document and an English translation of the document.

In order for my staff to evaluate the alleged defect, certain information is required. Pursuant to 49 U.S.C. § 30166, please provide numbered responses to the following information requests. Please repeat the applicable request verbatim above each response. After Honda's response to each request, identify the source of the information and indicate the last date the source updated the information prior to the preparation of the response. When documents are produced, the documents shall be produced in an identified, organized manner that corresponds with the Information Request letter (including the subparts). When documents are produced and the documents would not, standing alone, be self-explanatory, the production of documents shall be supplemented and accompanied by explanation.

If Honda cannot respond to any specific request or subpart thereof, please state the reason why it is unable to do so. If Honda claims that any document or other information or material responsive to any of the following items need not be provided to NHTSA because it is privileged or the work product of an attorney, separately by information request number, for each such document or other information or material, state the nature of that information or material and identify any document in which it is found by date, subject or title, name and position of the person from, and the person to whom it was sent, and the name and position of any other recipient. Honda must also describe the basis for the claim, and explain why Honda believes it applies.

1. Provide copies of all specifications or standards related to the fuel system crash performance of the subject peer vehicles.

2. Provide copies of all specifications or standards related to the design or pull-off performance (i.e., resistance to separation from external forces) of the hose joints used in the subject peer filler neck assemblies.

3. Provide copies of all test reports, data sheets, and/or other documents relating to pull-off testing of subject peer hose joints, or any of the components used therein. For each pull-off test conducted, state both the force, displacement, and hose elongation (%) corresponding to the beginning of hose slippage on the fitting and hose separation from the joint.

4. Provide the following information regarding the design and assembly of the subject peer fuel filler neck assemblies and tank spuds. All design dimensions should include both the nominal value and the allowed tolerances.

   a. filler hose inner diameter, wall thickness, and length;
   b. tank spud fitting outer diameter, wall thickness, and length;
   c. tank spud bead diameter, back angle, and ramp angle;

d. clamp description, supplier, and torque range;
e. lubricants allowed for use as assembly aids; and
f. any reinforcement sleeves/ferrules used in the tank spud.

5. Provide Honda's assessment of which aspects of the design and manufacture of clamped hose joints are factors in the pull-off resistance of the joint. Rank and weigh the contribution of each factor to the pull-off resistance of the joint and state Honda's specified parameters for each factor in the subject peer hose joint (if not already stated in response to Item 4).

6. Provide the following information regarding the design of all fuel tanks and fuel tank spuds used in the subject peer vehicles:

   a. the total tank volume based on an SAE reference fill;
   b. the height of the lowermost portion of the subject peer tank spud opening above/below (state which) the SAE reference fill level; and
   c. if the height stated in 6.b is below the SAE fill level, state the equivalent volume of fuel represented by the stated height difference.

7. In a December 20, 1999 letter DaimlerChrysler provided a document to NHTSA which had been developed for a proposed peer vehicle study that was never conducted. The document (copy enclosed) is a worksheet of various vehicle and fuel system design factors. Complete the enclosed worksheet for the subject peer vehicles.

8. Provide two samples of each variation of filler hose and fuel tank spud used in the subject peer vehicles.

This letter is being sent to Honda pursuant to 49 U.S.C. § 30166, which authorizes NHTSA to conduct any investigation that may be necessary to enforce Chapter 301 of Title 49. Honda's failure to respond promptly and fully to this letter could subject Honda to civil penalties pursuant to 49 U.S.C. § 30165 or lead to an action for injunctive relief pursuant to 49 U.S.C. § 30163. Other remedies and sanctions are available as well.

Honda's response to this letter, in duplicate, must be submitted to this office by April 14, 2000. Please include in Honda's response the identification codes referenced on page one of this letter. If Honda finds that it is unable to provide all of the information requested within the time allotted, Honda must request an extension from Mr. Thomas Z. Cooper at (202) 366-5218 no later than five business days before the response due date. If Honda is unable to provide all of the information requested by the original deadline, it must submit a partial response by the original deadline with whatever information Honda then has available, even if Honda has received an extension.

If Honda considers any portion of its response to be confidential information, 49 CFR Part 512, "Confidential Business Information," requires that Honda submit two copies of those document(s) containing allegedly confidential information (except only one copy of blueprints) and one copy of the documents from which information claimed to be confidential has been deleted, to the Office of Chief Counsel, National Highway Traffic Safety Administration, Room 5219 (NCC-30), 400 Seventh Street, SW, Washington, D.C. 20590. In addition, Honda must provide supporting information for the request for confidential treatment in accordance with 49 CFR Section 512.4(b) and (e) and include the name, address, and telephone number of a representative to receive a response from the Chief Counsel.

If you have any technical questions concerning this matter, please call Mr. Jeff Quandt of my staff at (202) 366-5207. If you have any questions concerning confidentiality claims, please contact Ms. Heidi Coleman, Assistant Chief Counsel for General Law, at (202) 366-1834.

Sincerely,

/S/
Kathleen C. DeMeter, Director
Office of Defects Investigation
Safety Assurance

Enclosure

Vehicle Identification - Make, Model, Model Year, options. Date of Inspection.

Wheel base of vehicle		
Rated fuel capacity		
Location of fuel fill tube (right or left side)		
Location of fill opening CntrLine on sheet metal		
Fore-Aft position of opening to rear axle CntrLine (in 'Y')		
Up_Down position of opening to top of rear wheel opening (above axle CntrLine, in 'Z')		
Description of fuel tank location in vehicle		
Position of rear edge of tank to rear axle CntrLine		
Position of front edge of tank to rear axle CntrLine		
Position of left outboard edge to outboard side of left sill		
Position of right outboard edge to outboard side of right sill		
Position of left outboard edge to inboard side of left rail		
Position of right outboard edge to inboard side of right rail		
Any additional comments ?		
Fill venting and valving		
ORVR, internal/external		
Location on tank and fill tube		
Material, attachment, size, valving		
Fuel tank material type (metal or plastic)		
Unique suspension or other chassis interface ?		
Fuel tank		
Location of fuel filler tube entry (Rear, side, top?)		
Submerged fill (yes or no?)		
Any tank shields ? Note if thermal or impact (skid plate), attached to tank, body or exhaust.		
Any additional comments ?		
Fuel tank straps		
How many straps ?		
Fore/aft or lateral ?		
Any additional comments ?		
Are they fastened to fixed dimension or to torque?		
Fill Pipe		
Housing at body side: Fixed or breakaway ?		
Approximate overall length		
Number of bends		
Pipe Material		
Pipe OD		
Routed above rail, below rail, through rail?		
Connection type to tank		
Pipe attachment to BIW structure (yes or no)		
Comments pertaining to venting hoses		
Unique rollover valves or plumbing ?		
Any shielding? For impact? (yes or no)		
Any additional comments ?		
Fill Pipe Hose		
Hose OD		
Length		
Number of bends		
Corrugated or not		

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Hose reinforced (yes or no)		
Any additional comments ?		
Fill pipe attachment to tank		
Type: Spud ? Note material, how attached to tank, length, diameter, diameter of bead.		
Clamp ? Style of clamp ?		
Bead type on spud		
Any additional comments ?		
Fuel cap		
Type (screw-on, quick-on, etc.)		
Valving		
Cap attachment - metal/plastic?		
Vehicle Attitude - Vertical from top of wheel opening above axle CntrLine (As received, no additional loading)		
Left Front		
Left Rear		
Right Front		
Right Rear		

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CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Frank D. Slaveter
National Technical Compliance Manager
Nissan Motor Corporation in U.S.A.
P.O. Box 191
Gardena, CA 90248-4505

NSA-12jlq
EA99-013

Dear Mr. Slaveter:

This letter is to request peer vehicle information to assist NHTSA in its investigation of crash-induced fuel filler neck failure in 1996 through current production DaimlerChrysler NS-minivan vehicles (EA99-013).

Unless otherwise stated in the text, the following definitions apply to this information request:

- **Subject peer vehicles**: all Nissan Quest minivans.

- **Subject peer fuel filler neck assembly**: the fuel filler neck assembly used in the subject vehicles.

- **Subject peer tank spud**: all tank fill spuds used in subject fuel tank assemblies, whether molded with the tank, hot-plate welded to the tank, or joined by other means.

- **Subject peer hose joint**: the clamped joint between the filler neck hose and the fuel tank spud, including the hose, the clamp, and the tank fill spud, or any or all of the components thereof.

- **Nissan**: Nissan Motor Corporation, all of its past and present officers and employees, whether assigned to its principal offices or any of its field or other locations, including all of its divisions, subsidiaries (whether or not incorporated) and affiliated enterprises and all of their headquarters, regional, zone and other offices and their employees, and all agents, contractors, consultants, attorneys and law firms and other persons engaged directly or indirectly (e.g., employee of a consultant) by or under the control of Nissan (including all business units and persons previously referred to), who are or, in or after January 1994,

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were involved in any way with any of the following related to the alleged defect in the subject vehicles:

a. design, engineering, analysis, modification or production (e.g. quality control);
b. testing, assessment or evaluation;
c. consideration, or recognition of potential or actual defects, reporting, record-keeping and information management, (e.g., complaints, field reports, warranty information, part sales), analysis, claims, or lawsuits; or
d. communication to, from or intended for zone representatives, fleets, dealers, or other field locations, including but not limited to people who have the capacity to obtain information from dealers.

- **Alleged defect**: shall refer to crash-induced fuel filler neck separation from the fuel tank.

- **Documents**: "Document(s)" is used in the broadest sense of the word and shall mean all original written, printed, typed, recorded, or graphic matter whatsoever, however produced or reproduced, of every kind, nature, and description, and all nonidentical copies of both sides thereof, including, but not limited to, papers, letters, memoranda, correspondence, communications, electronic mail (e-mail) messages (existing in hard copy and/or in electronic storage), faxes, mailgrams, telegrams, cables, telex messages, notes, annotations, working papers, drafts, minutes, records, audio and video recordings, data, databases, other information bases, summaries, charts, tables, graphics, other visual displays, photographs, statements, interviews, opinions, reports, newspaper articles, studies, analyses, evaluations, interpretations, contracts, agreements, jottings, agendas, bulletins, notices, announcements, instructions, blueprints, drawings, as-builts, changes, manuals, publications, work schedules, journals, statistical data, desk, portable and computer calendars, appointment books, diaries, travel reports, lists, tabulations, computer printouts, data processing program libraries, data processing inputs and outputs, microfilms, microfiches, statements for services, resolutions, financial statements, governmental records, business records, personnel records, work orders, pleadings, discovery in any form, affidavits, motions, responses to discovery, all transcripts, administrative filings and all mechanical, magnetic, photographic and electronic records or recordings of any kind, including any storage media associated with computers, including, but not limited to, information on hard drives, floppy disks, backup tapes, and zip drives, electronic communications, including but not limited to, the Internet and shall include any drafts or revisions pertaining to any of the foregoing, all other things similar to any of the foregoing, however denominated by Nissan, any other data compilations from which information can be obtained, translated if necessary, into a usable form and any other documents. For purposes of this request, any document which contains any note, comment, addition, deletion, insertion, annotation, or otherwise comprises a nonidentical copy of another document shall be treated as a separate document subject to production. In all cases where original and any non-identical copies are not available, "document(s)" also means any identical copies of the original and all non-identical copies thereof. Any

document, record, graph, chart, film or photograph originally produced in color must be provided in color. Furnish all documents whether verified by the manufacturer or not. If a document is not in the English language, provide both the original document and an English translation of the document.

In order for my staff to evaluate the alleged defect, certain information is required. Pursuant to 49 U.S.C. § 30166, please provide numbered responses to the following information requests. Please repeat the applicable request verbatim above each response. After Nissan's response to each request, identify the source of the information and indicate the last date the source updated the information prior to the preparation of the response. When documents are produced, the documents shall be produced in an identified, organized manner that corresponds with the Information Request letter (including the subparts). When documents are produced and the documents would not, standing alone, be self-explanatory, the production of documents shall be supplemented and accompanied by explanation.

If Nissan cannot respond to any specific request or subpart thereof, please state the reason why it is unable to do so. If Nissan claims that any document or other information or material responsive to any of the following items need not be provided to NHTSA because it is privileged or the work product of an attorney, separately by information request number, for each such document or other information or material, state the nature of that information or material and identify any document in which it is found by date, subject or title, name and position of the person from, and the person to whom it was sent, and the name and position of any other recipient. Nissan must also describe the basis for the claim, and explain why Nissan believes it applies.

1. Provide copies of all specifications or standards related to the fuel system crash performance of the subject peer vehicles.

2. Provide copies of all specifications or standards related to the design or pull-off performance (i.e., resistance to separation from external forces) of the hose joints used in the subject peer filler neck assemblies.

3. Provide copies of all test reports, data sheets, and/or other documents relating to pull-off testing of subject peer hose joints, or any of the components used therein. For each pull-off test conducted, state both the force, displacement, and hose elongation (%) corresponding to the beginning of hose slippage on the fitting and hose separation from the joint.

4. Provide the following information regarding the design and assembly of the subject peer fuel filler neck assemblies and tank spuds. All design dimensions should include both the nominal value and the allowed tolerances.

   a. filler hose inner diameter, wall thickness, and length;
   b. tank spud fitting outer diameter, wall thickness, and length;
   c. tank spud bead diameter, back angle, and ramp angle;

d. clamp description, supplier, and torque range;
e. lubricants allowed for use as assembly aids; and
f. any reinforcement sleeves/ferrules used in the tank spud.

5. Provide Nissan's assessment of which aspects of the design and manufacture of clamped hose joints are factors in the pull-off resistance of the joint. Rank and weigh the contribution of each factor to the pull-off resistance of the joint and state Nissan's specified parameters for each factor in the subject peer hose joint (if not already stated in response to Item 4).

6. Provide the following information regarding the design of all fuel tanks and fuel tank spuds used in the subject peer vehicles:

   a. the total tank volume based on an SAE reference fill;
   b. the height of the lowermost portion of the subject peer tank spud opening above/below (state which) the SAE reference fill level; and
   c. if the height stated in 6.b is below the SAE fill level, state the equivalent volume of fuel represented by the stated height difference.

7. In a December 20, 1999, letter DaimlerChrysler provided a document to NHTSA which had been developed for a proposed peer vehicle study that was never conducted. The document (copy enclosed) is a worksheet of various vehicle and fuel system design factors. Complete the enclosed worksheet for the subject peer vehicles.

8. Provide two samples of each variation of filler hose and fuel tank spud used in the subject peer vehicles.

This letter is being sent to Nissan pursuant to 49 U.S.C. § 30166, which authorizes NHTSA to conduct any investigation that may be necessary to enforce Chapter 301 of Title 49. Nissan's failure to respond promptly and fully to this letter could subject Nissan to civil penalties pursuant to 49 U.S.C. § 30165 or lead to an action for injunctive relief pursuant to 49 U.S.C. § 30163. Other remedies and sanctions are available as well.

Nissan's response to this letter, in duplicate, must be submitted to this office by April 14, 2000. Please include in Nissan's response the identification codes referenced on page one of this letter. If Nissan finds that it is unable to provide all of the information requested within the time allotted, Nissan must request an extension from Mr. Thomas Z. Cooper at (202) 366-5218 no later than five business days before the response due date. If Nissan is unable to provide all of the information requested by the original deadline, it must submit a partial response by the original deadline with whatever information Nissan then has available, even if Nissan has received an extension.

If Nissan considers any portion of its response to be confidential information, 49 CFR Part 512, "Confidential Business Information," requires that Nissan submit two copies of those document(s) containing allegedly confidential information (except only one copy of blueprints) and one copy of the documents from which information claimed to be confidential has been deleted, to the Office of Chief Counsel, National Highway Traffic Safety Administration, Room 5219 (NCC-30), 400 Seventh Street, SW, Washington, D.C. 20590. In addition, Nissan must provide supporting information for the request for confidential treatment in accordance with 49 CFR Section 512.4(b) and (e) and include the name, address, and telephone number of a representative to receive a response from the Chief Counsel.

If you have any technical questions concerning this matter, please call Mr. Jeff Quandt of my staff at (202) 366-5207. If you have any questions concerning confidentiality claims, please contact Ms. Heidi Coleman, Assistant Chief Counsel for General Law, at (202) 366-1834.

Sincerely,

Kathleen C. DeMeter, Director
Office of Defects Investigation
Safety Assurance

Enclosure

Vehicle Identification - Make, Model, Model Year, options. Date of Inspection.

Wheel base of vehicle		
Rated fuel capacity		
Location of fuel fill tube (right or left side)		
Location of fill opening CntrLine on sheet metal		
Fore-Aft position of opening to rear axle CntrLine (in 'Y')		
Up_Down position of opening to top of rear wheel opening (above axle CntrLine, in 'Z')		
Description of fuel tank location in vehicle		
Position of rear edge of tank to rear axle CntrLine		
Position of front edge of tank to rear axle CntrLine		
Position of left outboard edge to outboard side of left sill		
Position of right outboard edge to outboard side of right sill		
Position of left outboard edge to inboard side of left rail		
Position of right outboard edge to inboard side of right rail		
Any additional comments ?		
Fill venting and valving		
ORVR, internal/external		
Location on tank and fill tube		
Material, attachment, size, valving		
Fuel tank material type (metal or plastic)		
Unique suspension or other chassis interface ?		
Fuel tank		
Location of fuel filler tube entry (Rear, side, top?)		
Submerged fill (yes or no?)		
Any tank shields ? Note if thermal or impact (skid plate), attached to tank, body or exhaust.		
Any additional comments ?		
Fuel tank straps		
How many straps ?		
Fore/aft or lateral ?		
Any additional comments ?		
Are they fastened to fixed dimension or to torque?		
Fill Pipe		
Housing at body side: Fixed or breakaway ?		
Approximate overall length		
Number of bends		
Pipe Material		
Pipe OD		
Routed above rail, below rail, through rail?		
Connection type to tank		
Pipe attachment to BIW structure (yes or no)		
Comments pertaining to venting hoses		
Unique rollover valves or plumbing ?		
Any shielding? For impact? (yes or no)		
Any additional comments ?		
Fill Pipe Hose		
Hose OD		
Length		
Number of bends		
Corrugated or not		

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Hose reinforced (yes or no)		
Any additional comments ?		
Fill pipe attachment to tank		
Type: Spud ? Note material, how attached to tank, length, diameter, diameter of bead.		
Clamp ? Style of clamp ?		
Bead type on spud		
Any additional comments ?		
Fuel cap		
Type (screw-on, quick-on, etc.)		
Valving		
Cap attachment - metal/plastic?		
Vehicle Attitude - Vertical from top of wheel opening above axle CntrLine (As received, no additional loading)		
Left Front		
Left Rear		
Right Front		
Right Rear		

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X-4/6

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Yaichi Oishi, General Manager
Toyota Technical Center, U.S.A.
1850 M Street, NW, Suite 600
Washington, DC 20036

NSA-12jfa
EA99-013

Dear Mr. Oishi:

This letter is to request peer vehicle information to assist NHTSA in its investigation of crash-induced fuel filler neck failure in 1996 through current production DaimlerChrysler NS-minivan vehicles (EA99-013).

Unless otherwise stated in the text, the following definitions apply to this information request:

- **Subject peer vehicles**: all Toyota Sienna minivans.

- **Subject peer fuel filler neck assembly**: the fuel filler neck assembly used in the subject vehicles.

- **Subject peer tank spud**: all tank fill spuds used in subject fuel tank assemblies, whether molded with the tank, hot-plate welded to the tank, or joined by other means.

- **Subject peer hose joint**: the clamped joint between the filler neck hose and the fuel tank spud, including the hose, the clamp, and the tank fill spud, or any or all of the components thereof.

- **Toyota**: Toyota Motor Corporation, all of its past and present officers and employees, whether assigned to its principal offices or any of its field or other locations, including all of its divisions, subsidiaries (whether or not incorporated) and affiliated enterprises and all of their headquarters, regional, zone and other offices and their employees, and all agents, contractors, consultants, attorneys and law firms and other persons engaged directly or indirectly (e.g., employee of a consultant) by or under the control of Toyota (including all business units and persons previously referred to), who are or, in or after January 1994,

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were involved in any way with any of the following related to the alleged defect in the subject vehicles:

a. design, engineering, analysis, modification or production (e.g. quality control);
b. testing, assessment or evaluation;
c. consideration, or recognition of potential or actual defects, reporting, record-keeping and information management, (e.g., complaints, field reports, warranty information, part sales), analysis, claims, or lawsuits; or
d. communication to, from or intended for zone representatives, fleets, dealers, or other field locations, including but not limited to people who have the capacity to obtain information from dealers.

- **Alleged defect**: shall refer to crash-induced fuel filler neck separation from the fuel tank.

- **Documents**: "Document(s)" is used in the broadest sense of the word and shall mean all original written, printed, typed, recorded, or graphic matter whatsoever, however produced or reproduced, of every kind, nature, and description, and all nonidentical copies of both sides thereof, including, but not limited to, papers, letters, memoranda, correspondence, communications, electronic mail (e-mail) messages (existing in hard copy and/or in electronic storage), faxes, mailgrams, telegrams, cables, telex messages, notes, annotations, working papers, drafts, minutes, records, audio and video recordings, data, databases, other information bases, summaries, charts, tables, graphics, other visual displays, photographs, statements, interviews, opinions, reports, newspaper articles, studies, analyses, evaluations, interpretations, contracts, agreements, jottings, agendas, bulletins, notices, announcements, instructions, blueprints, drawings, as-builts, changes, manuals, publications, work schedules, journals, statistical data, desk, portable and computer calendars, appointment books, diaries, travel reports, lists, tabulations, computer printouts, data processing program libraries, data processing inputs and outputs, microfilms, microfiches, statements for services, resolutions, financial statements, governmental records, business records, personnel records, work orders, pleadings, discovery in any form, affidavits, motions, responses to discovery, all transcripts, administrative filings and all mechanical, magnetic, photographic and electronic records or recordings of any kind, including any storage media associated with computers, including, but not limited to, information on hard drives, floppy disks, backup tapes, and zip drives, electronic communications, including but not limited to, the Internet and shall include any drafts or revisions pertaining to any of the foregoing, all other things similar to any of the foregoing, however denominated by Toyota, any other data compilations from which information can be obtained, translated if necessary, into a usable form and any other documents. For purposes of this request, any document which contains any note, comment, addition, deletion, insertion, annotation, or otherwise comprises a nonidentical copy of another document shall be treated as a separate document subject to production. In all cases where original and any non-identical copies are not available, "document(s)" also means any identical copies of the original and all non-identical copies thereof. Any

5.3 Pressure—System operating pressures define the type of clamping system the joint requires. Low pressure systems will allow the most flexibility in the design of the joint and will be easier to seal. As the pressure increases the hose design requirements may also change. Higher pressure applications will require different reinforcements and constructions. Pressure is also important with respect to the friction between the hose and the fitting and the hose and the clamp.

5.3.1 MAXIMUM JOINT PRESSURE (PSI)

a. 1 > 80 PSI
b. 2 51 to 80 PSI
c. 3 31 to 50 PSI
d. 4 16 to 30 PSI
e. 5 0 to 15 PSI

5.4 Surface Finish—The surface finish of the fitting is important in the sealing process. Although rough finishes can contribute to a joint leak under some conditions, a certain degree of "grabbiness" by the fitting is required to prevent blow-off. Finishes that are too smooth will be harder to push on the fitting. Similarly if a boundary layer of fluid is allowed between the hose and a "too smooth" fitting, a blow-off condition is likely to occur. The more consistent the sealing surface, the better the chance the joint has to seal.

5.4.1 SURFACE FINISH OF FITTING (RA)

a. 1 Sand Cast (50 - 25)
b. 2 Sand Cast (24 - 6.3)
c. 3 Die Cast (6.2 - 2.1)
d. 4 Molded Plastic (2.0 - 0.8)
e. 5 Machined, Tubing,(0.8 - 0.2)

5.5 Roundness—Parting lines are direct leak paths. Larger parting lines have a higher probability of causing a joint leak than joints with smaller, faintly visible parting lines. Depressions or crevices below the contact surface will also cause leaks. Mismatch of dies or molds may create a leak path at low temperatures.

5.5.1 ROUNDNESS OF FITTING SEALING SURFACE

a. 1 > 0.50 mm Major Surface Imperfection
b. 2 0.28 to 0.50 mm Machined Imperfections
c. 3 0.178 to 0.254 mm No visual as produced imperfections
d. 4 0.076 to 0.152 mm Radial Removal of Discontinuities
e. 5 < 0.076 mm Turned Surfaces

5.6 Sealing Length—Longer sealing lengths provide a more robust design and assembly process. If the sealing length is not long enough, there is a greater potential that the clamp will be mis-aligned. In production settings, where accurate placement of the clamp cannot be guaranteed (assuming loose assembly), there is a greater possibility that the clamp will be placed either on the bead of the fitting or the hose stop. If the clamp is "tilted" a leak may develop.

5.6.1 SEALING LENGTH OF FITTING—See Figure 3.

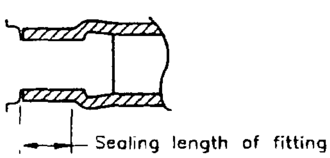

FIGURE 3—SEALABILITY—SEALING LENGTH

5.7 Temperature—Systems with a constant ambient or higher temperature will seal better than joints that have a constant cold temperature or fluctuating cold/hot temperatures. Greater rates of temperature changes may promote system leaks.

5.7.1 TEMPERATURE

a. 1 Constant Cold
b. 2 Fluctuating Cold Environment
c. 3 Fluctuating Cold/Hot Environment
d. 4 Constant Ambient Temperature
e. 5 Constant Hot Temperature

5.8 Adhesion—Any adhesion of the hose to the fitting aids in the sealing process and reduces the responsibility of the clamp. Joints that do not adhere over time rely more heavily on the clamp, hose interference, etc., to seal the joint. Not all EPDM hose bonds to copper brass.

5.8.1 ADHESION OF HOSE TO FITTING

a. 1 Paint/other that forms a lube
b. 2 Non-Dissipating Lubricant
c. 3 Clean/Smooth surface
d. 4 Paint that forms a bond
e. 5 Copper-Brass fitting to EPDM Hose

5.9 Bead Geometry and Diameter

a. 1 < 360 Degree Bead
b. 2 360 bead, 0 < 3% Interference
c. 3 360 bead, 3 to 5% Interference
d. 4 360 bead, 5 to 10% Interference
e. 5 360 bead, > 15% Interference

6. Hose Assembly

6.1 Bead Diameter—As the bead height increases the push-on force over the bead also increases. Although the larger bead aids in blow-off forces, it makes the joint more difficult to assemble.

6.1.1 BEAD DIAMETER OF FITTING—See Figure 4.

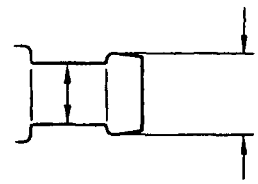

FIGURE 4—HOSE ASSEMBLY—BEAD DIAMETER

6.2 Interference to Fitting—Greater interference between the hose and the sealing surface of the fitting provides a better seal; however, the push-on forces (and efforts) increase also. In general, the greater the interference the greater the push-on forces.

6.2.1 INTERFERENCE TO FITTING—See Figure 5.

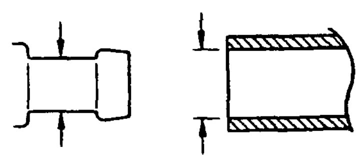

FIGURE 5—HOSE ASSEMBLY—INTERFERENCE TO FITTING

6.3 Hose Durometer—Higher durometer hose is less compliant than lower durometer hose and will have higher push-on forces. . Lower durometer materials will allow the translation of the pressure of the clamp directly to the sealing surface. Lower durometer hose will allow the joint to be designed with more interference. Note that hose column strength may be reduced by using lower durometer rubbers and consequently lead to more difficult installation.

6.3.1 HOSE TUBE DUROMETER (SHORE A)

a. 1 71 to 80
b. 2 61 to 70
c. 3 51 to 60
d. 4 40 to 50
e. 5 < 40*

6.4 Wall Thickness—The wall thickness variation of a hose can affect the distribution of pressure as applied by the clamp and the push-on force required to assemble the joint. Smaller wall thicknesses will allow easier installation and better transmission of load to the sealing surface.

6.4.1 WALL THICKNESS (FOR 15 TO 46 MM ID HOSES)

a. 1 6.0 mm
b. 2 5.3 mm
c. 3 4.8 mm
d. 4 4.3 mm
e. 5 3.8 mm

6.5 Angle of Installation—The angle of installation of the hose to the fitting will affect the push-on effort of the operator. The straighter the angle of installation the easier the joint is to assemble.

6.5.1 ANGLE OF INSTALLATION—See Figure 6.

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document, record, graph, chart, film or photograph originally produced in color must be provided in color. Furnish all documents whether verified by the manufacturer or not. If a document is not in the English language, provide both the original document and an English translation of the document.

In order for my staff to evaluate the alleged defect, certain information is required. Pursuant to 49 U.S.C. § 30166, please provide numbered responses to the following information requests. Please repeat the applicable request verbatim above each response. After Toyota's response to each request, identify the source of the information and indicate the last date the source updated the information prior to the preparation of the response. When documents are produced, the documents shall be produced in an identified, organized manner that corresponds with the Information Request letter (including the subparts). When documents are produced and the documents would not, standing alone, be self-explanatory, the production of documents shall be supplemented and accompanied by explanation.

If Toyota cannot respond to any specific request or subpart thereof, please state the reason why it is unable to do so. If Toyota claims that any document or other information or material responsive to any of the following items need not be provided to NHTSA because it is privileged or the work product of an attorney, separately by information request number, for each such document or other information or material, state the nature of that information or material and identify any document in which it is found by date, subject or title, name and position of the person from, and the person to whom it was sent, and the name and position of any other recipient. Toyota must also describe the basis for the claim, and explain why Toyota believes it applies.

1. Provide copies of all specifications or standards related to the fuel system crash performance of the subject peer vehicles.

2. Provide copies of all specifications or standards related to the design or pull-off performance (i.e., resistance to separation from external forces) of the hose joints used in the subject peer filler neck assemblies.

3. Provide copies of all test reports, data sheets, and/or other documents relating to pull-off testing of subject peer hose joints, or any of the components used therein. For each pull-off test conducted, state both the force, displacement, and hose elongation (%) corresponding to the beginning of hose slippage on the fitting and hose separation from the joint.

4. Provide the following information regarding the design and assembly of the subject peer fuel filler neck assemblies and tank spuds. All design dimensions should include both the nominal value and the allowed tolerances.

   a. filler hose inner diameter, wall thickness, and length;
   b. tank spud fitting outer diameter, wall thickness, and length;

c. tank spud bead diameter, back angle, and ramp angle;
d. clamp description, supplier, and torque range;
e. lubricants allowed for use as assembly aids; and
f. any reinforcement sleeves/ferrules used in the tank spud.

5. Provide Toyota's assessment of which aspects of the design and manufacture of clamped hose joints are factors in the pull-off resistance of the joint. Rank and weigh the contribution of each factor to the pull-off resistance of the joint and state Toyota's specified parameters for each factor in the subject peer hose joint (if not already stated in response to Item 4).

6. Provide the following information regarding the design of all fuel tanks and fuel tank spuds used in the subject peer vehicles:

   a. the total tank volume based on an SAE reference fill;
   b. the height of the lowermost portion of the subject peer tank spud opening above/below (state which) the SAE reference fill level; and
   c. if the height stated in 6.b is below the SAE fill level, state the equivalent volume of fuel represented by the stated height difference.

7. In a December 20, 1999 letter DaimlerChrysler provided a document to NHTSA which had been developed for a proposed peer vehicle study that was never conducted. The document (copy enclosed) is a worksheet of various vehicle and fuel system design factors. Complete the enclosed worksheet for the subject peer vehicles.

8. Provide two samples of each variation of filler hose and fuel tank spud used in the subject peer vehicles.

This letter is being sent to Toyota pursuant to 49 U.S.C. § 30166, which authorizes NHTSA to conduct any investigation that may be necessary to enforce Chapter 301 of Title 49. Toyota's failure to respond promptly and fully to this letter could subject Toyota to civil penalties pursuant to 49 U.S.C. § 30165 or lead to an action for injunctive relief pursuant to 49 U.S.C. § 30163. Other remedies and sanctions are available as well.

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must submit a partial response by the original deadline with whatever information DaimlerChrysler then has available, even if DaimlerChrysler has received an extension.

If DaimlerChrysler considers any portion of its response to be confidential information, 49 CFR Part 512, "Confidential Business Information," requires that DaimlerChrysler submit two copies of those document(s) containing allegedly confidential information (except only one copy of blueprints) and one copy of the documents from which information claimed to be confidential has been deleted, to the Office of Chief Counsel, National Highway Traffic Safety Administration, Room 5219 (NCC-30), 400 Seventh Street, SW, Washington, D.C. 20590. In addition, DaimlerChrysler must provide supporting information for the request for confidential treatment in accordance with 49 CFR Section 512.4(b) and (e) and include the name, address, and telephone number of a representative to receive a response from the Chief Counsel.

If you have any technical questions concerning this matter, please call Mr. Jeff Quandt of my staff at (202) 366-5207. If you have any questions concerning confidentiality claims, please contact Ms. Heidi Coleman, Assistant Chief Counsel for General Law, at (202) 366-1834.

Sincerely,

/S/ DP for

Kathleen C. DeMeter, Director
Office of Defects Investigation
Safety Assurance

Enclosures

must submit a partial response by the original deadline with whatever information DaimlerChrysler then has available, even if DaimlerChrysler has received an extension.

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Sincerely,

(S) DP for

Kathleen C. DeMeter, Director
Office of Defects Investigation
Safety Assurance

Enclosures

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If Toyota considers any portion of its response to be confidential information, 49 CFR Part 512, "Confidential Business Information," requires that Toyota submit two copies of those document(s) containing allegedly confidential information (except only one copy of blueprints) and one copy of the documents from which information claimed to be confidential has been deleted, to the Office of Chief Counsel, National Highway Traffic Safety Administration, Room 5219 (NCC-30), 400 Seventh Street, SW, Washington, D.C. 20590. In addition, Toyota must provide supporting information for the request for confidential treatment in accordance with 49 CFR Section 512.4(b) and (e) and include the name, address, and telephone number of a representative to receive a response from the Chief Counsel.

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Sincerely,

\S\
Kathleen C. DeMeter, Director
Office of Defects Investigation
Safety Assurance

Enclosure

Vehicle Identification - Make, Model, Model Year, options. Date of Inspection.

Wheel base of vehicle		
Rated fuel capacity		
Location of fuel fill tube (right or left side)		
Location of fill opening CntrLine on sheet metal		
Fore-Aft position of opening to rear axle CntrLine (in 'Y')		
Up_Down position of opening to top of rear wheel opening (above axle CntrLine, in 'Z')		
Description of fuel tank location in vehicle		
Position of rear edge of tank to rear axle CntrLine		
Position of front edge of tank to rear axle CntrLine		
Position of left outboard edge to outboard side of left sill		
Position of right outboard edge to outboard side of right sill		
Position of left outboard edge to inboard side of left rail		
Position of right outboard edge to inboard side of right rail		
Any additional comments ?		
Fill venting and valving		
ORVR, internal/external		
Location on tank and fill tube		
Material, attachment, size, valving		
Fuel tank material type (metal or plastic)		
Unique suspension or other chassis interface ?		
Fuel tank		
Location of fuel filler tube entry (Rear, side, top?)		
Submerged fill (yes or no?)		
Any tank shields ? Note if thermal or impact (skid plate), attached to tank, body or exhaust.		
Any additional comments ?		
Fuel tank straps		
How many straps ?		
Fore/aft or lateral ?		
Any additional comments ?		
Are they fastened to fixed dimension or to torque?		
Fill Pipe		
Housing at body side: Fixed or breakaway ?		
Approximate overall length		
Number of bends		
Pipe Material		
Pipe OD		
Routed above rail, below rail, through rail?		
Connection type to tank		
Pipe attachment to BIW structure (yes or no)		
Comments pertaining to venting hoses		
Unique rollover valves or plumbing ?		
Any shielding? For impact? (yes or no)		
Any additional comments ?		
Fill Pipe Hose		
Hose OD		
Length		
Number of bends		
Corrugated or not		

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Hose reinforced (yes or no)		
Any additional comments ?		
Fill pipe attachment to tank		
Type: Spud ? Note material, how attached to tank, length, diameter, diameter of bead.		
Clamp ? Style of clamp ?		
Bead type on spud		
Any additional comments ?		
Fuel cap		
Type (screw-on, quick-on, etc.)		
Valving		
Cap attachment - metal/plastic?		
Vehicle Attitude - Vertical from top of wheel opening above axle CntrLine (As received, no additional loading)		
Left Front		
Left Rear		
Right Front		
Right Rear		

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Exh 7

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Robert Simpson, President
Kautex/Textron, Inc.
750 Stephenson Highway
Troy, MI 48083

NSA-122jlq
EA99-013

Dear Mr. Simpson:

This letter is to advise you that the Office of Defects Investigation (ODI) of the National Highway Traffic Safety Administration (NHTSA) is conducting an investigation of crash induced filler neck assembly failure in 1996 through 2000 DaimlerChrysler NS-minivan vehicles equipped with fuel filler tube assemblies and fuel filler hoses supplied by Kautex/Textron (formerly Randall Textron), and to request certain information.

Unless otherwise stated in the text, the following definitions apply to this information request:

- **Subject vehicles**: all 1996 through current model year DaimlerChrysler NS-minivans.
- **Subject filler neck assembly**: all combinations of fuel tank spud, fuel filler hose, and fuel filler tube assembly used in the subject vehicles.
- **Subject filler tube assembly**: all filler tube assemblies used in the subject vehicles.
- **Subject hose joint**: the clamped joint between the fuel filler hose and the fuel tank spud, including the hose, the clamp, and the tank spud fitting.
- **Clamped hose joints**: joints and connections comprised of hoses, fittings, and clamps or retaining devices used to secure the joint.
- **Kautex/Textron**: Kautex/Textron and the former Randall Division of Textron, Inc., all of their past and present officers and employees, whether assigned to their principal offices or any of their field or other locations, including all of their divisions, subsidiaries (whether or not incorporated) and affiliated enterprises and all of their headquarters, regional, zone and other offices and their employees, and all agents, contractors,

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consultants, attorneys and law firms and other persons engaged directly or indirectly (e.g., employee of a consultant) by or under the control of Kautex/Textron (including all business units and persons previously referred to), who are or, in or after January 1994, were involved in any way with any of the following related to the alleged defect in the subject vehicles:

a. design, engineering, analysis, modification or production (e.g. quality control);
b. testing, assessment or evaluation;
c. consideration, or recognition of potential or actual defects, reporting, record-keeping and information management, (e.g., complaints, field reports, warranty information, part sales), analysis, claims, or lawsuits; or
d. communication to, from or intended for zone representatives, fleets, dealers, or other field locations, including but not limited to individuals who have the authority to obtain information from dealers.

- **Alleged defect**: shall refer to collision induced failure of the fuel filler neck.

- **Documents**: "Document(s)" is used in the broadest sense of the word and shall mean all original written, printed, typed, recorded, or graphic matter whatsoever, however produced or reproduced, of every kind, nature, and description, and all nonidentical copies of both sides thereof, including, but not limited to, papers, letters, memoranda, correspondence, communications, electronic mail (e-mail) messages (existing in hard copy and/or in electronic storage), faxes, mailgrams, telegrams, cables, telex messages, notes, annotations, working papers, drafts, minutes, records, audio and video recordings, data, databases, other information bases, summaries, charts, tables, graphics, other visual displays, photographs, statements, interviews, opinions, reports, newspaper articles, studies, analyses, evaluations, interpretations, contracts, agreements, jottings, agendas, bulletins, notices, announcements, instructions, blueprints, drawings, as-builts, changes, manuals, publications, work schedules, journals, statistical data, desk, portable and computer calendars, appointment books, diaries, travel reports, lists, tabulations, computer printouts, data processing program libraries, data processing inputs and outputs, microfilms, microfiches, statements for services, resolutions, financial statements, governmental records, business records, personnel records, work orders, pleadings, discovery in any form, affidavits, motions, responses to discovery, all transcripts, administrative filings and all mechanical, magnetic, photographic and electronic records or recordings of any kind, including any storage media associated with computers, including, but not limited to, information on hard drives, floppy disks, backup tapes, and zip drives, electronic communications, including but not limited to, the Internet and shall include any drafts or revisions pertaining to any of the foregoing, all other things similar to any of the foregoing, however denominated by Kautex/Textron, any other data compilations from which information can be obtained, translated if necessary, into a usable form and any other documents. For purposes of this request, any document which contains any note, comment, addition, deletion, insertion, annotation, or otherwise comprises a nonidentical copy of another document shall be treated as a separate document subject to production. In all cases where original and any non-identical copies are not available, "document(s)" also means any identical copies of the original and all non-identical copies thereof. Any document, record, graph, chart, film or photograph originally produced in color must be provided in color. Furnish all documents whether verified by the manufacturer or not. If a document is not in the English language, provide both the original document and an English translation of the document.

In order for my staff to evaluate the alleged defect, certain information is required. Pursuant to 49 U.S.C. § 30166, please provide numbered responses to the following information requests. Please repeat the applicable request verbatim above each response. After Kautex/Textron's response to each request, identify the source of the information and indicate the last date the source updated the information prior to the preparation of the response. Insofar as Kautex/Textron has previously provided a document to ODI, Kautex/Textron may either produce it again, or identify the document, the document submission to ODI in which it was included and the precise location in that submission where the document is located. When documents are produced, the documents shall be produced in an identified, organized manner that corresponds with the Information Request letter (including the subparts). When documents are produced and the documents would not, standing alone, be self-explanatory, the production of documents shall be supplemented and accompanied by explanation.

If Kautex/Textron cannot respond to any specific request or subpart thereof, please state the reason why it is unable to do so. If Kautex/Textron claims that any document or other information or material responsive to any of the following items need not be provided to NHTSA because it is privileged or the work product of an attorney, separately by information request number, for each such document or other information or material, state the nature of that information or material and identify any document in which it is found by date, subject or title, name and position of the person from, and the person to whom it was sent, and the name and position of any other recipient. Kautex/Textron must also describe the basis for the claim, and explain why Kautex/Textron believes it applies.

1. Provide copies of all documents related to communications between Kautex/Textron and DaimlerChrysler regarding the following subjects:

   a. the design, specification, packaging, or crash performance of the subject filler tube assemblies;
   b. the design, specification, or pull-off resistance of the subject hose joint or components used therein (e.g., fuel filler hose);
   c. the design, specification, assembly, or pull-off resistance of the subject filler tube assembly hose joint; and
   d. the design, specification, assembly, or pull-off resistance of clamped hose joints used in fuel filler necks.

Furnish the documents, sorted by date, in a separate enclosure for each category.

2. Provide copies of all documents related to communications between Kautex and any and all other entities, that are related in any way to the design, crash performance, pull-off performance, or sealing performance of the subject filler neck assembly or to the design and performance of clamped hose joints in general, since January 5, 1999. Furnish the documents sorted by date and in separate enclosures for each such entity.

3. Provide copies of all documents related to testing, research, calculations, and/or other analyses conducted by, or on behalf of, Kautex/Textron relating to the design or pull-off resistance of hose joints used in the fuel filler neck assemblies of motor vehicles (including the subject vehicles). For each pull-off test conducted, state both the force, displacement, and hose elongation (%) corresponding to the beginning of hose slippage on the fitting and hose separation from the joint.

4. Provide copies of all standards, handbooks, design guides, recommended practices, technical papers, reports, training material (including applicable sections of textbooks), or any other reference materials relating to the design, performance, or manufacture of clamped hose joints. Include all such materials received from or published or produced by technical or trade associations or other outside sources, as well as material developed by Kautex/Textron itself, either for internal or client use. Furnish all such documents which relate in any way to pull-off performance in a separate enclosure.

5. Provide Kautex/Textron's assessment of which aspects of the design and manufacture of clamped hose joints are factors in the pull-off resistance of the joint. Rank and weigh the contribution of each factor to the pull-off resistance of the joint, state the recommended parameters for each factor, and state the nominal value and tolerance range (state worst case tolerance stack-up condition for factors involving multiple dimensions, e.g., interference fit) in the subject hose joint design for each of the factors identified. Include in your response the influence of hose-fitting adhesion and the following categories listed in SAE Recommended Practice J1697 - Section 7, "Recommended Practices for Design and Evaluation of Passenger and Light Truck Coolant Hose Clamped Joints - Hose Blow Off," published in July 1996 (copy enclosed):

   a. interference fit;
   b. bead diameter;
   c. bead design (back angle);
   d. clamp type; and
   e. type of assembly lubricant.

6. Provide copies of all other documents in Kautex/Textron's possession or control that relate in any way to the hose joint design or crash performance of the filler neck assemblies used in the subject vehicles. Sort the documents furnished by date, in chronological order.

7. Provide the name and telephone number of a Kautex/Textron representative to answer technical questions regarding the information furnished in response to this letter.

This letter is being sent to Kautex/Textron pursuant to 49 U.S.C. § 30166, which authorizes NHTSA to conduct any investigation that may be necessary to enforce Chapter 301 of Title 49. Kautex/Textron's failure to respond promptly and fully to this letter could subject Kautex/Textron to civil penalties pursuant to 49 U.S.C. § 30165 or lead to an action for injunctive relief pursuant to 49 U.S.C. § 30163. Other remedies and sanctions are available as well.

Kautex/Textron's response to this letter, in duplicate, must be submitted to this office by April 14, 2000. Please include in Kautex/Textron's response the identification codes referenced on page one of this letter. If Kautex/Textron finds that it is unable to provide all of the information requested within the time allotted, Kautex/Textron must request an extension from Mr. Thomas Z. Cooper at (202) 366-5218 no later than five business days before the response due date. If Kautex/Textron is unable to provide all of the information requested by the original deadline, it must submit a partial response by the original deadline with whatever information Kautex/Textron then has available, even if Kautex/Textron has received an extension.

If Kautex/Textron considers any portion of its response to be confidential information, 49 CFR Part 512, "Confidential Business Information," requires that Kautex/Textron submit two copies of those document(s) containing allegedly confidential information (except only one copy of blueprints) and one copy of the documents from which information claimed to be confidential has been deleted, to the Office of Chief Counsel, National Highway Traffic Safety Administration, Room 5219 (NCC-30), 400 Seventh Street, SW, Washington, D.C. 20590. In addition, Kautex/Textron must provide supporting information for the request for confidential treatment in accordance with 49 CFR Section 512.4(b) and (e) and include the name, address, and telephone number of a representative to receive a response from the Chief Counsel.

If you have any technical questions concerning this matter, please call Mr. Jeff Quandt of my staff at (202) 366-5207. If you have any questions concerning confidentiality claims, please contact Ms. Heidi Coleman, Assistant Chief Counsel for General Law, at (202) 366-1834.

Sincerely,

Kathleen C. DeMeter, Director
Office of Defects Investigation
Safety Assurance

Enclosure

16 Fluid Conductor Fasteners

RECOMMENDED PRACTICES FOR DESIGN AND EVALUATION OF PASSENGER AND LIGHT TRUCK COOLANT HOSE CLAMPED JOINTS—SAE J1697 JUL96

SAE Recommended Practice

Report of the SAE Hose/Hose Clamp Performance and Compatibility Committee approved July 1996.

TABLE OF CONTENTS

1. Scope—This SAE Recommended Practice covers recommended practices for design and evaluation of hose clamped joints primarily in automotive applications. It is intended to: (a) evaluate current joint designs, (b) compare existing designs, (c) aid in the development of new designs, (d) give objective results once weights are set, (e) rate the overall design and individual sections of design, and (f) encourage future research by industry and the OEM's.

2. References

2.1 Related Publications—The following publications are provided for information purposes only and are not a required part of this document.

2.1.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J1508—Hose Clamp Specifications

SAE J1610—Test Method for Evaluating the Sealing Capability of Hose Connection with a PVT Test Facility

3. Abstract—Design of hose-clamped coolant joints is not an exact science, therefore precise formulas and methods cannot accurately predict performance. However, theoretical and philosophical constructs based on empirical data and industry experience can be used to develop standard practices for evaluating automotive hose-clamped coolant joints. This document allows individual users to define key parameters that are important to their products and educate the industry about hose clamped coolant joints.

Five major components of designing a robust hose-clamped joint are: (a) sealability, (b) hose assembly, (c) hose blow-off, (d) assembly of clamps over hose/fitting, and (e) serviceability of the clamp. Depending on the function of the joint and the priority of the design, one category may be more important than another. In automotive coolant joint designs, sealability and hose assembly are the main concerns. Since most of the coolant joints are "low" pressure, hose blow-off ranks third. To satisfy the end customer, coolant joints must not leak. In addition the hose must be able to be assembled. In other words, the effort to push the hose fully on the joint must not be higher than is consistently manageable by the assembly operator. Therefore both sealability and hose assembly conditions must be met. Until recently it was thought that either one or the other of the criteria could be met while sacrificing the other.

Assembly and serviceability are also legitimate concerns when variation and proliferation exist. Variation in the clamp assembly as well as the type of clamp is inversely related to the robustness of the joint. As the variation of the assembly decreases, the potential for the joint to seal increases. Serviceability is important because the clamping mechanism must be accessible to the general public or easily substituted with other standard products.

4. Methodology—A weighting system is used to rank choices in the design process. The weights are arbitrarily set by the user to target key system requirements for that particular user. The process works best with a computer program but is not required to use the procedure. The design choices are ranked from 1 to 5 where 1 is the worst choice and 5 is the best choice for that particular section. In the event that a given design does not match any of the listed choices, the most applicable match should be chosen.

a. 1 Poor Design—20% (1/5)
b. 2 Average to Poor Design—40%
c. 3 Average Design—60%
d. 4 Average to Good Design—80%
e. 5 Good Design—100%

NOTE—It must be noted that some sections may indicate excellent designs but due to the interactions and dependencies, the total joint will suffer. In the following example it is suggested that the designer has only two concerns: sealability and hose assembly. A 40% weight is assigned to sealability and a 60% weight is assigned to hose assembly. Therefore hose assembly is the most important joint design criterion.

For the sealability part of this example, only interference and residual load are considered important with weights of 30% and 70%, respectively. Therefore with the weights chosen it is understood that residual load is felt to contribute the most towards sealing a coolant joint.

For the hose assembly part of this example, only interference to the fitting and wall thickness are considered important with 60% and 40% weights,

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respectively. Therefore it is similarly understood that interference to the fitting plays the largest part in hose assembly.

In the first design iteration sealability of the joint is rated at 54% while hose sembly is rated at 56%. In the second design it is shown that both sealability nd hose assembly ratings have been increased to 57% and 72%, respectively.

The conclusion is that the second design is better in preventing leaks and is easier to assemble than the prior design. **However, keep in mind that most coolant joints are more complex than in the following example.**

4.1 Example

.4 Sealability

.3 Interference

1	Line to Line
2	0 < 2.5% Interference
3	2.5 < 5.0 Interference
4	5 - 10% Interference
5	> 10 % Interference
Design 1 selection:	2
Design 2 selection:	2

.7 System Pressure (PSI)

1	> 80 PSI
2	51 - 80 PSI
3	31 - 50 PSI
4	16 - 30 PSI
5	0 - 15 PSI
Design 1 selection:	3
Design 2 selection:	4

.6 Hose Assembly

.6 Interference to Fitting

1	> 10% Interference
2	5 - 10 % Interference
3	2.5 < 5% Interference
4	0 < 2.5% Interference
5	Line to Line
Design 1 selection:	4
Design 2 selection:	4

.4 Wall Thickness

1	6.0 mm
2	5.3 mm
3	4.8 mm
4	4.3 mm
5	3.8 mm
Design 1 selection:	1
Design 2 selection:	3

Calculations Design 1

Rating for Sealability = .4x.3x2 + .4x.7x3 = 1.08/2.0 = **54%**

Rating for Hose Assembly = .6x.6x4 + .6x.4x1 = 1.68/3.0 = **56%**

Total Joint Rating = 1.08 + 1.68 = 2.76/5.0 = 55.2%

Calculations Design 2

Rating for Sealability = 57%

Rating for Hose Assembly = 72%

FIGURE 1—EXAMPLE OF SEALABILITY AND HOSE ASSEMBLY

5. *Sealability*

5.1 Interference—Interference of the inside diameter of the hose to the sealing surface (shank) of the fitting is one of the most important criteria in designing a sealed system. There is a direct relationship between hose to fitting interference and push-on force. As the interference increases so will the push-on force. The relationship between interference and push-on will also change with hose material, reinforcement type and construction. Minimum design requirements should always have a line to line fit between inner diameter of the hose and the shank of the fitting. Clearance fits of any magnitude can lead to joint leaks. More interference has been proven to provide better sealing than less interference or a clearance fit. The greater the interference (provided the joint can still be assembled), the better probability of the sealed joint. Interference is calculated as shown in Equation 1:

$$((\text{Shank OD} - \text{Hose ID}) / \text{Hose ID}) * 100 \qquad \text{(Eq.1)}$$

.40 SEALABILITY

.30	- Interference
.20	- Pressure
.17	- Surface Finish
.16	- Roundness
.07	- Sealing Length
.06	- Temperature
.02	- Adhesion
.02	- Bead Geometry and Diameter

.25 HOSE ASSEMBLY

.26	- Bead Diameter
.20	- Interference to Fitting
.10	- Hose Durometer
.08	- Wall Thickness
.08	- Angle of Installation
.08	- Reach to Install
.06	- Lead End Diameter of Fitting
.05	- Ramp Angle
.05	- Column Strength of Hose
.04	- Lubrication

.20 HOSE BLOW-OFF

.30	- Pressure
.20	- Interference Fit
.15	- Bead Diameter
.15	- Bead Design
.12	- Clamp Type
.08	- Type of Assembly Lubrication

.10 ASSEMBLY OF CLAMPS OVER HOSE/FITTING

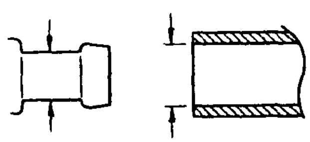
.30	- Number of Different Assembly Tools
.30	- Operator Sensitivity
.20	- Calibration of Tools
.15	- Rpm of Air Tools
.05	- Stray Assembly Lubricant (Slip Agents)

.05 SERVICEABILITY OF CLAMP

.40	- Tool Availability
.20	- Clamp Reuse
.20	- Clamp Availability
.15	- Adjustability
.05	- Corrosion

FIGURE 1—EXAMPLE OF SEALABILITY AND HOSE ASSEMBLY (CONTINUED)

5.1.1 HOSE/SHANK INTERFERENCE (% OF INSIDE DIAMETER)—(See Figure 2.)



1 Line to Line
2 0 < 2.5% Interference
3 2.5 ≤ x < 5% Interference
4 5 ≤ x ≤ 10% Interference
5 > 10 Interference

FIGURE 2—SEALABILITY—INTERFERENCE

5.2 Clamp Force Throughout Temperature Range (Residual Load)—Residual pressure, along with hose to fitting interference, is one of the mo important factors in designing a leak-free joint. Load around the diameter of th clamp (pressure) is required after the system has come to equilibrium. As th pressure increases the higher the clamping force needs to be to prevent leaka Products that can maintain continuous pressure on the hose, even after the ho has set, will have a greater potential to seal. The impact of clamping pressure o sealing will be reduced if imperfections in the fitting exist. Initial load is no complete indicator of how the joint will behave over time. Note that excessi clamp pressures can damage some hoses and fitting.

Incorrect sizing of the clamp can result in lower initial and residual load Development testing should determine the minimum pressure from the cla required to seal the joint taking into consideration production processes.

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CERTIFIED MAIL
RETURN RECEIPT REQUESTED

NSA-12jlq
EA99-013

Mr. William R. Willen
American Honda Motor Co., Inc.
1919 Torrance Boulevard
Torrance, CA 90501-2746

Dear Mr. Willen:

Please add the following request to the Agency's March 8, 2000, peer information request letter regarding EA99-013:

9. Furnish copies of all engineering standards, specifications, and guidelines regarding fuel tank and filler neck assembly packaging. "Packaging" should be interpreted in the context used in Section 4.12 of the enclosed copy of Society of Automotive Engineers Information Report SAE J1664, "Passenger Car and Light Truck Fuel Containment."

If you have any technical questions concerning this matter, please call Mr. Jeff Quandt of my staff at (202) 366-5207. If you have any questions concerning confidentiality claims, please contact Ms. Heidi Coleman, Assistant Chief Counsel for General Law, at (202) 366-1834.

Sincerely,

Kathleen C. DeMeter, Director
Office of Defects Investigation
Safety Assurance

Enclosure

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5.3 Pressure—System operating pressures define the type of clamping system the joint requires. Low pressure systems will allow the most flexibility in the design of the joint and will be easier to seal. As the pressure increases the hose design requirements may also change. Higher pressure applications will require different reinforcements and constructions. Pressure is also important with respect to the friction between the hose and the fitting and the hose and the clamp.

5.3.1 MAXIMUM JOINT PRESSURE (PSI)

a. 1 > 80 PSI
b. 2 51 to 80 PSI
c. 3 31 to 50 PSI
d. 4 16 to 30 PSI
e. 5 0 to 15 PSI

5.4 Surface Finish—The surface finish of the fitting is important in the sealing process. Although rough finishes can contribute to a joint leak under some conditions, a certain degree of "grabbiness" by the fitting is required to prevent blow-off. Finishes that are too smooth will be harder to push on the fitting. Similarly if a boundary layer of fluid is allowed between the hose and a "too smooth" fitting, a blow-off condition is likely to occur. The more consistent the sealing surface, the better the chance the joint has to seal.

5.4.1 SURFACE FINISH OF FITTING (RA)

a. 1 Sand Cast (50 - 25)
b. 2 Sand Cast (24 - 6.3)
c. 3 Die Cast (6.2 - 2.1)
d. 4 Molded Plastic (2.0 - 0.8)
e. 5 Machined, Tubing,(0.8 - 0.2)

5.5 Roundness—Parting lines are direct leak paths. Larger parting lines have a higher probability of causing a joint leak than joints with smaller, faintly visible parting lines. Depressions or crevices below the contact surface will also cause leaks. Mismatch of dies or molds may create a leak path at low temperatures.

5.5.1 ROUNDNESS OF FITTING SEALING SURFACE

a. 1 > 0.50 mm Major Surface Imperfection
b. 2 0.28 to 0.50 mm Machined Imperfections
c. 3 0.178 to 0.254 mm No visual as produced imperfections
d. 4 0.076 to 0.152 mm Radial Removal of Discontinuities
e. 5 < 0.076 mm Turned Surfaces

5.6 Sealing Length—Longer sealing lengths provide a more robust design and assembly process. If the sealing length is not long enough, there is a greater potential that the clamp will be mis-aligned. In production settings, where accurate placement of the clamp cannot be guaranteed (assuming loose assembly), there is a greater possibility that the clamp will be placed either on the bead of the fitting or the hose stop. If the clamp is "tilted" a leak may develop.

5.6.1 SEALING LENGTH OF FITTING—See Figure 3.

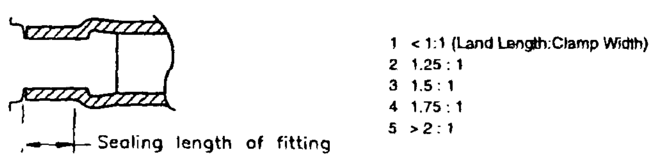

FIGURE 3—SEALABILITY—SEALING LENGTH

5.7 Temperature—Systems with a constant ambient or higher temperature will seal better than joints that have a constant cold temperature or fluctuating cold/hot temperatures. Greater rates of temperature changes may promote system leaks.

5.7.1 TEMPERATURE

a. 1 Constant Cold
b. 2 Fluctuating Cold Environment
c. 3 Fluctuating Cold/Hot Environment
d. 4 Constant Ambient Temperature
e. 5 Constant Hot Temperature

5.8 Adhesion—Any adhesion of the hose to the fitting aids in the sealing process and reduces the responsibility of the clamp. Joints that do not adhere over time rely more heavily on the clamp, hose interference, etc., to seal the joint. Not all EPDM hose bonds to copper brass.

5.8.1 ADHESION OF HOSE TO FITTING

a. 1 Paint/other that forms a lube
b. 2 Non-Dissipating Lubricant
c. 3 Clean/Smooth surface
d. 4 Paint that forms a bond
e. 5 Copper-Brass fitting to EPDM Hose

5.9 Bead Geometry and Diameter

a. 1 < 360 Degree Bead
b. 2 360 bead, 0 < 3% Interference
c. 3 360 bead, 3 to 5% Interference
d. 4 360 bead, 5 to 10% Interference
e. 5 360 bead, > 15% Interference

6. Hose Assembly

6.1 Bead Diameter—As the bead height increases the push-on force over the bead also increases. Although the larger bead aids in blow-off forces, it makes the joint more difficult to assemble.

6.1.1 BEAD DIAMETER OF FITTING—See Figure 4.

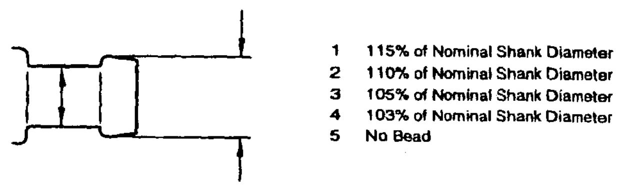

FIGURE 4—HOSE ASSEMBLY—BEAD DIAMETER

6.2 Interference to Fitting—Greater interference between the hose and the sealing surface of the fitting provides a better seal; however, the push-on forces (and efforts) increase also. In general, the greater the interference the greater the push-on forces.

6.2.1 INTERFERENCE TO FITTING—See Figure 5.

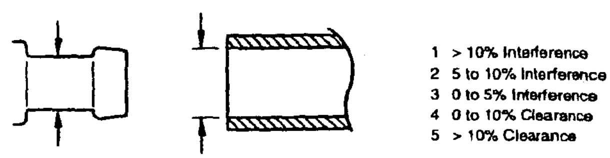

FIGURE 5—HOSE ASSEMBLY—INTERFERENCE TO FITTING

6.3 Hose Durometer—Higher durometer hose is less compliant than lower durometer hose and will have higher push-on forces. . Lower durometer materials will allow the translation of the pressure of the clamp directly to the sealing surface. Lower durometer hose will allow the joint to be designed with more interference. Note that hose column strength may be reduced by using lower durometer rubbers and consequently lead to more difficult installation.

6.3.1 HOSE TUBE DUROMETER (SHORE A)

a. 1 71 to 80
b. 2 61 to 70
c. 3 51 to 60
d. 4 40 to 50
c. 5 < 40*

6.4 Wall Thickness—The wall thickness variation of a hose can affect the distribution of pressure as applied by the clamp and the push-on force required to assemble the joint. Smaller wall thicknesses will allow easier installation and better transmission of load to the sealing surface.

6.4.1 WALL THICKNESS (FOR 15 TO 46 MM ID HOSES)

a. 1 6.0 mm
b. 2 5.3 mm
c. 3 4.8 mm
d. 4 4.3 mm
e. 5 3.8 mm

6.5 Angle of Installation—The angle of installation of the hose to the fitting will affect the push-on effort of the operator. The straighter the angle of installation the easier the joint is to assemble.

6.5.1 ANGLE OF INSTALLATION—See Figure 6.

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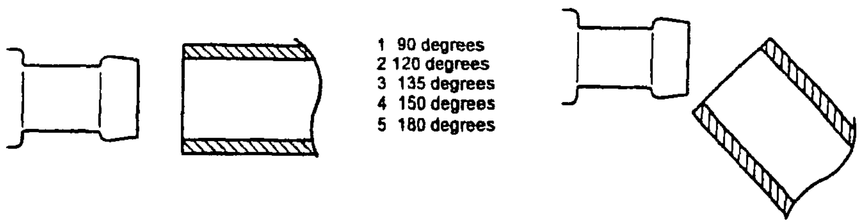

FIGURE 6—HOSE ASSEMBLY—ANGLE OF INSTALLATION

6.6 Reach to Install—Long overhead reaches to install hoses are more difficult than short horizontal reaches. Difficult to install joints have a higher probability of being assembled incorrectly.

6.6.1 REACH TO INSTALL

a. 1 Long Reach, Overhead
b. 2 Long Reach, Horizontal
c. 3 Average Reach, Horizontal
d. 4 Short Reach, Overhead
e. 5 Short Reach, Horizontal

Long Reach is > 1 foot from body
Short Reach is < 1 foot from body

6.7 Lead End Diameter of Fitting—See Figure 7.

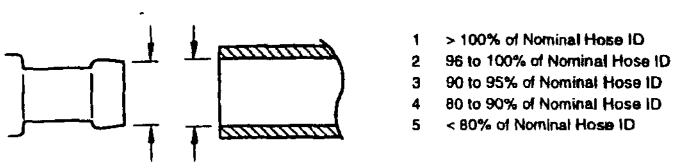

FIGURE 7—HOSE ASSEMBLY—LEAD END DIAMETER OF FITTING

6.8 Ramp Angle—Steep sloping ramp angles make assembly of the hose the fitting more difficult. However, ramp angles that increase the bead length also increase the surface area and may increase the hose push-on force.

6.8.1 RAMP ANGLE OF BEAD—See Figure 8.

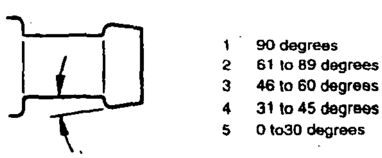

FIGURE 8—HOSE ASSEMBLY—RAMP ANGLE

6.9 Column Strength—For a given material and construction, hoses with a larger wall thickness will have a greater tendency to resist buckling during the installation of the hose. Reinforcement type (i.e., braid, spiral, knit, etc.) and configuration (i.e., angle, loops-needles, etc.) are very important parameters in push-on forces required to install the hose.

6.9.1 COLUMN STRENGTH OF HOSE

a. 1 3.8 mm
b. 2 4.3 mm
c. 3 4.8 mm
d. 4 5.3 mm
e 5 6.0 mm

6.10 Type of Assembly Lubrication—Lubrication aids in the assembly of the hose to the fitting in some cases. Typically lubricants are used because the interference between the hose and the fitting causes a high installation (push-on) force. Although interference is good for the seal of the joint, the related push-on forces must be kept manageable for production environments. Time and temperature will affect the dissipation of lubricants. Use of any type of nondissipating lubricant may increase the potential for hose blow-off.

6.10.1 LUBRICATION

a. 1 None
b. 2 Water
c. 3 Water and Glycol
d. 4 Partially Dissipating
e. 5 Dissipating

7. Hose Blow-Off

7.1 Pressure—Joints with higher system pressures will have a greater probability of blowing off than joints with lower pressures.

7.1.1 SYSTEM PRESSURE (PSI)

a. 1 > 80 PSI
b. 2 51 to 80 PSI
c. 3 31 to 50 PSI
d. 4 16 to 30 PSI
e. 5 0 to 15 PSI

7.2 Interference Fit—Greater interferences will require higher pressures to blow the hose off of the fitting (assuming no clamp). Proper hose to bead interference along with the proper clamp will give increased resistance to hose blow-off. Reinforcement type (i.e., braid, spiral, knit, etc.) and configuration (i.e., angle, loops-needles, etc.) are very important parameters in push-on forces required to install the hose.

7.2.1 INTERFERENCE FIT TO SHANK DIAMETER—See Figure 9.

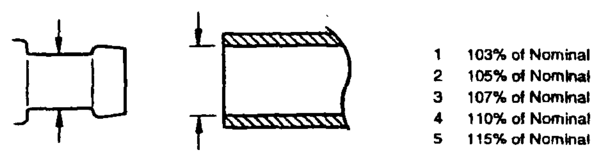

FIGURE 9—HOSE BLOW-OFF—INTERFERENCE FIT

7.3 Bead Diameter—Larger bead heights are better than smaller bead heights in resisting hose blow-off. However, as the bead height increases the force to assemble the joint also increases.

7.3.1 BEAD DIAMETER—See Figure 10.

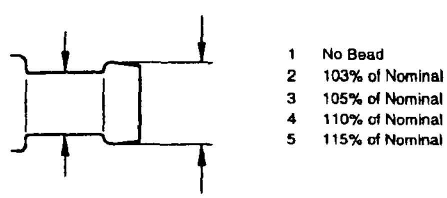

FIGURE 10—HOSE BLOW-OFF—BEAD DIAMETER

7.4 Bead Design (Back Angle)—See Figure 11.

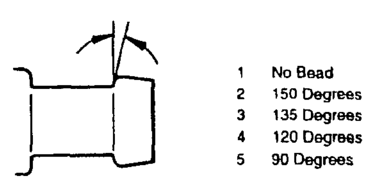

FIGURE 11—HOSE BLOW-OFF—BEAD DESIGN (BACK ANGLE)

7.5 Clamp Type—Fixed diameter clamps give the best resistance to hose blow-off. However, mechanically adjusted fixed diameter clamps will not compensate for the changing dynamics of a hose clamped joint nor will they respond to temperature fluctuations. Variable diameter clamps will not provide the blow-off resistance of fixed diameter clamps.

7.5.1 CLAMP TYPE

a. 1 No Clamp
b. 2 Compensating Diameter—Not manually adjustable
c. 3 Compensating Diameter—Manually adjustable
d. 4 Fixed Diameter—Not adjustable after installation
e. 5 Fixed Diameter—Adjustable after initial installation

7.6 Type of Assembly Lubrication—Lubrication aids in the assembly of the hose to the fitting in some cases. Typically lubricants are used because the interference between the hose and the fitting causes a high installation (push-on) force. Although interference is good for the seal of the joint, the related push-on forces must be kept manageable for production environments. Time and temperature will affect the dissipation of lubricants. Use of any type of nondissipating lubricant may increase the potential for hose blow-off.

7.7 Lubrication
a. 1 Non-Dissipating Lubricant
b. 2 Partially Dissipating Lubricant
c. 3 Water and Glycol
d. 4 Water
e. 5 None

8. Fastening and Assembly of Clamps Over Hose/Fitting

8.1 Number of Different Assembly Tools
a. 1 10 +
b. 2 6 to 10 tools
c. 3 3 to 5 tools
d. 4 2 to 3 tools
e. 5 1 tool

8.2 Operator Sensitivity
a. 1 Clamp position; tool; rpm; torque; >1 oper.
b. 2 Clamp position; tool; rpm; torque
c. 3 Clamp position; tool; rpm
d. 4 Clamp position; tool
e. 5 Clamp positioning or hose/clamp positioning only

8.3 Calibration of Tools—Tools that require calibration are sensitive to assembly variation.
a. 1 Recal., special tool, maintenance
b. 2 Recal. without special tool; not often
c. 3 Recal. with standard tool;
d. 4 No calibration but frequent adjustments
e. 5 No calibration; infrequent adjustments

8.4 Rpm of Air Tools (for screw clamps only)—High rpm tools are sources of assembly variation which may affect joint performance. The speed of the tightening tool will directly impact hose compression. High speed tools tend to shock the joint and fool the tool into shutting off before adequate hose compression is obtained. Lower rpm tools allow more time for the rubber to compress. Every air tool has a specific correlation between air pressure, rpm and torque. Variation in air pressure will cause variation in the dynamic torque reading. Setting the tool to a static torque specification is another source of variation. Static torque specifications for gasketed or soft joints often lead to frequent and unnecessary tool modifications.
a. 1 2500 +
b. 2 1500 to 2500 rpm
c. 3 1000 to 1499 rpm
d. 4 750 to 999 rpm
e. 5 < 750 rpm (enter 5 for nonscrew clamps)

8.5 Stray Assembly Lubricant (Slip Agents)—Assembly lubricants are necessary when interference fit designs are used. However, when stray lubricant comes in contact with the clamp, the joint performance can be compromised. Lubricants are intended to create a boundary layer between the hose and the fitting thus lowering the friction. Lower friction between the hose and the fitting translates directly into lower push-on forces. Problems are created specifically with screw clamps when stray assembly lubricant comes in contact with the screw. The lubricant will lower the friction coefficient between the screw and the band mechanism. The lower friction translates directly into higher forces for a given input torque. In some cases, the clamp will strip and in other cases, the hose will be damaged. Unless engineering specifically designed the joint with that lubricant on the screw clamp, the joint will be compressed differently. As the number of different slip lubricants used in the plant increases, the variation associated with clamping the joint also increases. Better joint designs limit the number of slip lubricants used on hose clamped joints and avoids contact with the clamp (specifically screw clamps).
a. 1 > 3 Slip Agents Used—100% contact
b. 2 2 Slip Agents—Occasional clamp contact
c. 3 2 Slip Agents—No clamp contact
d. 4 Only 1 Slip Agent—Occasional contact
e. 5 Only 1 Slip Agent—No clamp contact

9. Serviceability

9.1 Availability—Special tools will make any clamp or joint harder to service. Readily available tools will aid in the proper service of the joint.
a. 1 Special Order—Dealership
b. 2 Service Garage—Dealership
c. 3 Automotive Supply—Dealership
d. 4 Hardware Store—Dealership
e. 5 Grocery Store—Dealership

9.2 Clamp Reuse—Using different clamps may affect the performance of some joints, therefore using the same production clamp has some advantages.
a. 1 Not reusable
b. 2 Reusable but requires special care
c. 3 Reusable, if not initially damaged
d. 4 Reusable, if not damaged or rusted
e. 5 Very reusable; difficult to damage

9.3 Clamp Availability—Key to servicing a coolant carrying joint is the availability of similar if not identical replacement parts. Parts that can be easily obtained will lead to rapid joint repair.
a. 1 Special Order—Dealership
b 2 Service Garage—Dealership
c. 3 Automotive Supply—Dealership
d. 4 Hardware Store—Dealership
e. 5 Grocery Store—Dealership

9.4 Clamp Adjustability—Clamps that are not reusable are typically destroyed when the joint requires servicing. In removing the clamp, there is a chance that the hose may be damaged (if the hose is not the reason the joint is being serviced).

Self-adjusting clamps work on the principle of spring rate. Once initially installed, the spring rate of the clamp keeps pressure on the joint after the joint has been thermal cycled and come to equilibrium. Some self-adjusting clamps are have limited ranges and work for only very specific joint conditions (i.e., hose diameters, hose wall thickness, bead heights, etc.). By design, self-adjusting clamps are part of a "net joint design". Net joint design incorporates all necessary features to avoid in process manual adjustments by production operators. Net joint design theory assumes that coolant leaks are caused by poor joint design, not poor component design.

Manually adjustable clamps can make up for joint deficiencies; however, they are very sensitive to proper fastening and assembly tooling. Typically the rate these clamps are adjusted directly impacts the residual pressure on the joint. Manually adjustable clamps, by their nature, are designed for joint repair in production and service repair in the field.
a. 1 Not manually or self-adjusting
b. 2 Adjustable Once Installed—Not reusable due to rust
c. 3 Self-Adjusting—No manual adjustment
d. 4 Self-Adjusting—Allows manual adjustment
e. 5 Manual adjustment

9.5 Clamp Corrosion—There are two primary types of corrosion: cosmetic and structural. Cosmetic corrosion will eventually lead to structural corrosion of carbon steel clamps if not properly protected with a corrosion protection finish. Typically corrosion is associated with poor quality and therefore is undesirable in a coolant joint design. Red rust on carbon steel clamps will make serviceability difficult and may require the clamp to be destroyed upon removal. Low carbon steel clamps that rust within a year (of the end user's driving environment) provide minimal corrosion protection and are poorly designed for clamp corrosion. Alternative corrosion protective finishes should be evaluated in this case.

Clamps that do not exhibit red rust with 10 years are considered excellent from a serviceability perspective. These clamps should be easy to remove if the joint needs to be serviced. All stainless steel clamps (300 series) have the best chance of meeting this requirement. Shipping, handling and assembly tools make it difficult for carbon steel clamps with corrosion protective finishes to meet this specification. If the finish is scratched or scrapped off, corrosion will begin.
a. 1 Red Rust within 1 year
b. 2 No Red Rust within 3 years
c. 3 No Red Rust within 5 years
d 4 No Red Rust within 7 years
e. 5 No Red Rust within 10 years

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CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Steven Simpson, President
Norma Products US, Inc.
24650 Crestview Court
Farmington Hills, MI 48335

NSA-122jlq
EA99-013

Dear Mr. Simpson:

This letter is to advise you that the Office of Defects Investigation (ODI) of the National Highway Traffic Safety Administration (NHTSA) is conducting an investigation of crash induced filler neck assembly failure in 1996 through 2000 DaimlerChrysler NS-minivan vehicles equipped with fuel filler neck hose clamps supplied by Norma Products US, Inc., and to request certain information.

Unless otherwise stated in the text, the following definitions apply to this information request:

- **Subject vehicles**: all 1996 through current model year DaimlerChrysler NS-minivans.
- **Subject filler neck**: the fuel filler neck assembly comprising the fuel fill and vent tubing, fuel fill hose, and all associated clamping devices that are used in the subject vehicles.
- **Subject tank spud**: all tank fill spuds used in the subject vehicles, whether molded with the tank, hot-plate welded to the tank, or joined by other means.
- **Subject hose joint**: the clamped joint between the filler neck hose and the fuel tank spud on the subject vehicles, including the hose, the clamp, and the tank fill spud.
- **Norma**: Norma Products, Inc., all of its past and present officers and employees, whether assigned to its principal offices or any of its field or other locations, including all of its divisions, subsidiaries (whether or not incorporated) and affiliated enterprises and all of their headquarters, regional, zone and other offices and their employees, and all agents, contractors, consultants, attorneys and law firms and other persons engaged directly or indirectly (e.g., employee of a consultant) by or under the control of Norma (including all business units and persons previously referred to), who are or, in or after January 1994,

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were involved in any way with any of the following related to the alleged defect in the subject vehicles:

a. design, engineering, analysis, modification or production (e.g. quality control);
b. testing, assessment or evaluation;
c. consideration, or recognition of potential or actual defects, reporting, record-keeping and information management, (e.g., complaints, field reports, warranty information, part sales), analysis, claims, or lawsuits; or
d. communication to, from or intended for zone representatives, fleets, dealers, or other field locations, including but not limited to individuals who have the capacity to obtain information from dealers.

- **Alleged defect**: shall refer to crash-induced failure of the fuel filler neck.

- **Documents**: "Document(s)" is used in the broadest sense of the word and shall mean all original written, printed, typed, recorded, or graphic matter whatsoever, however produced or reproduced, of every kind, nature, and description, and all nonidentical copies of both sides thereof, including, but not limited to, papers, letters, memoranda, correspondence, communications, electronic mail (e-mail) messages (existing in hard copy and/or in electronic storage), faxes, mailgrams, telegrams, cables, telex messages, notes, annotations, working papers, drafts, minutes, records, audio and video recordings, data, databases, other information bases, summaries, charts, tables, graphics, other visual displays, photographs, statements, interviews, opinions, reports, newspaper articles, studies, analyses, evaluations, interpretations, contracts, agreements, jottings, agendas, bulletins, notices, announcements, instructions, blueprints, drawings, as-builts, changes, manuals, publications, work schedules, journals, statistical data, desk, portable and computer calendars, appointment books, diaries, travel reports, lists, tabulations, computer printouts, data processing program libraries, data processing inputs and outputs, microfilms, microfiches, statements for services, resolutions, financial statements, governmental records, business records, personnel records, work orders, pleadings, discovery in any form, affidavits, motions, responses to discovery, all transcripts, administrative filings and all mechanical, magnetic, photographic and electronic records or recordings of any kind, including any storage media associated with computers, including, but not limited to, information on hard drives, floppy disks, backup tapes, and zip drives, electronic communications, including but not limited to, the Internet and shall include any drafts or revisions pertaining to any of the foregoing, all other things similar to any of the foregoing, however denominated by Norma, any other data compilations from which information can be obtained, translated if necessary, into a usable form and any other documents. For purposes of this request, any document which contains any note, comment, addition, deletion, insertion, annotation, or otherwise comprises a nonidentical copy of another document shall be treated as a separate document subject to production. In all cases where original and any non-identical copies are not available, "document(s)" also means any identical copies of the original and all non-identical copies thereof. Any

document, record, graph, chart, film or photograph originally produced in color must be provided in color. Furnish all documents whether verified by the manufacturer or not. If a document is not in the English language, provide both the original document and an English translation of the document.

In order for my staff to evaluate the alleged defect, certain information is required. Pursuant to 49 U.S.C. § 30166, please provide numbered responses to the following information requests. Please repeat the applicable request verbatim above each response. After Norma's response to each request, identify the source of the information and indicate the last date the source updated the information prior to the preparation of the response. Insofar as Norma has previously provided a document to ODI, Norma may either produce it again, or identify the document, the document submission to ODI in which it was included and the precise location in that submission where the document is located. When documents are produced, the documents shall be produced in an identified, organized manner that corresponds with the Information Request letter (including the subparts). When documents are produced and the documents would not, standing alone, be self-explanatory, the production of documents shall be supplemented and accompanied by explanation.

If Norma cannot respond to any specific request or subpart thereof, please state the reason why it is unable to do so. If Norma claims that any document or other information or material responsive to any of the following items need not be provided to NHTSA because it is privileged or the work product of an attorney, separately by information request number, for each such document or other information or material, state the nature of that information or material and identify any document in which it is found by date, subject or title, name and position of the person from, and the person to whom it was sent, and the name and position of any other recipient. Norma must also describe the basis for the claim, and explain why Norma believes it applies.

1. Provide copies of all documents related to communications between Norma and DaimlerChrysler regarding the design, pull-off performance, and/or crash performance of the subject hose joint and/or subject filler neck assembly. Sort the documents furnished by date, in reverse chronological order.

2. Provide copies of all documents related to communications between Norma and any and all other entities, that are related in any way to the design, crash performance, pull-off performance, or sealing performance of the subject tank spud or to the design and performance of clamped hose joints in general, since January 5, 1999. Furnish the documents sorted by date and in separate enclosures for each such entity.

3. In separate enclosures, provide copies of all documents related to any and all testing, research, calculations, and/or other analyses conducted by, or on behalf of, Norma relating in any way to the design and/or pull-off resistance of the subject filler neck hose joints or

the components used therein. Sort the documents furnished by date, in reverse chronological order.

4. In a letter dated April 9, 1999, DaimlerChrysler provided information to NHTSA regarding pull-off testing conducted by Norma on the subject tank spuds. The information included a document titled "Design Decision Matrix" (copy enclosed) which listed various design and manufacturing process factors which could influence joint resistance to separation under load.

   Provide the following information concerning this document:

   a. state whether Norma (a) prepared and/or (b) transmitted this document to DaimlerChrysler;
   b. identify the author(s) of the document by name, company, title, division/group affiliation, and business telephone number;
   c. describe Norma's reason(s) for providing the document to DaimlerChrysler;
   d. state the bases for each "Conclusion/Recommendation" stated for each of the design/process factors listed in the "Design Decision Matrix" and provide copies of all supporting documents; and
   e. describe, and provide copies of all documents related to, all follow-up discussions between Norma and DaimlerChrysler concerning the "Design Decision Matrix," or any of the design issues identified in the matrix.

5. Provide Norma's assessment of which aspects of the design and manufacture of clamped hose joints are factors in the pull-off resistance of the joint. Rank and weigh the contribution of each factor to the pull-off resistance of the joint, state the recommended parameters for each factor, and state the nominal value and tolerance range (state worst case tolerance stack-up condition for factors involving multiple dimensions, e.g., interference fit) in the subject hose joint design for each of the factors identified. Include in your response the influence of hose-fitting adhesion and the following categories listed in SAE Recommended Practice J1697 - Section 7, "Recommended Practices for Design and Evaluation of Passenger and Light Truck Coolant Hose Clamped Joints - Hose Blow Off," published in July 1996 (copy enclosed):

   a. interference fit;
   b. bead diameter;
   c. bead design (back angle);
   d. clamp type; and
   e. type of assembly lubricant.

6. State the force, displacement, and hose elongation (%) corresponding to the beginning of hose slippage and hose separation for each hose pull-off test conducted by Norma on the subject filler neck hose joints.

7. Identify by make, model, model year, and fuel tank all 1990 through current model year motor vehicles using Norma clamps in fuel filler neck hose joints. If Norma does not possess this information, state each motor vehicle manufacturer whom Norma has sold clamps to for use in fuel filler neck assemblies by manufacture name, clamp (name and Norma model/part number), clamp type (provide a catalog describing all relevant clamps), and approximate number supplied by calendar year.

8. Provide copies of all documents related to testing, research, calculations, and/or other analyses conducted by, or on behalf of, Norma relating to the design or pull-off resistance of hose joints used in the fuel filler neck assemblies of other motor vehicles (i.e., any and all pull-off testing conducted by, or for, Norma on fuel filler neck hose joints, or components used therein, that were either used in, or considered for use in, vehicle applications other than the subject vehicles). For each pull-off test conducted, state both the force, displacement, and hose elongation (%) corresponding to the beginning of hose slippage on the fitting and hose separation from the joint.

9. Provide copies of all standards, handbooks, design guides, recommended practices, technical papers, reports, training material (including applicable sections of textbooks), or any other reference materials relating to the design, performance, or manufacture of clamped hose joints. Include all such materials received from or published or produced by technical or trade associations or other outside sources, as well as material developed by Norma itself, either for internal or client use. Furnish all such documents which relate in any way to pull-off performance in a separate enclosure.

10. Provide copies of all other documents in Norma's possession or control that are related in any way to the design, pull-off resistance, or crash performance of the subject filler neck hose joints. Furnish the documents in descending chronological order.

11. Provide the name, title, division/group affiliation, and business telephone number of a Norma representative who can answer technical questions regarding the information furnished in response to this letter.

This letter is being sent to Norma pursuant to 49 U.S.C. § 30166, which authorizes NHTSA to conduct any investigation that may be necessary to enforce Chapter 301 of Title 49. Norma's failure to respond promptly and fully to this letter could subject Norma to civil penalties pursuant to 49 U.S.C. § 30165 or lead to an action for injunctive relief pursuant to 49 U.S.C. § 30163. Other remedies and sanctions are available as well.

Norma's response to this letter, in duplicate, must be submitted to this office by April 14, 2000. Please include in Norma's response the identification codes referenced on page one of this letter. If Norma finds that it is unable to provide all of the information requested within the time allotted, Norma must request an extension from Mr. Thomas Z. Cooper at (202) 366-5218 no later than five business days before the response due date. If Norma is unable to provide all of the information requested by the original deadline, it must submit a partial response by the original deadline with whatever information Norma then has available, even if Norma has received an extension.

If Norma considers any portion of its response to be confidential information, 49 CFR Part 512, "Confidential Business Information," requires that Norma submit two copies of those document(s) containing allegedly confidential information (except only one copy of blueprints) and one copy of the documents from which information claimed to be confidential has been deleted, to the Office of Chief Counsel, National Highway Traffic Safety Administration, Room 5219 (NCC-30), 400 Seventh Street, SW, Washington, D.C. 20590. In addition, Norma must provide supporting information for the request for confidential treatment in accordance with 49 CFR Section 512.4(b) and (e) and include the name, address, and telephone number of a representative to receive a response from the Chief Counsel.

If you have any technical questions concerning this matter, please call Mr. Jeff Quandt of my staff at (202) 366-5207. If you have any questions concerning confidentiality claims, please contact Ms. Heidi Coleman, Assistant Chief Counsel for General Law, at (202) 366-1834.

Sincerely,

Kathleen C. DeMeter, Director
Office of Defects Investigation
Safety Assurance

Enclosure

16 Fluid Conductor Fasteners

RECOMMENDED PRACTICES FOR DESIGN AND EVALUATION OF PASSENGER AND LIGHT TRUCK COOLANT HOSE CLAMPED JOINTS—SAE J1697 JUL96

SAE Recommended Practice

Report of the SAE Hose/Hose Clamp Performance and Compatibility Committee approved July 1996.

TABLE OF CONTENTS

1. Scope—This SAE Recommended Practice covers recommended practices for design and evaluation of hose clamped joints primarily in automotive applications. It is intended to: (a) evaluate current joint designs, (b) compare existing designs, (c) aid in the development of new designs, (d) give objective results once weights are set, (e) rate the overall design and individual sections of design, and (f) encourage future research by industry and the OEM's.

2. References

2.1 Related Publications—The following publications are provided for information purposes only and are not a required part of this document.

2.1.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J1508—Hose Clamp Specifications

SAE J1610—Test Method for Evaluating the Sealing Capability of Hose Connection with a PVT Test Facility

3. Abstract—Design of hose-clamped coolant joints is not an exact science, therefore precise formulas and methods cannot accurately predict performance. However, theoretical and philosophical constructs based on empirical data and industry experience can be used to develop standard practices for evaluating automotive hose-clamped coolant joints. This document allows individual users to define key parameters that are important to their products and educate the industry about hose clamped coolant joints.

Five major components of designing a robust hose-clamped joint are: (a) sealability, (b) hose assembly, (c) hose blow-off, (d) assembly of clamps over hose/fitting, and (e) serviceability of the clamp. Depending on the function of the joint and the priority of the design, one category may be more important than another. In automotive coolant joint designs, sealability and hose assembly are the main concerns. Since most of the coolant joints are "low" pressure, hose blow-off ranks third. To satisfy the end customer, coolant joints must not leak. In addition the hose must be able to be assembled. In other words, the effort to push the hose fully on the joint must not be higher than is consistently manageable by the assembly operator. Therefore both sealability and hose assembly conditions must be met. Until recently it was thought that either one or the other of the criteria could be met while sacrificing the other.

Assembly and serviceability are also legitimate concerns when variation and proliferation exist. Variation in the clamp assembly as well as the type of clamp is inversely related to the robustness of the joint. As the variation of the assembly decreases, the potential for the joint to seal increases. Serviceability is important because the clamping mechanism must be accessible to the general public or easily substituted with other standard products.

4. Methodology—A weighting system is used to rank choices in the design process. The weights are arbitrarily set by the user to target key system requirements for that particular user. The process works best with a computer program but is not required to use the procedure. The design choices are ranked from 1 to 5 where 1 is the worst choice and 5 is the best choice for that particular section. In the event that a given design does not match any of the listed choices, the most applicable match should be chosen.

a. 1 Poor Design—20% (1/5)
b. 2 Average to Poor Design—40%
c. 3 Average Design—60%
d. 4 Average to Good Design—80%
e. 5 Good Design—100%

NOTE—It must be noted that some sections may indicate excellent designs but due to the interactions and dependencies, the total joint will suffer. In the following example it is suggested that the designer has only two concerns: sealability and hose assembly. A 40% weight is assigned to sealability and a 60% weight is assigned to hose assembly. Therefore hose assembly is the most important joint design criterion.

For the sealability part of this example, only interference and residual load are considered important with weights of 30% and 70%, respectively. Therefore with the weights chosen it is understood that residual load is felt to contribute the most towards sealing a coolant joint.

For the hose assembly part of this example, only interference to the fitting and wall thickness are considered important with 60% and 40% weights,

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respectively. Therefore it is similarly understood that interference to the fitting plays the largest part in hose assembly.

In the first design iteration sealability of the joint is rated at 54% while hose ;embly is rated at 56%. In the second design it is shown that both sealability .id hose assembly ratings have been increased to 57% and 72%, respectively.

The conclusion is that the second design is better in preventing leaks and is easier to assemble than the prior design. **However, keep in mind that most coolant joints are more complex than in the following example.**

4.1 Example

.4 **Sealability**

.3 Interference

1	Line to Line		
2	0 < 2.5% Interference		
3	2.5 < 5.0 Interference		
4	5 - 10% Interference		
5	> 10 % Interference		
		Design 1 selection:	2
		Design 2 selection:	2

.7 System Pressure (PSI)

1	> 80 PSI		
2	51 - 80 PSI		
3	31 - 50 PSI		
4	16 - 30 PSI		
5	0 - 15 PSI		
		Design 1 selection:	3
		Design 2 selection:	4

.6 **Hose Assembly**

.6 Interference to Fitting

1	> 10% Interference		
2	5 - 10 % Interference		
3	2.5 < 5% Interference		
4	0 < 2.5% Interference		
5	Line to Line		
		Design 1 selection:	4
		Design 2 selection:	4

.4 Wall Thickness

1	6.0 mm		
2	5.3 mm		
3	4.8 mm		
4	4.3 mm		
5	3.8 mm		
		Design 1 selection:	1
		Design 2 selection:	3

<u>Calculations Design 1</u>
Rating for Sealability = .4x.3x2 + .4x.7x3 = 1.08/2.0 = **54%**
Rating for Hose Assembly = .6x.6x4 + .6x.4x1 = 1.68/3.0 = **56%**
Total Joint Rating = 1.08 + 1.68 = 2.76/5.0 = 55.2%

<u>Calculations Design 2</u>
Rating for Sealability = **57%**
Rating for Hose Assembly = **72%**

FIGURE 1—EXAMPLE OF SEALABILITY AND HOSE ASSEMBLY

5. *Sealability*

5.1 Interference—Interference of the inside diameter of the hose to the sealing surface (shank) of the fitting is one of the most important criteria in designing a sealed system. There is a direct relationship between hose to fitting interference and push-on force. As the interference increases so will the push-on force. The relationship between interference and push-on will also change with hose material, reinforcement type and construction. Minimum design requirements should always have a line to line fit between inner diameter of the hose and the shank of the fitting. Clearance fits of any magnitude can lead to joint leaks. More interference has been proven to provide better sealing than less interference or a clearance fit. The greater the interference (provided the joint can still be assembled), the better probability of the sealed joint. Interference is calculated as shown in Equation 1:

$$((\text{Shank OD} - \text{Hose ID})/\ \text{Hose ID}) * 100 \qquad \text{(Eq.1)}$$

.40 <u>SEALABILITY</u>

.30	- Interference
.20	- Pressure
.17	- Surface Finish
.16	- Roundness
.07	- Sealing Length
.06	- Temperature
.02	- Adhesion
.02	- Bead Geometry and Diameter

.25 <u>HOSE ASSEMBLY</u>

.26	- Bead Diameter
.20	- Interference to Fitting
.10	- Hose Durometer
.08	- Wall Thickness
.08	- Angle of Installation
.08	- Reach to Install
.06	- Lead End Diameter of Fitting
.05	- Ramp Angle
.05	- Column Strength of Hose
.04	- Lubrication

.20 <u>HOSE BLOW-OFF</u>

.30	- Pressure
.20	- Interference Fit
.15	- Bead Diameter
.15	- Bead Design
.12	- Clamp Type
.08	- Type of Assembly Lubrication

.10 <u>ASSEMBLY OF CLAMPS OVER HOSE/FITTING</u>

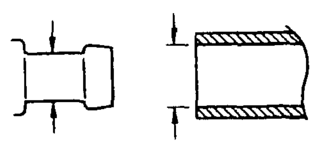
.30	- Number of Different Assembly Tools
.30	- Operator Sensitivity
.20	- Calibration of Tools
.15	- Rpm of Air Tools
.05	- Stray Assembly Lubricant (Slip Agents)

.05 <u>SERVICEABILITY OF CLAMP</u>

.40	- Tool Availability
.20	- Clamp Reuse
.20	- Clamp Availability
.15	- Adjustability
.05	- Corrosion

FIGURE 1—EXAMPLE OF SEALABILITY AND HOSE ASSEMBLY (CONTINUED)

5.1.1 HOSE/SHANK INTERFERENCE (% OF INSIDE DIAMETER)—(See Figure 2.)



1 Line to Line
2 0 < 2.5% Interference
3 2.5 ≤ x < 5% Interference
4 5 ≤ x ≤ 10% Interference
5 > 10 Interference

FIGURE 2—SEALABILITY—INTERFERENCE

5.2 Clamp Force Throughout Temperature Range (Residual Load)—Residual pressure, along with hose to fitting interference, is one of the m important factors in designing a leak-free joint. Load around the diameter of the clamp (pressure) is required after the system has come to equilibrium. As the pressure increases the higher the clamping force needs to be to prevent leaka Products that can maintain continuous pressure on the hose, even after the ho has set, will have a greater potential to seal. The impact of clamping pressure sealing will be reduced if imperfections in the fitting exist. Initial load is no complete indicator of how the joint will behave over time. Note that excess clamp pressures can damage some hoses and fitting.

Incorrect sizing of the clamp can result in lower initial and residual load Development testing should determine the minimum pressure from the cla required to seal the joint taking into consideration production processes.

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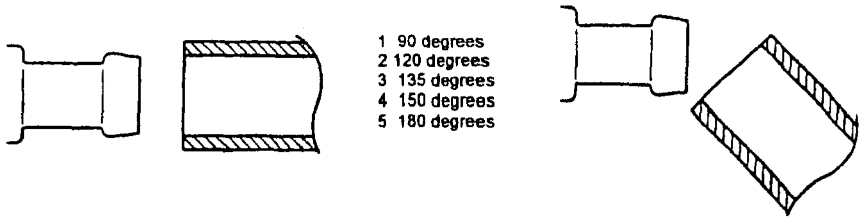

FIGURE 6—HOSE ASSEMBLY—ANGLE OF INSTALLATION

6.6 Reach to Install—Long overhead reaches to install hoses are more difficult than short horizontal reaches. Difficult to install joints have a higher probability of being assembled incorrectly.

6.6.1 REACH TO INSTALL

a. 1 Long Reach, Overhead
b. 2 Long Reach, Horizontal
c. 3 Average Reach, Horizontal
d. 4 Short Reach, Overhead
e. 5 Short Reach, Horizontal

Long Reach is > 1 foot from body
Short Reach is < 1 foot from body

6.7 Lead End Diameter of Fitting—See Figure 7.

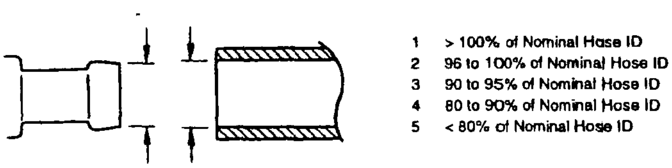

FIGURE 7—HOSE ASSEMBLY—LEAD END DIAMETER OF FITTING

6.8 Ramp Angle—Steep sloping ramp angles make assembly of the hose the fitting more difficult. However, ramp angles that increase the bead length also increase the surface area and may increase the hose push-on force.

6.8.1 RAMP ANGLE OF BEAD—See Figure 8.

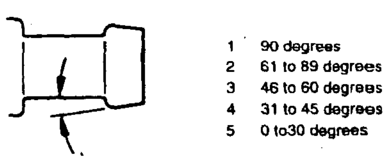

FIGURE 8—HOSE ASSEMBLY—RAMP ANGLE

6.9 Column Strength—For a given material and construction, hoses with a larger wall thickness will have a greater tendency to resist buckling during the installation of the hose. Reinforcement type (i.e., braid, spiral, knit, etc.) and configuration (i.e., angle, loops-needles, etc.) are very important parameters in push-on forces required to install the hose.

6.9.1 COLUMN STRENGTH OF HOSE

a. 1 3.8 mm
b. 2 4.3 mm
c. 3 4.8 mm
d. 4 5.3 mm
e 5 6.0 mm

6.10 Type of Assembly Lubrication—Lubrication aids in the assembly of the hose to the fitting in some cases. Typically lubricants are used because the interference between the hose and the fitting causes a high installation (push-on) force. Although interference is good for the seal of the joint, the related push-on forces must be kept manageable for production environments. Time and temperature will affect the dissipation of lubricants. Use of any type of nondissipating lubricant may increase the potential for hose blow-off.

6.10.1 LUBRICATION

a. 1 None
b. 2 Water
c. 3 Water and Glycol
d. 4 Partially Dissipating
e. 5 Dissipating

7. Hose Blow-Off

7.1 Pressure—Joints with higher system pressures will have a greater probability of blowing off than joints with lower pressures.

7.1.1 SYSTEM PRESSURE (PSI)

a. 1 > 80 PSI
b. 2 51 to 80 PSI
c. 3 31 to 50 PSI
d. 4 16 to 30 PSI
e. 5 0 to 15 PSI

7.2 Interference Fit—Greater interferences will require higher pressures to blow the hose off of the fitting (assuming no clamp). Proper hose to bead interference along with the proper clamp will give increased resistance to hose blow-off. Reinforcement type (i.e., braid, spiral, knit, etc.) and configuration (i.e., angle, loops-needles, etc.) are very important parameters in push-on forces required to install the hose.

7.2.1 INTERFERENCE FIT TO SHANK DIAMETER—See Figure 9.

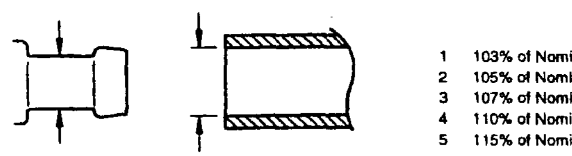

FIGURE 9—HOSE BLOW-OFF—INTERFERENCE FIT

7.3 Bead Diameter—Larger bead heights are better than smaller bead heights in resisting hose blow-off. However, as the bead height increases the force to assemble the joint also increases.

7.3.1 BEAD DIAMETER—See Figure 10.

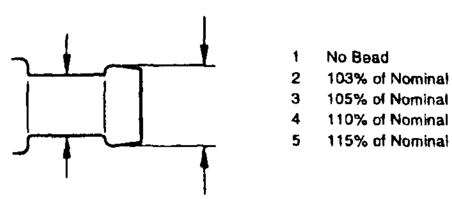

FIGURE 10—HOSE BLOW-OFF—BEAD DIAMETER

7.4 Bead Design (Back Angle)—See Figure 11.

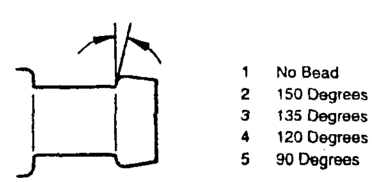

FIGURE 11—HOSE BLOW-OFF—BEAD DESIGN (BACK ANGLE)

7.5 Clamp Type—Fixed diameter clamps give the best resistance to hose blow-off. However, mechanically adjusted fixed diameter clamps will not compensate for the changing dynamics of a hose clamped joint nor will they respond to temperature fluctuations. Variable diameter clamps will not provide the blow-off resistance of fixed diameter clamps.

7.5.1 CLAMP TYPE

a. 1 No Clamp
b. 2 Compensating Diameter—Not manually adjustable
c. 3 Compensating Diameter—Manually adjustable
d. 4 Fixed Diameter—Not adjustable after installation
e. 5 Fixed Diameter—Adjustable after initial installation

7.6 Type of Assembly Lubrication—Lubrication aids in the assembly of the hose to the fitting in some cases. Typically lubricants are used because the interference between the hose and the fitting causes a high installation (push-on) force. Although interference is good for the seal of the joint, the related push-on forces must be kept manageable for production environments. Time and temperature will affect the dissipation of lubricants. Use of any type of nondissipating lubricant may increase the potential for hose blow-off.

7.7 Lubrication
a. 1 Non-Dissipating Lubricant
b. 2 Partially Dissipating Lubricant
c. 3 Water and Glycol
d. 4 Water
e. 5 None

8. Fastening and Assembly of Clamps Over Hose/Fitting

8.1 Number of Different Assembly Tools
a. 1 10 +
b. 2 6 to 10 tools
c. 3 3 to 5 tools
d. 4 2 to 3 tools
e. 5 1 tool

8.2 Operator Sensitivity
a. 1 Clamp position; tool; rpm; torque; >1 oper.
b. 2 Clamp position; tool; rpm; torque
c. 3 Clamp position; tool; rpm
d. 4 Clamp position; tool
e. 5 Clamp positioning or hose/clamp positioning only

8.3 Calibration of Tools—Tools that require calibration are sensitive to assembly variation.
a. 1 Recal., special tool, maintenance
b. 2 Recal. without special tool; not often
c. 3 Recal. with standard tool;
d. 4 No calibration but frequent adjustments
e. 5 No calibration; infrequent adjustments

8.4 Rpm of Air Tools (for screw clamps only)—High rpm tools are sources of assembly variation which may affect joint performance. The speed of the tightening tool will directly impact hose compression. High speed tools tend to shock the joint and fool the tool into shutting off before adequate hose compression is obtained. Lower rpm tools allow more time for the rubber to compress. Every air tool has a specific correlation between air pressure, rpm and torque. Variation in air pressure will cause variation in the dynamic torque reading. Setting the tool to a static torque specification is another source of variation. Static torque specifications for gasketed or soft joints often lead to frequent and unnecessary tool modifications.
a. 1 2500 +
b. 2 1500 to 2500 rpm
c. 3 1000 to 1499 rpm
d. 4 750 to 999 rpm
e. 5 < 750 rpm (enter 5 for nonscrew clamps)

8.5 Stray Assembly Lubricant (Slip Agents)—Assembly lubricants are necessary when interference fit designs are used. However, when stray lubricant comes in contact with the clamp, the joint performance can be compromised. Lubricants are intended to create a boundary layer between the hose and the fitting thus lowering the friction. Lower friction between the hose and the fitting translates directly into lower push-on forces. Problems are created specifically with screw clamps when stray assembly lubricant comes in contact with the screw. The lubricant will lower the friction coefficient between the screw and the band mechanism. The lower friction translates directly into higher forces for a given input torque. In some cases, the clamp will strip and in other cases, the hose will be damaged. Unless engineering specifically designed the joint with that lubricant on the screw clamp, the joint will be compressed differently. As the number of different slip lubricants used in the plant increases, the variation associated with clamping the joint also increases. Better joint designs limit the number of slip lubricants used on hose clamped joints and avoids contact with the clamp (specifically screw clamps).
a. 1 > 3 Slip Agents Used—100% contact
b. 2 2 Slip Agents—Occasional clamp contact
c. 3 2 Slip Agents—No clamp contact
d. 4 Only 1 Slip Agent—Occasional contact
e. 5 Only 1 Slip Agent—No clamp contact

9. Serviceability

9.1 Availability—Special tools will make any clamp or joint harder to service. Readily available tools will aid in the proper service of the joint.
a. 1 Special Order—Dealership
b. 2 Service Garage—Dealership
c. 3 Automotive Supply—Dealership
d. 4 Hardware Store—Dealership
e. 5 Grocery Store—Dealership

9.2 Clamp Reuse—Using different clamps may affect the performance of some joints, therefore using the same production clamp has some advantages.
a. 1 Not reusable
b. 2 Reusable but requires special care
c. 3 Reusable, if not initially damaged
d. 4 Reusable, if not damaged or rusted
e. 5 Very reusable; difficult to damage

9.3 Clamp Availability—Key to servicing a coolant carrying joint is the availability of similar if not identical replacement parts. Parts that can be easily obtained will lead to rapid joint repair.
a. 1 Special Order—Dealership
b 2 Service Garage—Dealership
c. 3 Automotive Supply—Dealership
d. 4 Hardware Store—Dealership
e. 5 Grocery Store—Dealership

9.4 Clamp Adjustability—Clamps that are not reusable are typically destroyed when the joint requires servicing. In removing the clamp, there is a chance that the hose may be damaged (if the hose is not the reason the joint is being serviced).

Self-adjusting clamps work on the principle of spring rate. Once initially installed, the spring rate of the clamp keeps pressure on the joint after the joint has been thermal cycled and come to equilibrium. Some self-adjusting clamps are have limited ranges and work for only very specific joint conditions (i.e., hose diameters, hose wall thickness, bead heights, etc.). By design, self-adjusting clamps are part of a "net joint design". Net joint design incorporates all necessary features to avoid in process manual adjustments by production operators. Net joint design theory assumes that coolant leaks are caused by poor joint design, not poor component design.

Manually adjustable clamps can make up for joint deficiencies; however, they are very sensitive to proper fastening and assembly tooling. Typically the rate these clamps are adjusted directly impacts the residual pressure on the joint. Manually adjustable clamps, by their nature, are designed for joint repair in production and service repair in the field.
a. 1 Not manually or self-adjusting
b. 2 Adjustable Once Installed—Not reusable due to rust
c. 3 Self-Adjusting—No manual adjustment
d. 4 Self-Adjusting—Allows manual adjustment
e. 5 Manual adjustment

9.5 Clamp Corrosion—There are two primary types of corrosion: cosmetic and structural. Cosmetic corrosion will eventually lead to structural corrosion of carbon steel clamps if not properly protected with a corrosion protection finish. Typically corrosion is associated with poor quality and therefore is undesirable in a coolant joint design. Red rust on carbon steel clamps will make serviceability difficult and may require the clamp to be destroyed upon removal. Low carbon steel clamps that rust within a year (of the end user's driving environment) provide minimal corrosion protection and are poorly designed for clamp corrosion. Alternative corrosion protective finishes should be evaluated in this case.

Clamps that do not exhibit red rust with 10 years are considered excellent from a serviceability perspective. These clamps should be easy to remove if the joint needs to be serviced. All stainless steel clamps (300 series) have the best chance of meeting this requirement. Shipping, handling and assembly tools make it difficult for carbon steel clamps with corrosion protective finishes to meet this specification. If the finish is scratched or scrapped off, corrosion will begin.
a. 1 Red Rust within 1 year
b. 2 No Red Rust within 3 years
c. 3 No Red Rust within 5 years
d 4 No Red Rust within 7 years
e. 5 No Red Rust within 10 years

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MAR 8 2000

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. David Westgate, President
Solvay Automotive, Inc.
Headquarters and Technical Center
2565 West Maple Road
Troy, MI 48084

NSA-122jlq
EA99-013

Dear Mr. Westgate:

This letter is to advise you that the Office of Defects Investigation (ODI) of the National Highway Traffic Safety Administration (NHTSA) is conducting an investigation of crash induced filler neck assembly failure in 1996 through 2000 DaimlerChrysler NS-minivan vehicles equipped with fuel tank assemblies supplied by Solvay Automotive, Inc., and to request certain information.

Unless otherwise stated in the text, the following definitions apply to this information request:

- **Subject vehicles**: all 1996 through current model year DaimlerChrysler NS-minivans.
- **Subject fuel tank assembly**: all fuel storage tanks supplied by Solvay for use in the subject vehicles.
- **Subject tank spud**: all tank fill spuds used in subject fuel tank assemblies, whether molded with the tank, hot-plate welded to the tank, or joined by other means.
- **Subject hose joint**: the clamped joint between the filler neck hose and the fuel tank spud, including the hose, the clamp, and the tank fill spud.
- **Solvay**: Solvay Automotive Inc., all of its past and present officers and employees, whether assigned to its principal offices or any of its field or other locations, including all of its divisions, subsidiaries (whether or not incorporated) and affiliated enterprises and all of their headquarters, regional, zone and other offices and their employees, and all agents, contractors, consultants, attorneys and law firms and other persons engaged directly or indirectly (e.g., employee of a consultant) by or under the control of Solvay (including all business units and persons previously referred to), who are or, in or after January 1994,

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were involved in any way with any of the following related to the alleged defect in the subject vehicles:

a. design, engineering, analysis, modification or production (e.g. quality control);
b. testing, assessment or evaluation;
c. consideration, or recognition of potential or actual defects, reporting, record-keeping and information management, (e.g., complaints, field reports, warranty information, part sales), analysis, claims, or lawsuits; or
d. communication to, from or intended for zone representatives, fleets, dealers, or other field locations, including but not limited to individuals who have the capacity to obtain information from dealers.

- **Alleged defect**: shall refer to collision induced failure of the fuel filler neck.

- **Documents**: "Document(s)" is used in the broadest sense of the word and shall mean all original written, printed, typed, recorded, or graphic matter whatsoever, however produced or reproduced, of every kind, nature, and description, and all nonidentical copies of both sides thereof, including, but not limited to, papers, letters, memoranda, correspondence, communications, electronic mail (e-mail) messages (existing in hard copy and/or in electronic storage), faxes, mailgrams, telegrams, cables, telex messages, notes, annotations, working papers, drafts, minutes, records, audio and video recordings, data, databases, other information bases, summaries, charts, tables, graphics, other visual displays, photographs, statements, interviews, opinions, reports, newspaper articles, studies, analyses, evaluations, interpretations, contracts, agreements, jottings, agendas, bulletins, notices, announcements, instructions, blueprints, drawings, as-builts, changes, manuals, publications, work schedules, journals, statistical data, desk, portable and computer calendars, appointment books, diaries, travel reports, lists, tabulations, computer printouts, data processing program libraries, data processing inputs and outputs, microfilms, microfiches, statements for services, resolutions, financial statements, governmental records, business records, personnel records, work orders, pleadings, discovery in any form, affidavits, motions, responses to discovery, all transcripts, administrative filings and all mechanical, magnetic, photographic and electronic records or recordings of any kind, including any storage media associated with computers, including, but not limited to, information on hard drives, floppy disks, backup tapes, and zip drives, electronic communications, including but not limited to, the Internet and shall include any drafts or revisions pertaining to any of the foregoing, all other things similar to any of the foregoing, however denominated by Solvay, any other data compilations from which information can be obtained, translated if necessary, into a usable form and any other documents. For purposes of this request, any document which contains any note, comment, addition, deletion, insertion, annotation, or otherwise comprises a nonidentical copy of another document shall be treated as a separate document subject to production. In all cases where original and any non-identical copies are not available, "document(s)" also means any identical copies of the original and all non-identical copies thereof. Any

document, record, graph, chart, film or photograph originally produced in color must be provided in color. Furnish all documents whether verified by the manufacturer or not. If a document is not in the English language, provide both the original document and an English translation of the document.

In order for my staff to evaluate the alleged defect, certain information is required. Pursuant to 49 U.S.C. § 30166, please provide numbered responses to the following information requests. Please repeat the applicable request verbatim above each response. After Solvay's response to each request, identify the source of the information and indicate the last date the source updated the information prior to the preparation of the response. Insofar as Solvay has previously provided a document to ODI, Solvay may either produce it again, or identify the document, the document submission to ODI in which it was included and the precise location in that submission where the document is located. When documents are produced, the documents shall be produced in an identified, organized manner that corresponds with the Information Request letter (including the subparts). When documents are produced and the documents would not, standing alone, be self-explanatory, the production of documents shall be supplemented and accompanied by explanation.

If Solvay cannot respond to any specific request or subpart thereof, please state the reason why it is unable to do so. If Solvay claims that any document or other information or material responsive to any of the following items need not be provided to NHTSA because it is privileged or the work product of an attorney, separately by information request number, for each such document or other information or material, state the nature of that information or material and identify any document in which it is found by date, subject or title, name and position of the person from, and the person to whom it was sent, and the name and position of any other recipient. Solvay must also describe the basis for the claim, and explain why Solvay believes it applies.

1. Provide copies of all documents related to all communications between Solvay and DaimlerChrysler regarding the design, crash performance, pull-off performance, or sealing performance of the subject tank spud (i.e., documents relating to the spud-tank weld need not be included). Sort the documents, furnished by date, in chronological order.

2. Provide copies of all documents related to communications between Solvay and any and all other entities, that are related in any way to the design, crash performance, pull-off performance, or sealing performance of the subject tank spud or to the design and performance of clamped hose joints in general, since January 5, 1999. Furnish the documents sorted by date and in separate enclosures for each such entity.

3. Provide the following information concerning the design and specification of the subject fuel tank spud:

a. provide copies of all documents related to any specifications from DaimlerChrysler regarding the subject tank spud or the subject hose joint;
b. describe Solvay's role in the design of the subject tank spud and provide copies of all relevant documents;
c. identify (by name, company title and group affiliation, and business telephone number) all past or present employees of Solvay who were involved to any extent in the design of the subject tank spud and state the specific role/responsibility of each individual in the design process;
d. state when Solvay first became involved in the design and/or development of the subject fuel tank assembly and describe Solvay's qualifications, expertise, and experience at the stated time period in the design of fuel tank spuds and clamped hose joints used for joining filler neck assemblies to motor vehicle fuel tanks with particular attention to the crash performance (i.e., resistance to separation from external loading) of such components/systems;
e. state whether crash performance and resistance to hose "pull-off" or separation under load were considered by Solvay in the design of the subject tank spud; and
f. explain the basis for the design of the subject tank spud bead, with particular attention to the bead back angle.

4. Provide copies of all documents related to testing, research, calculations, and/or other analyses conducted by, or on behalf of, Solvay relating to the design or pull-off resistance of hose joints used in the fuel filler neck assemblies of motor vehicles (including the subject vehicles). For each pull-off test conducted, state both the force, displacement, and hose elongation (%) corresponding to the beginning of hose slippage on the fitting and hose separation from the joint.

5. Provide copies of all standards, handbooks, design guides, recommended practices, technical papers, reports, training material (including applicable sections of textbooks), or any other reference materials relating to the design, performance, or manufacture of clamped hose joints. Include all such materials received from or published or produced by technical or trade associations or other outside sources, as well as material developed by Solvay itself, either for internal or client use. Furnish all such documents which relate in any way to pull-off performance in a separate enclosure.

6. Provide Solvay's assessment of which aspects of the design and manufacture of clamped hose joints are factors in the pull-off resistance of the joint. Rank and weigh the contribution of each factor to the pull-off resistance of the joint, state the recommended parameters for each factor, and state the nominal value and tolerance range (state worst case tolerance stack-up condition for factors involving multiple dimensions, e.g., interference fit) in the subject hose joint design for each of the factors identified. Include in your response the influence of hose-fitting adhesion and the following categories listed in SAE Recommended Practice J1697 - Section 7, "Recommended Practices for Design and

Evaluation of Passenger and Light Truck Coolant Hose Clamped Joints - Hose Blow Off," published in July 1996 (copy enclosed):

a. interference fit;
b. bead diameter;
c. bead design (back angle);
d. clamp type; and
e. type of assembly lubricant.

7. Provide copies of all other documents in Solvay's possession or control that are related in any way to the subject tank spud or to the design and manufacture of clamped hose joints. Furnish the documents in descending chronological order.

8. Provide a table listing all plastic fuel tanks manufactured by Solvay from 1995 to present, showing: (a) the name of the customer; (b) the size of the fuel tank in gallons; (c) the vehicle application(s) of the fuel tank by model and model year; (d) the filler neck configuration (e.g., filler tube-hose-tank configuration used in the subject vehicles, integrated fill neck design, or other); (e) design responsibility (Solvay or manufacturer); (f) the spud outer diameter; (g) the spud wall thickness; (h) whether the tank spud is reinforced by a metal ferrule/sleeve or other method (if another method, describe that method); (i) the spud bead diameter; (j) the spud bead width; and (k) the spud bead back angle. Include a diagram showing the coordinate system for the stated bead back angle. Items 8.f and 8.g refer to the fitting area of the spud over which the clamping device is situated.

9. Provide the name, title and office affiliation, and business telephone number of a Solvay representative who can answer technical questions regarding the information furnished in response to this letter.

This letter is being sent to Solvay pursuant to 49 U.S.C. § 30166, which authorizes NHTSA to conduct any investigation that may be necessary to enforce Chapter 301 of Title 49. Solvay's failure to respond promptly and fully to this letter could subject Solvay to civil penalties pursuant to 49 U.S.C. § 30165 or lead to an action for injunctive relief pursuant to 49 U.S.C. § 30163. Other remedies and sanctions are available as well.

Solvay's response to this letter, in duplicate, must be submitted to this office by April 14, 2000. Please include in Solvay's response the identification codes referenced on page one of this letter. If Solvay finds that it is unable to provide all of the information requested within the time allotted, Solvay must request an extension from Mr. Thomas Z. Cooper at (202) 366-5218 no later than five business days before the response due date. If Solvay is unable to provide all of the information requested by the original deadline, it must submit a partial response by the original deadline with whatever information Solvay then has available, even if Solvay has received an extension.

If Solvay considers any portion of its response to be confidential information, 49 CFR Part 512, "Confidential Business Information," requires that Solvay submit two copies of those document(s) containing allegedly confidential information (except only one copy of blueprints) and one copy of the documents from which information claimed to be confidential has been deleted, to the Office of Chief Counsel, National Highway Traffic Safety Administration, Room 5219 (NCC-30), 400 Seventh Street, SW, Washington, D.C. 20590. In addition, Solvay must provide supporting information for the request for confidential treatment in accordance with 49 CFR Section 512.4(b) and (e) and include the name, address, and telephone number of a representative to receive a response from the Chief Counsel.

If you have any technical questions concerning this matter, please call Mr. Jeff Quandt of my staff at (202) 366-5207. If you have any questions concerning confidentiality claims, please contact Ms. Heidi Coleman, Assistant Chief Counsel for General Law, at (202) 366-1834.

Sincerely,

Kathleen C. DeMeter, Director
Office of Defects Investigation
Safety Assurance

Enclosure

16 Fluid Conductor Fasteners

RECOMMENDED PRACTICES FOR DESIGN AND EVALUATION OF PASSENGER AND LIGHT TRUCK COOLANT HOSE CLAMPED JOINTS—SAE J1697 JUL96

SAE Recommended Practice

Report of the SAE Hose/Hose Clamp Performance and Compatibility Committee approved July 1996.

TABLE OF CONTENTS

1. Scope—This SAE Recommended Practice covers recommended practices for design and evaluation of hose clamped joints primarily in automotive applications. It is intended to: (a) evaluate current joint designs, (b) compare existing designs, (c) aid in the development of new designs, (d) give objective results once weights are set, (e) rate the overall design and individual sections of design, and (f) encourage future research by industry and the OEM's.

2. References

2.1 Related Publications—The following publications are provided for information purposes only and are not a required part of this document.

2.1.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J1508—Hose Clamp Specifications

SAE J1610—Test Method for Evaluating the Sealing Capability of Hose Connection with a PVT Test Facility

3. Abstract—Design of hose-clamped coolant joints is not an exact science, therefore precise formulas and methods cannot accurately predict performance. However, theoretical and philosophical constructs based on empirical data and industry experience can be used to develop standard practices for evaluating automotive hose-clamped coolant joints. This document allows individual users to define key parameters that are important to their products and educate the industry about hose clamped coolant joints.

Five major components of designing a robust hose-clamped joint are: (a) sealability, (b) hose assembly, (c) hose blow-off, (d) assembly of clamps over hose/fitting, and (e) serviceability of the clamp. Depending on the function of the joint and the priority of the design, one category may be more important than another. In automotive coolant joint designs, sealability and hose assembly are the main concerns. Since most of the coolant joints are "low" pressure, hose blow-off ranks third. To satisfy the end customer, coolant joints must not leak. In addition the hose must be able to be assembled. In other words, the effort to push the hose fully on the joint must not be higher than is consistently manageable by the assembly operator. Therefore both sealability and hose assembly conditions must be met. Until recently it was thought that either one or the other of the criteria could be met while sacrificing the other.

Assembly and serviceability are also legitimate concerns when variation and proliferation exist. Variation in the clamp assembly as well as the type of clamp is inversely related to the robustness of the joint. As the variation of the assembly decreases, the potential for the joint to seal increases. Serviceability is important because the clamping mechanism must be accessible to the general public or easily substituted with other standard products.

4. Methodology—A weighting system is used to rank choices in the design process. The weights are arbitrarily set by the user to target key system requirements for that particular user. The process works best with a computer program but is not required to use the procedure. The design choices are ranked from 1 to 5 where 1 is the worst choice and 5 is the best choice for that particular section. In the event that a given design does not match any of the listed choices, the most applicable match should be chosen.

a. 1 Poor Design—20% (1/5)
b. 2 Average to Poor Design—40%
c. 3 Average Design—60%
d. 4 Average to Good Design—80%
e. 5 Good Design—100%

NOTE—It must be noted that some sections may indicate excellent designs but due to the interactions and dependencies, the total joint will suffer. In the following example it is suggested that the designer has only two concerns: sealability and hose assembly. A 40% weight is assigned to sealability and a 60% weight is assigned to hose assembly. Therefore hose assembly is the most important joint design criterion.

For the sealability part of this example, only interference and residual load are considered important with weights of 30% and 70%, respectively. Therefore with the weights chosen it is understood that residual load is felt to contribute the most towards sealing a coolant joint.

For the hose assembly part of this example, only interference to the fitting and wall thickness are considered important with 60% and 40% weights,

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respectively. Therefore it is similarly understood that interference to the fitting plays the largest part in hose assembly.

In the first design iteration sealability of the joint is rated at 54% while hose sembly is rated at 56%. In the second design it is shown that both sealability ..d hose assembly ratings have been increased to 57% and 72%, respectively.

The conclusion is that the second design is better in preventing leaks and is easier to assemble than the prior design. **However, keep in mind that most coolant joints are more complex than in the following example.**

4.1 Example

.4 **Sealability**

.3	Interference			
	1	Line to Line		
	2	0 < 2.5% Interference		
	3	2.5 < 5.0 Interference		
	4	5 - 10% Interference		
	5	> 10 % Interference		
			Design 1 selection:	2
			Design 2 selection:	2
.7	System Pressure (PSI)			
	1	> 80 PSI		
	2	51 - 80 PSI		
	3	31 - 50 PSI		
	4	16 - 30 PSI		
	5	0 - 15 PSI		
			Design 1 selection:	3
			Design 2 selection:	4

.6 **Hose Assembly**

.6	Interference to Fitting			
	1	> 10% Interference		
	2	5 - 10 % Interference		
	3	2.5 < 5% Interference		
	4	0 < 2.5% Interference		
	5	Line to Line		
			Design 1 selection:	4
			Design 2 selection:	4
.4	Wall Thickness			
	1	6.0 mm		
	2	5.3 mm		
	3	4.8 mm		
	4	4.3 mm		
	5	3.8 mm		
			Design 1 selection:	1
			Design 2 selection:	3

Calculations Design 1
Rating for Sealability = .4x.3x2 + .4x.7x3 = 1.08/2.0 = **54%**
Rating for Hose Assembly = .6x.6x4 + .6x.4x1 = 1.68/3.0 = **56%**
Total Joint Rating = 1.08 + 1.68 = 2.76/5.0 = 55.2%

Calculations Design 2
Rating for Sealability = **57%**
Rating for Hose Assembly = **72%**

FIGURE 1—EXAMPLE OF SEALABILITY AND HOSE ASSEMBLY

5. *Sealability*

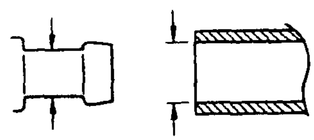
5.1 Interference—Interference of the inside diameter of the hose to the sealing surface (shank) of the fitting is one of the most important criteria in designing a sealed system. There is a direct relationship between hose to fitting interference and push-on force. As the interference increases so will the push-on force. The relationship between interference and push-on will also change with hose material, reinforcement type and construction. Minimum design requirements should always have a line to line fit between inner diameter of the hose and the shank of the fitting. Clearance fits of any magnitude can lead to joint leaks. More interference has been proven to provide better sealing than less interference or a clearance fit. The greater the interference (provided the joint can still be assembled), the better probability of the sealed joint. Interference is calculated as shown in Equation 1:

$$((\text{Shank OD} - \text{Hose ID}) / \text{Hose ID}) * 100 \qquad \text{(Eq.1)}$$

.40	**SEALABILITY**	
	.30	- Interference
	.20	- Pressure
	.17	- Surface Finish
	.16	- Roundness
	.07	- Sealing Length
	.06	- Temperature
	.02	- Adhesion
	.02	- Bead Geometry and Diameter
.25	**HOSE ASSEMBLY**	
	.26	- Bead Diameter
	.20	- Interference to Fitting
	.10	- Hose Durometer
	.08	- Wall Thickness
	.08	- Angle of Installation
	.08	- Reach to Install
	.06	- Lead End Diameter of Fitting
	.05	- Ramp Angle
	.05	- Column Strength of Hose
	.04	- Lubrication
.20	**HOSE BLOW-OFF**	
	.30	- Pressure
	.20	- Interference Fit
	.15	- Bead Diameter
	.15	- Bead Design
	.12	- Clamp Type
	.08	- Type of Assembly Lubrication
.10	**ASSEMBLY OF CLAMPS OVER HOSE/FITTING**	
	.30	- Number of Different Assembly Tools
	.30	- Operator Sensitivity
	.20	- Calibration of Tools
	.15	- Rpm of Air Tools
	.05	- Stray Assembly Lubricant (Slip Agents)
.05	**SERVICEABILITY OF CLAMP**	
	.40	- Tool Availability
	.20	- Clamp Reuse
	.20	- Clamp Availability
	.15	- Adjustability
	.05	- Corrosion

FIGURE 1—EXAMPLE OF SEALABILITY AND HOSE ASSEMBLY (CONTINUED)

5.1.1 HOSE/SHANK INTERFERENCE (% OF INSIDE DIAMETER)—(See Figure 2)



1 Line to Line
2 0 < 2.5% Interference
3 2.5 ≤ x < 5% Interference
4 5 ≤ x ≤ 10% Interference
5 > 10 Interference

FIGURE 2—SEALABILITY—INTERFERENCE

5.2 Clamp Force Throughout Temperature Range (Residual Load)—Residual pressure, along with hose to fitting interference, is one of the most important factors in designing a leak-free joint. Load around the diameter of the clamp (pressure) is required after the system has come to equilibrium. As the pressure increases the higher the clamping force needs to be to prevent leakage. Products that can maintain continuous pressure on the hose, even after the hose has set, will have a greater potential to seal. The impact of clamping pressure on sealing will be reduced if imperfections in the fitting exist. Initial load is not a complete indicator of how the joint will behave over time. Note that excessive clamp pressures can damage some hoses and fitting.

Incorrect sizing of the clamp can result in lower initial and residual loads. Development testing should determine the minimum pressure from the clamp required to seal the joint taking into consideration production processes.

5.3 Pressure—System operating pressures define the type of clamping system the joint requires. Low pressure systems will allow the most flexibility in the design of the joint and will be easier to seal. As the pressure increases the hose design requirements may also change. Higher pressure applications will require different reinforcements and constructions. Pressure is also important with respect to the friction between the hose and the fitting and the hose and the clamp.

5.3.1 MAXIMUM JOINT PRESSURE (PSI)

a. 1 > 80 PSI
b. 2 51 to 80 PSI
c. 3 31 to 50 PSI
d. 4 16 to 30 PSI
e. 5 0 to 15 PSI

5.4 Surface Finish—The surface finish of the fitting is important in the sealing process. Although rough finishes can contribute to a joint leak under some conditions, a certain degree of "grabbiness" by the fitting is required to prevent blow-off. Finishes that are too smooth will be harder to push on the fitting. Similarly if a boundary layer of fluid is allowed between the hose and a "too smooth" fitting, a blow-off condition is likely to occur. The more consistent the sealing surface, the better the chance the joint has to seal.

5.4.1 SURFACE FINISH OF FITTING (RA)

a. 1 Sand Cast (50 - 25)
b. 2 Sand Cast (24 - 6.3)
c. 3 Die Cast (6.2 - 2.1)
d. 4 Molded Plastic (2.0 - 0.8)
e. 5 Machined, Tubing,(0.8 - 0.2)

5.5 Roundness—Parting lines are direct leak paths. Larger parting lines have a higher probability of causing a joint leak than joints with smaller, faintly visible parting lines. Depressions or crevices below the contact surface will also cause leaks. Mismatch of dies or molds may create a leak path at low temperatures.

5.5.1 ROUNDNESS OF FITTING SEALING SURFACE

a. 1 > 0.50 mm Major Surface Imperfection
b. 2 0.28 to 0.50 mm Machined Imperfections
c. 3 0.178 to 0.254 mm No visual as produced imperfections
d. 4 0.076 to 0.152 mm Radial Removal of Discontinuities
e. 5 < 0.076 mm Turned Surfaces

5.6 Sealing Length—Longer sealing lengths provide a more robust design and assembly process. If the sealing length is not long enough, there is a greater potential that the clamp will be mis-aligned. In production settings, where accurate placement of the clamp cannot be guaranteed (assuming loose assembly), there is a greater possibility that the clamp will be placed either on the bead of the fitting or the hose stop. If the clamp is "tilted" a leak may develop.

5.6.1 SEALING LENGTH OF FITTING—See Figure 3.

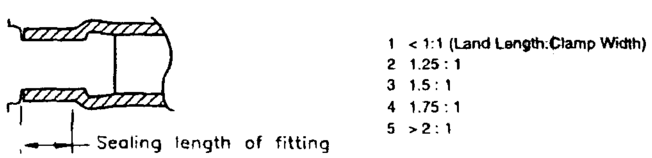


FIGURE 3—SEALABILITY—SEALING LENGTH

5.7 Temperature—Systems with a constant ambient or higher temperature will seal better than joints that have a constant cold temperature or fluctuating cold/hot temperatures. Greater rates of temperature changes may promote system leaks.

5.7.1 TEMPERATURE

a. 1 Constant Cold
b. 2 Fluctuating Cold Environment
c. 3 Fluctuating Cold/Hot Environment
d. 4 Constant Ambient Temperature
e. 5 Constant Hot Temperature

5.8 Adhesion—Any adhesion of the hose to the fitting aids in the sealing process and reduces the responsibility of the clamp. Joints that do not adhere over time rely more heavily on the clamp, hose interference, etc., to seal the joint. Not all EPDM hose bonds to copper brass.

5.8.1 ADHESION OF HOSE TO FITTING

a. 1 Paint/other that forms a lube
b. 2 Non-Dissipating Lubricant
c. 3 Clean/Smooth surface
d. 4 Paint that forms a bond
e. 5 Copper-Brass fitting to EPDM Hose

5.9 Bead Geometry and Diameter

a. 1 < 360 Degree Bead
b. 2 360 bead, 0 < 3% Interference
c. 3 360 bead, 3 to 5% Interference
d. 4 360 bead, 5 to 10% Interference
e. 5 360 bead, > 15% Interference

6. Hose Assembly

6.1 Bead Diameter—As the bead height increases the push-on force over the bead also increases. Although the larger bead aids in blow-off forces, it makes the joint more difficult to assemble.

6.1.1 BEAD DIAMETER OF FITTING—See Figure 4.

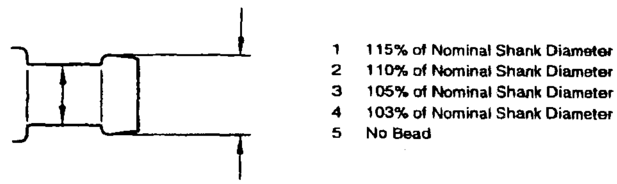


FIGURE 4—HOSE ASSEMBLY—BEAD DIAMETER

6.2 Interference to Fitting—Greater interference between the hose and the sealing surface of the fitting provides a better seal; however, the push-on forces (and efforts) increase also. In general, the greater the interference the greater the push-on forces.

6.2.1 INTERFERENCE TO FITTING—See Figure 5.

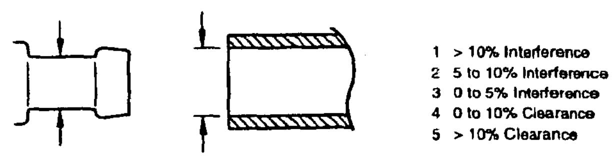


FIGURE 5—HOSE ASSEMBLY—INTERFERENCE TO FITTING

6.3 Hose Durometer—Higher durometer hose is less compliant than lower durometer hose and will have higher push-on forces. Lower durometer materials will allow the translation of the pressure of the clamp directly to the sealing surface. Lower durometer hose will allow the joint to be designed with more interference. Note that hose column strength may be reduced by using lower durometer rubbers and consequently lead to more difficult installation.

6.3.1 HOSE TUBE DUROMETER (SHORE A)

a. 1 71 to 80
b. 2 61 to 70
c. 3 51 to 60
d. 4 40 to 50
c. 5 < 40*

6.4 Wall Thickness—The wall thickness variation of a hose can affect the distribution of pressure as applied by the clamp and the push-on force required to assemble the joint. Smaller wall thicknesses will allow easier installation and better transmission of load to the sealing surface.

6.4.1 WALL THICKNESS (FOR 15 TO 46 MM ID HOSES)

a. 1 6.0 mm
b. 2 5.3 mm
c. 3 4.8 mm
d. 4 4.3 mm
e. 5 3.8 mm

6.5 Angle of Installation—The angle of installation of the hose to the fitting will affect the push-on effort of the operator. The straighter the angle of installation the easier the joint is to assemble.

6.5.1 ANGLE OF INSTALLATION—See Figure 6.

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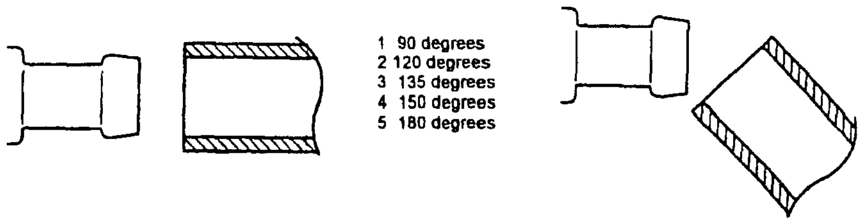

FIGURE 6—HOSE ASSEMBLY—ANGLE OF INSTALLATION

6.6 Reach to Install—Long overhead reaches to install hoses are more difficult than short horizontal reaches. Difficult to install joints have a higher probability of being assembled incorrectly.

6.6.1 REACH TO INSTALL

a. 1 Long Reach, Overhead
b. 2 Long Reach, Horizontal
c. 3 Average Reach, Horizontal
d. 4 Short Reach, Overhead
e. 5 Short Reach, Horizontal

Long Reach is > 1 foot from body
Short Reach is < 1 foot from body

6.7 Lead End Diameter of Fitting—See Figure 7.

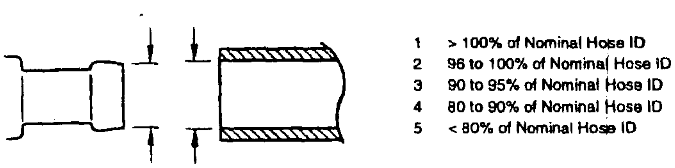

FIGURE 7—HOSE ASSEMBLY—LEAD END DIAMETER OF FITTING

6.8 Ramp Angle—Steep sloping ramp angles make assembly of the hose the fitting more difficult. However, ramp angles that increase the bead length also increase the surface area and may increase the hose push-on force.

6.8.1 RAMP ANGLE OF BEAD—See Figure 8.

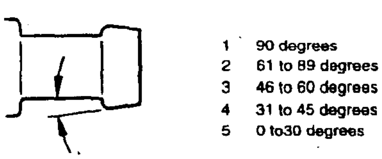

FIGURE 8—HOSE ASSEMBLY—RAMP ANGLE

6.9 Column Strength—For a given material and construction, hoses with a larger wall thickness will have a greater tendency to resist buckling during the installation of the hose. Reinforcement type (i.e., braid, spiral, knit, etc.) and configuration (i.e., angle, loops-needles, etc.) are very important parameters in push-on forces required to install the hose.

6.9.1 COLUMN STRENGTH OF HOSE

a. 1 3.8 mm
b. 2 4.3 mm
c. 3 4.8 mm
d. 4 5.3 mm
e 5 6.0 mm

6.10 Type of Assembly Lubrication—Lubrication aids in the assembly of the hose to the fitting in some cases. Typically lubricants are used because the interference between the hose and the fitting causes a high installation (push-on) force. Although interference is good for the seal of the joint, the related push-on forces must be kept manageable for production environments. Time and temperature will affect the dissipation of lubricants. Use of any type of nondissipating lubricant may increase the potential for hose blow-off.

6.10.1 LUBRICATION

a. 1 None
b. 2 Water
c. 3 Water and Glycol
d. 4 Partially Dissipating
e. 5 Dissipating

*7. **Hose Blow-Off***

7.1 Pressure—Joints with higher system pressures will have a greater probability of blowing off than joints with lower pressures.

7.1.1 SYSTEM PRESSURE (PSI)

a. 1 > 80 PSI
b. 2 51 to 80 PSI
c. 3 31 to 50 PSI
d. 4 16 to 30 PSI
e. 5 0 to 15 PSI

7.2 Interference Fit—Greater interferences will require higher pressures to blow the hose off of the fitting (assuming no clamp). Proper hose to bead interference along with the proper clamp will give increased resistance to hose blow-off. Reinforcement type (i.e., braid, spiral, knit, etc.) and configuration (i.e., angle, loops-needles, etc.) are very important parameters in push-on forces required to install the hose.

7.2.1 INTERFERENCE FIT TO SHANK DIAMETER—See Figure 9.

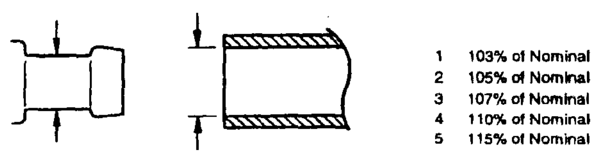

FIGURE 9—HOSE BLOW-OFF—INTERFERENCE FIT

7.3 Bead Diameter—Larger bead heights are better than smaller bead heights in resisting hose blow-off. However, as the bead height increases the force to assemble the joint also increases.

7.3.1 BEAD DIAMETER—See Figure 10.

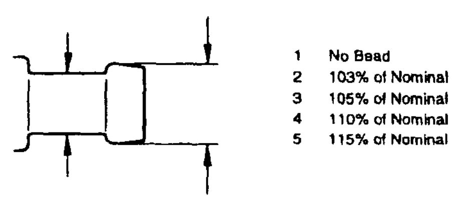

FIGURE 10—HOSE BLOW-OFF—BEAD DIAMETER

7.4 Bead Design (Back Angle)—See Figure 11.

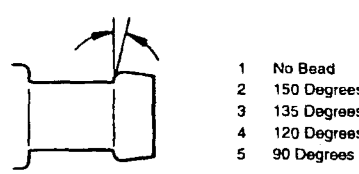

FIGURE 11—HOSE BLOW-OFF—BEAD DESIGN (BACK ANGLE)

7.5 Clamp Type—Fixed diameter clamps give the best resistance to hose blow-off. However, mechanically adjusted fixed diameter clamps will not compensate for the changing dynamics of a hose clamped joint nor will they respond to temperature fluctuations. Variable diameter clamps will not provide the blow-off resistance of fixed diameter clamps.

7.5.1 CLAMP TYPE

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a. 1 No Clamp
b. 2 Compensating Diameter—Not manually adjustable
c. 3 Compensating Diameter—Manually adjustable
d. 4 Fixed Diameter—Not adjustable after installation
e. 5 Fixed Diameter—Adjustable after initial installation

7.6 Type of Assembly Lubrication—Lubrication aids in the assembly of the hose to the fitting in some cases. Typically lubricants are used because the interference between the hose and the fitting causes a high installation (push-on) force. Although interference is good for the seal of the joint, the related push-on forces must be kept manageable for production environments. Time and temperature will affect the dissipation of lubricants. Use of any type of nondissipating lubricant may increase the potential for hose blow-off.

7.7 Lubrication

a. 1 Non-Dissipating Lubricant
b. 2 Partially Dissipating Lubricant
c. 3 Water and Glycol
d. 4 Water
e. 5 None

8. Fastening and Assembly of Clamps Over Hose/Fitting

8.1 Number of Different Assembly Tools

a. 1 10 +
b. 2 6 to 10 tools
c. 3 3 to 5 tools
d. 4 2 to 3 tools
e. 5 1 tool

8.2 Operator Sensitivity

a. 1 Clamp position; tool; rpm; torque; >1 oper.
b. 2 Clamp position; tool; rpm; torque
c. 3 Clamp position; tool; rpm
d. 4 Clamp position; tool
e. 5 Clamp positioning or hose/clamp positioning only

8.3 Calibration of Tools—Tools that require calibration are sensitive to assembly variation.

a. 1 Recal., special tool, maintenance
b. 2 Recal. without special tool; not often
c. 3 Recal. with standard tool;
d. 4 No calibration but frequent adjustments
e. 5 No calibration; infrequent adjustments

8.4 Rpm of Air Tools (for screw clamps only)—High rpm tools are sources of assembly variation which may affect joint performance. The speed of the tightening tool will directly impact hose compression. High speed tools tend to shock the joint and fool the tool into shutting off before adequate hose compression is obtained. Lower rpm tools allow more time for the rubber to compress. Every air tool has a specific correlation between air pressure, rpm and torque. Variation in air pressure will cause variation in the dynamic torque reading. Setting the tool to a static torque specification is another source of variation. Static torque specifications for gasketed or soft joints often lead to frequent and unnecessary tool modifications.

a. 1 2500 +
b. 2 1500 to 2500 rpm
c. 3 1000 to 1499 rpm
d. 4 750 to 999 rpm
e. 5 < 750 rpm (enter 5 for nonscrew clamps)

8.5 Stray Assembly Lubricant (Slip Agents)—Assembly lubricants are necessary when interference fit designs are used. However, when stray lubricant comes in contact with the clamp, the joint performance can be compromised. Lubricants are intended to create a boundary layer between the hose and the fitting thus lowering the friction. Lower friction between the hose and the fitting translates directly into lower push-on forces. Problems are created specifically with screw clamps when stray assembly lubricant comes in contact with the screw. The lubricant will lower the friction coefficient between the screw and the band mechanism. The lower friction translates directly into higher forces for a given input torque. In some cases, the clamp will strip and in other cases, the hose will be damaged. Unless engineering specifically designed the joint with that lubricant on the screw clamp, the joint will be compressed differently. As the number of different slip lubricants used in the plant increases, the variation associated with clamping the joint also increases. Better joint designs limit the number of slip lubricants used on hose clamped joints and avoids contact with the clamp (specifically screw clamps).

a. 1 > 3 Slip Agents Used—100% contact
b. 2 2 Slip Agents—Occasional clamp contact
c. 3 2 Slip Agents—No clamp contact
d. 4 Only 1 Slip Agent—Occasional contact
e. 5 Only 1 Slip Agent—No clamp contact

9. Serviceability

9.1 Availability—Special tools will make any clamp or joint harder to service. Readily available tools will aid in the proper service of the joint.

a. 1 Special Order—Dealership
b. 2 Service Garage—Dealership
c. 3 Automotive Supply—Dealership
d. 4 Hardware Store—Dealership
e. 5 Grocery Store—Dealership

9.2 Clamp Reuse—Using different clamps may affect the performance of some joints, therefore using the same production clamp has some advantages.

a. 1 Not reusable
b. 2 Reusable but requires special care
c. 3 Reusable, if not initially damaged
d. 4 Reusable, if not damaged or rusted
e. 5 Very reusable; difficult to damage

9.3 Clamp Availability—Key to servicing a coolant carrying joint is the availability of similar if not identical replacement parts. Parts that can be easily obtained will lead to rapid joint repair.

a. 1 Special Order—Dealership
b 2 Service Garage—Dealership
c. 3 Automotive Supply—Dealership
d. 4 Hardware Store—Dealership
e. 5 Grocery Store—Dealership

9.4 Clamp Adjustability—Clamps that are not reusable are typically destroyed when the joint requires servicing. In removing the clamp, there is a chance that the hose may be damaged (if the hose is not the reason the joint is being serviced).

Self-adjusting clamps work on the principle of spring rate. Once initially installed, the spring rate of the clamp keeps pressure on the joint after the joint has been thermal cycled and come to equilibrium. Some self-adjusting clamps are have limited ranges and work for only very specific joint conditions (i.e., hose diameters, hose wall thickness, bead heights, etc.). By design, self-adjusting clamps are part of a "net joint design". Net joint design incorporates all necessary features to avoid in process manual adjustments by production operators. Net joint design theory assumes that coolant leaks are caused by poor joint design, not poor component design.

Manually adjustable clamps can make up for joint deficiencies; however, they are very sensitive to proper fastening and assembly tooling. Typically the rate these clamps are adjusted directly impacts the residual pressure on the joint. Manually adjustable clamps, by their nature, are designed for joint repair in production and service repair in the field.

a. 1 Not manually or self-adjusting
b. 2 Adjustable Once Installed—Not reusable due to rust
c. 3 Self-Adjusting—No manual adjustment
d. 4 Self-Adjusting—Allows manual adjustment
e. 5 Manual adjustment

9.5 Clamp Corrosion—There are two primary types of corrosion: cosmetic and structural. Cosmetic corrosion will eventually lead to structural corrosion of carbon steel clamps if not properly protected with a corrosion protection finish. Typically corrosion is associated with poor quality and therefore is undesirable in a coolant joint design. Red rust on carbon steel clamps will make serviceability difficult and may require the clamp to be destroyed upon removal. Low carbon steel clamps that rust within a year (of the end user's driving environment) provide minimal corrosion protection and are poorly designed for clamp corrosion. Alternative corrosion protective finishes should be evaluated in this case.

Clamps that do not exhibit red rust with 10 years are considered excellent from a serviceability perspective. These clamps should be easy to remove if the joint needs to be serviced. All stainless steel clamps (300 series) have the best chance of meeting this requirement. Shipping, handling and assembly tools make it difficult for carbon steel clamps with corrosion protective finishes to meet this specification. If the finish is scratched or scrapped off, corrosion will begin.

a. 1 Red Rust within 1 year
b. 2 No Red Rust within 3 years
c. 3 No Red Rust within 5 years
d 4 No Red Rust within 7 years
e. 5 No Red Rust within 10 years

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CERTIFIED MAIL
RETURN RECEIPT REQUESTED

NSA-122jlq
EA99-013

Louis Camp, Director
Automobile Safety and Engineering Standards Office
Ford Motor Company
Fairlane Plaza South
330 Town Center Drive, Suite 400
Dearborn, MI 48126

Dear Mr. Camp:

Please add the following request to the Agency's March 8, 2000, peer information request letter regarding EA99-013:

9. Furnish copies of all engineering standards, specifications, and guidelines regarding fuel tank and filler neck assembly packaging in the subject vehicles. "Packaging" should be interpreted in the context used in Section 4.12 of the enclosed copy of Society of Automotive Engineers Information Report SAE J1664, "Passenger Car and Light Truck Fuel Containment."

If you have any technical questions concerning this matter, please call Mr. Jeff Quandt of my staff at (202) 366-5207. If you have any questions concerning confidentiality claims, please contact Ms. Heidi Coleman, Assistant Chief Counsel for General Law, at (202) 366-1834.

Sincerely,

/S/ DB FOR
Kathleen C. DeMeter, Director
Office of Defects Investigation
Safety Assurance

Enclosure

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PASSENGER CAR AND LIGHT TRUCK FUEL CONTAINMENT—SAE J1664 JAN94

SAE Information Report

Report of the SAE Fuel Containment Standards Committee approved January 1994.

Foreword—The integrity of the fuel containment system has been a longstanding concern of automotive engineers throughout the industry and has been specifically addressed by government regulatory authorities in the U.S., Europe, and Japan. This document is intended to point out design aspects that are important and thus offer an opportunity for overall improvement in system design.

a. Vehicle manufacturers should conduct proving ground and customer fleet tests to confirm their fuel system design will meet the regulated time or mileage requirements. The proving ground durability tests should include stone pecking (gravel impingement) and ground clearance tests as appropriate. Any fuel-system shielding should be evaluated to the same durability standards (including corrosion resistance) that apply to the fuel containment components.
b. Failure Mode and Effects Analysis (FMEA)—As a useful tool for design, manufacturing, and assembly evaluation, FMEA or a similar methodology is suggested for application during the development of the fuel containment system.
   (1) In addition to meeting government standards, consideration should be given to all reasonably likely "real world" causes of fuel containment failure including reasonably foreseeable crashes, long-term corrosion effects, and other abnormalities such as failure of other vehicle components, assembly or service errors, and failures or abnormalities on other vehicles which might be involved in a crash situation.
   (2) It would not be reasonable or practical to design fuel containment systems that would completely eliminate all risks of failure in any condition identified in a FMEA study; however, a disciplined FMEA approach can eliminate many "real world" failure modes and reduce the frequency of many others.

*1. **Scope***—The scope of this SAE Information Report is the liquid fuel containment system for gasoline or flexible fuels (up to 85% methanol in gasoline), along with their associated vapors, as designed for use on passenger cars and light trucks. For purposes of this document, fuel containment addresses the fuel tank and components that are directly attached to the fuel tank. These components may include the filler neck, tank, fill vent tube, fuel cap, pump-sender, and rollover control valve closure seals, insofar as they act as closure or containment mechanisms. Emphasis will be on fuel containment and the required system closures. Furthermore, emphasis will be placed on design recommendations as they relate to performance. Mounting and shielding of the "system" components are included only to the extent they affect the containment aspects.

1.1 Purpose—The purpose of this document is to suggest design practices for automotive fuel tanks and any related components that directly close the fuel tank. This document incorporates the consensus of the SAE Fuel Containment Standards Committee as to those practices that are reasonable, practicable, and appropriate.

*2. **References***

2.1 Applicable Documents—The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply.

2.1.1 SAE PUBLICATION—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J1681—Gasoline Methanol Mixtures for Materials Testing

2.1.2 ASTM PUBLICATION—Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

ASTM B 117—Method of Salt Spray (Fog) Testing

2.1.3 FEDERAL PUBLICATION—Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

FMVSS 301

2.1.4 ECE PUBLICATION—Available from Commission of the European Communities, 200, Rue de La Loi, B-1049 Brussels, Belgium.

ECE 34

2.1.5 NHTSA PUBLICATION—Available from Superintent of Documents, U.S. Government Printing Office, Washington, DC 20402.

"Fires and Burns in the Towed Light Vehicle Crashes," 1992, Susan Partyka

2.2 Related Publications—The following publications are provided for information purposes only and are not a required part of this document.

EPA Evaporative Regulation 40 CFR Part 86

CARB Regulation Evaporative Emission - Title 13 California Code of Regulations Sect 1976

*3. **Principles***—This section details the general principles suggested by the Fuel Containment Standards Subcommittee. If the Guidelines in Section 6 are incomplete, or if there appears to be inconsistency or ambiguity in the application of the Guidelines, the Principles should be applied to resolve the uncertainty.

3.1 Normal Use Principle—The fuel containment system should provide for a lifetime of customer service without maintenance or fuel leakage and with continuing compliance to applicable emission or safety regulations.

3.1.1 Furthermore, current Environmental Protection Agency (EPA) requirements for fuel system useful life are 10 years or 160 900 km (100 000 miles), whichever comes first for all passenger cars and light trucks below 1701 kg (3750 lb) gross vehicle weight and 11 years or 193 080 km (120 000 miles) for all other light-duty trucks. No fuel leaks or increase in evaporative emissions above those allowed by regulation are permitted throughout the useful life.

3.2 Abnormal Use Principle—The fuel containment system should be designed in anticipation of certain abnormalities which could occur in customer usage so as to prevent, to the extent practicable, the release of fuel even in such abnormal conditions. Each design should be subjected to a FMEA to identify abnormal failure modes and to suggest approaches to eliminate, to the extent practicable, system failures or misuse that could release fuel.

3.3 Collision Damage Principle—An automotive vehicle and its fuel containment system are subject to collision damage in an infinite variety of situations including various angles, speeds, and fixed or moving objects impacted, multiple impacts, and rollovers with or without preceding or subsequent impacts. A FMEA should be performed and consideration given to vehicle package and fuel containment system design in order to eliminate or minimize collision-related fuel spillage to the extent practicable.

*4. **Guidelines***

4.1 Durability Guideline—Laboratory bench tests and proving-ground vehicle-durability tests under conditions representative of worst-case customer use should be performed to confirm fuel-system lifetime capability.

4.2 Corrosion Guideline—The fuel-containment system must be robust with respect to exterior corrosion so as to provide high confidence in passing expected use over the vehicle's lifetime.

Attention should be given to not only material selection but also protective coatings and galvanic interactions between dissimilar metals.

4.2.1 Some manufacturers utilize accelerated vehicle proving-ground corrosion tests that subject vehicles to a fairly corrosive environment over several months as a simulation of lifetime corrosion exposure. A minimum of 2000 h salt-spray test (per ASTM B 117) is suggested for evaluating exterior-corrosion protection. In addition, various fuel soaks and laboratory exposure tests are suggested for determining interior-corrosion performance of fuel-containment components, as discussed in more detail as follows:

4.2.2 Provisions should also be made through proper material selection and, if necessary, the use of protective coatings for the fuel containment interior surfaces to provide appropriate corrosion and fuel resistance, including resistance to additives, water, or other contaminants.

4.2.3 There should be no component-related contribution to fuel contamination from lead, silicone, phosphorus, aluminum, plasticizers, barrier treatments, or from material-corrosion by-products.

4.2.4 Verification of successful performance of internal- and external-corrosion protection should take place after completing proving ground durability or corrosion tests and laboratory soak tests using recommended fuels from SAE J1681. A minimum of 4000 h of internal component exposure to these SAE fuels is suggested. Note that for some applications, corrosion requirements may need revision to meet more stringent situations (e.g., worldwide use).

4.2.5 Verification should include component visual inspection inside and out plus system testing for evaporative emissions using a full vehicle size Sealed Housing for Evaporative Determination (SHED) or a mini-SHED large enough to contain the fuel system. Tests should be conducted according to California or Federal evaporative regulations.

NOTE—The fuel constituents (particularly alcohol levels used during durability or soak tests) can affect SHED test results.

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4.3 Aging Guideline—Accelerated corrosion tests, proving-ground durability tests, and rapid accumulation of mileage through commercial-fleet testing are methods used to simulate real-world effects of time and mileage. These can be augmented by various laboratory bench tests (e.g., long-term fuel soaks, ozone tests, and pressure-cycle fatigue tests). Also, knowledge gained during reviews of customer units that have been in use for long periods is helpful to fuel system engineers. It is difficult, however, to predict precisely how a new material or process will perform after 10 or more years based on the previous tests. Consequently, a certain degree of "overdesign" may be advisable.

4.4 Fatigue Guideline—Fuel-containment components should be subjected to laboratory fatigue tests with inputs derived from customer applications using instrumented vehicles. The primary fatigue loadings are from system pressure and vacuum cycles coupled with those from road-induced mechanical input. Consideration should be given to extreme loading situations, vibration inputs, and cold- and hot-ambient operating conditions.

4.5 Permeation Guideline—Evaporative losses must be within state (e.g., California) and Federal requirements (total vehicle not just the fuel system). Check to insure latest state and Federal requirements are reviewed. Addresses and telephone numbers of interest:

a. Environmental Protection Agency
Regulation Development and Support Division
2565 Plymouth Rd.
Ann Arbor, MI 48105-2425
Telephone: (313) 741-7828

b. State of California
Air Resources Board
Haagen-Smit Laboratory
9528 TelStar Avenue
El Monte, CA 91731-2990
Telephone: (818) 575-6800

4.5.1 An initial (24-h test) target for the fuel-containment system should be established low enough to allow the total vehicle to meet the requirement at the end of the necessary time, 10 years (Car) and 11 years (Light Truck), or the mileage shown previously. Vehicle background hydrocarbons (e.g., from tires, paint, plastics, and interior trim) affect the total vehicle hydrocarbon evaporative emission results.

4.5.2 It is important to insure the fuel containment system is properly "stabilized" relative to hydrocarbon permeation prior to testing (e.g., lab soak at 40 °C for 8 weeks or 90 days minimum vehicle soak and driving). It may be advisable to soak the fuel containment system for 8 weeks, or more, to attain equilibrium and then stabilize at room temperature for 12 to 24 h prior to SHED tests to avoid abnormal peaks in HC data. As a general rule, the more resistant a material is to permeation, the longer it will take to stabilize at its equilibrium rate.

4.6 Fuel Compatibility Guideline—Fuel compatibility with respect to fuel system components should receive appropriate attention. Of concern should be tank/pump/other component interior corrosion effects as well as effects of fuels on various elastomers (especially with regard to property reduction, swell after exposure, shrink after dry out, and leaching out of plasticizers). The 4000-h test suggested in 4.2.4 is applicable here.

4.6.1 Fuel-system components themselves may be adversely affected by fuels (e.g., some of the residual constituents may be dissolved by fuel and carried forward through the pump, filter, and injectors). It is important to subject various fuel components to the range of expected fuels and additives to understand any deleterious effects on materials.

4.6.2 Reference SAE fuels are advisable for use in testing because they represent recognized, reasonable worst-case conditions and to allow uniform comparison with other industry available information. The SAE has a subcommittee addressing appropriate fuel formulations, including additives (reference SAE J1681).

4.6.3 In the case of flexible fuels, the engineer should consider a range of fuels from M0 to M85 (100% unleaded fuel to 85% methanol + 15% unleaded gasoline) as well as various levels of ethanol in the fuel. Further, the oxygenate Methyl Tertiary Butyl Ether (MTBE) is coming into more widespread use, and its effects alone and in combination with ethanol or methanol are worth considering.

4.7 Service Guidelines—It is advisable to instruct users that fuel-containment components must not be repaired, but should be replaced with Original Equipment Manufacturer (OEM) or OEM recommended parts if evidence of a leak exists or replacement is necessary. Warning labels or other indicators with this information placed on the components and in appropriate sections of service manuals are suggested. Design engineers should be aware that fuel tanks are sometimes cleaned by non-OEM repair shops that may use aggressive cleaners.

4.8 Manufacturing Guidelines—Tank manufacturers must provide strict attention to process parameters to assure leak-free parts. Care must be taken not to damage protective surface finishes during the manufacturing process. For plastic tanks, process effects on interior treatments for permeation resistance (e.g., sulfonation or fluorination) must be considered. Uniform coverage on interior surfaces (especially on complex tank shapes) must be provided.

4.8.1 Several sources of contamination exist. Manufacturing and assembly engineers should be cognizant of these: (a) residuals from the tank manufacturing or assembly process that are not properly removed (e.g., die lube, weld spatter, machining chips for High Density Polyethylene (HDPE) tank openings), (b) contaminants introduced by assembly plant fuel fill, and (c) contaminants introduced as a result of the tank leak test process (usually residual water).

4.8.2 Appropriate filtration of in plant fuel and quality checks of incoming fuel should suffice for item 4.8.1(b). Surveys of fuels available in the field should help determine what foreign matter must be handled by the fuel system. Understanding these factors is important to be able to protect the fuel system and provide long-service life.

4.8.3 Specification and verification methods for contamination should be agreed on by the tank supplier and purchasing or engineering.

4.9 Leak Testing and Pressure Resistance—No residual water must be left in the tank (e.g., from weld-cooling process on steel tank) prior to leak testing. Such water can plug pin-hole leaks and give a false "pass." Two possible leak test methods are: (a) pressure decay test or (b) air-under-water test with no leaks at manufacturer-determined internal tank pressurization. Leak tests with water must be evaluated for post-test residual water that might remain inside the tank. Current test procedures and leak rates are 13.79 to 27.58 kPA (2 to 4 psi) under water and no pressure loss for 2 min or no evidence of air bubbles. With the tighter standards for evaporative emissions, current methods of leak detection are inadequate. These will identify identify gross leaks. The only known method to find very small leaks is via helium gas leak detection.

4.10 Abnormal Use Guideline—Among the abnormalities that should be considered are misassembly, either in production or in subsequent service, vent system failure, engine or fuel system malfunction, exhaust system leakage or failure, overfilled fuel tanks, possible combinations of these, and other abnormalities identified by the FMEA.

4.11 Heat-Protection Guideline—Proximity of the fuel-containment components to exhaust system and other sources of heat must be given careful attention early in the design stage. Design clearance standards, if available to the engineer, should be confirmed on the specific design via vehicle testing. Component surface temperature and fuel-temperature monitoring is suggested.

4.11.1 Care must be taken to examine extreme vehicle use situations (those which will create maximum temperatures) and maximum expected ambient conditions (including altitude effects). Extreme limit conditions could be the effects of 1 h of operation with reasonably severe engine malfunctions (e.g., single failed spark plug or exhaust system leakage) with maximum in-tank fuel temperature of 60 °C. Effect of failed components or lack of proper maintenance should be factored into the FMEA.

4.11.2 In a malfunction condition that develops excessive heat, consider effects on the contained fuel temperatures, vapor generation rates, and resulting fuel system pressures.

4.12 Packaging Guideline—As government standards become more stringent in either impact speed or location, the design engineer will become increasingly challenged to protect the fuel containment system. A combination of analytical/computer modeling, lab testing, and actual vehicle tests is advisable. Unfortunately, models have not progressed to the stage where actual design confirmation crash tests can be eliminated.

4.12.1 Crash testing required by FMVSS 301 is one method to assess the crashworthiness of a vehicle's fuel system. The intent of the regulation is to minimize the risk of injury or death due to crash induced fuel fires. Crash tests other than those prescribed by FMVSS 301 may be necessary to evaluate fuel system performance.

4.12.2 Packaging aspects of the fuel-containment system are very design dependent. What "works" (passes crash testing) for one tank or component design may not be acceptable for another design or location.

4.12.3 Design considerations as to tank location (forward in chassis, mid-vehicle, or rearward in vehicle), tank shape (rectangular, long and narrow, or "pancake" design) should receive considerable **up front** evaluation in the platform design. Requirements for crash protection may differ with tank or component location in the vehicle and may also depend on vehicle intended use. The package location and surrounding environment of the fuel tank should also

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be included in the FMEA to eliminate, to the extent practicable, fuel spillage in a collision due to tank puncture or rupture from intrusion by other vehicle components.

4.12.4 Package must also consider the location and failure susceptibility of the fuel filler pipe and cap, the fuel pump and sender, and of vent valves and other devices that require openings and closures to the main storage tank.

4.13 Tank Pressure Resistance Guideline—Most containment systems include a safety pressure relief device to prevent fuel system damage if the normal vent system fails to function properly. Testing of the fuel system to maximum pressure expected under failed tank vapor control (i.e., pinched line) in the "as-installed" condition is advisable.

4.13.1 Some typical pressure resistance tests follow:

a. Zero - Safety relief pressure [usually 17.24 kPa (2.5 psi)] (with tank in "as-installed" constraint). Acceptance criteria are no leak under water and no distortion that affects function (e.g., gage indication, ground clearance, or fatigue resistance).
b. 17.24 to 31.03 (2.5 to 4.5 psi) (European requirement with tank in "as-installed" constraint). Acceptance criteria are no leaks under water and no permanent deflection beyond agreed upon percentage.
c. To monitor the manufacturing process, some manufacturers test fuel tanks pressurized above 31.03 kPa (4.5 psi) with the tank in an unrestrained condition under water. Acceptance criteria (leak or burst requirement) is as determined by agreement between the tank supplier/vehicle manufacturer.

4.13.2 Vacuum applied to the system can cause adverse effects, even if only of a dimensional nature. Vacuum cycling effects may become more significant as On Board Diagnostic (OBD) regulations phase in. Some strategies will utilize regular application of a vacuum to the system to verify evaporative system integrity. Such designs should account for the dimensional effects of the pressure fluctuations on the tank in the installed condition. Also, the pressure-cycling tests developed to prove tank fatigue capability must consider added fatigue damage from OBD.

4.14 Containment Integrity Guidelines—Under crash event per FMVSS 301 or other reasonable crash circumstance, there should be no component rupture, puncture, or closure element separation from the fuel tank. It is suggested the engineer test design sensitivity to a variety of reasonable crash circumstances.

4.14.1 GENERAL DESIGN CONSIDERATIONS TO PREVENT FUEL LOSS IN REASONABLY SEVERE CRASHES—Most importantly, fuel containment components should be packaged in a "friendly" environment. Material selection should consider puncture resistance, material thickness requirements, and burst pressure strength. Laminate or composite materials may have useful application, especially in providing a "shielding" function.

4.14.2 Key causes of fuel loss during or immediately after a crash:

a. Hydrodynamic Rupture—In selecting the fuel tank placement in the vehicle, the engineer must consider vehicle structural collapse insofar as such collapse may affect the hydrodynamic rupture characteristics of the tank. It might be necessary in a given location to strengthen the structure surrounding the tank to prevent or limit the amount of tank deformation in a specific crash mode. Other factors to consider are:
   (1) Shape of tank.
   (2) Vapor space when tank is filled to design maximum (allowing for fuel expansion with temperature—the larger the amount of vapor space versus liquid fuel, the greater the ability of the tank to withstand crush).
   (3) Material properties (e.g., tensile strength, ductility, including visco-elasticity, if present, and impact strength). (A ductile material will absorb more energy.)
b. Filler neck or other component separation from tank. Key elements to consider are:
   (1) Joint structural properties to resist leaking from twist, bending, or axial loads, or combinations of these.
   (2) Relative separation or crush loads experienced during a crash. The filler pipe and its attachments to the tank and the outer body at the filler inlet should be designed to prevent, to the extent possible, separating the pipe from the tank. For example, the pipe to body separation force should be significantly less than the pipe to tank separation force.
   (3) Fuel caps are often subjected to prying forces and direct impact during crashes. Reasonable design efforts are suggested with the objective of maintaining system integrity when fuel caps are subjected to these loading mechanisms.
c. Puncture—Basically, the fuel tank should be protected from intrusion by other components. Emphasis should be placed on the following considerations with respect to overall crash integrity:
   (1) Shielding and shield shape when it contacts the fuel tank in a crash.
   (2) Tank material and thickness.
   (3) Location of "unfriendly" surfaces/components (and the path they travel during a crash).
   (4) Vehicle structural collapse characteristics in relation to the fuel tank location (considering the variety of impact directions) as well as to other fuel containment components (e.g., fill neck).
   (5) Penetration by a striking object external to the vehicle.

4.15 Open Flame Resistance Guidelines—When considering resistance of the fuel containment system to open flame, design engineers are advised to address: (a) fire size and duration as established by the size of the assumed fuel spill (possibly from another vehicle per 4.15.3), (b) size and location of possible punctures in the fuel containment system caused from a collision, and (c) potential effects on the system from grass fires underneath the vehicle (a specific concern in some countries such as Australia).

4.15.1 Europe has an open flame test standard (part of ECE 34) which is required for plastic fuel tank equipped vehicles. Such vehicles manufactured in the U.S. for sale in Europe must also meet ECE 34, Annex 5, which requires no liquid fuel release after 2 min of fire exposure.

4.15.2 To conform to proposed requirements, fuel filler pipes for use with methanol (e.g., flexible fuel vehicles) must have anti-siphon capability. It may also be advisable to incorporate a flame arrestor on tanks designed for flexible fuel vehicles and to consider an anti-siphon capability on all new tank designs as an added safety feature.

4.15.3 Based on a 1992 NHTSA report, "Fires and Burns in Towed Light Vehicle Crashes" by Susan Partyka, 24% of fires came from outside the vehicle or unknown causes. Also from the same report (using data collected on 1979 to 1986 models and 1988 to 1990 models), 59% of fires involving crashes were frontal impacts, 12% rear impacts, 12% side impacts, and 14% from rollovers. Therefore, it may be advisable to apply the ECE 34, Annex 5, criteria for all new tank designs, regardless of material.

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CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Susan M. Cischke, Vice President
Vehicle Certification, Compliance and Safety Affairs
DaimlerChrysler Corporation - CIMS 482-00-91
800 Chrysler Drive
Auburn Hills, MI 48326-2757

NSA-122jlq
EA99-013

Dear Ms Cischke:

This letter is to request additional information regarding NHTSA's investigation of crash-induced fuel filler neck assembly failure in 1996 through 2000 DaimlerChrysler NS-minivan vehicles.

For your information, NHTSA's examination of the fuel filler tube assembly in the 2000 Dodge Caravan that experienced the filler hose separation incident in the January 6, 2000 SINCAP test identified two additional failure modes for the filler neck assembly. The first involved contact between the anchor plate for the left-middle seat belt and the fuel filler pipe, resulting in a 37 mm x 4 mm puncture in the pipe. The second involved the plastic section of the fuel vent tube, which was cut across more than two-thirds of the tube circumference in an area where the tube was sandwiched between the fuel filler pipe and the left rail flange (directly behind the filler pipe puncture). Pictures of the fuel filler neck assembly crush and filler pipe puncture are enclosed.

Also, NHTSA has identified another left-side impact fire involving a subject vehicle in a search of the 1998 Fatality Analysis Reporting System (FARS) database. An August 23, 1998 crash in Texas involving a 1998 Dodge Grand Caravan resulted in three fatalities where the Most Harmful Event was coded as fire. The fatalities all involved occupants in left seating positions. Three occupants seated on the right side of the vehicle received non-incapacitating injuries.

Unless otherwise stated in the text, the following definitions apply to this information request:

- **Subject vehicles**: all 1996 through current model year DaimlerChrysler NS-minivans.

- **Subject fuel tank assembly**: all fuel storage tanks used in the subject vehicles.

- **Subject tank spud**: all fill spuds used in subject fuel tank assemblies.

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- **Subject hose joint**: the clamped joint between the filler neck hose and the subject tank spud, including the hose, the clamp, and the tank fill spud, or any or all of the components thereof.

- **DaimlerChrysler**: DaimlerChrysler Corporation and Chrysler Corporation, all of its past and present officers and employees, whether assigned to its principal offices or any of its field or other locations, including all of its divisions, subsidiaries (whether or not incorporated) and affiliated enterprises and all of their headquarters, regional, zone and other offices and their employees, and all agents, contractors, consultants, attorneys and law firms and other persons engaged directly or indirectly (e.g., employee of a consultant) by or under the control of DaimlerChrysler (including all business units and persons previously referred to), who are or, in or after January 1994, were involved in any way with any of the following related to the alleged defect in the subject vehicles:

  a. design, engineering, analysis, modification or production (e.g. quality control);
  b. testing, assessment or evaluation;
  c. consideration, or recognition of potential or actual defects, reporting, record-keeping and information management, (e.g., complaints, field reports, warranty information, part sales), analysis, claims, or lawsuits; or
  d. communication to, from or intended for zone representatives, fleets, dealers, or other field locations, including but not limited to people who have the capacity to obtain information from dealers.

- **Alleged defect**: shall refer to crash-induced fuel filler neck assembly failure.

- **Documents**: "Document(s)" is used in the broadest sense of the word and shall mean all original written, printed, typed, recorded, or graphic matter whatsoever, however produced or reproduced, of every kind, nature, and description, and all nonidentical copies of both sides thereof, including, but not limited to, papers, letters, memoranda, correspondence, communications, electronic mail (e-mail) messages (existing in hard copy and/or in electronic storage), faxes, mailgrams, telegrams, cables, telex messages, notes, annotations, working papers, drafts, minutes, records, audio and video recordings, data, databases, other information bases, summaries, charts, tables, graphics, other visual displays, photographs, statements, interviews, opinions, reports, newspaper articles, studies, analyses, evaluations, interpretations, contracts, agreements, jottings, agendas, bulletins, notices, announcements, instructions, blueprints, drawings, as-builts, changes, manuals, publications, work schedules, journals, statistical data, desk, portable and computer calendars, appointment books, diaries, travel reports, lists, tabulations, computer printouts, data processing program libraries, data processing inputs and outputs, microfilms, microfiches, statements for services, resolutions, financial statements, governmental records, business records, personnel records, work orders, pleadings, discovery in any form, affidavits, motions, responses to discovery, all transcripts, administrative filings and all mechanical, magnetic, photographic and electronic records or recordings of any kind, including any storage media associated with computers, including, but not limited to, information on hard drives, floppy disks, backup tapes, and zip drives, electronic communications, including but not limited to, the Internet and shall include any drafts or revisions pertaining to any of the foregoing, all other things similar to any of the foregoing, however denominated by DaimlerChrysler, any other data compilations from which information can be obtained, translated if necessary, into a usable form and any other documents. For purposes of this request, any document which contains any note, comment, addition, deletion, insertion, annotation, or otherwise comprises a nonidentical copy of another document shall be treated as a separate document subject to production. In all cases where original and any non-identical copies are not available, "document(s)" also means any identical copies of the original and all non-identical copies thereof. Any document, record, graph, chart, film or photograph originally produced in color must be provided in color. Furnish all documents whether verified by the manufacturer or not. If a document is not in the English language, provide both the original document and an English translation of the document.

In order for my staff to evaluate the alleged defect, certain information is required. Pursuant to 49 U.S.C. § 30166, please provide numbered responses to the following information requests. Please repeat the applicable request verbatim above each response. After DaimlerChrysler's response to each request, identify the source of the information and indicate the last date the source updated the information prior to the preparation of the response. Insofar as DaimlerChrysler has previously provided a document to ODI, DaimlerChrysler may either produce it again, or identify the document, the document submission to ODI in which it was included and the precise location in that submission where the document is located. When documents are produced, the documents shall be produced in an identified, organized manner that corresponds with the Information Request letter (including the subparts). When documents are produced and the documents would not, standing alone, be self-explanatory, the production of documents shall be supplemented and accompanied by explanation.

If DaimlerChrysler cannot respond to any specific request or subpart thereof, please state the reason why it is unable to do so. If DaimlerChrysler claims that any document or other information or material responsive to any of the following items need not be provided to NHTSA because it is privileged or the work product of an attorney, separately by information request number, for each such document or other information or material, state the nature of that information or material and identify any document in which it is found by date, subject or title, name and position of the person from, and the person to whom it was sent, and the name and position of any other recipient. DaimlerChrysler must also describe the basis for the claim, and explain why DaimlerChrysler believes it applies.

1. Furnish the following dimensions, in millimeters, for both the short- and long-wheelbase subject vehicles:

a. the longitudinal dimension from a vertical plane passing through the front axle centerline to the rear edge of the anchor plate for the left-middle seat belt (furnish these dimensions for each seating option available in the subject vehicles);
b. the longitudinal dimension from a vertical plane passing through the front axle centerline to the front and rear of the rail opening through which the fuel filler vent tube passes (vent tube pass-through);
c. the longitudinal dimension from a vertical plane passing through the front axle centerline to the interface between the sill inner wall and the left-rear wheelhouse extension;
d. the lateral dimension from a vertical plane passing through the vehicle centerline to the inner and outer edges of the fuel tank spud;
e. the minimum clearance between the fuel filler tube and: (1) the left rear wheelhouse; and (2) the sill inner wall;
f. the lateral dimension from a vertical plane passing through the vehicle centerline to the anchor bolt for the left-middle seat belt (furnish these dimensions for each seating option available in the subject vehicles); and
g. the vertical dimension from the bottom edge of the fuel tank nipple to the lower dimensions of the anchor plate for the left-middle seat belt (furnish these dimensions for each seating option available in the subject vehicles) and the vent tube pass-through.

2. Furnish copies of all engineering standards, specifications, and guidelines regarding fuel tank and filler neck assembly packaging in the subject vehicles. "Packaging" should be interpreted in the context used in Section 4.12 of the enclosed copy of Society of Automotive Engineers Information Report SAE J1664, "Passenger Car and Light Truck Fuel Containment."

3. State whether DaimlerChrysler has ever considered the safety implications of the packaging of the subject vehicle fuel filler neck assembly relative to the left-middle seat belt anchor plate and, if so, provide copies of all related documents.

This letter is being sent to DaimlerChrysler pursuant to 49 U.S.C. § 30166, which authorizes NHTSA to conduct any investigation that may be necessary to enforce Chapter 301 of Title 49. DaimlerChrysler's failure to respond promptly and fully to this letter could subject DaimlerChrysler to civil penalties pursuant to 49 U.S.C. § 30165 or lead to an action for injunctive relief pursuant to 49 U.S.C. § 30163. Other remedies and sanctions are available as well.

DaimlerChrysler's response to this letter, in duplicate, must be submitted to this office by May 5, 2000. Please include in DaimlerChrysler's response the identification codes referenced on page one of this letter. If DaimlerChrysler finds that it is unable to provide all of the information requested within the time allotted, DaimlerChrysler must request an extension from Mr. Thomas Z. Cooper at (202) 366-5218 no later than five business days before the response due date. If DaimlerChrysler is unable to provide all of the information requested by the original deadline, it

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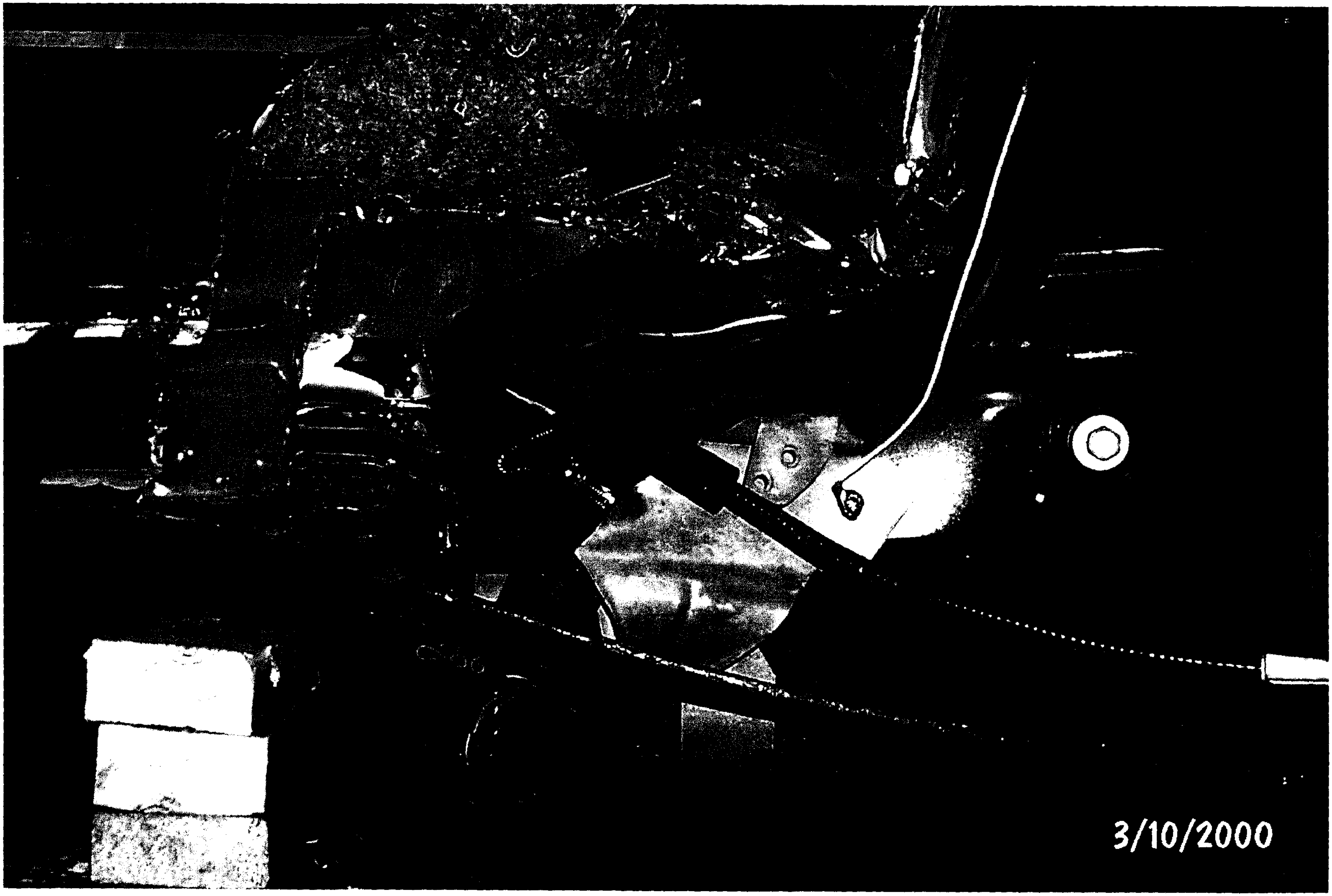
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PASSENGER CAR AND LIGHT TRUCK FUEL CONTAINMENT—SAE J1664 JAN94

SAE Information Report

Report of the SAE Fuel Containment Standards Committee approved January 1994.

Foreword—The integrity of the fuel containment system has been a longstanding concern of automotive engineers throughout the industry and has been specifically addressed by government regulatory authorities in the U.S., Europe, and Japan. This document is intended to point out design aspects that are important and thus offer an opportunity for overall improvement in system design.

a. Vehicle manufacturers should conduct proving ground and customer fleet tests to confirm their fuel system design will meet the regulated time or mileage requirements. The proving ground durability tests should include stone pecking (gravel impingement) and ground clearance tests as appropriate. Any fuel-system shielding should be evaluated to the same durability standards (including corrosion resistance) that apply to the fuel containment components.

b. Failure Mode and Effects Analysis (FMEA)—As a useful tool for design, manufacturing, and assembly evaluation, FMEA or a similar methodology is suggested for application during the development of the fuel containment system.

   (1) In addition to meeting government standards, consideration should be given to all reasonably likely "real world" causes of fuel containment failure including reasonably foreseeable crashes, long-term corrosion effects, and other abnormalities such as failure of other vehicle components, assembly or service errors, and failures or abnormalities on other vehicles which might be involved in a crash situation.

   (2) It would not be reasonable or practical to design fuel containment systems that would completely eliminate all risks of failure in any condition identified in a FMEA study; however, a disciplined FMEA approach can eliminate many "real world" failure modes and reduce the frequency of many others.

1. Scope—The scope of this SAE Information Report is the liquid fuel containment system for gasoline or flexible fuels (up to 85% methanol in gasoline), along with their associated vapors, as designed for use on passenger cars and light trucks. For purposes of this document, fuel containment addresses the fuel tank and components that are directly attached to the fuel tank. These components may include the filler neck, tank, fill vent tube, fuel cap, pump-sender, and rollover control valve closure seals, insofar as they act as closure or containment mechanisms. Emphasis will be on fuel containment and the required system closures. Furthermore, emphasis will be placed on design recommendations as they relate to performance. Mounting and shielding of the "system" components are included only to the extent they affect the containment aspects.

1.1 Purpose—The purpose of this document is to suggest design practices for automotive fuel tanks and any related components that directly close the fuel tank. This document incorporates the consensus of the SAE Fuel Containment Standards Committee as to those practices that are reasonable, practicable, and appropriate.

2. References

2.1 Applicable Documents—The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply.

2.1.1 SAE PUBLICATION—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J1681—Gasoline Methanol Mixtures for Materials Testing

2.1.2 ASTM PUBLICATION—Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

ASTM B 117—Method of Salt Spray (Fog) Testing

2.1.3 FEDERAL PUBLICATION—Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

FMVSS 301

2.1.4 ECE PUBLICATION—Available from Commission of the European Communities, 200, Rue de La Loi, B-1049 Brussels, Belgium.

ECE 34

2.1.5 NHTSA PUBLICATION—Available from Superintent of Documents, U.S. Government Printing Office, Washington, DC 20402.

"Fires and Burns in the Towed Light Vehicle Crashes," 1992, Susan Partyka

2.2 Related Publications—The following publications are provided for information purposes only and are not a required part of this document.

EPA Evaporative Regulation 40 CFR Part 86

CARB Regulation Evaporative Emission - Title 13 California Code of Regulations Sect 1976

3. Principles—This section details the general principles suggested by the Fuel Containment Standards Subcommittee. If the Guidelines in Section 6 are incomplete, or if there appears to be inconsistency or ambiguity in the application of the Guidelines, the Principles should be applied to resolve the uncertainty.

3.1 Normal Use Principle—The fuel containment system should provide for a lifetime of customer service without maintenance or fuel leakage and with continuing compliance to applicable emission or safety regulations.

3.1.1 Furthermore, current Environmental Protection Agency (EPA) requirements for fuel system useful life are 10 years or 160 900 km (100 000 miles), whichever comes first for all passenger cars and light trucks below 1701 kg (3750 lb) gross vehicle weight and 11 years or 193 080 km (120 000 miles) for all other light-duty trucks. No fuel leaks or increase in evaporative emissions above those allowed by regulation are permitted throughout the useful life.

3.2 Abnormal Use Principle—The fuel containment system should be designed in anticipation of certain abnormalities which could occur in customer usage so as to prevent, to the extent practicable, the release of fuel even in such abnormal conditions. Each design should be subjected to a FMEA to identify abnormal failure modes and to suggest approaches to eliminate, to the extent practicable, system failures or misuse that could release fuel.

3.3 Collision Damage Principle—An automotive vehicle and its fuel containment system are subject to collision damage in an infinite variety of situations including various angles, speeds, and fixed or moving objects impacted, multiple impacts, and rollovers with or without preceding or subsequent impacts. A FMEA should be performed and consideration given to vehicle package and fuel containment system design in order to eliminate or minimize collision-related fuel spillage to the extent practicable.

4. Guidelines

4.1 Durability Guideline—Laboratory bench tests and proving-ground vehicle-durability tests under conditions representative of worst-case customer use should be performed to confirm fuel-system lifetime capability.

4.2 Corrosion Guideline—The fuel-containment system must be robust with respect to exterior corrosion so as to provide high confidence in passing expected use over the vehicle's lifetime.

Attention should be given to not only material selection but also protective coatings and galvanic interactions between dissimilar metals.

4.2.1 Some manufacturers utilize accelerated vehicle proving-ground corrosion tests that subject vehicles to a fairly corrosive environment over several months as a simulation of lifetime corrosion exposure. A minimum of 2000 h salt-spray test (per ASTM B 117) is suggested for evaluating exterior-corrosion protection. In addition, various fuel soaks and laboratory exposure tests are suggested for determining interior-corrosion performance of fuel-containment components, as discussed in more detail as follows:

4.2.2 Provisions should also be made through proper material selection and, if necessary, the use of protective coatings for the fuel containment interior surfaces to provide appropriate corrosion and fuel resistance, including resistance to additives, water, or other contaminants.

4.2.3 There should be no component-related contribution to fuel contamination from lead, silicone, phosphorus, aluminum, plasticizers, barrier treatments, or from material-corrosion by-products.

4.2.4 Verification of successful performance of internal- and external-corrosion protection should take place after completing proving ground durability or corrosion tests and laboratory soak tests using recommended fuels from SAE J1681. A minimum of 4000 h of internal component exposure to these SAE fuels is suggested. Note that for some applications, corrosion requirements may need revision to meet more stringent situations (e.g., worldwide use).

4.2.5 Verification should include component visual inspection inside and out plus system testing for evaporative emissions using a full vehicle size Sealed Housing for Evaporative Determination (SHED) or a mini-SHED large enough to contain the fuel system. Tests should be conducted according to California or Federal evaporative regulations.

NOTE—The fuel constituents (particularly alcohol levels used during durability or soak tests) can affect SHED test results.

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4.3 **Aging Guideline**—Accelerated corrosion tests, proving-ground durability tests, and rapid accumulation of mileage through commercial-fleet testing are methods used to simulate real-world effects of time and mileage. These can be augmented by various laboratory bench tests (e.g., long-term fuel soaks, ozone tests, and pressure-cycle fatigue tests). Also, knowledge gained during reviews of customer units that have been in use for long periods is helpful to fuel system engineers. It is difficult, however, to predict precisely how a new material or process will perform after 10 or more years based on the previous tests. Consequently, a certain degree of "overdesign" may be advisable.

4.4 **Fatigue Guideline**—Fuel-containment components should be subjected to laboratory fatigue tests with inputs derived from customer applications using instrumented vehicles. The primary fatigue loadings are from system pressure and vacuum cycles coupled with those from road-induced mechanical input. Consideration should be given to extreme loading situations, vibration inputs, and cold- and hot-ambient operating conditions.

4.5 **Permeation Guideline**—Evaporative losses must be within state (e.g., California) and Federal requirements (total vehicle not just the fuel system). Check to insure latest state and Federal requirements are reviewed. Addresses and telephone numbers of interest:

a. Environmental Protection Agency
Regulation Development and Support Division
2565 Plymouth Rd.
Ann Arbor, MI 48105-2425
Telephone: (313) 741-7828

b. State of California
Air Resources Board
Haagen-Smit Laboratory
9528 TelStar Avenue
El Monte, CA 91731-2990
Telephone: (818) 575-6800

4.5.1 An initial (24-h test) target for the fuel-containment system should be established low enough to allow the total vehicle to meet the requirement at the end of the necessary time, 10 years (Car) and 11 years (Light Truck), or the mileage shown previously. Vehicle background hydrocarbons (e.g., from tires, paint, plastics, and interior trim) affect the total vehicle hydrocarbon evaporative emission results.

4.5.2 It is important to insure the fuel containment system is properly "stabilized" relative to hydrocarbon permeation prior to testing (e.g., lab soak at 40 °C for 8 weeks or 90 days minimum vehicle soak and driving). It may be advisable to soak the fuel containment system for 8 weeks, or more, to attain equilibrium and then stabilize at room temperature for 12 to 24 h prior to SHED tests to avoid abnormal peaks in HC data. As a general rule, the more resistant a material is to permeation, the longer it will take to stabilize at its equilibrium rate.

4.6 **Fuel Compatibility Guideline**—Fuel compatibility with respect to fuel system components should receive appropriate attention. Of concern should be tank/pump/other component interior corrosion effects as well as effects of fuels on various elastomers (especially with regard to property reduction, swell after exposure, shrink after dry out, and leaching out of plasticizers). The 4000-h test suggested in 4.2.4 is applicable here.

4.6.1 Fuel-system components themselves may be adversely affected by fuels (e.g., some of the residual constituents may be dissolved by fuel and carried forward through the pump, filter, and injectors). It is important to subject various fuel components to the range of expected fuels and additives to understand any deleterious effects on materials.

4.6.2 Reference SAE fuels are advisable for use in testing because they represent recognized, reasonable worst-case conditions and to allow uniform comparison with other industry available information. The SAE has a subcommittee addressing appropriate fuel formulations, including additives (reference SAE J1681).

4.6.3 In the case of flexible fuels, the engineer should consider a range of fuels from M0 to M85 (100% unleaded fuel to 85% methanol + 15% unleaded gasoline) as well as various levels of ethanol in the fuel. Further, the oxygenate Methyl Tertiary Butyl Ether (MTBE) is coming into more widespread use, and its effects alone and in combination with ethanol or methanol are worth considering.

4.7 **Service Guidelines**—It is advisable to instruct users that fuel-containment components must not be repaired, but should be replaced with Original Equipment Manufacturer (OEM) or OEM recommended parts if evidence of a leak exists or replacement is necessary. Warning labels or other indicators with this information placed on the components and in appropriate sections of service manuals are suggested. Design engineers should be aware that fuel tanks are sometimes cleaned by non-OEM repair shops that may use aggressive cleaners.

4.8 **Manufacturing Guidelines**—Tank manufacturers must provide strict attention to process parameters to assure leak-free parts. Care must be taken not to damage protective surface finishes during the manufacturing process. For plastic tanks, process effects on interior treatments for permeation resistance (e.g., sulfonation or fluorination) must be considered. Uniform coverage on interior surfaces (especially on complex tank shapes) must be provided.

4.8.1 Several sources of contamination exist. Manufacturing and assembly engineers should be cognizant of these: (a) residuals from the tank manufacturing or assembly process that are not properly removed (e.g., die lube, weld spatter, machining chips for High Density Polyethylene (HDPE) tank openings), (b) contaminants introduced by assembly plant fuel fill, and (c) contaminants introduced as a result of the tank leak test process (usually residual water).

4.8.2 Appropriate filtration of in plant fuel and quality checks of incoming fuel should suffice for item 4.8.1(b). Surveys of fuels available in the field should help determine what foreign matter must be handled by the fuel system. Understanding these factors is important to be able to protect the fuel system and provide long-service life.

4.8.3 Specification and verification methods for contamination should be agreed on by the tank supplier and purchasing or engineering.

4.9 **Leak Testing and Pressure Resistance**—No residual water must be left in the tank (e.g., from weld-cooling process on steel tank) prior to leak testing. Such water can plug pin-hole leaks and give a false "pass." Two possible leak test methods are: (a) pressure decay test or (b) air-under-water test with no leaks at manufacturer-determined internal tank pressurization. Leak tests with water must be evaluated for post-test residual water that might remain inside the tank. Current test procedures and leak rates are 13.79 to 27.58 kPA (2 to 4 psi) under water and no pressure loss for 2 min or no evidence of air bubbles. With the tighter standards for evaporative emissions, current methods of leak detection are inadequate. These will identify gross leaks. The only known method to find very small leaks is via helium gas leak detection.

4.10 **Abnormal Use Guideline**—Among the abnormalities that should be considered are misassembly, either in production or in subsequent service, vent system failure, engine or fuel system malfunction, exhaust system leakage or failure, overfilled fuel tanks, possible combinations of these, and other abnormalities identified by the FMEA.

4.11 **Heat-Protection Guideline**—Proximity of the fuel-containment components to exhaust system and other sources of heat must be given careful attention early in the design stage. Design clearance standards, if available to the engineer, should be confirmed on the specific design via vehicle testing. Component surface temperature and fuel-temperature monitoring is suggested.

4.11.1 Care must be taken to examine extreme vehicle use situations (those which will create maximum temperatures) and maximum expected ambient conditions (including altitude effects). Extreme limit conditions could be the effects of 1 h of operation with reasonably severe engine malfunctions (e.g., single failed spark plug or exhaust system leakage) with maximum in-tank fuel temperature of 60 °C. Effect of failed components or lack of proper maintenance should be factored into the FMEA.

4.11.2 In a malfunction condition that develops excessive heat, consider effects on the contained fuel temperatures, vapor generation rates, and resulting fuel system pressures.

4.12 **Packaging Guideline**—As government standards become more stringent in either impact speed or location, the design engineer will become increasingly challenged to protect the fuel containment system. A combination of analytical/computer modeling, lab testing, and actual vehicle tests is advisable. Unfortunately, models have not progressed to the stage where actual design confirmation crash tests can be eliminated.

4.12.1 Crash testing required by FMVSS 301 is one method to assess the crashworthiness of a vehicle's fuel system. The intent of the regulation is to minimize the risk of injury or death due to crash induced fuel fires. Crash tests other than those prescribed by FMVSS 301 may be necessary to evaluate fuel system performance.

4.12.2 Packaging aspects of the fuel-containment system are very design dependent. What "works" (passes crash testing) for one tank or component design may not be acceptable for another design or location.

4.12.3 Design considerations as to tank location (forward in chassis, mid-vehicle, or rearward in vehicle), tank shape (rectangular, long and narrow, or "pancake" design) should receive considerable **up front** evaluation in the platform design. Requirements for crash protection may differ with tank or component location in the vehicle and may also depend on vehicle intended use. The package location and surrounding environment of the fuel tank should also

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be included in the FMEA to eliminate, to the extent practicable, fuel spillage in a collision due to tank puncture or rupture from intrusion by other vehicle components.

4.12.4 Package must also consider the location and failure susceptibility of the fuel filler pipe and cap, the fuel pump and sender, and of vent valves and other devices that require openings and closures to the main storage tank.

4.13 Tank Pressure Resistance Guideline—Most containment systems include a safety pressure relief device to prevent fuel system damage if the normal vent system fails to function properly. Testing of the fuel system to maximum pressure expected under failed tank vapor control (i.e., pinched line) in the "as-installed" condition is advisable.

4.13.1 Some typical pressure resistance tests follow:

a. Zero - Safety relief pressure [usually 17.24 kPa (2.5 psi)] (with tank in "as-installed" constraint). Acceptance criteria are no leak under water and no distortion that affects function (e.g., gage indication, ground clearance, or fatigue resistance).
b. 17.24 to 31.03 (2.5 to 4.5 psi) (European requirement with tank in "as-installed" constraint). Acceptance criteria are no leaks under water and no permanent deflection beyond agreed upon percentage.
c. To monitor the manufacturing process, some manufacturers test fuel tanks pressurized above 31.03 kPa (4.5 psi) with the tank in an unrestrained condition under water. Acceptance criteria (leak or burst requirement) is as determined by agreement between the tank supplier/vehicle manufacturer.

4.13.2 Vacuum applied to the system can cause adverse effects, even if only of a dimensional nature. Vacuum cycling effects may become more significant as On Board Diagnostic (OBD) regulations phase in. Some strategies will utilize regular application of a vacuum to the system to verify evaporative system integrity. Such designs should account for the dimensional effects of the pressure fluctuations on the tank in the installed condition. Also, the pressure-cycling tests developed to prove tank fatigue capability must consider added fatigue damage from OBD.

4.14 Containment Integrity Guidelines—Under crash event per FMVSS 301 or other reasonable crash circumstance, there should be no component rupture, puncture, or closure element separation from the fuel tank. It is suggested the engineer test design sensitivity to a variety of reasonable crash circumstances.

4.14.1 GENERAL DESIGN CONSIDERATIONS TO PREVENT FUEL LOSS IN REASONABLY SEVERE CRASHES—Most importantly, fuel containment components should be packaged in a "friendly" environment. Material selection should consider puncture resistance, material thickness requirements, and burst pressure strength. Laminate or composite materials may have useful application, especially in providing a "shielding" function.

4.14.2 Key causes of fuel loss during or immediately after a crash:

a. Hydrodynamic Rupture—In selecting the fuel tank placement in the vehicle, the engineer must consider vehicle structural collapse insofar as such collapse may affect the hydrodynamic rupture characteristics of the tank. It might be necessary in a given location to strengthen the structure surrounding the tank to prevent or limit the amount of tank deformation in a specific crash mode. Other factors to consider are:
   (1) Shape of tank.
   (2) Vapor space when tank is filled to design maximum (allowing for fuel expansion with temperature—the larger the amount of vapor space versus liquid fuel, the greater the ability of the tank to withstand crush).
   (3) Material properties (e.g., tensile strength, ductility, including visco-elasticity, if present, and impact strength). (A ductile material will absorb more energy.)
b. Filler neck or other component separation from tank. Key elements to consider are:
   (1) Joint structural properties to resist leaking from twist, bending, or axial loads, or combinations of these.
   (2) Relative separation or crush loads experienced during a crash. The filler pipe and its attachments to the tank and the outer body at the filler inlet should be designed to prevent, to the extent possible, separating the pipe from the tank. For example, the pipe to body separation force should be significantly less than the pipe to tank separation force.
   (3) Fuel caps are often subjected to prying forces and direct impact during crashes. Reasonable design efforts are suggested with the objective of maintaining system integrity when fuel caps are subjected to these loading mechanisms.
c. Puncture—Basically, the fuel tank should be protected from intrusion by other components. Emphasis should be placed on the following considerations with respect to overall crash integrity:
   (1) Shielding and shield shape when it contacts the fuel tank in a crash.
   (2) Tank material and thickness.
   (3) Location of "unfriendly" surfaces/components (and the path they travel during a crash).
   (4) Vehicle structural collapse characteristics in relation to the fuel tank location (considering the variety of impact directions) as well as to other fuel containment components (e.g., fill neck).
   (5) Penetration by a striking object external to the vehicle.

4.15 Open Flame Resistance Guidelines—When considering resistance of the fuel containment system to open flame, design engineers are advised to address: (a) fire size and duration as established by the size of the assumed fuel spill (possibly from another vehicle per 4.15.3), (b) size and location of possible punctures in the fuel containment system caused from a collision, and (c) potential effects on the system from grass fires underneath the vehicle (a specific concern in some countries such as Australia).

4.15.1 Europe has an open flame test standard (part of ECE 34) which is required for plastic fuel tank equipped vehicles. Such vehicles manufactured in the U.S. for sale in Europe must also meet ECE 34, Annex 5, which requires no liquid fuel release after 2 min of fire exposure.

4.15.2 To conform to proposed requirements, fuel filler pipes for use with methanol (e.g., flexible fuel vehicles) must have anti-siphon capability. It may also be advisable to incorporate a flame arrestor on tanks designed for flexible fuel vehicles and to consider an anti-siphon capability on all new tank designs as an added safety feature.

4.15.3 Based on a 1992 NHTSA report, "Fires and Burns in Towed Light Vehicle Crashes" by Susan Partyka, 24% of fires came from outside the vehicle or unknown causes. Also from the same report (using data collected on 1979 to 1986 models and 1988 to 1990 models), 59% of fires involving crashes were frontal impacts, 12% rear impacts, 12% side impacts, and 14% from rollovers. Therefore, it may be advisable to apply the ECE 34, Annex 5, criteria for all new tank designs, regardless of material.

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APR 10 2000

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Frank C. Sonye, Director
Product Investigations
General Motors Corporation
30500 Mound Road
Warren, MI 48090-9055

NSA-122jlq
EA99-013

Dear Mr. Sonye:

Please add the following request to the Agency's March 8, 2000, peer information request letter regarding EA99-013:

9. Furnish copies of all engineering standards, specifications, and guidelines regarding fuel tank and filler neck assembly packaging. "Packaging" should be interpreted in the context used in Section 4.12 of the enclosed copy of Society of Automotive Engineers Information Report SAE J1664, "Passenger Car and Light Truck Fuel Containment."

If you have any technical questions concerning this matter, please call Mr. Jeff Quandt of my staff at (202) 366-5207. If you have any questions concerning confidentiality claims, please contact Ms. Heidi Coleman, Assistant Chief Counsel for General Law, at (202) 366-1834.

Sincerely,

Kathleen C. DeMeter, Director
Office of Defects Investigation
Safety Assurance

Enclosure

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APR 10 2000

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. William R. Willen
American Honda Motor Co., Inc.
1919 Torrance Boulevard
Torrance, CA 90501-2746

NSA-12jlq
EA99-013

Dear Mr. Willen:

Please add the following request to the Agency's March 8, 2000, peer information request letter regarding EA99-013:

9. Furnish copies of all engineering standards, specifications, and guidelines regarding fuel tank and filler neck assembly packaging. "Packaging" should be interpreted in the context used in Section 4.12 of the enclosed copy of Society of Automotive Engineers Information Report SAE J1664, "Passenger Car and Light Truck Fuel Containment."

If you have any technical questions concerning this matter, please call Mr. Jeff Quandt of my staff at (202) 366-5207. If you have any questions concerning confidentiality claims, please contact Ms. Heidi Coleman, Assistant Chief Counsel for General Law, at (202) 366-1834.

Sincerely,

(S)
Kathleen C. DeMeter, Director
Office of Defects Investigation
Safety Assurance

Enclosure

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CERTIFIED MAIL
RETURN RECEIPT REQUESTED

APR 10 2000

Yaichi Oishi, General Manager
Toyota Technical Center, U.S.A.
1850 M Street, NW, Suite 600
Washington, DC 20036

NSA-12jlq
EA99-013

Dear Mr. Oishi:

Please add the following request to the Agency's March 8, 2000, peer information request letter regarding EA99-013:

9. Furnish copies of all engineering standards, specifications, and guidelines regarding fuel tank and filler neck assembly packaging. "Packaging" should be interpreted in the context used in Section 4.12 of the enclosed copy of Society of Automotive Engineers Information Report SAE J1664, "Passenger Car and Light Truck Fuel Containment."

If you have any technical questions concerning this matter, please call Mr. Jeff Quandt of my staff at (202) 366-5207. If you have any questions concerning confidentiality claims, please contact Ms. Heidi Coleman, Assistant Chief Counsel for General Law, at (202) 366-1834.

Sincerely,

/S/
Kathleen C. DeMeter, Director
Office of Defects Investigation
Safety Assurance

Enclosure

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APR 10 2000

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Frank D. Slaveter
National Technical Compliance Manager
Nissan Motor Corporation in U.S.A.
P.O. Box 191
Gardena, CA 90248-4505

NSA-12jlq
EA99-013

Dear Mr. Slaveter:

Please add the following request to the Agency's March 8, 2000, peer information request letter regarding EA99-013:

9. Furnish copies of all engineering standards, specifications, and guidelines regarding fuel tank and filler neck assembly packaging. "Packaging" should be interpreted in the context used in Section 4.12 of the enclosed copy of Society of Automotive Engineers Information Report SAE J1664, "Passenger Car and Light Truck Fuel Containment."

If you have any technical questions concerning this matter, please call Mr. Jeff Quandt of my staff at (202) 366-5207. If you have any questions concerning confidentiality claims, please contact Ms. Heidi Coleman, Assistant Chief Counsel for General Law, at (202) 366-1834.

Sincerely,

Kathleen C. DeMeter, Director
Office of Defects Investigation
Safety Assurance

Enclosure

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SOLVAY

SOLVAY AUTOMOTIVE

April 12, 2000

Kathleen C. DeMeter, Director
Office of Defects Investigation
Safety Assurance
National Highway Traffic Safety Administration
400 Seventh St., S.W.
Washington, D.C. 20590

Reference: NSA-122jlq; EA99-013

Dear Ms. DeMeter,

This letter is in response to your information request relating to the Office of Defects Investigation review of crash induced filler neck assembly failure in 1996 through 2000 DaimlerChrysler NS minivans. Solvay Automotive, Inc.'s responses are attached. The requested documents are considered confidential and have been forwarded to the Office of Chief Counsel..

I can be reached at (713) 525-6025 if you have any questions regarding the enclosed responses or documents

Sincerely,

Lisa D. Anouilh

Lisa D. Anouilh
Attorney

Enclosures

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Solvay Automotive Inc.'s Response to
NHTSA's Information Request dated March 9, 2000

Question 1. Provide copies of all documents related to all communications between Solvay and DaimlerChrysler regarding the design, crash performance, pull-off performance, or sealing performance of the subject tank spud (i.e. documents relating to the spud-tank weld need not be included). Sort the documents, furnished by date, in chronological order.
Response 1. Copies of fill neck and fuel tank design are confidential and have been forwarded to the Office of Chief Counsel as Attachment 1. Solvay Automotive does not have any communications or any other requested documents because it does not have system responsibility as explained more fully herein.

Question 2. Provide copies of all documents related to communications between Solvay and other entities, that are related in any way to the design, crash performance, pull-off performance, or sealing performance of the subject tank spud or to the design and performance of clamped hose joints in general, since January 5, 1999. Furnish the documents sorted by date and in separate enclosures for each such entity.
Response 2. Responsive documents are confidential and have been forwarded to the Office of Chief Counsel as Attachment 2. Solvay Automotive has limited documentation because it does not have system responsibility as explained more fully herein.

Question 3. Provide the following information concerning the design and specification of the subject fuel tank spud:

a. provide copies of all documents related to any specifications from DaimlerChrysler regarding the subject tank spud or the subject hose joint;
b. describe Solvay's role in the design of the subject tank spud and provide copies of all relevant documents;
c. identify (by name, company title and group affiliation, and business telephone number) all past or present employees of Solvay who were involved to any extent in the design of the subject tank spud and state the specific role/responsibility of each individual in the design process;
d. state when Solvay first became involved in the design and/or development of the subject fuel tank assembly and describe Solvay's qualifications, expertise, and experience at the stated time period in the design of fuel tank spuds and clamped hose joints used for joining filler neck assemblies to the motor vehicle fuel tanks with particular attention to the crash performance (i.e. resistance to separation from external loading) of such components/systems;
e. state whether crash performance and resistance to hose "pull-off" or separation under load were considered by Solvay in the design of the subject tank spud; and
f. explain the basis for the design of the subject tank spud bead, with particular attention to the bead back angle.

Response 3.

a. There is no DaimlerChrysler specification for the tank spud or its relationship to the hose joint.
b. Solvay Automotive, Inc., using DaimlerChrysler provided vehicle geometry and interface requirements (i.e. fill neck diameter, bead diameter) developed the fill neck design detail. The fill neck detail was submitted to DaimlerChrysler as part of the fuel tank assembly for approval. Prints for these designs are in Attachment 1.
c. The primary contact for questions regarding information pertinent to this investigation is John Herald, Vice President of Quality and Purchasing, 248-280-6457. Solvay Automotive, Inc. discussed this response with Jeff Quandt on 4/7/2000, and it was agreed that subject to further inquiry, a primary contact would be provided to which all questions may be submitted.
d. Solvay Automotive, Inc. became involved in the development of the subject tank beginning in 1992. Solvay Automotive's expertise was in fuel tank design. The design of the spud, clamped hose joints and crash performance is a vehicle system design responsibility of DaimlerChrysler with which Solvay Automotive has had no involvement.
e. As stated in 3d, crash performance is a vehicle design parameter under DaimlerChrysler control. There is not a DaimlerChrysler requirement for hose retention to the fill neck.

f. The design intent of the fill neck bead is to provide a seal between the fill neck and the fill pipe hose. The bead diameter and the fill neck diameter were based on existing data from other similar fill pipe hose diameters. The bead angles were also based on existing designs.

Question 4. Provide copies of all documents related to the testing, research, calculations, and/or other analyses conducted by, or on the behalf of, Solvay relating to the design or pull-off resistance of hose joints used in the fuel filler neck assemblies of motor vehicles (including the subject vehicles). For each pull-off test conducted, state both the force, displacement, and hose elongation (%) corresponding to the beginning of hose slippage on the fitting and hose separation from the joint.
Response 4. The interaction of the hose to either the fill neck or the fill pipe is a vehicle fuel system requirement that is under DaimlerChrysler design control. Solvay Automotive, Inc. has neither conducted, nor contracted services for, hose pull-off performance, and therefore has no responsive documents.

Question 5. Provide copies of all standards, handbooks, design guides, recommended practices, technical papers, reports, training materials (including applicable sections of textbooks), or any other reference materials relating to the design, performance, or manufacture of clamped joints. Include all such materials received from or published or produced by Solvay itself, either for internal or client use. Furnish all such documents which relate in any way to pull-off performance in a separate enclosure.
Response 5. Copies of reference material related to clamped joints (none of which are directly related to fuel systems) are confidential and have been forwarded to the Office of Chief Counsel as Attachment 5.

Question 6. Provide Solvay's assessment of which aspects of the design and manufacture of clamped hose joints are factors in the pull-off resistance of the joint. Rank and weigh the contribution of each factor to the pull-off resistance of the joint, state the recommended parameters for each factor, and state the nominal value and tolerance range (state worst case tolerance stack-up condition for factors involving multiple dimensions, e.g., interference fit) in the subject hose joint design for each of the factors identified. Include in your response the influence of hose-fitting adhesion and the following categories list in SAE Recommended Practice J1697 - Section 7, "Recommended Practices for Design and Evaluation of Passenger and Light Truck Coolant Hose Clamped Joints - Hose Blow Off," published in July 1996 (copy enclosed):

a. interference fit;
b. bead diameter;
c. bead design (back angle);
d. clamp type; and
e. type of assembly lubricant.

Response 6. Hose retention is a vehicle fuel system design responsibility of DaimlerChrysler. Solvay Automotive, Inc. provides a product which is one component of that fuel system.
Solvay Automotive, Inc. does not have vehicle fuel system responsibility, therefore assessment of the aspects of clamped hose joint design and its impact on hose pull-off is not within Solvay Automotive's expertise or area of responsibility.

Question 7. Provide copies of all other documents in Solvay's possession or control that are related in any way to the subject tank spud or to the design and manufacture of clamped hose joints. Furnish the documents in descending chronological order.
Response 7. Responsive documents are confidential and have been forwarded to the Office of Chief Counsel as Attachment 7.
Question 8. Provide a table listing all plastic fuel tanks manufactured by Solvay from 1995 to present, showing: (a) the name of the customer; (b) the size of the fuel tank in gallons; (c) the vehicle application(s) of the fuel tank by model and model year; (d) the filler neck configuration (e.g., filler tube-hose-tank configuration used in the subject vehicles, integrated fill neck design, or other); (e) design responsibility (Solvay or manufacturer); (f) the spud outer diameter; (g) the spud wall thickness; (h) whether the tank spud is reinforced by a metal ferrule/sleeve or other method (if another method, describe that method); (I) the spud bead diameter; (j) the spud bead width; and (k) the spud bead back angle. Include a diagram showing the coordinate system for the stated bead back angle. Items 8.f and 8.g refer to the fitting area of the spud over which the clamping device is situated.

Response 8. In the confidential Enclosure is a matrix of all DaimlerChrysler plastic fuel tanks produced from 1995 to the present along with the requested parameters. This has been forwarded to the Office of Chief Counsel. The provision of other non-DaimlerChrysler customer information is proprietary, the disclosure of which will require customer approval. Solvay Automotive's response to this question was discussed with Jeff Quandt on 4/7/00, and it was agreed that only DaimlerChrysler data would be provided at this time, subject to further inquiry.

Question 9. Provide the name, title and office affiliation, and business telephone number of a Solvay representative who can answer technical questions regarding the information furnished in response to this letter.
Response 9. John Herald, Vice President of Quality and Purchasing, Solvay Automotive, Inc. Troy, Michigan, will be the contact for any questions regarding the Solvay Automotive, Inc. response. His business number is 248-280-6457.

Inf 10

NORMA

NORMA PRODUCTS (U.S.), INC. A WORLD OF INNOVATIVE SOLUTIONS ™
31132 CENTURY DRIVE • WIXOM, MI 48393 • PHONE: (248) 668-9510 • FAX: (248) 668-9523

April 12, 2000

Sent via FedEx

Ms. Kathleen C. DeMeter, Director
Office of Defects Investigation, Safety Assurance
U.S. Department of Transportation
400 Seventh St., S.W.
Washington, D.C. 20590

Reference: NSA-122jlq
EA99-013

Dear Ms. DeMeter,

In response to the letter sent to Norma Products (U.S.), Inc. dated March 8, 2000 and referenced above, please find the following responses to the questions asked:

1. **Provide copies of all documents related to communications between Norma and DaimlerChrysler regarding the design, pull-off performance, and/or crash performance of the subject hose joint and/or subject filler neck assembly. Sort the documents furnished by date, in reverse chronological order.**

1A. Please find the attached documents, which are correspondence between Daimler Chrysler and Norma. All test data and test reports are being provided to NHTSA's Office of Chief Counsel and are requested to be treated as confidential business information.

2. **Provide copies of all documents related to communications between Norma and any and all other entities, that are related in any way to the design, crash performance, pull-off performance, or sealing performance of the subject tank spud or to the design and performance of clamped hose joints in general, since January 5, 1999. Furnish the documents sorted by date and in separate enclosures for each such entity.**

2A. All communications, test data and test reports are being provided to NHTSA's Office of Chief Counsel and are requested to be treated as confidential business information.

3. **In separate enclosures, provide copies of all documents related to any and all testing, research, calculations, and/or other analyses conducted by, or on behalf of, Norma relating in any way to the design and/or pull-off resistance of the subject filler neck hose joints or the components used therein. Sort the documents furnished by date, in reverse chronological order.**

3A. All test data and test reports are being provided to NHTSA's Office of Chief Counsel and are requested to be treated as confidential business information.

4. **In a letter dated April 9, 1999, DaimlerChrysler provided information to NHTSA regarding pull-off testing conducted by Norma on the subject tank spuds. The information included a document titled "Design Decision Matrix" (copy enclosed) which listed various design and manufacturing process factors which could influence joint resistance to separation under load.**

   Provide the following information concerning this document:

   a. **state whether Norma (a) prepared and/or (b) transmitted this document to DaimlerChrysler;**
   b. **identify the author(s) of the document by name, company, title, division/group affiliation, and business telephone number;**
   c. **describe Norma's reason(s) for providing the document to DaimlerChrysler;**
   d. **state the bases for each "Conclusion/Recommendation" stated for each of the design/process factors listed in the "Design Decision Matrix" and provide copies of all supporting documents; and**
   e. **describe, and provide copies of all documents related to, all follow-up discussions between Norma and DaimlerChrysler concerning the "Design Decision Matrix," or any of the design issues identified in the matrix.**

4A. Design Decision Matrix:

a) Norma prepared and submitted to Daimler Chrysler.

b) The authors of this document are

Bob Ristovski	Robert Ward
Norma Products (U.S.), Inc.	Norma Products (U.S.), Inc.
Systems Manager	Vice President of Sales and Marketing

Both may be reached at 248-668-9510

c) The purpose of this document was to provide some assistance to Daimler Chrysler by pointing out factors that influence the pull-off force of a joint.

d) The basis for each conclusion/recommendation is as follows:

Assembly Speed – We recommend no more than 500 rpm. Very high installation speeds can result in the clamps being installed incorrectly.

Installation Torque- It is important that the clamp is torqued properly and to assure that it is not being over torqued.

Lubrication – Testing was completed using the current assembly aids in use and dry samples, it was determined that the lubricants made a difference with this particular joint design.

Relaxation Torque –The test results show similar pull-off results between low values of relaxed torque and higher values of relaxed torque as seen in test reports 200-99 and 201-99 and 217-99.

Torque Cap – Is not a factor in pull off. A torque cap is used as an assembly aid to assure that the clamp has reached the optimum installation torque.

WDHC vs. WDHC w/spring – Norma's built in spring design is able to compensate for hose relaxation but only offers a marginal increase in pull-off.

Wall Thickness of Spud – Increasing the wall thickness of the tank spud or adding a metal ferrule to the inside would prevent collapsing during pull-off, which in turn would increase the pull off force values. (Refer to spread sheet detailing similar bead designs, with sleeves (ferrules) and without sleeves (ferrules).

Back Angle of Bead – Generally the closer the beads back angle is to 90° from the shank, the higher pull results are. When the back angle is larger than 90° the results are less. (Refer to spread sheet detailing machined beads at 90° vs. any other test report showing the current spud)

Proper Installation of the clamp – If the clamp is not torqued to the optimum torque, the clamping force of the clamp would be less, thus providing lower pull results.

e) We have no follow-up documents related to the "Design Decision Matrix"

5. **Provide Norma's assessment of which aspects of the design and manufacture of clamped hose joints are factors in the pull-off resistance of the joint. Rank and weigh the contribution of each factor to the pull-off resistance of the joint, state the recommended parameters for each factor, and state the nominal value and tolerance range (state worst case tolerance stack-up condition for factors involving multiple dimensions, e.g., interference fit) in the subject hose joint design for each of the factors identified. Include in your response the influence of hose-fitting adhesion and the following categories listed in SAE Recommended Practice J1697 – Section 7, "Recommended Practices for Design and Evaluation of Passenger and Light Truck Coolant Hose Clamped Joints – Hose Blow Off," published in July 1996 (copy enclosed):**

a. **interference fit;**
b. **bead diameter;**
c. **bead design (back angle);**
d. **clamp type; and**
e. **type of assembly lubricant.**

5A. Norma is not a supplier of tanks or tank spuds. Norma is not design responsible for any of these systems. From our testing experience, many factors influence pull-off results, including but not confined to:

- Type of clamp, how the clamp is installed, hose dimensions, hose construction, spud dimensions, spud material, surface finish of spud, surface finish of hose and lubricants.

To our knowledge no study has been completed to rate which factors have the greatest influence. This would be an enormous effort that has not been commissioned by any Norma customer.

Automotive Fuel System Designs have undergone substantial changes due to environmental legislation and changes in material technology. For these reasons, Norma's experience has been to conduct testing and supply data for the use by our customers. We offer our testing facility to all automotive customers and must be very sensitive to competitive confidentiality.

6. **State the force, displacement, and hose elongation (%) corresponding to the beginning of hose slippage and hose separation for each hose pull-off test conducted by Norma on the subject filler neck hose joints.**

6A. The force corresponding to the beginning of the hose slippage was not monitored and is not a part of the pull-results. The force at which a tested hose started to slip and the displacement could be estimated by reviewing the computer print out sheets with each test report. Hose elongation (%) was not a monitored aspect of any testing conducted.

7. **Identify by make, model, model year, and fuel tank all 1990 through current model year motor vehicles using Norma clamps in fuel filler neck hose joints. If Norma does not possess this information, state each motor vehicle manufacturer whom Norma has sold clamps to for use in fuel filler neck assemblies by manufacture name, clamp (name and Norma model/part number), clamp type (provide a catalog describing all relevant clamps), and approximate number supplied by calendar year.**

7A. All information is being provided to NHTSA's Office of Chief Counsel and is requested to be treated as confidential business information.

8. Provide copies of all documents related to testing, research, calculations, and/or other analyses conducted by, or on behalf of, Norma relating to the design or pull-off resistance of hose joints used in the fuel filler neck assemblies of other motor vehicles (i.e., any and all pull-off testing conducted by, or for, Norma on fuel filler neck hose joints, or components used therein, that were either used in, or considered for use in, vehicle applications other than the subject vehicles). For each pull-off test conducted, state both the force, displacement, and hose elongation (%) corresponding to the beginning of hose slippage on the fitting and hose separation from the joint.

8A. Norma maintains a testing facility, which is available for use by our customers or for Norma to do testing as specified by our customers. The testing facility is used as a marketing tool giving us a competitive edge over our competition that do not have similar facilities in the Detroit area. In some cases, Norma does the testing for customers. In other cases, the customer does its own testing using Norma's facilities. Test reports, if supplied, are most often to convey raw data or comparative data for parts supplied. These data by Norma, without feedback from the requesting party, do not always indicate what elements were under test. In either case, frequently Norma does not know the purpose of the test or even, in many cases, the elements under test. Moreover, the results of this testing are considered the proprietary property of the customer. Under the circumstances, Norma is unable to determine with certainty what, if any, documents it may have which would be responsive to the parameters of the request and, in any case, Norma believes that such documents should not be produced without consent of its customers for whom or by whom the tests were performed. For this reason, we have not included any of this data with this response.

9. Provide copies of all standards, handbooks, design guides, recommended practices, technical papers, reports, training material (including applicable sections of textbooks), or any other reference materials relating to the design, performance, or manufacture of clamped hose joints. Include all such materials received from or published or produced by technical or trade associations or other outside sources, as well as material developed by Norma itself, either for internal or client use. Furnish all such documents which relate in any way to pull-off performance in a separate enclosure.

9A. Norma does not design tanks or tank spuds. We do not have any literature on clamped hose joints for this type of application.

10. Provide copies of all other documents in Norma's possession or control that are related in any way to the design, pull-off resistance, or crash performance of the subject filler neck hose joints. Furnish the documents in descending chronological order.

10A. All documents have been supplied which are related to the subject fuel filler.

11. Provide the name, title, division/group affiliation, and business telephone number of a Norma representative who can answer technical questions regarding the information furnished in response to this letter.

11A. All technical questions should be directed to:

Bob Ristovski Norma Products (US) Inc. Systems Manager	Robert Ward Norma Products (US) Inc. Vice President of Sales and Marketing

Both may be reached at 248-668-9510

To respond to this investigation, Norma Products (U.S.), Inc. conducted thorough searches of locations likely to have relevant documents and inquiries of responsible persons likely to know relevant information. The scope of this search did not, nor could it reasonably, include all of Norma as defined in NHTSA's March 8, 2000 information request.

Conclusion and request for confidential treatment

Confidential treatment of the information and documents marked "confidential" is requested for an indefinite period. The information stamped confidential is privileged commercial information. The certification in support of the request for confidentiality is attached.

Consistent with the request in your letter, as well as the provisions of 49 CFR 512.4(a)(4) and (5), Norma is submitting to your office this copy of this letter with confidential material omitted. Norma is also submitting two copies of those documents containing confidential information, and one copy of the information from which confidential information has been deleted, to the Office of Chief Counsel, National Highway Traffic Safety Administration, Room 219 (NCC-30), 400 Seventh St., S.W., Washington, D.C. 20590.

It is requested that the response from the Chief Counsel to Norma's request for confidentiality and any other notifications regarding this request be sent to:

Steven L. Simpson
Norma Products (U.S.), Inc.
31132 Century Drive
Wixom, MI 48393

As stated above, the portions of this letter and all attachments as to which confidentiality has been requested have been marked "confidential". If a request for disclosure of any or all of the information or documents is received by NHTSA, Norma requests notification of receipt of such request and, if necessary, an opportunity to further explain the reason why such materials should not be disclosed under the applicable statutes and regulations.

Sincerely,
NORMA Products (U.S.), Inc.

Steven L. Simpson President	Bob Ristovski Quality Manager	Robert S. Ward VP Sales/Marketing

Cc: Mr. Ed Kronk – Butzel Long

00000827

1.

Bob Ristovski

From: Bob Ristovski <bristovs@normatech.com>
To: <bristovs@normatech.com>
Sent: Monday, March 27, 2000 5:10 PM
Subject: Fw: NS Fill Neck 90 Degree Back Angle 'Pull' Evaluation

-----Original Message-----
From: jc79@daimlerchrysler.com <jc79@daimlerchrysler.com>
To: Bob Ristovski <bristovs@normatech.com>
Cc: Mike.Monacelli@Solvay.com <Mike.Monacelli@Solvay.com>
Date: Friday, February 25, 2000 3:57 PM
Subject: Re: NS Fill Neck 90 Degree Back Angle 'Pull' Evaluation

>I added a column for 'Avg" and a column for 'Std Dev". Please call me when
>you receive this reply to discuss my comments/observations.
>
>

00000828

Bob Ristovski

From: Lee Callon <lcallon@normatech.com>
To: <bristovs@normatech.com>
Sent: Friday, March 31, 2000 4:21 PM
Subject: Fw: clamp ID measurements

-----Original Message-----
From: Bob Ristovski <bristovs@normatech.com>
To: jc79@daimlerchrysler.com <jc79@daimlerchrysler.com>
Cc: bward@normatech.com <bward@normatech.com>; lcallon@normatech.com <lcallon@normatech.com>
Date: Wednesday, December 01, 1999 12:04 PM
Subject: clamp ID measurements

>Hello Jerry,
>
>The following is the measurements of the clamp ID's as requested:
>
>Old hose, old spud, clamp torqued to 35"-lbs = 51.3mm
>New hose, new spud, clamp torqued to 25"-lbs = 52.70mm
>
>I will forward your request to Lee regarding the addition of the latest
>pull test to the bar graphs.
>
>Best Regards,
>Bob
>

00000829

Bob Ristovski

From: Lee Callon <lcallon@normatech.com>
To: <bristovs@normatech.com>
Sent: Friday, March 31, 2000 4:23 PM
Subject: Fw: Pull off charts on PowerPoint

-----Original Message-----
From: Lee Callon <lcallon@normatech.com>
To: JC79@daimlerchrysler.com <JC79@daimlerchrysler.com>
Date: Wednesday, November 24, 1999 10:02 AM
Subject: Pull off charts on PowerPoint

>Hello Jerry!
>
>Please see the attached PowerPoint file. It's just a rough draft. I would
>like for you to look it over and see if the format works for you. This
file
>will correlate to the 11-7-99 report #218-99 that Bob R. provided in one of
>our recent meetings (it's the one showing eight different pull condition
>results). I chose PowerPoint because you select a print option that will
>show 6 slides or graphs per page.
>
>I look forward to your feedback.
>
>Best Regards,
>
>Lee Callon
>Account Manager
>NORMA Product (U.S.) Inc.
>(248) 668-9510 ext.. 18
>

000008

1.

Bob Ristovski

From: Lee Callon <lcallon@normatech.com>
To: <bristovs@normatech.com>
Sent: Friday, March 31, 2000 4:21 PM
Subject: Fw: NS Filler Tube/Fuel Tank Joint - 11/19/99 Follow-up Meeting

-----Original Message-----
From: JC79@daimlerchrysler.com <JC79@daimlerchrysler.com>
To: nak@chrysler.com <nak@chrysler.com>; JAW@chrysler.com <JAW@chrysler.com>; RW32@chrysler.com <RW32@chrysler.com>; ces1@chrysler.com <ces1@chrysler.com>; bristovs@normatech.com <bristovs@normatech.com>; lcallon@normatech.com <lcallon@normatech.com>; John.Herald@Solvay.com <John.Herald@Solvay.com>; Mike.Monacelli@Solvay.com <Mike.Monacelli@Solvay.com>; Timothy.Judy@Solvay.com <Timothy.Judy@Solvay.com>; Mark_Lentz@markivauto.com <Mark_Lentz@markivauto.com>
Cc: ahb1@chrysler.com <ahb1@chrysler.com>; GLC5@chrysler.com <GLC5@chrysler.com>
Date: Saturday, November 13, 1999 9:31 AM
Subject: NS Filler Tube/Fuel Tank Joint - 11/19/99 Follow-up Meeting

>
>
>Our next meeting is scheduled as follows:
>
> Date: Friday, 11-19-99
> Time: 2:00PM - 3:00PM
> Location: DCTC, Conference Room Process-3E, Phone
> Phone T/L 722-0765, O/S 248.512.0765
>
>Note: The Norma Products participants and Jerry Coval may participate via a
>conference call from the Norma facility in Wixom, Mi. If this happens,
Jerry
>Coval will place the conference call from Norma at 2:00PM!
>
>

0000083

Design Decision Matrix

Factor	Influence (Yes / No)	Conclusion / Recommendation
Assembly Speed	Yes	Verify Speed of Gun, 500 RPM Max.
Installation torque	Yes	3.0 - 3.5 Nm at 500 rpm max.
Lubrication	Yes	Recommend use of Merpol or water
Relaxation Torque	No	No need for audit torque (Better to monitor installation torque)
Torque Cap	No	No increase in performance, only as an assembly indicator
WDHC vs WDHC w/spring	Yes	WDHC clamp is best solution as w/spring offers marginal performance improvement
Wall Thickness of Spud	Yes	Increase wall thickness or add metal ferrule
Back angle of Bead	Yes	Change closer to a 90° back angle on spud for increased pull-off forces
Proper Installation of Clamp	Yes	Use ratio of OD of Clamp to OD of hose, or verify torque guns on a regular basis (3 times per shift)

[handwritten initials] 9

KAUTEX

KAUTEX TEXTRON, NORTH AMERICA
SUBSIDIARY OF TEXTRON AUTOMOTIV

750 STEPHENSON HIGHWAY
TROY, MICHIGAN 48083

TEL: (248) 616-5100
FAX: (248) 616-5395

OFFICE
DEFECTS INVESTIGATION

April 13, 2000

Kathleen C. DeMeter, Director
Office of Defects Investigation, Safety Assurance
National Highway Traffic Safety Administration
400 Seventh Street S. W. (NSA-12; Room 5326)
Washington, D.C. 20590

Re: NSA-122jlq
EA99-013

Dear Ms. DeMeter:

This responds to your March 8, 2000 letter requesting information from Textron Automotive Company Inc., Kautex North America ("Kautex Textron") related to certain filler neck assemblies in 1996 through 2000 DaimlerChrysler NS-minivan vehicles.

Kautex Textron's responses to your numbered requests are set forth below. Kautex Textron's responses relate to its supply to DaimlerChrysler, for use in certain 1996 through 2000 DaimlerChrysler NS-minivan vehicles, of a filler neck assembly consisting of a tube, hose and clamp which attaches the tube to the hose. Kautex Textron did not supply a fuel tank spud fitting or fuel tank spud clamp.

As requested, Kautex Textron provides the following responses to your numbered requests.

1. Provide copies of all documents related to communications between Kautex/Textron and DaimlerChrysler regarding the following subjects:

- **(a) the design, specification, packaging, or crash performance of the subject filler tube assemblies;**
- **(b) the design, specification, or pull-off resistance of the subject hose joint or components used therein (e.g., fuel filler hose);**
- **(c) the design, specification, assembly, or pull-off resistance of the subject filler tube assembly hose joint; and**
- **(d) the design, specification, assembly, or pull-off resistance of clamped hose joints used in fuel filler necks.**

Furnish the documents, sorted by date, in a separate enclosure for each category.

Response - Question 1

Responsive documents are provided in separate enclosures, identified as Confidential Disclosure 1A and 1B, with a request for treatment as confidential business information in accordance with 49 CFR Part 512. As noted above, Kautex Textron supplied the hose portion of the subject hose joint referred to in subparts (b) and (c).

2. Provide copies of all documents related to communications between Kautex and any and all other entities, that are related in any way to the design, crash performance, pull-off performance, or sealing performance of the subject filler neck assembly or to the design and performance of clamped hose joints in general, since January 5, 1999. Furnish the documents sorted by date and in separate enclosures for each such entity.

Response - Questions 2

Kautex Textron has located no documents related to communications between Kautex Textron and entities other than DaimlerChrysler regarding the subject filler neck assembly.

Kautex Textron supplies different fuel neck assemblies that incorporate different clamped hose joints to various customers in accordance with customer supplied specifications. Kautex Textron likely has numerous documents related to communications with customers that reference a particular "design" or specification, but those documents generally would not relate to the development of clamped hose joint designs. Kautex Textron has not included such documents in its submission.

3. Provide copies of all documents related to testing, research, calculations, and/or other analyses conduced by, or on behalf of, Kautex/Textron relating to the design or pull-off resistance of hose joints used in the fuel filler neck assemblies of motor vehicles (including the subject vehicles). For each pull-off test conducted, state both the force, displacement, and hose elongation (%) corresponding to the beginning of hose slippage on the fitting and hose separation from the joint.

Response - Question 3

Documents related to pull and clamp torque testing of hose joints are provided in a separate enclosure, identified as Confidential Enclosure 2A, with a request for treatment as confidential business information. The components of the subject fuel filler neck assembly supplied by Kautex Textron are referenced in the documents as part numbers 4275925AA, 4809331AA and 4809331AB. Documents related to production, inspection and quality control processes concerning components of the subject fuel filler neck assembly supplied by Kautex Textron are also provided in a separate enclosure, identified as Confidential Disclosure 2B, with a request for treatment as confidential business information. These documents include samples of daily inspection sheets generated at the assembly plant. Kautex Textron has not included the large volume of similar sheets reflecting the same inspection process over the life of the assembly.

4. Provide copies of all standards, handbooks, design guides, recommended practices, technical papers, reports, training material (including applicable sections of textbooks), or any other reference materials relating to the design, performance, or manufacture of clamped hose joints. Include all such materials received from or published or produced by technical or trade associates or other outside sources, as well as material developed by Kautex/Textron itself, either for internal or client use. Furnish all such documents which relate in any way to pull-off performance in a separate enclosure.

Response - Questions 4

Kautex Textron has not located any such materials responsive to this request.

5. Provide Kautex/Textron's assessment of which aspects of the design and manufacture of clamped nose joints are factors in the pull-off resistance of the joint. Rank and weigh the contribution of each factor to the pull-off resistance of the joint, state the recommended parameters for each factor, and state the nominal value and tolerance range (state worst case tolerance stack-up condition for factors involving multiple dimensions, e.g., interference fit) in the subject hose joint design for each of the factors identified. Include in your response the influence of hose-fitting adhesion and the following categories listed in SAE Recommended Practice J1697 - Section 7, "Recommended Practices for Design and Evaluation of Passenger and Light Truck Coolant Hose Clamped Joints - Hose Blow off," published in July 1996 (copy enclosed):

(a) interference fit;
(b) bead diameter;
(c) bead design (back angle);
(d) clamp type; and
(e) type of assembly lubricant.

Response - Question 5

Kautex Textron did not design the subject filler neck assembly and generally does not design such components. Kautex Textron does not believe that it can provide any meaningful assessment of which aspects of the design and manufacture of clamped hose joints are factors in the pull-off resistance of a hose joint.

6. Provide copies of all other documents in Kautex/Textron's possession or control that relate in any way to the hose joint design or crash performance of the filler neck assemblies used in the subject vehicles. Sort the documents furnished by date, in chronological order.

Response - Question 6

Kautex Textron has located no additional documents that relate to the hose joint design or crash performance of the filler neck assemblies used in the subject vehicles.

7. Provide the name and telephone number of a Kautex/Textron representative to answer technical questions regarding the information furnished in response to this letter.

Response - Question 7

Please direct any technical questions you may have regarding the information furnished in this letter to David A. Cataldi, Senior Vice President, Operation Manufacturing Systems, 750 Stephenson Highway, Troy, Michigan 48083

This letter reflects the information available to Kautex Textron as of April 13, 2000 from Kautex Textron's employees and records located at facilities in Troy, Michigan; Windsor, Ontario, Canada; and Wilmington, Ohio.

Please contact Mr. Cataldi to discuss any questions you have during your review of this response.

Sincerely

KAUTEX TEXTRON, NORTH AMERICA

Robert K. Simpson

Robert K. Simpson
President

lk

TEXTRON Automotive Company Inc.

Textron Automotive Company Inc.
A Subsidiary of Textron Inc.
John R. Clark
Assistant General Counsel
e-mail: jclark5@tac.textron.com

750 Stephenson Highway
Troy, MI 48083
Phone: (248) 616-5603
FAX: (248) 616-5691

April 13, 2000

Ms. Heidi Coleman
Assistant Chief Counsel
National Highway Safety Administration
400 Seventh Street, S.W. (NCC-30; Room 5219)

Re: Request for Confidential Treatment of Documents Provided for EA99-013

Dear Ms. Coleman:

Textron Automotive Company, Inc., Kautex North America ("Kautex Textron") is submitting information to the Office of Defects Investigation relating to Engineering Analysis 99-013 (NSA-122jlq). The documents submitted contain confidential business information for which Kautex Textron respectfully requests protection pursuant to Part 512 of NHTSA regulations. Those documents are enclosed with this letter.

Confidential Enclosure 1A contains design drawings for components of the subject filler neck assembly supplied by Kautex Textron. Confidential Enclosure 1B contains documents reflecting communications with DaimlerChrysler that reference or comment upon the specifications provided in the design drawing. These documents include drawing format descriptions, part submission warrants and related documents, data point coordination worksheets, design and verification plan and reports, failure mode and effects analysis, production control plans and process flow diagrams.

Confidential Enclosure 2A contains documents related to pull and clamp torque testing of various hose joints, including the clamp which attaches the hose to the tube of the subject filler neck assembly and assemblies supplied to unrelated applications and customers. Confidential Enclosure 2B contains documents reflecting the production, inspection and quality control processes utilized by Kautex Textron in producing components for the subject filler neck assembly.

This information is not customarily made public by Kautex Textron and contains trade secrets and commercial information which is privileged or confidential under NHTSA regulations. The justification for confidential treatment is based on the subject information relating to the class determination for engineering drawings, internal product evaluation and production processes and product performance testing. Further, some of the enclosures include design data or specifications supplied to Kautex Textron by customers who may have additional grounds for maintaining confidentiality.

Enclosure 1A contains engineering drawings of fuel system details. The drawings are entitled to protection pursuant to NHTSA's class determination contained in Appendix B to Part 512.

Enclosures 1B, 2A and 2B reflect Kautex Textron's production processes, test data, measurements and quality guidelines for the subject components as well as other unrelated components. This information is entitled to protection because it reveals competitively sensitive information about the production processes, performance factors, evaluation methods and quality control processes that Kautex Textron considers significant in manufacturing its products. This information has value to Kautex Textron and could have competitive value to other manufacturers. Kautex Textron incurred substantial expenditures of manpower, capital, facilities and equipment generating this material. The information could be used by a competitor to reevaluate and, if necessary, modify its comparable processes or parts. In such a situation, the competitor could save development expenses without compensating Kautex Textron for the expenses it incurred developing its products and processes. Kautex Textron treats these materials as confidential, proprietary information available only to authorized personnel.

Kautex Textron is requesting permanent confidential treatment for the documents identified. Kautex Textron believes that the confidential information identified should be permanently protected because Kautex Textron's interest in protecting the confidentiality of the documents will not expire at any fixed point in the future.

Kautex Textron has appended to this letter the certification required by regulation. If you need further clarification or additional information, please contact me at 248-616-5603.

Sincerely,

TEXTRON AUTOMOTIVE COMPANY INC.

John R. Clark
Assistant General Counsel

Attachments: Certificate in Support of Request for Confidentiality
Confidential Enclosures Re: NSA-122jlq; EA99-013

cc: Kathleen C. DeMeter

Certificate in Support of Request for Confidentiality

I, David A. Cataldi, pursuant to the provisions of 49 C.F.R. Part 512, state as follows:

1. I am Senior Vice President, Operations Manufacturing Systems, of Textron Automotive Company Inc., Kautex North America ("Kautex Textron") and I am authorized by Kautex Textron to execute documents on behalf of Kautex Textron.

2. The information contained in the identified documents is confidential and proprietary and is being submitted with the claim that it is entitled to confidential treatment under 5 U.S.C. § 552 (b)(4).

3. I have personally inquired of the responsible Kautex Textron personnel who have authority in the normal course of business to release the information for which a claim of confidentiality has been made to ascertain whether such information has ever been released outside Kautex Textron, except to Kautex Textron customers and suppliers with the understanding that such information be kept confidential.

4. Based upon those inquiries and my personal involvement in the production and supply of the products described in the identified documents, to the best of my knowledge, information and belief the information for which Kautex Textron has claimed confidential treatment has never been released or become available outside Kautex Textron, except as stated in Paragraph 3.

5. I make no representations beyond those contained in this certificate and in particular, I make no representations as to whether this information may become available outside Kautex Textron because of unauthorized or inadvertent disclosure.

6. I certify under penalty of perjury that the foregoing is true and correct.

Executed on this 13th day of April 2000

David A. Cataldi

Ff 4

Ford

L. W. Camp
Director
Automotive Safety Office
Environmental And Safety Engineering

Ford Motor Company
330 Town Center Drive
Dearborn, Michigan 48126 USA

April 13, 2000

Ms. Kathleen C. DeMeter, Director
Office of Defects Investigation
Safety Assurance
National Highway Traffic Safety
Administration
400 Seventh Street, S. W.
Washington, DC 20590

Dear Ms. DeMeter:

Subject: EA99-013:NSA-122jlq

Attached is Ford's response to the agency's March 8, 2000 letter requesting certain information concerning Ford Windstar minivan fuel filler neck assemblies.

If you have any questions concerning this response please contact me.

Very truly yours,

L W Camp

Attachments
do/zp/w:ea99013

0000841

Attachment
April 13, 2000

FORD'S RESPONSE TO EA99-013

Ford's response to this Engineering Analysis information request was prepared pursuant to a diligent and good faith search for the information requested. While we have employed our best good faith efforts to provide responsive information, the breadth of the Agency's request and the requirement that information be provided on an expedited basis makes this a difficult task. We nevertheless have made every effort to provide thorough and accurate information and we would be pleased to meet with Agency personnel to discuss any aspect of this inquiry.

The scope of Ford's investigation conducted to locate responsive information focused on Ford employees most likely to be knowledgeable about the subject matter of this inquiry, and reviewing Ford files in which responsive information ordinarily would be expected to be found and to which Ford ordinarily would refer, as more fully described in this response. Ford notes that although electronic information was included within the scope of its search, Ford has not attempted to retrieve from computer storage media electronic files that were overwritten or deleted. As the Agency is aware, such files generally are unavailable to the computer user even if they still exist and are retrievable through expert means. To the extent that the Agency's definition of Ford includes suppliers, contractors and affiliated enterprises for which Ford does not exercise day-to-day operational control, we note that information belonging to such entities ordinarily is not in Ford's possession, custody or control. Ford has defined the scope of this request to include 1995 through 2000 model year Ford Windstar minivans with crash-induced fuel filler neck separation from the fuel tank. Ford has construed this request as pertaining to vehicles manufactured for sale in the United States.

Answers to your specific questions are set forth below. As requested, after each numeric designation, we have set forth verbatim the request for information, followed by our response. Unless otherwise stated, Ford has undertaken to provide responsive documents dated up to and including March 27, 2000. The Ford business units and/or affiliates which were searched for responsive documents are as follows: Advanced Vehicle Technology, Environmental and Safety Engineering, Large Vehicle Center, Quality Division, Truck Vehicle Center, Visteon Chassis, Visteon Current & Past LVC.

Request No. 1

> Provide copies of all specifications or standards related to the fuel system crash performance of the subject peer vehicles.

Answer

The requested specifications or standards pertaining to fuel system crash performance of the subject peer vehicles consists of confidential business information. This information is contained in Appendix I, Appendix II, Appendix III and Appendix IV which are being submitted under separate cover to the Chief Council's Office pursuant to 49 CFR, Part 512.

Crash performance of the subject vehicles was evaluated in accordance with applicable full vehicle crash specifications or standards, including Ford Motor Company standards, Federal Motor Vehicle Safety Standards (FMVSS), New Car Assessment Program (NCAP) standards and Lateral Impact New Car Assessment Program (LINCAP) standards. To the extent that these specifications or standards included a fuel system integrity evaluation, such tests are summarized in Appendix I.

A summary table of crash standards which were used to specifically evaluate the subject vehicle's fuel system integrity is provided in Appendix II.

Appendix III contains a summary of Ford's vehicle crash performance criteria pertaining to full vehicle crash and fuel system integrity evaluations.

Copies of applicable Ford Engineering Test Procedures are provided in Appendix IV.

Request No. 2

Provide copies of all specifications or standards related to the design or pull-off performance (i.e., resistance to separation from external forces) of the hose joints used in the subject peer filler neck assemblies.

Answer

Copies of Ford's documents pertaining to fuel filler system design specifications and standards, including pull-off performance of the subject hose joints, consists of confidential business information. This information is contained in Appendix V which is being submitted under separate cover to the Chief Council's Office pursuant to 49 CFR, Part 512.

Request No. 3

Provide copies of all test reports, data sheets, and/or other documents relating to pull-off testing of subject peer hose joints, or any of the components used therein. For each pull-off test conducted, state both the force, displacement, and hose elongation (%) corresponding to the beginning of hose slippage on the fitting and hose separation from the joint.

Answer

Ford construes this request to seek information relative to production representative peer hose joints. Ford has not searched for documents pertaining to memoranda or the development of the fuel system or any uncertified designs. Responsive Ford documentation is contained in Appendix VI which is being submitted under separate cover as proprietary information to the Chief Council's Office pursuant to 49 CFR, Part 512.

Request No. 4

Provide the following information regarding the design and assembly of the subject peer fuel filler neck assemblies and tank spuds. All design dimensions should include both the nominal value and the allowed tolerances.

a. filler hose inner diameter, wall thickness, and length;
b. tank spud fitting outer diameter, wall thickness, and length;
c. tank spud bead diameter, back tangle, and ramp angle;
d. clamp description, supplier, and torque range;
e. lubricants allowed for use as assembly aids, and
f. any reinforcement sleeves/ferrules used in the tank spud.

Answer

A summary table of the requested information has been provided in Appendix VII.

Request No. 5

Provide Ford's assessment of which aspects of the design and manufacture of clamped hose joints are factors in the pull-off resistance of the joint. Rank and weigh the contribution of each factor to the pull-off resistance of the joint and state Ford's specified parameters for each factor in the subject peer hose joint (if not already stated in response to Item 4).

Answer

During a March 15, 2000 phone conversation with members of my staff, Messrs. Quandt and Cooper of your office stated that Ford was not required to provide a response to this request. Based on that agreement Ford is not providing a response to this request.

Request No. 6

Provide the following information regarding the design of all fuel tanks and fuel tank spuds used in the subject peer vehicles:

a. the total tank volume based on an SAE reference fill;
b. the height of the lowermost portion of the subject peer tank spud opening above/below (state which) the SAE reference fill level; and
c. if the height state in 6.b is below the SAE fill level, state the equivalent volume of fuel represented by the stated height difference.

Answer

Ford construes Request No. 6 (b) to seek tank fill level height relative to the hose joint with the fuel tank spud. This hose joint with the fuel tank spud is above the SAE reference fill level for the subject vehicles. A summary table of the requested information has been provided in Appendix VIII.

Request No. 7

In a December 20, 1999, letter DaimlerChrysler provided a document to NHTSA which had been developed for a proposed peer vehicle study that was never conducted. The document (copy enclosed) is a worksheet of various vehicle and fuel system design factors. Complete the enclosed worksheet for the subject peer vehicles.

Answer

A summary table of the requested information has been provided in Appendix IX.

Request No. 8

Provide two samples of each variation of filler hose and fuel tank spud used in the subject peer vehicles.

Answer

Two variations of fuel tank spuds were used in the subject peer vehicles. Two samples of each variation are enclosed with this response. In a March 15, 2000 phone conversation with members of my staff, Messrs. Quandt and Cooper of your office advised that the agency would separately procure samples of the subject filler hose and clamp assemblies as necessary.

Request No. 9

Furnish copies of all engineering standards, specifications, and guidelines regarding fuel tank and filler neck assembly packaging in the subject vehicles. "Packaging" should be interpreted in the context used in Section 4.12 of the enclosed copy of Society of Automotive Engineers Information Report SAE J1664, "Passenger Car and Light Truck Fuel Containment."

Answer

Responsive information to this request was included in Ford's June 17, 1999 confidential submission request to PE99-025:NSA-122jlq. To the extent that the agency's request for assembly packaging information encompasses a broader range of standards, specifications and guidelines than those submitted for PE99-025, Ford is providing additional documentation responsive to this request in Appendix X. This documentation consists of confidential business information which is being submitted under separate cover to the Chief Council's Office pursuant to 49 CFR, Part 512.

VII

Question 4 Design Dimensions

Tank Spud

	1995/1996	1997/1998	1999/2000
Outer Diameter	34.1 - 34.6 mm	34.1 - 34.6 mm	34.1 - 34.6 mm
Wall Thickenss	6.8 - 7.6 mm	6.8 - 7.6 mm	6.8 - 7.6 mm
Length *	49.2 mm	49.2 mm	49.2 mm
Bead Diameter	39.0 - 39.4 mm	39.0 - 39.4 mm	39.0 - 39.4 mm
Back Angle	90 degrees	90 degrees	90 degrees
Ramp Angle	34.5 degrees	34.5 degrees	34.5 degrees
Reinforcement Sleeves/Ferrules	None	None	None

*from spud tip to stop bead

Filler Pipe Hose

	1995/1996	1997/1998	1999/2000
Filler Hose Inner Diameter	34.5 - 36.0 mm	36.3 +- 0.75 mm	35.4 - 36.9 mm
Wall Thickness	4.1 - 6.2 mm	3.8 +- 0.6 mm	3.5 - 5.1 mm
Hose Length			287.7 mm

Fuel Filler Clamp

	1995/1996	1997/1998	1999/2000
Description	<- 35mm Round Worm Screw Hose Clamp ->		
Supplier	Trident	Trident	Trident
Torque Range*	3.6 + - 0.6 nm	3.6 + - 0.6 nm	3.6 + - 0.6 nm

* Assembly torque range not part absolute torque

Lubricants

	1995/1996	1997/1998	1999/2000
Lubricants used for assembly	None	None	None

VIII

IX

Hose reinforced (yes or no)		YES
Any additional comments ?		—
Fill pipe attachment to tank		—
Type: Spud ? Note material, how attached to tank, length, diameter, diameter of bead.		HDPE, HOT PLATE WEL
Clamp ? Style of clamp ?		YES,
Bead type on spud		
Any additional comments ?		
Fuel cap		SEE RESPONSE TO Q 4
Type (screw-on, quick-on, etc.)		1/8 TURN
Valving		PRESSURE + VACCUM
Cap attachment - metal/plastic?		PLASTIC
Vehicle Attitude - Vertical from top of wheel opening above axle CntrLine (As received, no additional loading)		
Left Front	423.6	
Left Rear	430.3	
Right Front	423.6	
Right Rear	430.2	

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7 [illegible]

NISSAN

NISSAN NORTH AMERICA, INC.

April 14, 2000

Ms. Kathleen C. DeMeter, Director
Office of Defects Investigation
National Highway Traffic Safety Administration
400 Seventh St. S.W.
Washington, D.C. 20590

Re: NSA-12jlq, EA99-013

Dear Ms. DeMeter:

Enclosed is Nissan's response to the referenced NHTSA peer vehicle Information Request of March 8, 2000 and follow up question of April 10, 2000 concerning the agency's investigation of crash induced fuel filler neck failure in certain DaimlerChrysler NS model minivans. At this time, Nissan is submitting responses to questions 1, 2(partial), 3, 4, 5, 6, 7 and 8. We continue to research information responsive to question 9 at this time. Confidential Attachment B for question 2 will be provided on April 20, 2000 and we will attempt to provide question 9 information by April 28, 2000.

****

The attached reply responds by first stating each question, then the response. Please contact Donald Neff at (310) 771-5463 if you have any questions.

Sincerely,

Frank D. Slaveter

Frank D. Slaveter
Corporate Manager, Technical Compliance

enclosures: Responses to Questions 1, 2(partial) 3, 4, 5, 6, 7 and 8
Confidential Attachment A
Confidential Attachment C
Confidential Attachment D
Attachment E

00000853

INTRODUCTION

In responding to this Information Request ("IR"), information has been obtained from those places within Nissan likely to contain such information in the regular and ordinary course of business. When a particular Request seeks "documents" as defined in the IR, reasonable, good faith searches have also been made of corporate records in those places likely to maintain them in the regular and ordinary course of business.

The definitions of "documents" and "Nissan", however, are unreasonably broad, vague and ambiguous in the context of the information sought by this IR. For example, "calendars", "appointment books", "financial statements" and "personnel records" would not contain investigations pertaining to the alleged defect. Therefore, searches were not made for such "documents", inasmuch as they would not likely contain responsive information. In addition, Nissan has not provided information from persons or entities over which it does not ordinarily exercise control.

Further, Nissan does not believe it has responsive "documents" that are privileged; accordingly, no claim of privilege is asserted. However, the definitions are so broad, vague and ambiguous that Nissan cannot readily ascertain whether it has failed to identify "documents" covered by a privilege and, therefore, the request for such identification is not reasonable.

Nissan understands this IR to seek information on vehicles manufactured for sale in the United States. At this time Nissan's responses are limited to model year 1999 – 2000 Quests (V41 model).

Responses are provided after each request, and Attachments are utilized as appropriate.

1. Provide copies of all specifications or standards related to the fuel system crash performance of the subject peer vehicles.

   A chart and other information concerning crash test specifications and reference values Nissan uses related to fuel system crash performance are provided in Confidential Attachment A. In addition, the vehicles are tested to demonstrate compliance with the requirements of FMVSS 301.

2. Provide copies of all specifications or standards related to the design or pull-off performance (i.e., resistance to separation from external forces) of the hose joints used in the subject peer filler neck assemblies.

   Specifications and standards related to the design of the subject hose joint are submitted as Confidential Attachment B.

   Nissan has no specific standards or specifications related to the pull-off performance of the fuel filler hose/fuel tank hose joint. The entire system performance is considered as a whole. The factors outlined in response to question 5 below, along with the design dimensions and tolerances provided in response to question 4, ensure appropriate performance. The performance is confirmed by the methods described in the response to question number 1.

3. Provide copies of all test reports, data sheets, and/or other documents relating to pull-off testing of subject peer hose joints, or any of the components used therein. For each pull-off test conducted, state both the force, displacement, and hose elongation (%) corresponding to the beginning of hose slippage on the fitting and hose separation from the joint.

   The fuel hose supplier during certain hose durability evaluations uses a pull-off type method to evaluate hose material durability. However, this is not representative of the clamped hose joint in production vehicles because the test does not utilize production parts. Data relating to pull-off testing in Nissan's possession from the supplier from a filler hose durability evaluation is provided in Confidential Attachment C.

4. Provide the following information regarding the design and assembly of the subject peer fuel filler neck assemblies and tank spuds. All design dimensions should include both the nominal value and the allowed tolerances.

   a. filler hose inner diameter, wall thickness, and length;
   b. tank spud fitting outer diameter, wall thickness, and length;
   c. tank spud bead diameter, back angle, and ramp angle;

d. clamp description, supplier, and torque range;
e. lubricants allowed for use as assembly aids; and
f. any reinforcement sleeves/ferrules used in the tank spud.

The information requested in questions 4a through 4f is provided in Confidential Attachment D.

5. Provide Nissan's assessment of which aspects of the design and manufacture of clamped hose joints are factors in the pull-off resistance of the joint. Rank and weigh the contribution of each factor to the pull-off resistance of the joint and state Nissan's specified parameters for each factor in the subject peer hose joint (if not already stated in response to Item 4).

Some factors which may affect hose pull-off resistance are as follows. These are neither ranked nor weighted, as the entire system performance is considered as a whole. See the response to question number 1 above.

1. Nissan's filler tube design incorporates a curve or bend of appropriate length, allowing the hose to stretch as the tank and filler tube move apart, relative to the rest of the vehicle, in a dynamic event. This design helps minimize, to the extent possible, removal forces applied to the hose at the joint.
2. Clamp screw torque (in the case of a screw clamp), which applies the clamping force. See response to question 4.
3. Clamp design. Applies the clamping force evenly around 360° of the hose circumference.
4. Tube bulge outside diameter compared to hose inside diameter. See response to question number 4.
5. The coefficient of friction between the tube plating and the rubber hose inner surface.
6. Hose material properties.

6. Provide the following information regarding the design of all fuel tanks and fuel tank spuds used in the subject peer vehicles:

a. the total tank volume based on an SAE reference fill;
b. the height of the lowermost portion of the subject peer tank spud opening above/below (state which) the SAE reference fill level; and
c. if the height stated in 6.b is below the SAE fill level, state the equivalent volume of fuel represented by the stated height difference.

a. the total tank volume based on SAE reference fill:

78.5 liters

b. the height of the lowermost portion of the subject peer tank spud opening above/below (state which) the SAE reference fill level:

33.4 mm below the SAE reference fill level.

c. if the height stated in 6.b. is below the SAE fill level, state the equivalent volume of fuel represented by the stated height difference:

17.3 liters.

7. In a December 20, 1999, letter DaimlerChrysler provided a document to NHTSA which had been developed for a proposed peer vehicle study that was never conducted. The document (copy enclosed) is a worksheet of various vehicle and fuel system design factors. Complete the enclosed worksheet for the subject peer vehicles.

   The worksheet is provided as Attachment E.

8. Provide two samples of each variation of filler hose and fuel tank spud used in the subject peer vehicles.

   Two samples of the fuel filler hose and tank spud for the V41 model Quest are submitted under separate cover.

9. Furnish copies of all engineering standards, specifications and guidelines regarding fuel tank and filler neck assembly packaging. "Packaging" should be interpreted in the context used in Section 4.12 of the enclosed copy of Society of Automotive Engineers Information Report SAE J1664, "Passenger Car and Light Truck Fuel Containment."

   The response to this question will be submitted at a later date as it was added to the Information Request by letter dated April 10, 2000.

NSA-12jlq
EA99-013

CONFIDENTIAL ATTACHMENT A

Crash Test Specifications

NSA-12jlq
EA99-013

CONFIDENTIAL ATTACHMENT C

Supplier Durability Test Data

NSA-12jlq
EA99-013

CONFIDENTIAL ATTACHMENT D

Responses to Questions 4a through 4f

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ATTACHMENT E

Worksheet

Vehicle Identification - Make, Model, Model Year, options. Date of Inspection.

Wheel base of vehicle		
Rated fuel capacity	20 GALLONS	
Location of fuel fill tube (right or left side)	LEFT	
Location of fill opening CntrLine on sheet metal	FOR CURB LOADING ; GXE MODEL	
Fore-Aft position of opening to rear axle CntrLine (in 'Y')	62.47 mm FORE	
Up_Down position of opening to top of rear wheel opening (above axle CntrLine, in 'Z')	198.5 mm UP	
Description of fuel tank location in vehicle		
Position of rear edge of tank to rear axle CntrLine	67.92 mm FORE	
Position of front edge of tank to rear axle CntrLine	1065.0 mm FORE	
Position of left outboard edge to outboard side of left sill	394.15 mm	
Position of right outboard edge to outboard side of right sill	677.07 mm	
Position of left outboard edge to inboard side of left rail	50.53 mm	
Position of right outboard edge to inboard side of right rail	333.45 mm	
Any additional comments ?	—	
Fill venting and valving		
ORVR, internal/external	NO	
Location on tank and fill tube	—	
Material, attachment, size, valving	—	
Fuel tank material type (metal or plastic)	METAL	
Unique suspension or other chassis interface ?	NO	
Fuel tank		
Location of fuel filler tube entry (Rear, side, top?)	SIDE	
Submerged fill (yes or no?)	YES	FUEL TANK
Any tank shields ? Note if thermal or impact (skid plate), attached to tank, body or exhaust.		STONE CHIP PROTECTOR
Any additional comments ?	—	
Fuel tank straps		
How many straps ?	2	
Fore/aft or lateral ?	FORE/AFT	
Any additional comments ?	—	
Are they fastened to fixed dimension or to torque?	FORE IS FIXED ; REAR IS TORQUED	
Fill Pipe		
Housing at body side: Fixed or breakaway ?	BREAKAWAY	
Approximate overall length	1106.5	
Number of bends	5	
Pipe Material	STEEL	
Pipe OD	35.5	
Routed above rail, below rail, through rail?	THROUGH RAIL	
Connection type to tank	RUBBER HOSE	
Pipe attachment to BIW structure (yes or no)	YES	
Comments pertaining to venting hoses	—	
Unique rollover valves or plumbing ?	NO	
Any shielding? For impact? (yes or no)	YES ; STONE CHIP PROTECTOR	
Any additional comments ?	—	
Fill Pipe Hose		
Hose OD	42.0 mm	
Length	423.7 mm	
Number of bends	2	
Corrugated or not	NO	

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Hose reinforced (yes or no)	NO	
Any additional comments ?	—	
Fill pipe attachment to tank		
Type: Spud ? Note material, how attached to tank, length, diameter, diameter of bead. SPUD, STEEL, WELDED		
Clamp ? Style of clamp ?	YES; WIRE SCREW	CLAMP
Bead type on spud		
Any additional comments ?	—	
Fuel cap		
Type (screw-on, quick-on, etc.)	QUICK-ON	
Valving	PRESSURE AND VACUUM	
Cap attachment - metal/plastic?	METAL	
Vehicle Attitude - Vertical from top of wheel opening above axle CntrLine (As received, no additional loading) CURB WT,		
Left Front	460.3	
Left Rear	468.8	(GXE MODEL)
Right Front	460.3	
Right Rear	468.8	

32.6 SPUD O.D,
37.0 BEAD

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TOYOTA

TOYOTA TECHNICAL CENTER, USA, INC.

APR 14 2000

April 14, 2000

Ms. Kathleen C. Demeter, Director
Office of Defects Investigation
National Highway Traffic Safety Administration
400 Seventh Street, S.W.
Washington, D.C. 20590

Re: NSA-12jfa, EA99-013

Dear Ms. Demeter:

This is in response to your March 8, 2000 letter concerning the peer vehicle information request regarding EA99-013. This response, however, does not include a response to your additional request in your April 10, 2000 letter. We will submit it as soon as possible.

Should you have any questions about this response, please contact Mr. Michiteru Kato or Mr. Chris Tinto of my staff at (202) 775-1707.

Sincerely,

TOYOTA TECHNICAL CENTER, U.S.A., INC.

Takashi Yoshie
General Manager
Vehicle Safety Regulations

TY: mk
Attachments

1. Provide copies of all specifications or standards related to the fuel system crash performance of the subject peer vehicles.

Response 1

Copies of all standards related to the fuel system crash performance of the subject peer vehicles are provided as Attachment 1 and 2.

Toyota has also provided as Attachment 3 its side collision test standard which complies with the performance evaluation requirements specified in FMVSS No. 214. Although this standard does not directly relate to the fuel system crash performance, we insure that there is no fuel leakage after the test.

2. Provide copies of all specifications or standards related to the design or pull-off performance (i.e., resistance to separation from external forces) of the hose joints used in the subject peer filler neck assemblies.

Response 2

A copy of the standard related to the pull-off performance of the hose joints used in the subject peer filler neck assemblies is provided as Attachment 4.

3. Provide copies of all test reports, data sheets, and/or other documents relating to pull-off testing of subject peer hose joints, or any of the components used therein. For each pull-off test conducted, state both the force, displacement, and hose elongation (%) corresponding to the beginning of hose slippage on the fitting and hose separation from the joint.

Response 3

A summary of test reports and data sheets relating to pull-off testing of the subject peer hose joints is provided as Attachment 5.

In this summary, the force, displacement, and hose elongation (%) corresponding to the beginning of hose slippage on the fitting, and hose separation from the joint are also described.

4. Provide the following information regarding the design and assembly of the subject peer fuel filler neck assemblies and tank spuds. All design dimensions should include both the nominal value and the allowed tolerances.

a. filler hose inner diameter, wall thickness, and length;
b. tank spud fitting outer diameter, wall thickness, and length;
c. tank spud bead diameter, back angle, and ramp angle;
d. clamp description, supplier, and torque range;
e. lubricants allowed for use as assembly aids; and
f. any reinforcement sleeves/ferrules used in the tank spud.

Response 4

The requested information regarding the design and assembly of the subject peer fuel filler neck assemblies and tank spuds are provided as Attachment 6.

5. Provide Toyota's assessment of which aspects of the design and manufacture of clamped hose joints are factors in the pull-off resistance of the joint. Rank and weigh the contribution of each factor to the pull-off resistance of the joint and state Toyota's specified parameters for each factor in the subject peer hose joint (if not already stated in response to Item 4).

Response 5

Toyota understands that the factors relating to the pull-off resistance of clamped hose joints are as follows;

Design factors

filler hose : inner diameter and wall thickness at clamped portion, length inserted to tank spud

tank spud : outer diameter at clamped portion, bead diameter

clamp : location of clamping, tightening stroke (TMC - What is tightening stroke? The amount the clamp is tightened?)

Manufacturing (assembling) factors

filler hose : length inserted to tank spud

clamp : location of clamping, tightening stroke

As we described in our response to questions #2 and #3, the evaluation of the pull-off resistance is conducted on an assembled unit, which combines all of these factors. Therefore, we do not have any data for ranking and weighing the contribution of each factor to the pull-off resistance of the joint.

6. Provide the following information regarding the design of all fuel tanks and fuel tank spuds used in the subject peer vehicles:

a. the total tank volume based on an SAE reference fill;
b. the height of the lowermost portion of the subject peer tank spud opening above/below (state which) the SAE reference fill level; and
c. if the height stated in 6.b is below the SAE fill level, state the equivalent volume of fuel represented by the stated height difference.

Response 6

a. The total tank volume based on an SAE reference fill level is 20.9 gallons (79 liters).
b. The height of the lowermost portion of the subject peer tank spud opening below the SAE reference fill level is 23.7mm (0.9 inches).

c. The equivalent volume of fuel represented by the stated height difference between the lowermost portion of the subject peer tank spud opening and the SAE reference fill level is 4.1 gallons (15.5 liters).

7. In a December 20, 1999 letter Daimler Chrysler provided a document to NHTSA which had been developed for a proposed peer vehicle study that was never conducted. The document (copy enclosed) is a worksheet of various vehicles and fuel system design factors. Complete the enclosed worksheet for the subject peer vehicles.

Response 7

The completed worksheet for the subject peer vehicle is provided as Attachment 7.

8. Provide two samples of each variation of filler hose and fuel tank spud used in the subject peer vehicles.

Response 8

Two samples of a filler hose and fuel tank spud (including clamp) used in the subject peer vehicles are provided with this response.

Attachment 1

TSA5120G-5
CRITERIA FOR FUEL LEAKAGE IN FRONTAL COLLISION

CRITERIA FOR FUEL LEAKAGE IN FRONTAL COLLISION

1. Scope

This standard specifies the criteria for fuel leakage in the head-on collision and oblique collision tests according to TSA 5120G. The types of vehicle to which this standard is applied shall comply with Table 1.

Remark: In this standard, units and numerical values given in { } are based on customary units system, and are specified values.

Table 1

	Scope
FMVSS No.301 CMVSS No.301	Passenger cars (1). With a GVWR (2) of 4536kg {10000 lb} or less multipurpose passenger vehicles (3), trucks and buses.
ECE No.34	Passenger cars (4).
SSA No.267	Passenger cars (4).
Safety Regulations for Road Vehicles in Japan, Article 15, Item 1-2	Vehicle (A), (B) and (C) (5)

Notes: (1) Passenger cars: Motor vehicles designed to transport not more than 10 passengers. (Excluding multipurpose passenger vehicles and trailers)

(2) GVWR : An acronym for Gross Vehicle Weight Rating. Maximum mass that a loaded vehicle can reach.

(3) Multipurpose passenger vehicles : Motor vehicles designed to transport not more than 10 passengers, mounted on a truck chassis and used off road at times (Excepting trailers).

Notes: (4) Passenger cars : Motor vehicles designed to transport not more than 9 passengers. (Excepting multipurpose passenger vehicles.)

(5) Vehicle (A) : Other than Vehicle (B) and (C)

Vehicle (B) : Vehicle is the following conditions.
Four or more wheeled vehicles, two or three wheeled vehicles other than vehicle(c).
Overall length : 4.7 m max
Overall width : 1.7 m max
Overall height : 2.0 m max
Piston displacement : 2000 cm^3 max
(an internal-combusion engine)
In case of diesel engine, piston displacement isn't specified.

Vehicle (C) : Vehicle is the following conditions.
(Other than two wheeled vehicles)
Overall length : 3.3 m max
Overall width : 1.4 m max
Overall height : 2.0 m max
Piston displacement : 660 cm^3 max
(an internal-combusion engine)
or (Two wheeled vehicles)
Overall length : 2.5 m max
Overall width : 1.3 m max
Overall height : 2.0 m max
Piston displacement : 250 cm^3 max
(an internal-combusion engine)

2. Criteria
   The criteria shall comply with Table 2.

Table 2

Item			Criteria			
			Head-on Collision			Head-on Collision Oblique Collision
			Safety Regulation for Road Vehicles in Japan 15, Item 1-2	ECE No.34	Saudi SSA No.267	FMVSS No.301 CMVSS No.301
Test conditions	Collision speed	Head-on Collision	50.0±2 km/h	48.3 to 53.1 km/h	48.3 to 53.1 km/h	48.3 km/h (30 mph) or less
		Oblique Collision	—			
	Test mass		Vehicle equivalent mass (6)	Unloaded vehicle mass (7)	Curb mass (7)	UVW (8) + luggage mass + 2 dummies
	Filled fuel quantity		90 % or more of tank nominal capacity		90 to 95 % of tank nominal capacity	
	Used liquid		Liquid having similar viscosity and specific gravity	Fire-resistant liquid having viscosity and density similar to those of the fuel used	Fire-resistant liquid having a density of 0.7 to 1.0 g/cm³ may be used.	Stoddard Solvent ASTM Standard D235 Type 1
Test results	Leakage during collision (from the moment of collision to stopping of vehicle)		Not specified	Little leakage only is accepted.	30 g or less	28 g (1 ounce) or less
	Fuel leakage after collision		30 g or less for the first 1 min after collision, and 150 g or less for 5 min	30 g/min or less	150 g/5 min or less	141 g (5 ounce) or less for 5 min after stop of vehicle, and for 25 min after it 28 g (1 ounce) or less
	Fuel leakage in rollover test (9)	No. of times of rollover	—			1
		Turning speed	—			90° /1 to 3 min
		For 5 min after start of turning of each 90°	—			141 g (5 ounce) /5 min or less
Fuel leakage in rollover test (9)	To the start of the next turning		—			28 g (1 ounce) /min or less

Notes: (6) Empty vehicle mass, vehicle equivalent mass: Mass of standard equipment + fuel, oil, and full cooling water.
Spare tire, tools and jack are not included, but they are included in the test.

(7) Unloaded vehicle mass, curb mass: Mass of standard equipment + fuel, oil, and full cooling water

(8) UVW: Unloaded Vehicle Weight

(9) The rollover test is applied only to FMVSS 301 and CMVSS 301.

Applicable Standards:

ASTM D235 Specification for Mineral Spirits (Petroleum Spirits)
(Hydro Carbon Drycleaning Solvents, Spec.)

Attachment 2

TSA5121G-1
CRITERIA FOR FUEL LEAKAGE ON REAR-END OR SIDE COLLISION

CRITERIA FOR FUEL LEAKAGE ON REAR-END OR SIDE COLLISION

1. Scope
This standard covers criteria for fuel leakage on rear-end or side collision when the collision test is carried out according to TSA5121G. Applicable types of vehicles under this standard are as listed in Table 1.

Remark: In this standard, units and numerical values given in { } are based on the customary units system, and are standard values.
The SI units and the numerical values are also standard values.

* Table 1

	Application
FMVSS No. 301 CMVSS No. 301	Passenger cars (1), Multi-purpose passenger vehicles (3), Trucks and buses with a GVWR (2) up to 4536 kg {10000 lb}
ECE No. 34	Passenger cars (4)
Saudi Standard No. 264	
Safety Regulations for Road Vehicles in Japan Article 15, Item 1-2	Conventional passenger cars, small size motor vehicles, and light duty vehicles (5)

Notes: (1) Passenger cars:
Motor vehicles designed to carry 10 or less persons (excluding multi-purpose passenger vehicles and trailers)
(2) GVWR:
Gross Vehicle Weight Rating; the maximum mass that may be attained by a loaded vehicle.
(3) Multi purpose passenger vehicles:
Among vehicles designed to carry 10 or less persons, those mounted on truck chassis or those used on off-road from time to time (excluding trailers)
(4) Passenger cars:
Motor vehicles designed to carry 9 or less persons (excluding multi purpose passenger vehicles)

Prepared and Written by :
Dept. No. 14
Vehicle Evaluation & Engineering Div. I

Engineering Administration Div.
Established / 3 rd Mar. 1996 Revised :

* Notes:(5) Motor vehicles designed to carry more than 10 persons, motor vehicles with a gross vehicle weight exceeding 2.8 t, two-wheeled vehicles, two-wheeled vehicles with side cars, and light duty vehicles equipped with caterpillers and sleds shall be excluded.

2. Criteria

Criteria shall be as given in Table 2.

* Table 2

Item			Criteria			
			Rear-end collision			Rear-end collision and side collision
			Safety Regulations for Road Vehicles in Japan Article 15, Item 1-2	ECE No. 34	Saudi SSA No. 264	FMVSS No. 301 CMVSS No. 301
Test conditions	Collision velocity	Rear-end collision	50±2 km/h	35 to 38 km/h	48.3 to 53.1 km/h	48.3 km/h {30 mph}
		Side collision				32.2 km/h {20 mph}
	Test Mass		Mass equivalent to the vehicle (7)	Mass of an unloaded vehicle (8)	Vehicle curb weight (8)	UVW (9) + Luggage wt + 2 dummies
	Moving barrier mass		1100±20 kg		1800±30 kg	1816 kg {4000 lb}
	Fuel filling quantity		90 % or more of the tank nominal capacity		90 to 95 % of the tank nominal capacity	
	Test fluid		A substitute fluid with a similar viscos density to that of the test fluid	A nonflammable fluid with a similar viscos density to that of the test fluid	A nonflammable fluid with a density of 0.7 to 1.0 g/cm³ may be used.	Stoddard Solvent ASTM Standard D484-71 Type I
Test results	Fuel leakage quantity during a collision (from the moment of collision up to stoppage of vehicle)		Not specified	Slight leakage shall not occur	30 g max	28 g {1 ounce max}
	Fuel leakage after testing		30 g/min max and 150 g/5 min max after stoppage of vehicle	30 g/min max after collision	150 g/5 min max after stoppage of vehicle	141 g {5 ounces} max for 5 minutes after stoppage of vehicle, and 28 g {1 ounce} /min max for 25 minutes thereafter

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Table 2 (Continued)

Item			Criteria			
			Rear-end collision			Rear-end collision and side collision
			Safety Regulations for Road Vehicles in Japan Article 15, Item 1-2	ECE No. 34	Saudi SSA No. 264	FMVSS No. 301 CMVSS No. 301
Test results	Fuel leakage after roll-over test	Number of roll-over tests				1 roll-over
		Roll-over speed				90° /1 to 3 min
		5 min after the initiation of roll-over by 90°				141 g {5 ounces} / 5 min max
		Thereafter up to the initiation of next roll-over				28 g {1 ounce} / 1 min max

Notes:(7) Unloaded vehicle mass, vehicle equivalent mass:
the mass of standard equipment + fuel + oil, with the coolant filled up

(8) Unloaded vehicle mass, curb weight:
the vehicle mass of Note (7) + spare tier + tools + jacks
If the air conditioner is a factory option for both Notes (7) and (8), the mass of the air conditioner shall be included.

(9) UVW:
Abbreviation of Unloaded Vehicle Weight

Applicable Standard

ASTM D484 Hydrocarbon Drycleaning Solvents, Spec

Established / 3 rd Mar. 1996 Revised :

Attachment 3

TSA5141G
MOVING DEFORMABLE BARRIER SIDE COLLISION TEST METHOD FOR AUTOMOBILES

MOVING DEFORMABLE BARRIER SIDE COLLISION TEST METHOD FOR AUTOMOBILES

1. Scope
   This standard covers the side collision test method for passive safety test vehicles (hereinafter referred to as "test vehicles") using a moving deformable barrier (hereinafter referred to as an "MDB"). This test method complies with the performance evaluation requirements specified in FMVSS No. 214.

   Remark: In this standard, units and numerical values given in { } are based on the customary units system, and are given for reference.

2. Test Equipment

2.1 MDB (Moving Deformable Barrier)
An MDB must meet the following as required by the Safety Act Part 587:
(1) Mass
The total mass including the impact face should be 1368 kg.
(2) Barrier face
The barrier face to be attached to the front of an MDB should have an aluminum honeycomb construction and a load-deflection characteristic of 310±17 kPa {45±2.5 psi} (1690±103 kPa {245±15 psi} for the bumper).
(3) Wheel angles
The four wheels on the carriage should be angled to 27±1° relative to the axis of the MDB.

Remark: The wheel angles allow the MDB to run obliquely ("crabbed carriage").

(4) Brake system
An MDB should have a brake system that enables it to stop swiftly after an initial collision without losing control, in order to prevent a subsequent collision against the test vehicle. An example of an MDB is shown in Figs. 1 and 2:

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Dept. No. 24	Established/ Revised:
Vehicle Evaluation & Engineering Div. II	Jun. 1996

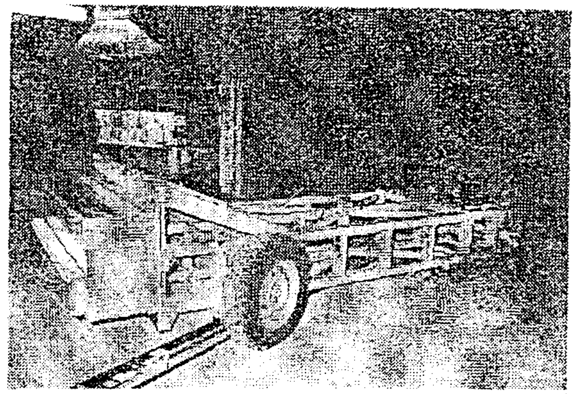

Fig. 1 Example of MDB

All Measurements in millimeters

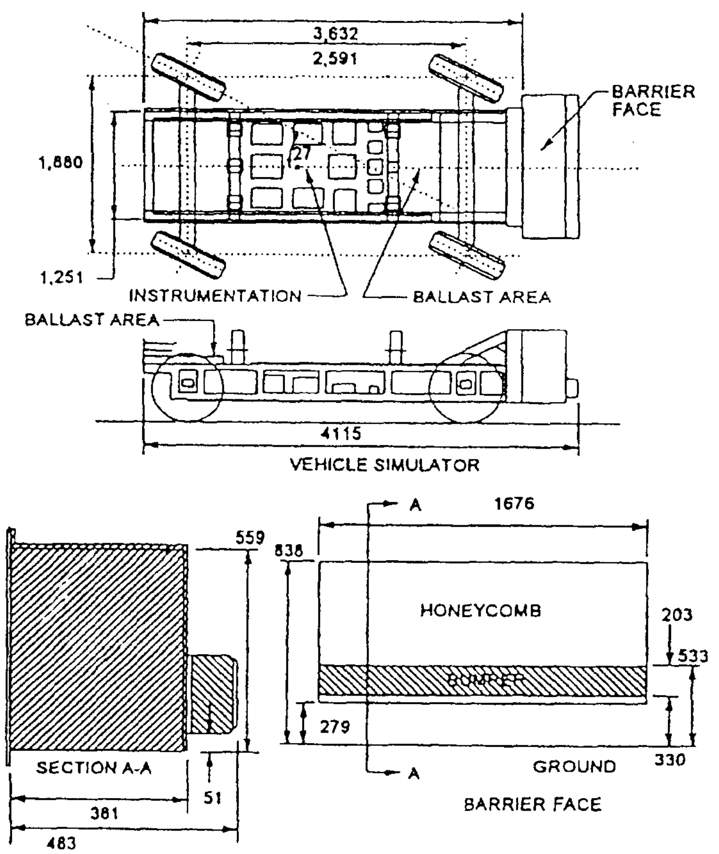

Fig. 2 Example of MDB

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2.2 MDB Approach

An approach should meet the following conditions:

(1) Level and flat.

(2) Wide and long enough for acceleration to at least 62 km/h.

(3) Can target the impact face of an MDB within horizontal and vertical ranges of 50 mm and 25 mm, respectively, of the impact point.

(4) Does not significantly hamper the position and motion of an MDB and test vehicle.

2.3 MDB Tow and Release Systems

The tow and release systems include a guide rail that ensures the correct direction of an MDB during acceleration, and a device to release the acceleration wire immediately before collision.

2.4 MDB Acceleration System (see TSA5120G)

The acceleration system is a system that accelerates an MDB smoothly to an intended speed, using a DC motor or a drop weight. Fig. 3 shows an example of the test site layout for a motor-driven system:

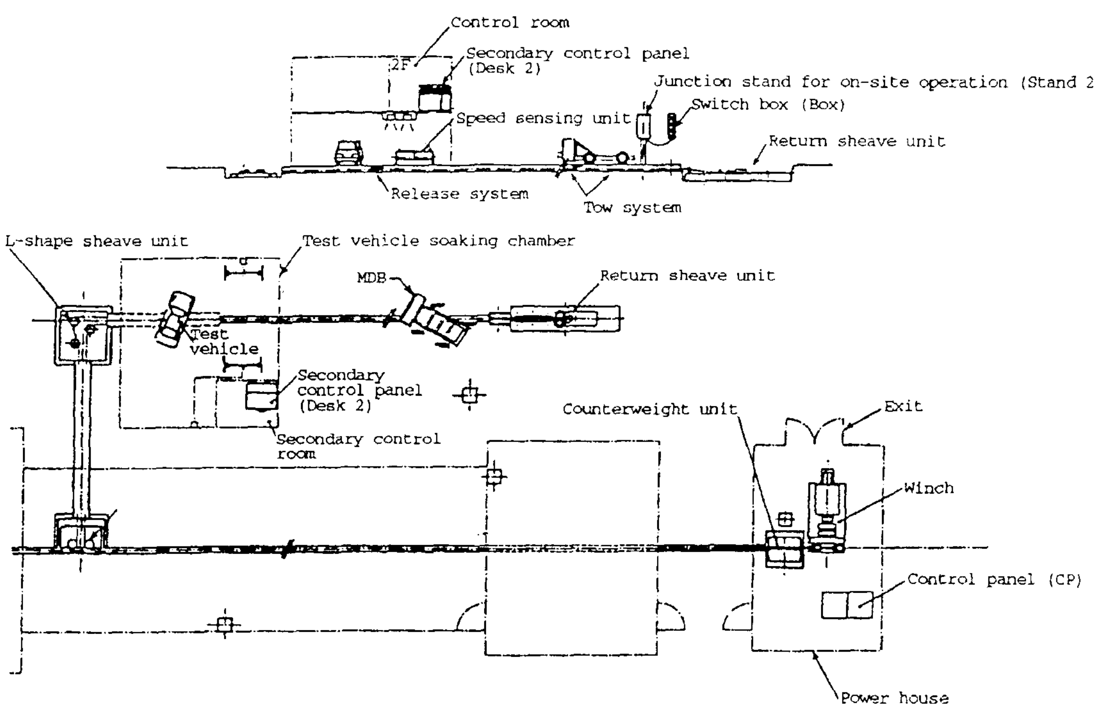

Fig. 3 Example of Test Site Layout for Motor-Driven System

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2.5 MDB Collision Speed Sensing Unit (see TSA5120G)
Following are examples of speed sensors:
(1) Laser sensor
(2) Pressure-sensitive switch sensor

3. Instrumentation

3.1 Signal Processing System (see TSA5120G)
(1) Accelerometers
The necessary characteristics of accelerometers vary depending on the position of installation as shown in Table 1:

Table 1

	Test vehicle	MDB	Test dummy
Capacity (m/s^2) (G)	4900 (500)	1960 (200)	19600 (2000)
	9800 (1000)		
Frequency response (kHz)	0 to 3	2.1	4
	0 to 3.5		
	0 to 5		
Accuracy (%)	1	1	1
Operating temperature (°C)	-10 to +60	-10 to +60	-18 to +66

(2) Contact sensors
Use pressure-sensitive switches, aluminum foil switches, etc., to sense contact at necessary points and generate contact signals.
(3) Amplifier (signal conditioner)
The major specifications of an amplifier are shown in Table 2. An amplifier is often built in an on-board signal conditioner unit.

Table 2

Item	Specification
Frequency response (kHz)	0 to 5
Accuracy (%)	0.5

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(4) Low-pass filter
Use a low-pass filter to eliminate high-frequency components unnecessary for analysis. The available cutoff frequencies should include 1650 Hz (analog), and 100, 300, 600 and 1000 Hz (digital). A 1650 Hz analog filter is often built in an on-board signal conditioner unit for antialiasing.

(5) A-D converter (signal conditioner)
Use an A-D converter to convert analog signals to digital ones. The major specification is shown in Table 3. An A-D converter is often built in an on-board signal conditioner unit.

Table 3

Item	Specification
Sampling rate (kHz)	10 min.

(6) Storage device (signal conditioner digital memory, etc.)
Use a storage device to store digital signals. An example of specification is shown in Table 4. A storage device is often built in an on-board signal conditioner unit.

Table 4

Item	Specification
Storage capacity (kilowords/ch.)	128

3.2 Collision Photographing System

(1) High speed camera
Use a high speed camera to photograph the time history of the test vehicle, MDB and dummy at 500 to 1000 frames per second. A high-resolution sprocket-drive camera is normally used. See TSA5120G for more information.

(2) Timing signal generator
A timing signal generator is used to generate a signal at the moment of collision in order to synchronize recording by a high speed camera and measurement by a signal processing system. A timing signal from a pressure-sensitive switch is sent to the signal processing system, as well as to an electronic flashlamp to produce a flash for recording by the high speed camera.

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3.3 Test Dummy

A test dummy is a model of human body used as its alternative to monitor and measure the time history, impact shock, etc. FMVSS 214 stipulates that the male 50th percentile dummy (DOT SID) specified in the Safety Act Part 572 Subpart F be used in a side impact test. Other types of side impact test dummies include those shown in Table 5. Fig. 4 shows an example of a side impact dummy.

Table 5

Type	Size	Measured items
DOT-SID	U.S. male adult 50th percentile	Acceleration and displacement
Bio-SID		Acceleration, displacement, load and momentum

Fig. 4 Example of Side Impact Dummy

4. Test Method

4.1 Test Preparation

4.1.1 Determination of Test Conditions

Before testing, determine the following conditions:

(1) MDB collision speed
(2) MDB impact point
(3) Test vehicle impact face
(4) Test vehicle loading condition (test dummy and cargo)
(5) Test vehicle mass

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4.1.2 Test Vehicle Setup

Perform whichever of the following is necessary:

(1) Draw reference lines for dimensional analysis and measure necessary dimensions. Attach target marks as necessary for analysis.
(2) Paint the door trims, pillar garnishes, etc.
(3) Supply alternative fuel to 92% to 94% of the design capacity of the fuel tank plus the fuel piping volume.
(4) Operate the fuel pump to check for any fuel leakage.
(5) Install the signal processing system described in Section 3.1.
(6) Install the accelerometers, displacement gages, contact signal sensors, strain gages, and any other sensors, and make their wiring accessible from the signal processing system.
(7) Load the test vehicle with the test dummy and cargo.
(8) Connect the signal processing system.
(9) Measure the test vehicle mass and the load distribution on wheels, and adjust them to specification.
(10) Install the electronic flashlamp within the field of view of the high speed camera. Attach a pressure-sensitive switch to the point on the test vehicle that first contacts the MDB.
(11) Apply grease paint to the test vehicle, dummy, and any other necessary parts.
(12) Attach a welding rod to each end of the aluminum honeycomb block described in Section 2.1 (2), and mark the point on the test vehicle which first contacts the MDB. Apply grease paint to the end of the welding rods.

4.1.3 Preparation of High Speed Camera

Install the high speed camera described in Section 3.2 (1) in the specified position, and adjust its field of view, focus, and exposure. Set the photographing start time (i.e., the MDB position where photographing should be started), considering the time it takes the camera to reach the intended speed.

4.1.4 Preparation of Acceleration/Tow System and Release System

Prepare the acceleration/tow system and the release system described in Sections 2.3 and 2.4. Set the release point to within 610 mm of impact. See TSA5120G for more information (substitute MDB for test vehicle).

4.1.5 Preparation of Signal Processing System

Prepare the signal processing system described in Section 3.1, and adjust and calibrate them before testing.

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4.1.6 Preparation of MDB
(1) Adjust the height of the aluminum honeycomb block described in Section 2.1 (2).
(2) Set the MDB at the specified position.

4.1.7 Final Inspection of Test Vehicle
The final check points should include those shown in Table 6:

Table 6

Check point	Setting
Shift lever	2nd for manual transmission vehicles N for automatic transmission vehicles
Ignition switch	On
Parking brake	Applied
Seat slide position	Normally mid-position
Seat adjuster	Normally design standard position
Head restraint	Uppermost position
Retractable arm rest	Retracted
Test dummy	Left- or right-seat dummy, whichever is applicable
Seat belt	Fastened
Door latches	Fully latched
Door locks	Unlocked
Side windows	Fully closed
Roof (convertible top, etc.)	Fully closed

4.2 Items and Methods of Measurement

4.2.1 MDB Collision Speed
Measure the collision speed using the apparatus described in Section 2.5, after releasing the MDB from the tow wire within 610 mm of impact.

4.2.2 MDB Impact Point
Determine the impact point between the MDB front aluminum honeycomb block and the test vehicle according to Section 4.1.2 (12).

4.2.3 Impact Shocks
Measure the accelerations in various directions on the MDB, test dummy, and any necessary parts of the test vehicle, using the accelerometers, amplifier and storage device described in Section 3.1.

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4.2.4 Contact Signals

Detect contact of the MDB, test dummy, and any necessary parts of the test vehicle, using the switches described in Section 3.1 (2).

4.2.5 Impact Displacement

Examine the time history and displacement of the MDB, test dummy, and any necessary parts of the test vehicle, based on the acceleration as measured according to Section 4.2.3, photographs taken by the high speed camera described in Section 3.2 (1), and the dimensions measured before and after the test.

4.3 Test Procedure

(1) After confirming the completion of all the necessary preparations and safety of the test site, the supervisor starts counting down. Communication with operators and observers is to be made via speakers or transceivers.
(2) Start the acceleration/tow system at the start call.
(3) When the MDB reaches the predetermined point, check for the operation of the high speed camera.
(4) After collision, check that the MDB and the test vehicle have stopped completely. Then, inspect and photograph using a still camera, and download the recorded signal data.

4.4 Inspection after Testing

(1) Test vehicle
Measure and record necessary dimensions according to Section 4.1.2 (1) for comparison between the tested and non-tested conditions. Check for any damages in the test vehicle and test dummy, as well as grease paint transfer.
(2) MDB
Measure the dimensions of the aluminum honeycomb block as necessary.
(3) Still photographing
Photograph the MDB, test dummy, various parts of the test vehicle, etc., for comparison between the tested and non-tested conditions.

Established/ Jun. 1996 Revised:

Attachment 4

TSE7360G
TEST METHOD FOR MATERIAL PROPERTIES OF HOSES FOR FUEL TAK FILLER

(2) Average adhesion strength[5][6]

Within the effective range in the graph of peeling loads, obtain the load value on each projecting point (projecting toward higher levels) on the plotted wave-like line. Report the average adhesion strength (N/2.5 cm {kgf/2.5 cm}) determined by the equation (7). Where appropriate, attach the graph.

$$P = \frac{1}{n}\sum_{i=1}^{n} F_i \quad \text{..........} \quad (7)$$

where,

P: average adhesion strength (N/2.5 cm {kgf/2.5 cm})

Fi: peeling load (N/2.5 cm {kgf/2.5 cm})

Note (5):
If rubber breaks early in peeling, discard the data.

Note (6):
If rubber breaks in the middle of peeling, mark the breaking point in the chart.

23. Pull-Out Test (Type 6 of TSE7351G and Types 1, 2, and 3 of TSE7361G)

For mating pipes (complying with Fig. 17) and clamps, use product samples. For clamps, the tightening margin[4] shall be at its minimum. (Or the tightening force shall be at its minimum.)

Insert pipes in both ends of the hose with an insert margin used for an actual vehicle. Store for 24 h under this condition. Place the sample on a tensile tester as shown in Fig. 21. Apply force at a tension rate of 500 mm/min. Report the maximum load and displacement obtained at the moment of hose's withdrawal or breakage.

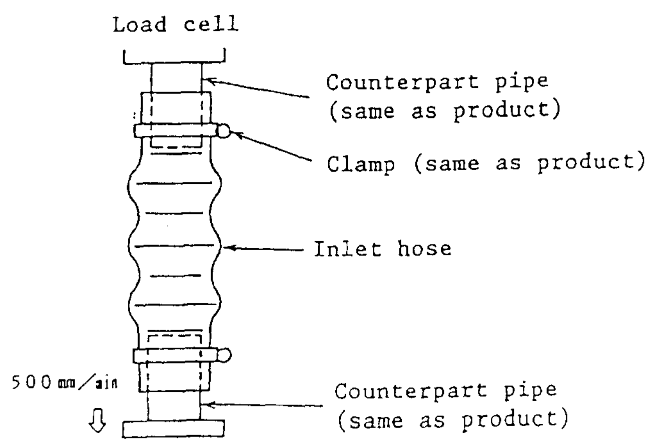


Fig. 21 Sample Settings

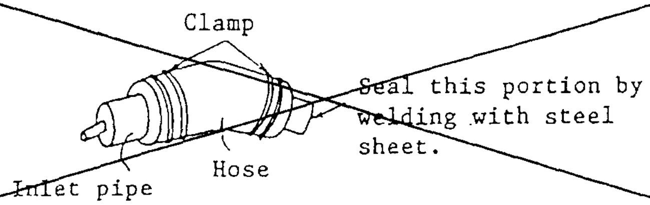
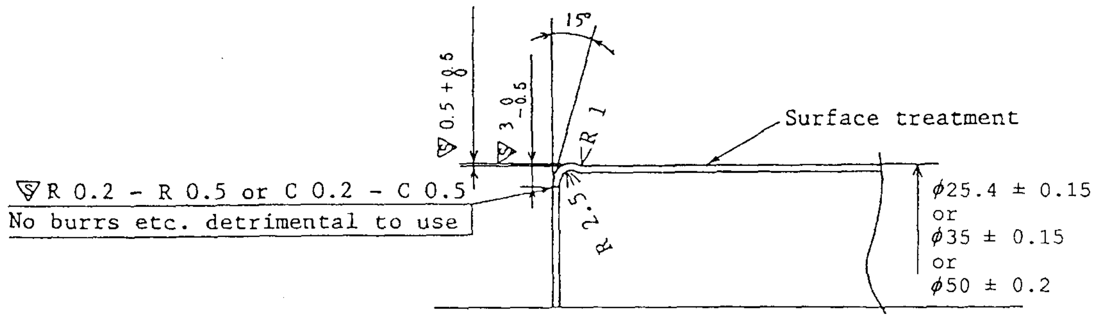


Fig. 16 Installation of Types 1 and 5 to 7 of TSE7351G Hoses and Types 1, 2, and 3 of TSE7361G Hoses



Surface treatment method: in accordance with TSH6500G

Fig. 17 Shape of Pipe

Table 9

Aging temperature (℃)	Time (h)
100 ± 2℃	160^{+2}_{0}

19. Heat Crack Resistance Test (Types 1 and 5 to 7 of TSE7351G; Types 1, 2, and 3 of TSE7361G)

Set a hose to a jig constructed in the same form as that of the hose mounting section of fuel tank. Heat this sample at 100 ± 2℃. Remove the hose 6 h later, and check for cracks the clamped surfaces and portions around where tightened by bolt.

For clamps, the tightening margin(4) shall be at its maximum. (Or the tightening force shall be at its maximum.)

Established/ 4 Revised: Jun.1999

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Attachment 5

April 22. ‘97

Technical report (Summary for NHTSA information request EA99-013)

Subject

Model :Sienna

Part number :77213-08010

Part name :Hose, fuel tank to filler pipe

Purpose

Evaluate performance of subject part (mass-production sample)

Test items and results

Test item	Requirements	Test method	Result (pull out)		
Pull out	Report the pull out load-displacement curve.	TSE7360G Section 23	See chart		
				Sample 1	Sample 2
			Load	1265 N	1393 N
			Displacement	327 mm (12.9 in.)	340 mm (13.4 in.)
			(Elongation)	(101%)	(105%)

Result (beginning of hose slippage on the fitting)

	Sample 1	Sample 2
Load	1042N	1216N
Displacement	235 mm (9.25 in.)	275 mm (10.8 in.)
(Elongation)	(73%)	(85%)

PULL OUT CHART

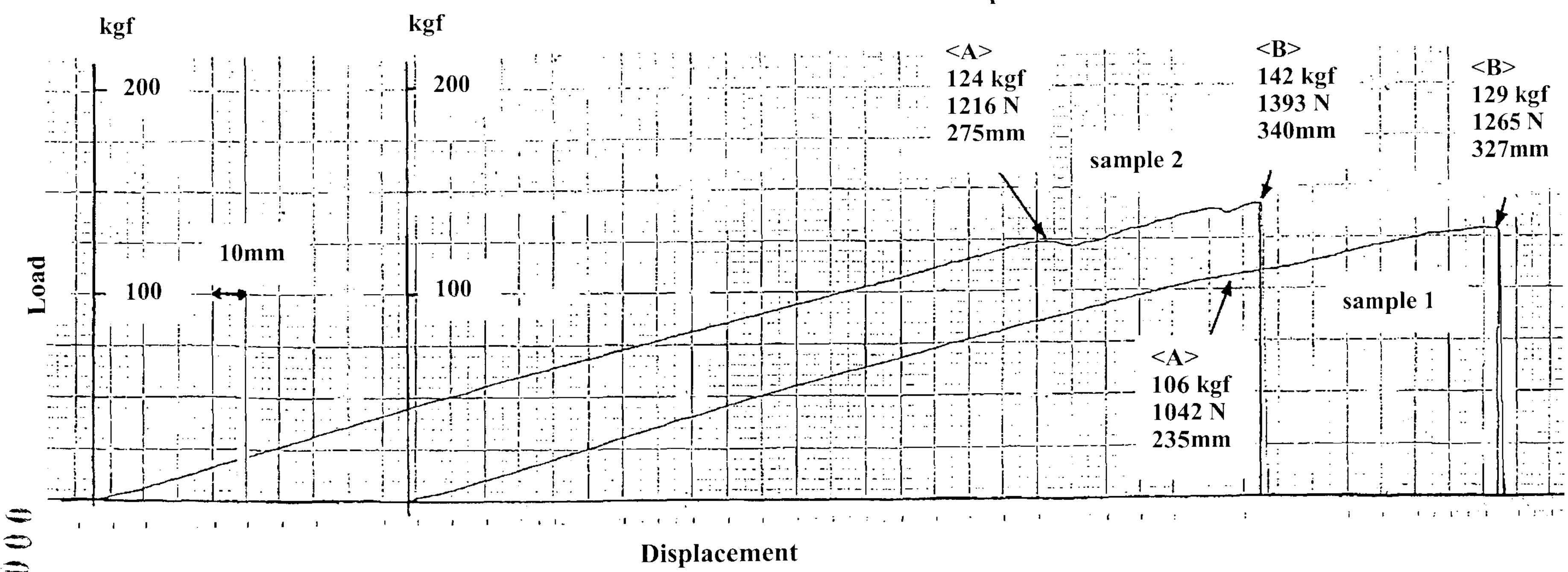
Model :Sienna

Part number :77213-08010

Part name :Hose, fuel tank to filler pipe

<A> : beginning of hose slippage

<B> : pull out



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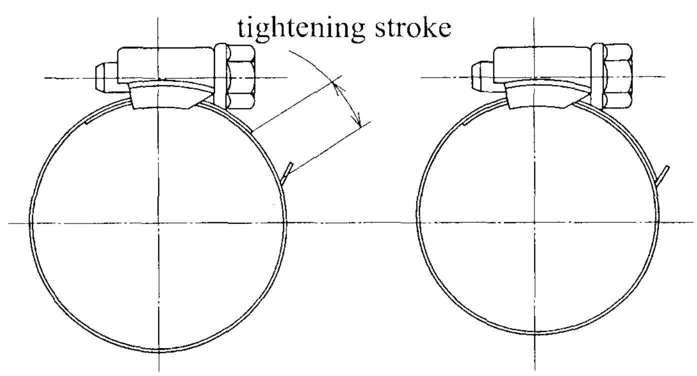
Attachment 6

Related information are provided in order of your question "a" through "f".

a	filler hose	inner diameter	φ40.0 +0.5/-1.0 mm [general portion] (φ1.57 +0.02/-0.04 in.) φ34.0 +0.5/-1.0 mm [connecting portion] (φ1.34 +0.02/-0.04 in.)
		wall thickness	2.8 ±0.4 mm [general portion] (0.11 ±0.02 in.) 5.0 ±0.5 mm [connecting portion] (0.20 ±0.02 in.)
		length	345.0 ±6.0 mm (13.58 ±0.24 in.)
b	tank spud fitting	outer diameter	φ35.0 ±0.2 mm (φ1.38 ±0.01 in.)
		wall thickness	1.0 ±0.04 mm (0.039 ±0.002 in.)
		length	38.0 ±1.2 mm (1.50 ±0.05 in.)
c	tank spud	bead diameter	φ36.6 ±0.2 mm (φ1.44 ±0.01 in.)
		back angle	62°
		ramp angle	11.5°
d	clamp	description	worm screw type (see figure 1 below)
		supplier	Takagi mfg. co. ltd.
		torque range	N/A (see tightening stroke on figure 1)
e	lubricants allowed for use as assembly aids		KEROSENE
f	any reinforcement sleeves/ferrules used in the tank spud		none



<before tightening> <after tightening>

figure 1 :Clamp

Attachment 7

Vehicle Identification

- Make :Toyota
- Model :Sienna
- Model Year :1998 - 2000
- Options :N/A
- Date of Inspection :N/A

Wheel base of vehicle	2900 mm (114.2 in.)
Rated fuel capacity	20.9 gallons (79 liters)
Location of fuel fill tube (right or left side)	left side
Location of fill opening CntrLine on sheet metal	
Fore-Art position of opening to rear axle CntrLine (in 'Y')	230.0 mm (9.1 in.)
Up_Down position of opening to top of rear wheel opening (above axle CntrLine, in 'Z')	144.7 mm (5.7 in)
Description of fuel tank location in vehicle	
Position of rear edge of tank to rear axle CntrLine	483.3 mm (19.0 in.)
Position of front edge of tank to rear axle CntrLine	1439.0 mm (56.7 in.)
Position of left outboard edge to outboard side of left sill	303.4 mm (11.9 in.)
Position of right outboard edge to outboard side of right sill	574.3 mm (22.6 in.)
Position of left outboard edge to inboard side of left rail	187.1 mm (7.4 in.)
Position of right outboard edge to inboard side of right rail	457.9 mm (18.0 in.)
Any additional comments?	none
Fill venting and valving	
ORVR, internal/external	N/A
Location on tank and fill tube	tank :left side of spud fill tube :top of fill tube
Material, attachment, size, valving	metal tube & rubber hose joint
Fuel tank material type (metal or plastic)	metal
Unique suspension or other chassis interface?	none
Fuel tank	
Location of fuel filler tube entry (Rear, side, top?)	rear, left side
Submerged fill (yes or no?)	no
Any tank shields? Note if thermal or impact (skid plate), attached to tank, body or exhaust.	thermal shield chipping protector
Any additional comment?	none
Fuel tank straps	
How many straps?	2
Fore/aft or lateral?	fore/aft
Any additional comment?	none
Are they fastened to fixed dimension or to torque?	to torque

Fill Pipe	
Housing at body side: Fixed or breakaway?	breakaway
Approximate overall length	1217 mm (47.9 in.)
Number of bends	5
Pipe material	metal
Pipe OD	ϕ 34.9 mm (ϕ 1.4 in.)
Routed above rail, below rail, through rail?	below rail
Connection type to tank	hose joint
Pipe attachment to BIW structure (yes or no)	yes
Comments pertaining to venting hoses	none
Unique rollover valves or plumbing?	none
Any shielding? For impact? (yes or no)	chipping protector
Any additional comments?	none
Fill Pipe Hose	
Hose OD	ϕ 45.6 mm (ϕ1.8 in.)
Length	345 mm (13.6 in.)
Number of bends	2
Corrugated or not	corrugated
Hose reinforced (yes or no)	no
Any additional comments?	none
Fill pipe attachment to tank	
Type: Spud? Note material, how attached to tank, length, diameter, diameter of bead.	material : metal how attached to tank : projection welding length : 38 mm (1.5 in.) diameter: ϕ 35 mm (ϕ1.4 in.) diameter of bead : ϕ 36.6 mm (ϕ1.4 in.)
Clamp? Style of clamp?	worm screw type
Bead type on spud	bulge
Any additional comments?	none
Fuel cap	
Type (screw-on, quick-on, etc.)	screw-on
Valving	yes
Cap attachment – metal/plastic?	plastic
Vehicle Attitude – Vertical from top of wheel opening above axle Cntr Line (As received, no additional loading)	
Left Front	730 mm (28.7 in.)
Left Rear	730 mm (28.7 in.)
Right Front	742 mm (29.2 in.)
Right Rear	742 mm (29.2 in.)

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April 14, 2000

NSA-12jlq
EA99-013

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Director
Office of Defects Investigation Safety Assurance
U.S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
400 Seventh Street, S.W.
Washington, DC 20590

Dear Ms. DeMeter:

In response to your letter of March 8, 2000, requesting peer vehicle information for the fuel filler neck of Honda Odysseys, we are submitting the following responses.

1. PROVIDE COPIES OF ALL SPECIFICATIONS OR STANDARDS RELATED TO THE FUEL SYSTEM CRASH PERFORMANCE OF THE SUBJECT PEER VEHICLES.

   Response: *See Attachment #1.*

2. PROVIDE COPIES OF ALL SPECIFICATIONS OR STANDARDS RELATED TO THE DESIGN OR PULL-OFF PERFORMANCE (I.E., RESISTANCE TO SEPARATION FROM EXTERNAL FORCES) OF THE HOSE JOINTS USED IN THE SUBJECT PEER FILLER NECK ASSEMBLIES.

   Response: *See Attachment #2.*

3. PROVIDE COPIES OF ALL TEST REPORTS, DATA SHEETS, AND/OR OTHER DOCUMENTS RELATING TO PULL-OFF TESTING OF SUBJECT PEER HOSE JOINTS, OR ANY OF THE COMPONENTS USED THEREIN. FOR EACH PULL-OFF TEST CONDUCTED, STATE BOTH THE FORCE, DISPLACEMENT, AND HOSE ELONGATION (%) CORRESPONDING TO THE BEGINNING OF HOSE SLIPPAGE ON THE FITTING AND HOSE SEPARATION FROM THE JOINT.

   Response: *See Attachment #3.*

4. PROVIDE THE FOLLOWING INFORMATION REGARDING THE DESIGN AND ASSEMBLY OF THE SUBJECT PEER FUEL FILLER NECK ASSEMBLIES AND TANK SPUDS. ALL DESIGN DIMENSIONS SHOULD INCLUDE BOTH THE NOMINAL VALUE AND THE ALLOWED TOLERANCES.

A. FILLER HOSE INNER DIAMETER, WALL THICKNESS, AND LENGTH;
B. TANK SPUD FITTING OUTER DIAMETER, WALL THICKNESS, AND LENGTH;
C. TANK SPUD BEAD DIAMETER, BACK ANGLE, AND RAMP ANGLE;
D. CLAMP DESCRIPTION, SUPPLIER, AND TORQUE RANGE;
E. LUBRICANTS ALLOWED FOR USE AS ASSEMBLY AIDS; AND
F. ANY REINFORCEMENT SLEEVES/FERRULES USED IN THE TANK SPUD.

Response:

A. Filler Hose

Inner diameter of filler pipe side:	33 ± 0.5 mm
Inner diameter of tank side:	37 ± 0.5 mm
Wall thickness of filler pipe side:	4 ± 0.5 mm
Wall thickness of tank side:	3.7 + 0.5, -0.7 mm
Length:	329 mm

B. Filler Hose

Outer diameter:	39 ± 0.3 mm
Wall thickness:	3.5 ± 0.15
Length:	31 mm

C. Tank Spud

Bead diameter:	40.5 ± 0.3 mm
Back angle:	Horizontal (perpendicular to the vehicle's vertical center line)
Ramp angle:	Perpendicular to the vehicle's longitudinal center line

D. Clamp

Description:	Clamp tightened by bolt
Supplier:	Chuo Hatsujo
Torque range:	Clamping = 12 ± 2 mm (See Attachment 4)

E. Lubricants

The following lubricants allowed for use as assembly aids:
1. SP331 made by Chemical Solvents, Inc.
2. Nisseki Isosol 300 made by Nippon Oil Co., Ltd.
3. Daphne Cleaner L made by Idemitsu Kosan Co., Ltd.

F. Reinforcement Sleeve in the Tank Spud

Material: STAM 290GA

5. PROVIDE HONDA'S ASSESSMENT OF WHICH ASPECTS OF THE DESIGN AND MANUFACTURE OF CLAMPED HOSE JOINTS ARE FACTORS IN THE PULL-OFF RESISTANCE OF THE JOINT. RANK AND WEIGH THE CONTRIBUTION OF EACH FACTOR TO THE PULL-OFF RESISTANCE OF THE JOINT, AND STATE HONDA'S SPECIFIED PARAMETERS FOR EACH FACTOR IN THE SUBJECT PEER HOSE JOINT (IF NOT ALREADY STATED IN RESPONSE TO ITEM 4).

Response:

Factors in the pull-off resistance of the joint:

RANK	DESIGN ASPECT (Additional Information)	FACTOR WEIGHT
1.	Tube layout (Allow extra length so that the tube is not stretched under extreme tension when it is pulled)	High
2.	Secure sufficient lap margin between the tube's inside diameter and the pipe's outside diameter	Medium
3.	Pipe bulge outside diameter (Allow pipe bulge to have rather large diameter)	Medium
4.	Secure adequate force to tighten clamp	Medium
5.	Prevention of deformation when tightening clamp (The Odyssey uses a resin pipe, and a collar is added to prevent deformation of the pipe)	Medium
6.	Selection of lubricant used as insertion aid (Use of highly volatile lubricant is indicated on the drawing)	Medium

6. PROVIDE THE FOLLOWING INFORMATION REGARDING THE DESIGN OF ALL FUEL TANKS AND FUEL TANK SPUDS USED IN THE SUBJECT PEER VEHICLES:

A. THE TOTAL TANK VOLUME BASED ON AN SAE REFERENCE FILL;
B. THE HEIGHT OF THE LOWERMOST PORTION OF THE SUBJECT PEER TANK SPUD OPENING ABOVE/BELOW (STATE WHICH) THE SAE REFERENCE FILL LEVEL; AND
C. IF THE HEIGHT STATED IN 6.B IS BELOW THE SAE FILL LEVEL, STATE THE EQUIVALENT VOLUME OF FUEL REPRESENTED BY THE STATED HEIGHT DIFFERENCE.

Response:

A.	Total tank volume	20 gallons
B.	Height of lowermost portion of The tank spud opening	61.1 mm below the SAE fill level
C.	Volume of fuel represented by The stated height difference	8.53 gallons

7. IN A DECEMBER 20, 1999 LETTER, DAIMLERCHRYSLER PROVIDED A DOCUMENT TO NHTSA THAT HAD BEEN DEVELOPED FOR A PROPOSED PEER VEHICLE STUDY THAT WAS NEVER CONDUCTED. THE DOCUMENT (COPY ENCLOSED) IS A WORKSHEET OF VARIOUS VEHICLE AND FUEL SYSTEM DESIGN FACTORS. COMPLETE THE ENCLOSED WORKSHEET FOR THE SUBJECT PEER VEHICLES.

   Response: *See Attachment #5, 5-1 and 5-2.*

   Please note that we have some questions, which are noted in attachment #5. We will provide responses after receiving NHTSA's clarification of these points.

8. PROVIDE TWO SAMPLES OF EACH VARIATION OF FILLER HOSE AND FUEL TANK SPUD USED IN THE SUBJECT PEER VEHICLES.

   Response:

   We are submitting two sample parts of each of the following:

   - Fuel tank spud
   - Filler hose
   - Clip of fuel tank side (Honda part number 17652-S0E-003)
   - Clip of fuel filler side (Honda part number 17652-SA5-000)

(New question received April 10, 2000.)

9. FURNISH COPIES OF ALL ENGINEERING STANDARDS, SPECIFICATIONS, AND GUIDELINES REGARDING FUEL TANK AND FILLER NECK ASSEMBLY PACKAGING. "PACKAGING" SHOULD BE INTERPRETED IN THE CONTEXT USED IN SECTION 4.12 OF THE ENCLOSED COPY OF SOCIETY OF AUTOMOTIVE ENGINEERS INFORMATION REPORT SAE J1664, "PASSENGER CAR AND LIGHT TRUCK FUEL CONTAINMENT."

Response:

We are researching this additional information and will submit it as soon as possible.

Sincerely,

AMERICAN HONDA MOTOR CO., INC.

William R. Willen
Managing Counsel
Product Regulatory Office

WRW:ke

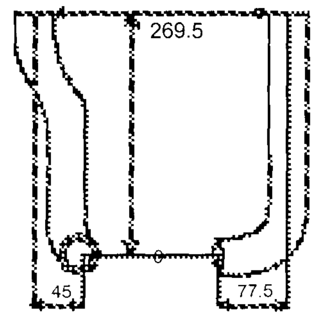
Attachments

Attachment #3

Tokai Rubber Industries, Ltd.
April 3, 2000

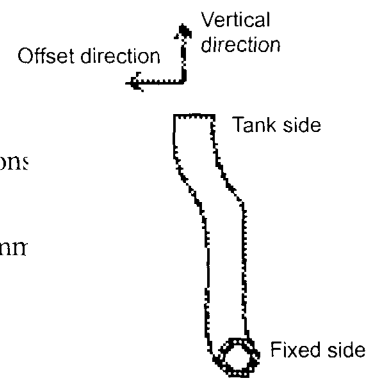
S0X (US Odyssey) Filler Neck Tube Pull-off Test Report

As requested by fax, we provide the report and data on the SOX filler neck tube pull-off test.



1) Test sample
   - Part No. 17651-S0X-A020-M1
   - Hose size Filler neck side ϕ 33×t4.0
     Tank side ϕ 37×t3.7
   - Hose clamp part No. Filler neck side 17652-SA5-000
     Tank side 17652-S0E-003

2) Test method
   - Test date March 7, 2000
   - Test place Hose/fuel laboratory, Tokai Rubber Industries, Ltd.
   - Test conditions
     - Pull-off direction .... In the directions of arrows in the sketch at left (pulled in two directions
     - Pull-off speed .... 500 mm/min
     - Assembling condition... Length of insertion onto pipe 30 mm
       Clamp tightening margin
       14 mm under neck
     - Installed posture .... Same as installed in actual vehicle



3) Test results (See Attachments 1 & 2 for load-displacement curve) (n=1 data)

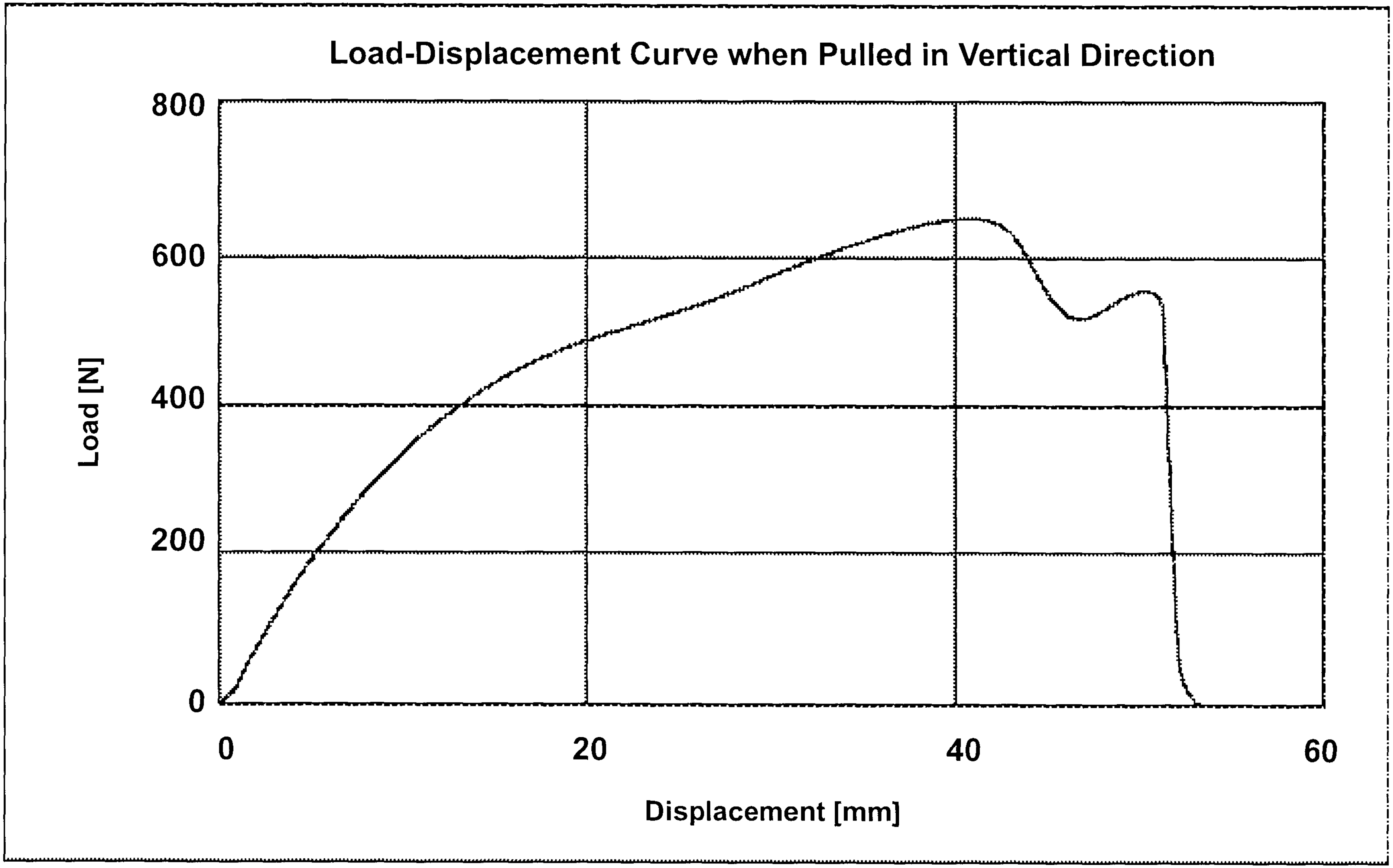
		Slippage on pipe	Separation from pipe	Remark
Vertical direction	Load [N]	652	551	Attachment 1
	Displacement [mm]	41	50	
	Elongation [%]	15	19	
Offset direction	Load [N]	536	536	Attachment 2
	Displacement [mm]	330	330	
	Elongation [%]	733	733	

Elongation [%] calculation method

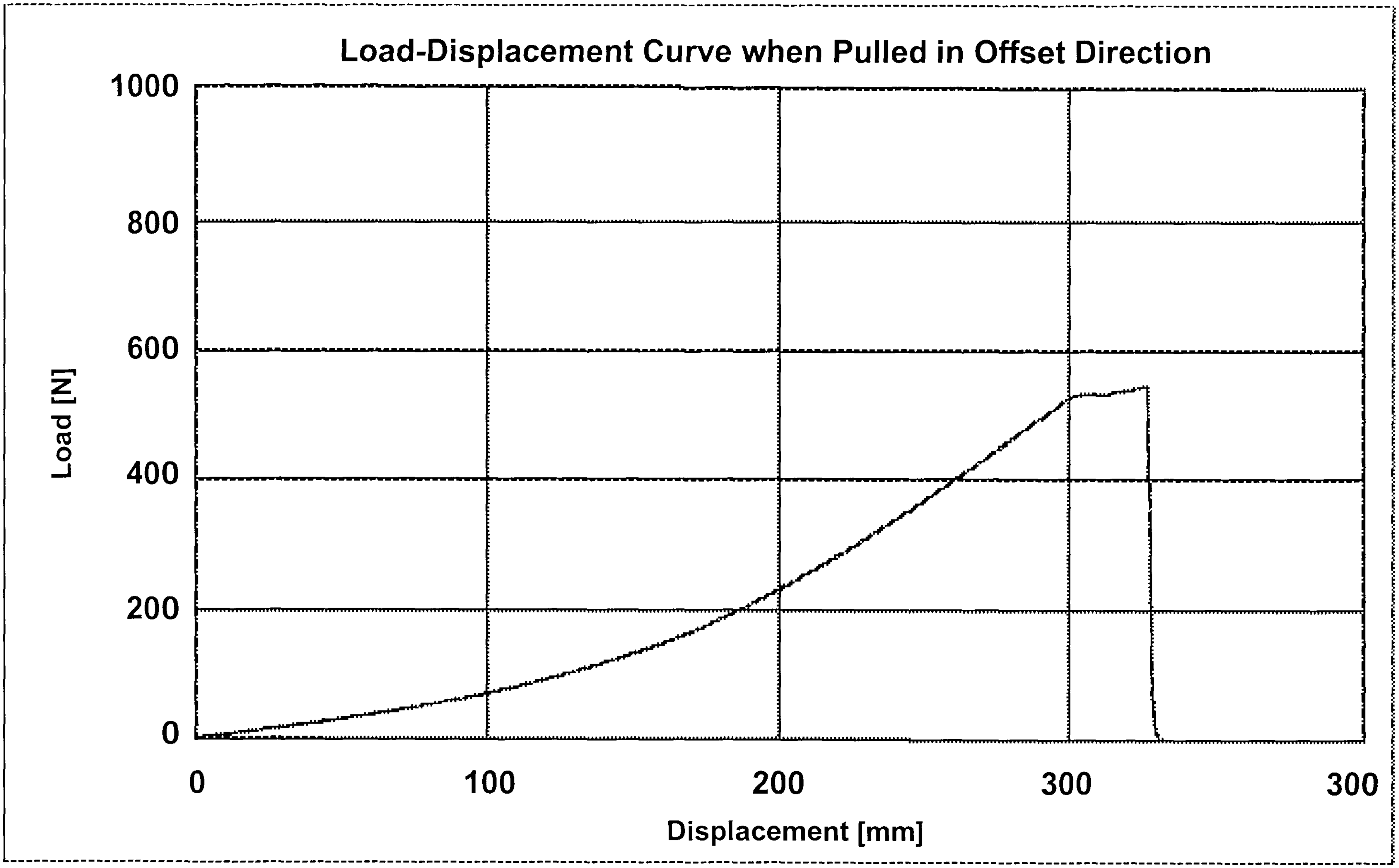
Vertical direction : (Displacement × 100) / 269.5 Elongation [%] in vertical direction

Offset direction : (Displacement × 100) / 45 Elongation [%] in offset direction

Attachment 1



Attachment 2



00000903

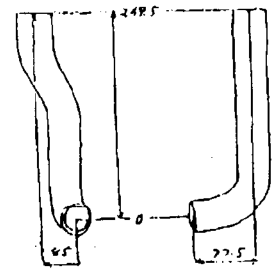
株式会社 本田技術研究所殿

1D-B3-Fuel 太田ACE様

C-1781
東海ゴム工業株式会社
自動車技術統括本部
ホース技術本部
第2技術部第22技術課
'00. 4. 3

SOX(USオデッセイ向け)フィラーネックチューブ引抜評価

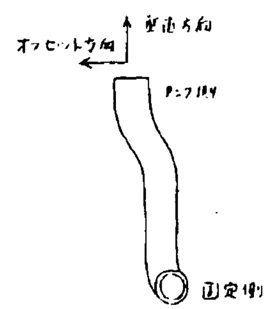
標記の件、FAXにてご依頼のありました、SOXフィラーネックチューブの引抜データ詳細につき、下記報告致します。



1テストサンプル

- ・部番　17651-SCX-A020-M1
- ・ホースサイズ　フィラーネック側　ϕ33×t4.0
  タンク側　ϕ37×t3.7
- ・ホースクランプ部番　フィラーネック側　17652-SA5-000
  タンク側　17652-S0E-003

2テスト方法



- ・テスト日　・2000. 3. 7
- ・テスト場所　・東海ゴム工業株式会社 ホース燃料実験室
- ・テスト条件　・引抜方向…　右図矢印方向(2方向)
  ・引抜き速度…　500mm/min
  ・ASSY条件…　パイプ挿入代 30mm
  クランプ締代 首下 14mm
  ・組付状態…　実車レイアウトに同じ

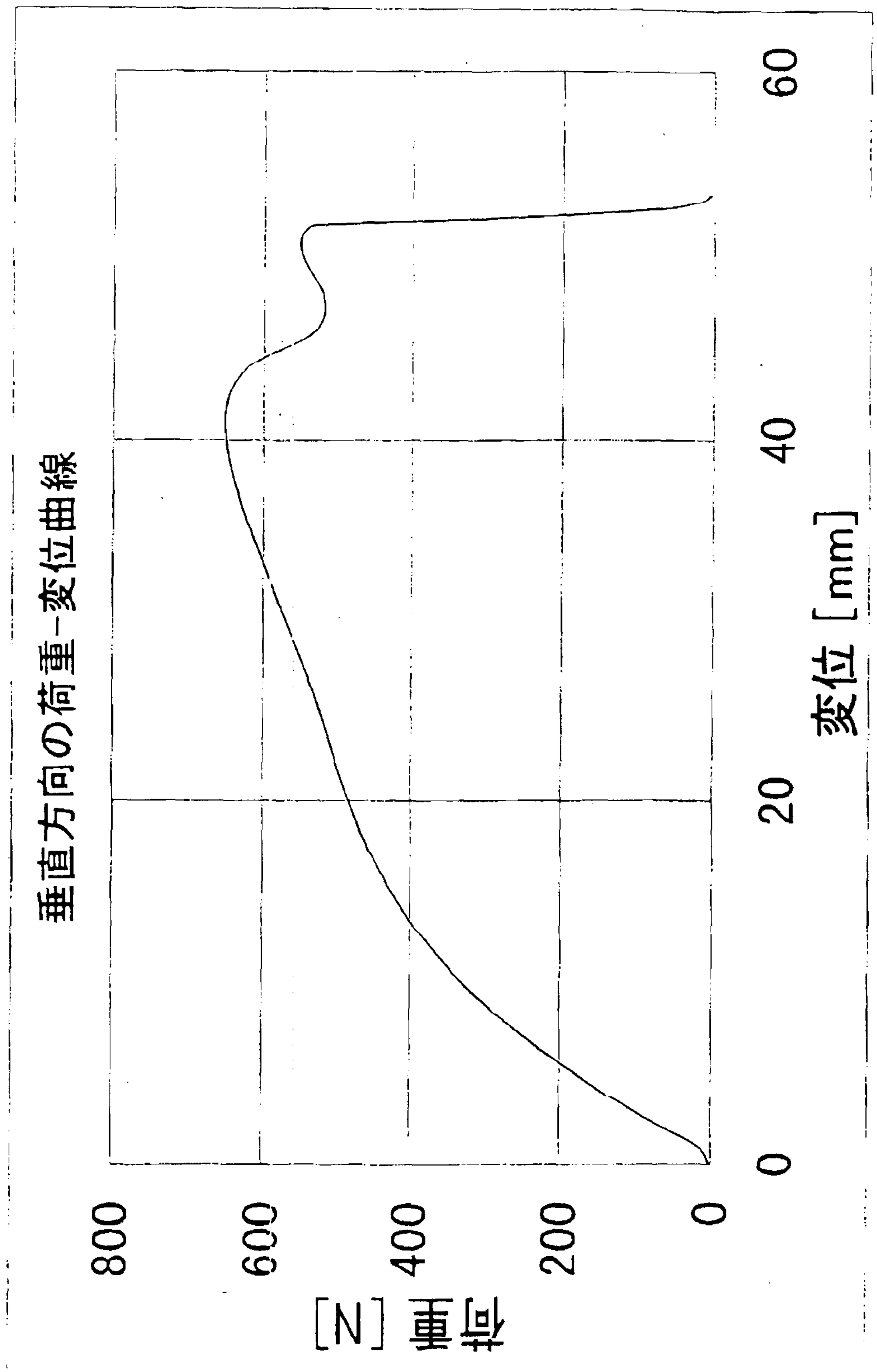
3テスト結果(荷重-変位曲線は別紙1,2参照)　(n=1 データ)

		パイプズレ	パイプ抜け	備考
垂直方向	荷重 [N]	652	551	別紙1
	変位 [mm]	41	50	
	伸び [%]	15	19	
オフセット方向	荷重 [N]	536	536	別紙2
	変位 [mm]	330	330	
	伸び [%]	733	733	

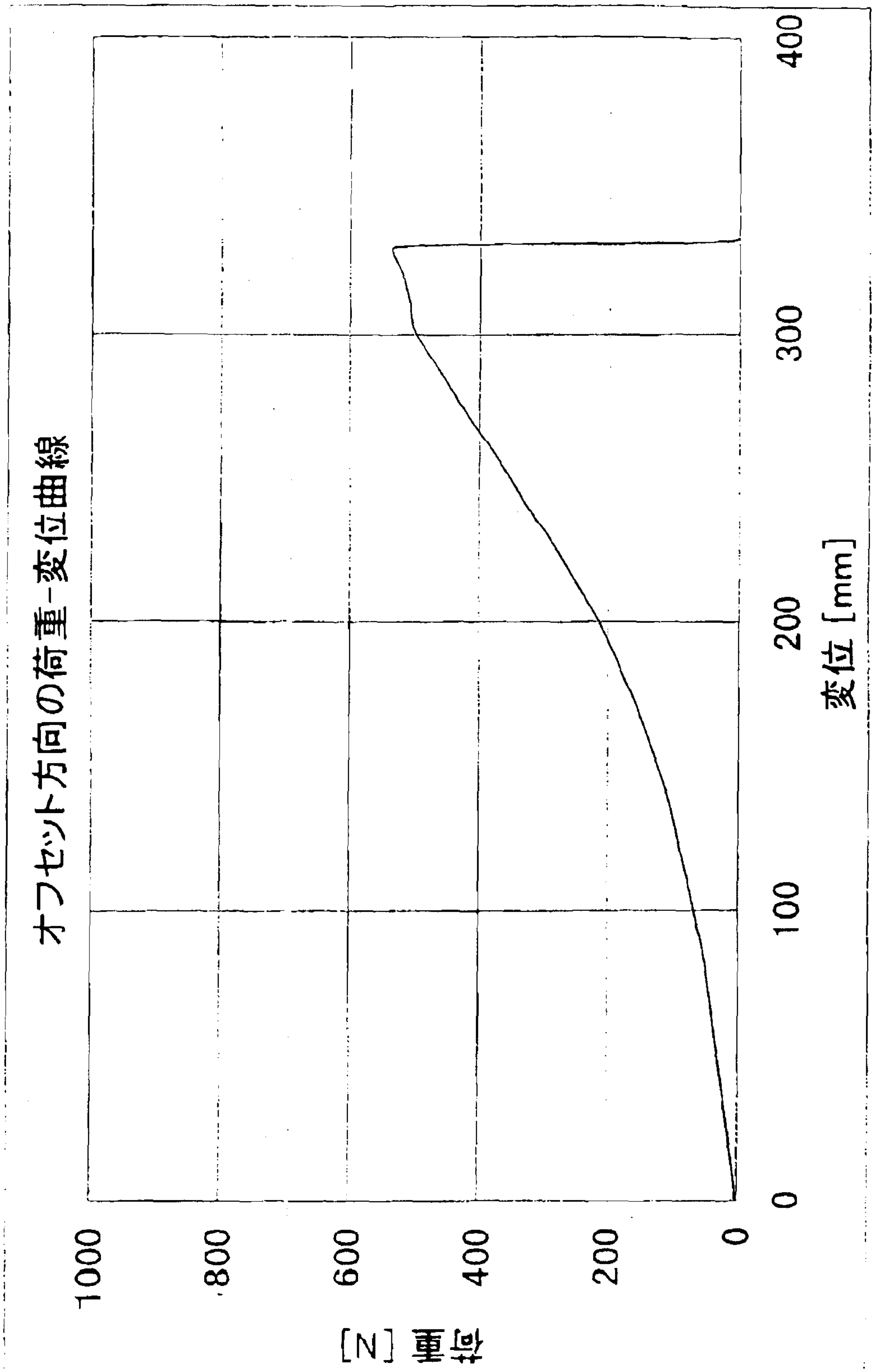
伸び(%)：計算方法
垂直方向 (変位 × 100)/ 269.5 = 垂直方向 伸び [%]
オフセット方向 (変位 × 100)/ 45 = オフセット方向 伸び [%]

00000904

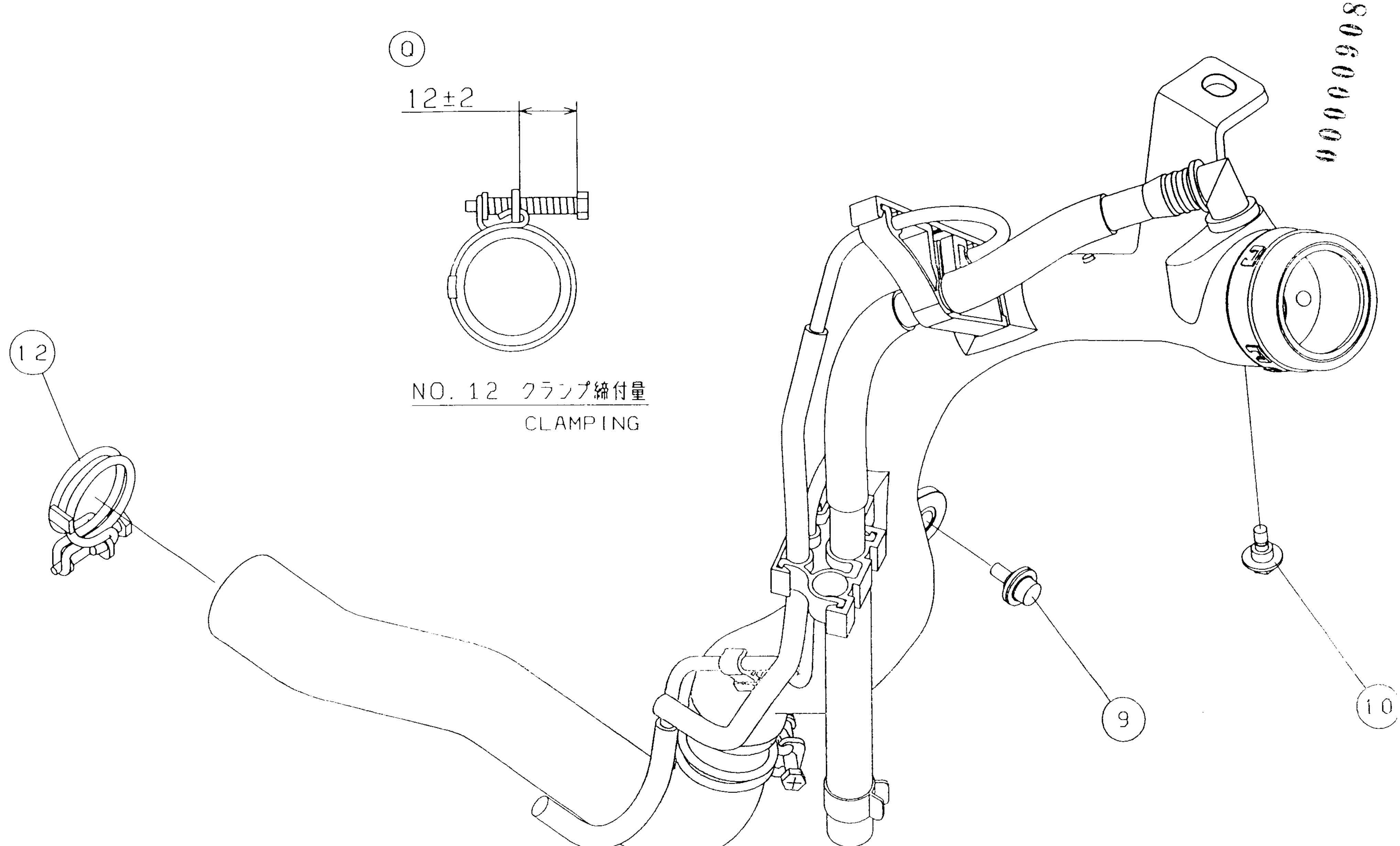
別紙.1



別紙2


オフセット方向の荷重-変位曲線
荷重 [N]
1000
800
600
400
200
0
変位 [mm]
0
100
200
300
400

Attachment #4


Q
12±2
NO. 12 クランプ締付量
CLAMPING
12
9
10
00000908

Attachment #5

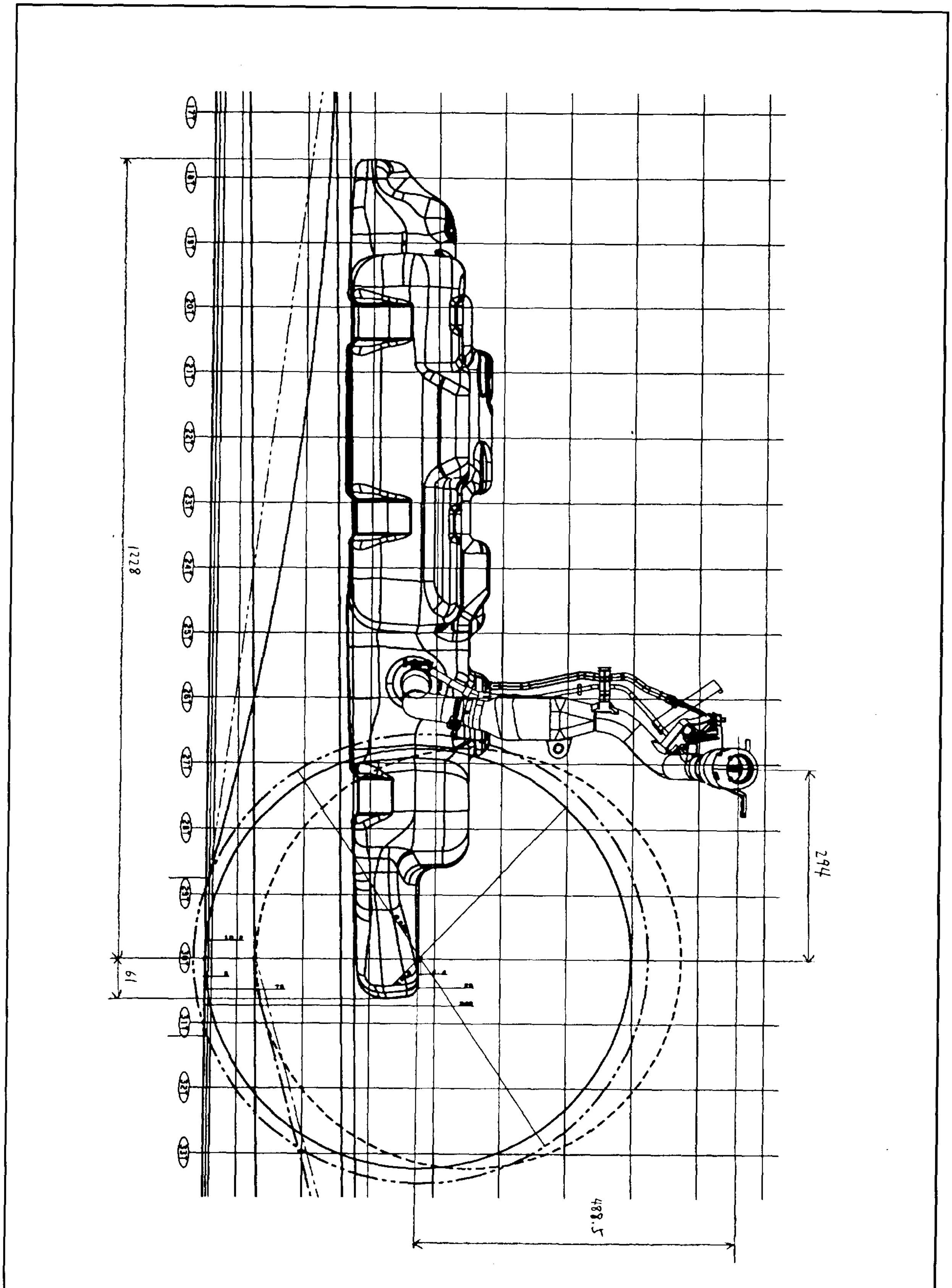
Vehicle Identification

Make :	HONDA OF CANADA Mfg inc
Model :	ODYSSEY
Model Year :	2000 Year
Option :	None
Date of Inspection :	Apr 7, 2000

Wheel base of vehicle	3000mm
Rated fuel capacity	20 gallons (=75.7 liters)
Location of fuel fill tube (right or left side)	Left side
Location of fill opening CntrLine on sheet metal	
Fore-Aft position of opening to rear axle CntrLine (in 'Y')	294mm (See attachment 5-1)
Up-Down position of opening to top of rear wheel opening (above axle CntrLine, in 'Z')	488.5mm (See attachment 5-1)
Description of fuel tank location in vehicle	
Position of rear edge of tank to rear axle CntrLine	61mm (See attachment 5-1)
Position of front edge of tank to rear axle CntrLine	1228mm (See attachment 5-1)
Position of left outboard edge to outboard side of left sill	453.5mm (See attachment 5-2)
Position of right outboard edge to outboard side of right sill	773mm (See attachment 5-2)
Position of left outboard edge to inboard side of left rail	0mm (Butted)
Position of right outboard edge to inboard side of right rail	311.5mm (See attachment 5-2)
Any additional comments?	None
Fill venting and valving	We cannot understand what "fill venting and valving" means
ORVR, internal/external	No answer, because of above
Location on tank and fill tube	No answer, because of above
Material, attachment, size, valving	No answer, because of above
Fuel tank material type (metal or plastic)	Plastic
Unique suspension or other chassis interface?	None
Fuel tank	
Location of fuel filler tube entry (Rear, side, top?)	Side
Submerged fill (yes or no?)	Yes
Any tank shields? Note if thermal or impact (skid plate), attached to tank, body or exhaust.	The exhaust pipe is beside the tank, and a heat insulating baffle (made of metal) attached to the body exists between them.
Any additional comments?	None
Fuel tank straps	
How many straps?	3 straps
Fore/aft or lateral?	Lateral
Any additional comments?	None
Are they fastened to fixed dimension or to torque?	Tightened to specified torque
Fill Pipe	
Housing at body side: Fixed or breakaway?	Breakaway
Approximate overall length	615mm
Number of bends	4 bends
Pipe material	Plastic (HDPE)

Pipe OD	See Drawing No. 17660 (Not uniform because of plastic)
Routed above rail, below rail, through rail?	Below (Construed "rail" as "frame")
Connection type to tank	Connected by means of rubber tube
Pipe attachment to BIW structure (yes or no)	Yes
Comments pertaining to venting hoses	None
Unique rollover valves or plumbing?	No such valve. A tube is beside the filler pipe but it is not connected to filler pipe.
Any shielding? For impact? (yes or no)	No
Any additional comments?	None
Fill Pipe Hose	
Hose OD	See Drawing No. 17651 (Different between both ends)
Length	329mm
Number of bends	3 bends
Corrugated or not	Not corrugated
Hose reinforced (yes or no)	No
Any additional comments?	Hose inner surface is coated with resin to prevent permeation
Fill pipe attachment to tank	
Type: Spud? Note material, how attached to tank, length, diameter, diameter of bead.	Spud is welded to tank. See Drawing No. 17531 for length and other details.
Clamp? Style of clamp?	Screw-operated clamp. See Drawing for details.
Bead type on spud	See Drawing for details.
Any additional comments?	None
Fuel cap	
Type (screw-on, quick-on, etc.)	Screw-on type
Valving	Positive/negative pressure type
Cap attachment – metal/plastic?	Metal
Vehicle Altitude – Vertical from top of wheel opening above axle CntrLine (As received, no additional loading)	We cannot understand exact locations. Please illustrate measuring points of vehicle altitude with sketch.
Left Front	Ditto
Left Rear	Ditto
Right Front	Ditto
Right Rear	Ditto

Attachment #5-1



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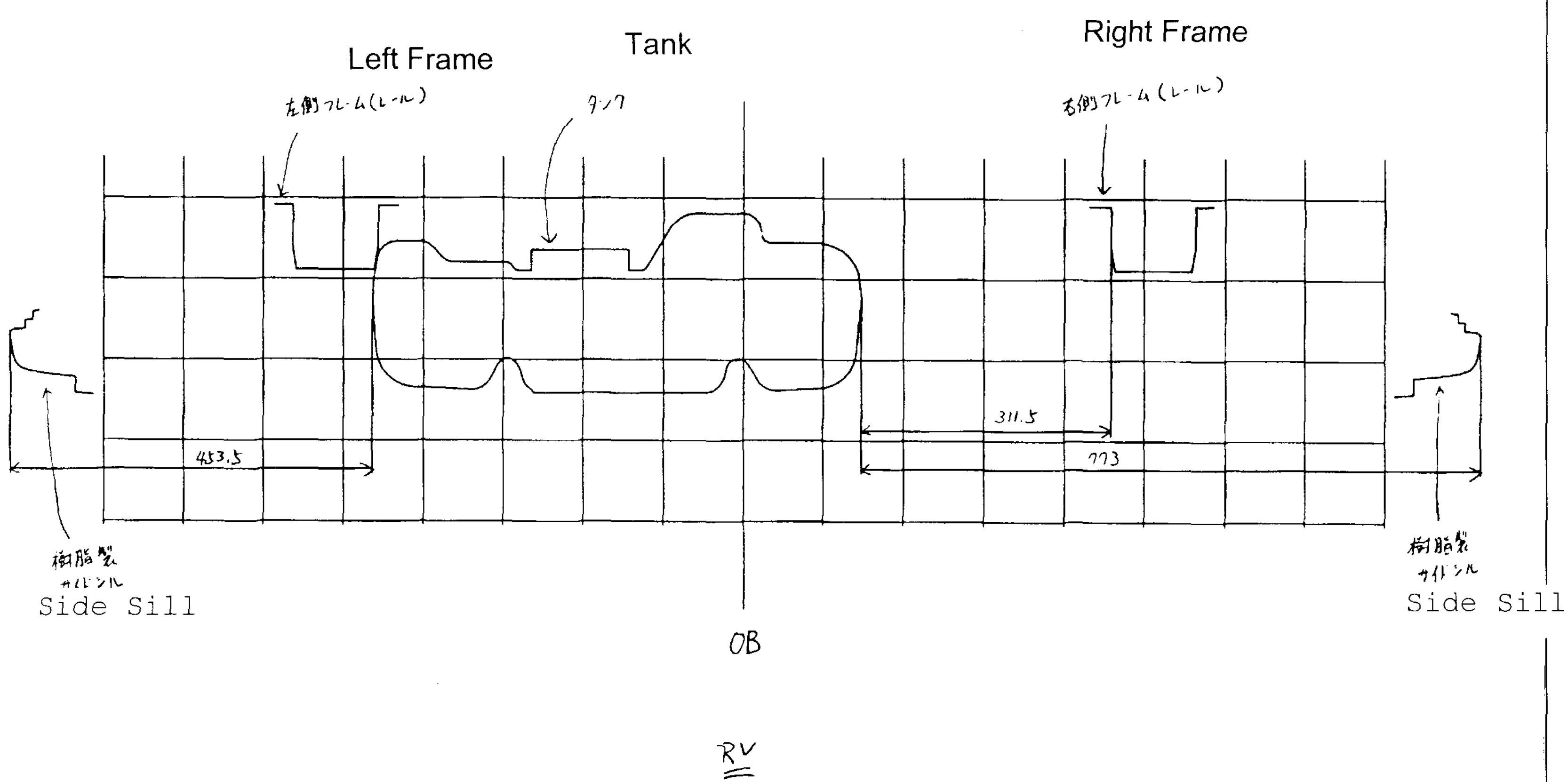
Attachment #5-2


Left Frame
Tank
Right Frame
左側フレーム(レール)
タンク
右側フレーム(レール)
453.5
311.5
773
樹脂製サイドシル
Side Sill
樹脂製サイドシル
Side Sill
OB
RV

Inf/ 5

GM GENERAL MOTORS NORTH AMERICA
Safety Center

April 14, 2000

Ms. Kathleen C. DeMeter, Director
Office of Defects Investigation
NHTSA Safety Assurance
400 Seventh Street, S.W.
Washington, D.C. 20590

GM-586

NSA-122jlq
EA99-013

Dear Ms. DeMeter:

This letter is GM's response to your information request (IR) pertaining to the agency's investigation of crash induced fuel filler neck failures in 1996 through current production DaimlerChrysler NS-minivans vehicles.

The subject vehicles are the 1997 – 2000 model year domestic U vans – regular wheel base and extended wheel base (also known as X vans). Depending on the wheel base, these vehicles were equipped with different capacity fuel tanks; however, the fuel tank spuds, fill pipe assemblies and attaching hoses were the same in any given year for the regular and extended wheel base vans.

Your requests and our corresponding replies are as follows:

1. **Provide copies of all specifications or standards related to the fuel system crash performance of the subject peer vehicles.**

   Attachment A contains the following:
   - General Motors Uniform Test Specification (GMUTS) R-8A-9. Fuel System Integrity Car-to-Car Development Test
   - GMUTS R1-8A-301. Fuel System Integrity
   - GMUTS R-8A-8. Fuel System Integrity Development Test
   - NAO Procedure R-15-20G. Vehicle - 30 MPH Frontal Barrier Impact
   - NAO Procedure L2-1C5-214G. Vehicle Side Impact Performance
   - GMUTS L3-1A2R-208G. Passive Restraints - Barrier Impact
   - Global Vehicle Technical Specifications (VTS), Paragraph 3.2.1.2.2 Crash Worthiness
   - Global VTS, Paragraph 3.2.1.2.2.1 Frontal Impact Up to and Including 30 MPH - Standard
   - Global VTS, Paragraph 3.2.1.2.2.2 Frontal Impact at 35 MPH
   - Global VTS, Paragraph 3.2.1.2.2.3 Rear Impact - Standard
   - Global VTS, Paragraph 3.2.1.2.2.4 Side Impact - Standard

   The fuel system crash performance is affected by the design of not only the fuel system components, but the architecture of the vehicle and many components of the chassis and body. If you need specifications for particular components, please advise me.

2. **Provide copies of all specifications or standards related to the design or pull-off performance (i.e., resistance to separation from external forces) of the hose joints used in the subject peer filler neck assemblies.**

00000916

Product Investigations
Mail Code: 480-16-304 • 30500 Mound Road • Warren, MI 48090-9055
Phone: (810) 986-8029 • Fax: (810) 947-2318

The pull-off performance is referenced as a Key Product Characteristic on drawings 10261175 and 10282233. The specification on both of these drawings is the same, "Hose must withstand a minimum of 2700 N applied along pipe axis at a rate of 1mm per second without separating from pipe". These drawings can be found in Attachment B.

Part number 10236227 (found on drawing 10261175) is the fuel tank fill pipe assembly used on 1997 model year vehicles. Part numbers 10282241 and 10425290 (found on drawing 10282233) are the fuel tank pipe assemblies used on the 1998-2000 model year vehicles. The other fill assemblies referenced drawings, 1026117 and 1028223, are for export use only.

1. Provide copies of all test reports, data sheets, and/or other documents relating to pull-off testing of subject peer hose joints, or any of the components used therein. For each pull-off test conducted, state both the force, displacement, and hose elongation (%) corresponding to the beginning of hose slippage on the fitting and hose separation from the joint.

Attachment C contains the reports for fill pipe assembly (10236227) used in the 1997 model year vehicles and fill pipe assembly (10282241) used in the 1998 model year vehicles.

The report for the fill pipe assembly (10282241) used on the 1998 model year subject vehicles also applies to fill pipe assembly (1042590) used in the 1999 and 2000 model year vehicles. These fill pipes are identical except for a slot change incorporated on the 1999 and 2000 model year vehicles to facilitate production. The slot change does not affect the attachment of the hose.

4. Provide the following information regarding the design and assembly of the subject peer fuel filler neck assemblies and tank spuds. All design dimensions should include both the nominal value and the allowed tolerances.

a. filler hose inner diameter, wall thickness, and length;
b. tank spud fitting outer diameter, wall thickness, and length;
c. tank spud bead diameter, back angle, and ramp angle;
d. clamp description, supplier, and torque range;
e. lubricants allowed for use as assembly aids; and
f. any reinforcement sleeves/ferrules used in the tank spud.

The information requested is as follows:

a. These dimensions can be found on drawing numbers 10236573, model year 1997, and 10292455, model years 1998-2000; both labeled 'Hose-Fuel Tank Fill'. Both drawings are located in Attachment D.

b. These dimensions can be found on drawing number 10277968, labeled 'Pipe – F/Tank Fil' located in Attachment D.

c. These dimensions can be found on drawing number 10277968, labeled 'Pipe – F/Tank Fil' located in Attachment D.

d. There are two clamps used on the hose. The first clamp is specified on drawing number 10289791, in Attachment D, which is supplied by Oetiker. This is a deformable clamp that does not have a torque specification. The ear deformation specification is found on drawings 10261175 (1997 Model Year) and 10282233 (1998-2000 Model Year) located in Attachment B.

   The other clamp, used on tank end, is shown on drawing number 12551390, in Attachment D. Global Fastener supplies it. It had a specified production torque value of 2.0 NM FDSNS (fully driven, seated, not stripped) in the 1997 – 1999 model years. The specified production torque value in the 2000 model year is 2.5 +/- 0.3 NM.

e. Attachment E contains the specified lubricants used during assembly.

f. These reinforcement specifications can be found on drawing number 10277968, labeled 'Pipe – F/Tank Fil' located in Attachment D.

5. Provide GM's assessment of which aspects of the design and manufacture of clamped hose joints are factors in the pull-off resistance of the joint. Rank and weigh the contribution of each factor to the pull-off resistance of the joint and state GM's specified parameters for each factor in the subject peer hose joint (if not already stated in response to Item 4).

GM has not located documents containing such an assessment.

6. Provide the following information regarding the design of all fuel tanks and fuel tank spuds used in the subject peer vehicles:

a. the total tank volume based on an SAE reference fill;
b. the height of the lowermost portion of the subject peer tank spud opening above/below (state which) the SAE reference fill level; and
c. if the height stated in 6.b is below the SAE fill level, state the equivalent volume of fuel represented by the stated height difference.

The volumes requested are separated by Regular Wheel Base U-Vans (RWB) and Extended Wheel Base U-Vans (EWB).

a. RWB: 19.8 Gallons, MY 1997 - 2000
   EWB: 24.3 Gallons, MY 1997-1998
   EWB: 25.0 Gallons, MY 1999-2000

b. RWB: 51.05 mm below, MY 1997-2000
   EWB: 49.58 mm below, MY 1997-1998
   EWB: 52.02 mm below, MY 1999-2000

c. RWB: 24.3 L (6.4 Gallons), MY 1997-2000
   EWB: 28.4 L (7.5 Gallons), MY 1997-1998
   EWB: 29.5 L (7.8 Gallons), MY 1999-2000

7. **In a December 20, 1999, letter DaimlerChrysler provided a document to NHTSA which had been developed for a proposed peer vehicle study that was never conducted. The document (copy enclosed) is a worksheet of various vehicle and fuel system design factors. Complete the enclosed worksheet for the subject peer vehicles.**

   Attachment F contains the requested worksheet.

8. **Provide two samples of each variation of filler hose and fuel tank spud used in the subject peer vehicles.**

   The parts requested will be supplied under a separate cover letter.

9. **Furnish copies of all engineering standards, specifications and guidelines regarding fuel tank and filler neck assembly packaging. "Packaging" should be interpreted in the context used in Section 4.12 of the enclosed copy of Society of Automotive Engineers Information Report SAE J1664, "Passenger Car and Light Truck Fuel Containment."**

   This request was received on April 10, 2000, separate from the original IR, which was faxed to GM on March 9, 2000. GM anticipates that its response to this request will be completed within the next 10 working days.

* * *

General Motors requests that the documents stamped "GM Confidential" included in Attachments A, B & D be afforded confidential treatment by the NHTSA. This information is not customarily made public by General Motors and contains trade secrets and commercial information which is privileged or confidential under 5 U.S.C. Section 552(b)(4), 49 CFR Part 512 and 49 U.S.C. Section 30167(a).

Attachments B & D contains engineering drawings that are not publicly available. The subject of these drawings cannot be manufactured without the drawing, except, perhaps, after significant reverse engineering. Thus, the engineering drawings in Attachments B & D are within the class determination of confidentiality set forth in 49 CFR part 512, Appendix B.

Attachment A contains test procedures and product specifications utilized by General Motors during development of the subject vehicles. The information has commercial value and can be obtained independently only at considerable cost. This information can be used by competitors to identify testing and specification differences, thereby enabling them to improve their own test procedures and products, without expenditures associated with the evaluation of testing parameters, all at the expense of General Motors. Attachment A therefore, contains commercial information whose disclosure will likely result in substantial competitive harm.

General Motors treats the above material as confidential proprietary information available only to authorized General Motors personnel and not otherwise available to the public. The documents are maintained under a record-keeping system which is intended to control dissemination of this material within General Motors, and to assure that it is not disseminated outside the Corporation, except as described in the attached certification made pursuant to 49 CFR Part 512.4(e).

To the best of our knowledge, no prior determinations of the confidentiality of these documents have been made by the NHTSA, other Federal Agencies, or the Federal Courts. Documents such as those contained in Attachments A, B & D, however, have, to the best of our knowledge, normally been granted confidential treatment by the NHTSA in the past. The drawings in Attachments B & D are of a type for which a class determination of confidentiality has been made under 49 CFR Part 512, Appendix B.

The documents for which confidential treatment are being requested, with a copy of this letter, are being submitted to your Office of the Chief Counsel. It is requested that notice concerning the Agency's determination of confidentiality for this material and any questions relating to confidentiality be addressed to Howard Silverman, Attorney, GM Legal Staff, MC 480-106-304, 30500 Mound Rd., Warren, MI 48090; [(810) 986-8424]. Confidential treatment of this material is requested for an indefinite period.

The documents subject to this request for confidentiality have been clearly stamped "GM CONFIDENTIAL". If a request for disclosure of any or all of this information is received by the NHTSA, General Motors requests notification of receipt of each such request and, if necessary, an opportunity to further explain the reasons why such material is trade secret and commercial information which should not be disclosed under the applicable statutes and regulations.

This response is based on searches of General Motors Corporation (GM) locations where documents determined to be responsive to your request would ordinarily be found. As a result, the scope of this search did not include, nor could it reasonably include, "all past and present officers and employees, whether assigned to its principle offices or any of its field or other locations, including all of its divisions, subsidiaries (whether or not incorporated) and affiliated enterprises and all of its headquarters, regional, zone, and other offices and their employees, and all agents, contractors, consultants, attorneys and law firms and other persons engaged directly or indirectly (e.g., employee of a consultant) by or under the control of GM (including all business units and persons previously referred to) who are or, in or after 1990, were involved in any way with (a) design, engineering, analysis, modification, or production; (b) testing, assessment, evaluation; or (c) record-keeping, claims, or lawsuits relating to the alleged defect in the subject vehicles".

This response was compiled and prepared by this office upon review of the documents produced by various GM locations, and does not include documents generated or received at those GM locations subsequent to their searches.

Please contact me if you require further information about this response or the nature or scope of our searches.

Sincerely,

F. C. Sonye

Frank C. Sonye, Jr.
Director
Product Investigations

attachments

CERTIFICATE IN SUPPORT OF REQUEST FOR CONFIDENTIALITY

EA99-013 / GM-586

I, Frank C. Sonye, Jr., pursuant to the provisions of 49 CFR Part 512 state as follows:

(1) I am Director of Product Investigations, and I am authorized by General Motors Corporation (GM) to execute documents on its behalf;

(2) The information stamped "GM Confidential" contained in Attachments A, B and D to this document is confidential and proprietary data and is being submitted with the claim that it is entitled to confidential treatment of 5 USC §552(b)(4), 49 U.S.C. Section 30167(a) and implemented in 49 CFR Part 512;

(3) I, or members of my staff, have personally inquired of the responsible GM personnel who have authority in the normal course of business to release the information for which a claim of confidentiality has been made to ascertain whether such information has ever been released outside GM;

(4) Based upon such inquiries to the best of my knowledge, information and belief, the information for which GM has claimed confidential treatment has never been released or become available outside GM, except as hereinafter specified: None.

(5) I make no representations beyond those contained in this certificate and in particular, I make no representations as to whether this information may become available outside GM because of unauthorized or inadvertent disclosure except as stated in Paragraph 4; and,

(6) I certify under penalty of perjury that the foregoing is true and correct. Executed on this the fourteenth day of April 2000.

F. C. Sonye

Frank C. Sonye, Jr.
Director
Product Investigations

ATTACHMENT "A"

General Motors Corporation

EA99-013; GM586

"GM CONFIDENTIAL" MATERIAL HAS BEEN REMOVED FROM THIS ATTACHMENT AND SUPPLIED TO THE OFFICE OF THE CHIEF COUNSEL.

Attachment A

ATTACHMENT "B"

General Motors Corporation

EA99-013; GM586

"GM CONFIDENTIAL" MATERIAL HAS BEEN REMOVED FROM THIS ATTACHMENT AND SUPPLIED TO THE OFFICE OF THE CHIEF COUNSEL.

Attachment A

ATTACHMENT "C"

General Motors Corporation

EA99-013; GM586

Attachment C

00000927

GM586 Att C 3000

Production Part Approval
Performance Test Results

SUPPLIER				PART NUMBER		
PILOT INDUSTRIES, INC.				10282240 - 241 - 242		
NAME OF LABORATORY				PART NAME		
PILOT INDUSTRIES, INC.				FUEL TANK FILL PIPE ASSEMBLY		
REF. NO.	REQUIREMENTS	DATE	QTY. TESTED	SUPPLIER TEST RESULTS AND TEST CONDITIONS	OK	NOT OK
1	Bracket Destructive Load Test: Apply force @ 1 mm per sec.until bracket seperates from the fill pipe Must meet leak requirement after seperation.	02/10/97	5	Conforms, Seperated Bracket From Fill Pipe. No Leakage. Results Attached.	X	
2	Vent Pipe Destructive Load Test: Apply force for a distance of 15 mm @ 1 mm per sec. min. Must be leak proof after deflection.	02/11/97	5	Conforms, Applied Force To 15 mm. No Leakage. Results Attached.	X	
3	Assy. must not leak when pressurized to 35.0 kpa.	02/10/97	5	Conforms, Pressurized To 35 kPa. No Leakage. Results Attached.	X	
4	Hose must withstand a minimum of 2700 N @ 1mm per second without seperating from the pipe.	02/10/97	5	Conforms, Applied Force Up To 2750 N. Hose Did Not Seperate From Fill Pipe. Results Attached.	X	
5	Deflector: After 2000 cycles applied with a 20.6 dia. plunger inserted 76.0 deep, a 5.0 max. distortion is permissible. Resistance To Be Less Than 10 Meg ohms.	02/10/97	2 ea Inlet	Conforms, Applied 2000 Plus Cycles. No Distortion. Resistance Before And After Cycle Test, Less Than 10 Megohms. Results Attached.	X	
6	Assembly must freely admit test nozzle spout, lock-ring & test plug gage to full depth.	02/10/97	5	Conforms, Freely Admitted Test Nozzle Spout And Plug Gage To Full Depth. Locking Ring Locked. Results Attached.	X	
7	The interior & exterior of asy. must be free of oil, dirt, chips, corrosion, or any other foreign material.	02/10/97	5	Conforms, No Oil, Dirt, Chips, Corrosion, Or Foreign Material. Results Attached.	X	
8	Spotwelds: Must conform to GM-4488-M Spec. Nugget size 4.0 min., location within tol., distortion less than 25 .No cracks, holes, or extra welds.	02/10/97	2	Conforms, To GM - 4488 - M Specification. Results Attached.	X	
9	Inlet Torque Test: Must Withstand 20.0 Nm Torque And Meet Requirements Of Leak Test.	02/10/97	5	Conforms,Torqued To 20.3 Nm And Leak Tested @ 35.0 Kpa. Results Attached.	X	
3.4	Finish: Per GM-6173-M Corrosion Resistance 240 hr. salt spray.	12/13/96	1	Conforms, Refer To Metal Coatings Salt Spray Report. Results Attached.	X	
3.6	Humidity Test: No blisters or apperance change.	02/21/96	2	Conforms, Refer To Sherry Laboratories Report. The Scattered Spot Observed Are Water Spots Not Rust. Results Attached.	X	
3.6	Adhesion Test: No more than 3.0 mm peel back from the scribe line allowed.	02/21/96		Conforms, Refer To Sherry Laboratories Report. Results Attached.	X	
	Hose, 10292455: Per GM 6289-M Type A or B Construction No. 4			Testing In Progress. Results From Goodyear's Lincoln, Nebraska Plant Are Included. Results Attached. Refer To Goodyear's PSW.		
				GM586 Att C 3081		

SIGNATURE	TITLE	DATE
Carl Bell	Quality Technician	02/11/97

PILOT INDUSTRIES, INC.

NORTH VERNON DIVISION 505 Industrial Dr., North Vernon, IN 47265 Telephone: 812-346-5750 Fax: 812-346-1164

Part Number: 10236227

Part Name: FUEL FILLER TUBE

Used In:

Customer: GENERAL MOTORS

Finish:

Customer Prod. Std.:

Date Prod: 02/07/96

Date Tested: 02/09/96

Date Rec:

Pieces Rec:

Supplier:

P.O. No.:

Date Sent To Lab:

Lot Number:

Pieces Sent To Lab: 10

Requirements	Results of Lab Test	Remarks
THICKNESS: ______ INS.		
SALT SPRAY: ______ HRS.		
WATER IMMERSION: ______ HRS.		
HEAT: ______ HRS. AT ______ °C		
HOT OIL: ______ HRS. AT ______ °C		
HOT GAS: ______ HRS. AT ______ °C		
ETHYLENE GLYCOL: ______ HRS. AT ______ °C		
OTHER: Hose Pull Off: Hose must withstand a minimum of 2700 N @ 1mm per sec. without seperating from pipe.	Applied Force Of 3000 N @ 1 mm Per Sec. NO SEPERATION FROM PIPE	ALL PARTS PASSED

SIGNED NORTH VERNON PLANT: Joe Walden

SIGNED LAB: Carl Ball

GM586 Att C 3082

00000929

Production Part Approval
Performance Test Results

SUPPLIER PILOT INDUSTRIES, INC.	PART NUMBER 10236227
NAME OF LABORATORY PILOT INDUSTRIES, INC.	PART NAME FUEL TANK FILL PIPE ASSEMBLY

REF. NO.	REQUIREMENTS	DATE	QTY. TESTED	SUPPLIER TEST RESULTS AND TEST CONDITIONS	OK	NOT OK
1	Bracket Destructive Load Test: Apply force @ 1 mm per sec,until bracket seperates from the fill pipe Must meet leak requirement after seperation.	02/14/96	5	SEPERATED BRACKET FROM FILL PIPE & LEAK TESTED. NO LEAKAGE	X	
2	Vent Pipe Destructive Load Test: Apply force for a distance of 15 mm @ 1 mm per sec. min. Must be leak proof after deflection.	02/14/96	5	APPLIED FORCE TO 15 MM WITHIN 1MM PER SEC. & LEAK TESTED. NO LEAKAGE	X	
3	Asy. must not leak when pressurized to 35.0 kpa.	02/14/96	5	PRESSURIZED TO 35.0 KPA. NO LEAKAGE.	X	
4	Hose must withstand a minimum of 2700 N @ 1mm per second without seperating from the pipe.	02/09/96	10	APPLIED FORCE OF 3000 N @ 1 MM PER SEC. NO SEPERATION FROM FILL PIPE.	X	
5	Deflector: After 2000 cycles applied with a 20.6 dia. plunger inserted 76.0 deep, a 5.0 max. distortion is permissible.	02/09/96	2	APPLIED 2100 CYCLES. NO DISTORTION.	X	
6	Assembly must freely admit test nozzle spout, lock-ring & test thread plug gage to full depth.	02/14/96	5	FREELY ADMITTED TEST NOZZLE SPOUT, LOCKING RING LOCKED. ADMITTED THREAD GAGE TO FULL DEPTH.	X	
7	The interior & exterior of asy. must be free of oil, dirt, chips, corrosion, or any other foreign material.	02/14/96	5	NO OIL, DIRT, CHIPS, CORROSION, OR FOREIGN MATERIAL.	X	
8	Spotwelds: Must conform to GM-4488-M Spec. Nugget size 4.0 min., location within tol., distortion less than 25 .No cracks, holes, or extra welds.	02/14/96	1	BAFFLE 5.50, 5.20, 5.30. FLANGE 9.20, 5.61, 8.00 LOCATION WITHIN TOL. DISTORTION LESS THAN 25 . NO CRACKS OR HOLES. # OF WELDS REQUIRED.	X	
3.4	Finish: Per GM-6173-M Corrosion Resistance 240 hr. salt spray.			CONFORMS,REFER TO METAL COATINGS ATTACHED RESULTS.	X	
3.6	Humidity Test: No blisters or apperance change.	02/21/96		NO BLISTERS. SCATTERED SPOTS OBSERVED. SPOTS FORM A CORROSION RESISTANCE BARRIER.	X	
3.6	Adhesion Test: No more than 3.0 mm peel back from the scribe line allowed.	02/21/96		CONFORMS, NO PEEL BACK FROM SCRIBES OR UNDER TAPE. RESULTS ATTACHED. REFER TO SHERRY LAB.	X	
	Hose, 10236573: Per GM 6272-M Type B.			CONFORMS, RESULTS ATTACHED. REFER TO GOODYEAR'S PSW.	X	
	Cannister Air Line 10277485: Nylon 12 Per GMP PA12.003 & M 6264-M, GM 9080-P			CONFORMS, RESULTS ATTACHED. REFER TO PILOT'S PPAP.	X	
				GM586 Att C 3003		

SIGNATURE	TITLE	DATE
Carl Ball	Quality [illegible]	02/21/96

MAR 24 2000 14:14

00000930

PILOT INDUSTRIES, INC.

NORTH VERNON DIVISION 505 Industrial Dr., North Vernon, IN 47265 Telephone: 812-346-5750 Fax: 812-346-1164

Part Number: 10236227E

Part Name: FUEL FILLER TUBE

Used In:

Customer:

Finish:

Customer Prod. Std.:

Date Prod: 4-24-95

Date Tested: 4-25-95

Date Rec:

Pieces Rec:

Supplier:

P.O. No.:

Date Sent To Lab:

Lot Number:

Pieces Sent To Lab:

Requirements	Results of Lab Test	Remarks
THICKNESS: ______ INS.		
SALT SPRAY: ______ HRS.		
WATER IMMERSION: ______ HRS.		
HEAT: ______ HRS. AT ______ °C		
HOT OIL: ______ HRS. AT ______ °C		
HOT GAS: ______ HRS. AT ______ °C		
ETHYLENE GLYCOL: ______ HRS. AT ______ °C		
OTHER: 4 HOSE MUST WITHSTAND A MINIMUM OF 2200 N APPLIED ALONG PIPE AXIS AT A RATE OF 1 MM PER SECOND WITHOUT SEPERATING FROM PIPE.	APPLIED FORCE NO SEPERATION	PASS

GM586 Att C 3004

SIGNED NORTH VERNON PLANT: J H Walker

SIGNED LAB: Carl Bell

00000931

Production Part Approval – Performance Test Results

SUPPLIER	PART NUMBER
Pilot Industries, Inc.	10236227 E
NAME OF LABORATORY	**PART NAME**
Pilot	Fuel Filler Tube

REF. NO.	REQUIREMENTS		TEST FREQ.	QTY. TESTED	SUPPLIER TEST RESULTS AND TEST CONDITIONS	OK	NOT OK
4	Hose must withstand a min.					X	
	of 2700 N applied along pipe				Applied force No		
	axis at a rate of 1mm per				Seperation		
	second without seperating						
	from pipe.						

JAN 1993 CFG-1005

SIGNATURE	TITLE	DATE
Carl Bell	Quality Technician	4-25-95

GM586 Att C 00000932

MAR 24 2000 14:15

PILOT INDUSTRIES, INC.

NORTH VERNON DIVISION 505 Industrial Dr., North Vernon, IN 47265 Telephone: 812-346-5750 Fax: 812-346-1164

[illegible] Number:	10282240 - 241 - 242	Part Name:	FUEL TANK FILL PIPE ASSY
Used In:		Customer:	GENERAL MOTORS
Finish:		Customer Prod. Std.:	
Date Prod:	02/07/97	Date Tested:	02/10/97
Date Rec:		Pieces Rec:	
Supplier:		P.O. No.:	
Date Sent To Lab:		Lot Number:	
Pieces Sent To Lab:	5		

Requirements	Results of Lab Test	Remarks
THICKNESS: ______ INS.		
SALT SPRAY: ______ HRS.		
WATER IMMERSION: ______ HRS.		
HEAT: ______ HRS. AT ______ °C		
HOT OIL: ______ HRS. AT ______ °C		
HOT GAS: ______ HRS. AT ______ °C		
ETHYLENE GLYCOL: ______ HRS. AT ______ °C		
OTHER: Hose Pull Test; Hose Must Withstand A Minimum Of 2700 N Pulled At 1 mm Per Second Without Seperating From The Fill Pipe.	Applied Force Up To 2750 N. Hose Did Not Seperate From Fill Pipe.	ALL PARTS PASSED

SIGNED NORTH VERNON PLANT: Joe W[illegible] SIGNED LAB: [illegible]

GM586 Att C 3006

00000933

Production Part Approval
Performance Test Results

SUPPLIER PILOT INDUSTRIES, INC.				PART NUMBER 10282240 - 241 - 242		
NAME OF LABORATORY PILOT INDUSTRIES, INC.				PART NAME FUEL TANK FILL PIPE ASSEMBLY		
REF. NO.	REQUIREMENTS	DATE	QTY. TESTED	SUPPLIER TEST RESULTS AND TEST CONDITIONS	OK	NOT OK
1	Bracket Destructive Load Test: Apply force @ 1 mm per sec.until bracket seperates from the fill pipe Must meet leak requirement after seperation.	02/10/97	5	Conforms, Seperated Brackct From Fill Pipe. No Leakage. Results Attached.	X	
2	Vent Pipe Destructive Load Test: Apply force for a distance of 15 mm @ 1 mm per sec. min. Must be leak proof after deflection.	02/11/97	5	Conforms, Applied Force To 15 mm. No Leakage. Results Attached.	X	
3	Assy. must not leak when pressurized to 35.0 kpa.	02/10/97	5	Conforms, Pressurized To 35 kPa. No Leakage. Results Attached.	X	
4	Hose must withstand a minimum of 2700 N @ 1mm per second without seperating from the pipe.	02/10/97	5	Conforms, Applied Force Up To 2750 N. Hose Did Not Seperate From Fill Pipe. Results Attached.	X	
5	Deflector: After 2000 cycles applied with a 20.6 dia. plunger inserted 76.0 deep, a 5.0 max. distortion is permissible. Resistance To Be Less Than 10 Meg ohms.	02/10/97	2 ea inlet	Conforms, Applied 2000 Plus Cycles. No Distortion. Resistance Before And After Cycle Test, Less Than 10 Megohms. Results Attached.	X	
6	Assembly must freely admit test nozzle spout, lock-ring & test plug gage to full depth.	02/10/97	5	Conforms, Freely Admitted Test Nozzle Spout And Plug Gage To Full Depth. Locking Ring Locked. Results Attached.	X	
7	The interior & exterior of asy. must be free of oil, dirt, chips, corrosion, or any other foreign material.	02/10/97	5	Conforms, No Oil, Dirt, Chips, Corrosion, Or Foreign Material. Results Attached.	X	
8	Spotwelds: Must conform to GM-4488-M Spec. Nugget size 4.0 min., location within tol., distortion less than 25 .No cracks, holes, or extra welds.	02/10/97	2	Conforms, To GM - 4488 - M Specification. Results Attached.	X	
9	Inlet Torque Test: Must Withstand 20.0 Nm Torque And Meet Requirements Of Leak Test.	02/10/97	5	Conforms,Torqued To 20.3 Nm And Leak Tested @ 35.0 Kpa. Results Attached.	X	
3.4	Finish: Per GM-6173-M Corrosion Resistance 240 hr. salt spray.	12/13/96	1	Conforms, Refer To Metal Coatings Salt Spray Report. Results Attached.	X	
3.6	Humidity Test: No blisters or apperance change.	02/21/96	2	Conforms, Refer To Sherry Laboratories Report. The Scattered Spot Observed Are Water Spots Not Rust. Results Attached.	X	
3.6	Adhesion Test: No more than 3.0 mm peel back from the scribe line allowed.	02/21/96		Conforms, Refer To Sherry Laboratories Report. Results Attached.	X	
	Hose, 10292455: Per GM 6289-M Type A or B Construction No. 4			Testing In Progress. Results From Goodyear's Lincoln, Nebraska Plant Are Included. Results Attached. Refer To Goodyear's PSW.		
				GM586 Att C 3007		

SIGNATURE	TITLE	DATE
Carl Bell	Quality Technician	02/11/97

PILOT INDUSTRIES, INC.

NORTH VERNON DIVISION 505 Industrial Dr., North Vernon, IN 47265 Telephone: 812-346-5750 Fax: 812-346-1164

Part Number:	10236227	Part Name:	FUEL FILLER TUBE
Used In:		Customer:	GENERAL MOTORS
Finish:		Customer Prod. Std.:	
Date Prod:	02/07/96	Date Tested:	02/09/96
Date Rec:		Pieces Rec:	
Supplier:		P.O. No.:	
Date Sent To Lab:		Lot Number:	
Pieces Sent To Lab:	10		

Requirements	Results of Lab Test	Remarks
THICKNESS: ______ INS.		
SALT SPRAY: ______ HRS.		
WATER IMMERSION: ______ HRS.		
HEAT: ______ HRS. AT ______ °C		
HOT OIL: ______ HRS. AT ______ °C		
HOT GAS: ______ HRS. AT ______ °C		
ETHYLENE GLYCOL: ______ HRS. AT ______ °C		
OTHER: Hose Pull Off: Hose must withstand a minimum of 2700 N @ 1mm per sec. without seperating from pipe.	Applied Force Of 3000 N @ 1 mm Per Sec. NO SEPERATION FROM PIPE	ALL PARTS PASSED

SIGNED NORTH VERNON PLANT: Joe Walden SIGNED LAB: Carl Ball

GM586 Att C 3008

00000935

MAR 24 2000 14:14

Production Part Approval
Performance Test Results

SUPPLIER	PART NUMBER
PILOT INDUSTRIES, INC.	10236227
NAME OF LABORATORY	PART NAME
PILOT INDUSTRIES, INC.	FUEL TANK FILL PIPE ASSEMBLY

REF. NO.	REQUIREMENTS	DATE	QTY. TESTED	SUPPLIER TEST RESULTS AND TEST CONDITIONS	OK	NOT OK
1	Bracket Destructive Load Test: Apply force @ 1 mm per sec,until bracket seperates from the fill pipe Must meet leak requirement after seperation.	02/14/96	5	SEPERATED BRACKET FROM FILL PIPE & LEAK TESTED. NO LEAKAGE	X	
2	Vent Pipe Destructive Load Test: Apply force for a distance of 15 mm @ 1 mm per sec. min. Must be leak proof after deflection.	02/14/96	5	APPLIED FORCE TO 15 MM WITHIN 1MM PER SEC. & LEAK TESTED. NO LEAKAGE	X	
3	Asy. must not leak when pressurized to 35.0 kpa.	02/14/96	5	PRESSURIZED TO 35.0 KPA. NO LEAKAGE.	X	
4	Hose must withstand a minimum of 2700 N @ 1mm per second without seperating from the pipe.	02/09/96	10	APPLIED FORCE OF 3000 N @ 1 MM PER SEC. NO SEPERATION FROM FILL PIPE.	X	
5	Deflector: After 2000 cycles applied with a 20.6 dia. plunger inserted 76.0 deep, a 5.0 max. distortion is permissible.	02/09/96	2	APPLIED 2100 CYCLES. NO DISTORTION.	X	
6	Assembly must freely admit test nozzle spout, lock-ring & test thread plug gage to full depth.	02/14/96	5	FREELY ADMITTED TEST NOZZLE SPOUT, LOCKING RING LOCKED. ADMITTED THREAD GAGE TO FULL DEPTH.	X	
7	The interior & exterior of asy. must be free of oil, dirt, chips, corrosion, or any other foreign material.	02/14/96	5	NO OIL, DIRT, CHIPS, CORROSION, OR FOREIGN MATERIAL.	X	
8	Spotwelds: Must conform to GM-4488-M Spec. Nugget size 4.0 min., location within tol., distortion less than 25 .No cracks, holes, or extra welds.	02/14/96	1	BAFFLE 5.50, 5.20, 5.30. FLANGE 9.20, 5.61, 8.00 LOCATION WITHIN TOL. DISTORTION LESS THAN 25 . NO CRACKS OR HOLES. # OF WELDS REQUIRED.	X	
3.4	Finish: Per GM-6173-M Corrosion Resistance 240 hr. salt spray.			CONFORMS,REFER TO METAL COATINGS ATTACHED RESULTS.	X	
3.6	Humidity Test: No blisters or apperance change.	02/21/96		NO BLISTERS. SCATTERED SPOTS OBSERVED. SPOTS FORM A CORROSION RESISTANCE BARRIER.	X	
3.6	Adhesion Test: No more than 3.0 mm peel back from the scribe line allowed.	02/21/96		CONFORMS, NO PEEL BACK FROM SCRIBES OR UNDER TAPE. RESULTS ATTACHED. REFER TO SHERRY LAB.	X	
	Hose, 10236573: Per GM 6272-M Type B.			CONFORMS, RESULTS ATTACHED. REFER TO GOODYEAR'S PSW.	X	
	Cannister Air Line 10277485: Nylon 12 Per GMP PA12.003 & M 6264-M, GM 9080-P			CONFORMS, RESULTS ATTACHED. REFER TO PILOT'S PPAP.	X	
				GM586 Att C 3889		

SIGNATURE	TITLE	DATE
Carl Ball	Quality Technician	02/21/96

PILOT INDUSTRIES, INC.

NORTH VERNON DIVISION 505 Industrial Dr., North Vernon, IN 47265 Telephone: 812-346-5750 Fax: 812-346-1164

Part Number:	10236227E	Part Name:	FUEL FILLER TUBE
Used In:		Customer:	
Finish:		Customer Prod. Std.:	
Date Prod:	4-24-95	Date Tested:	4-25-95
Date Rec:		Pieces Rec:	
Supplier:		P.O. No.:	
Date Sent To Lab:		Lot Number:	
Pieces Sent To Lab:			

Requirements	Results of Lab Test	Remarks
THICKNESS: ______ INS.		
SALT SPRAY: ______ HRS.		
WATER IMMERSION: ______ HRS.		
HEAT: ______ HRS. AT ______ °C		
HOT OIL: ______ HRS. AT ______ °C		
HOT GAS: ______ HRS. AT ______ °C		
ETHYLENE GLYCOL: ______ HRS. AT ______ °C		
OTHER: ⟨4⟩ HOSE MUST WITHSTAND A MINIMUM OF 2200 N APPLIED ALONG PIPE AXIS AT A RATE OF 1 MM PER SECOND WITHOUT SEPERATING FROM PIPE,	APPLIED FORCE NO SEPERATION GM586 Att	PASS C 3010

SIGNED NORTH VERNON PLANT: JH Walker SIGNED LAB: Carl Bell

Production Part Approval – Performance Test Results

SUPPLIER: Pilot Industries, Inc.	PART NUMBER: 10236227 E
NAME OF LABORATORY: Pilot	PART NAME: Fuel Filler Tube

REF. NO.	REQUIREMENTS		TEST FREQ.	QTY. TESTED	SUPPLIER TEST RESULTS AND TEST CONDITIONS	OK	NOT OK
Ⓥ	Hose must withstand a min.					X	
	of 2700 N applied along pipe				Applied force no		
	axis at a rate of 1mm per				seperation		
	second without seperating						
	from pipe.						

JAN 1993 CFG-1005

SIGNATURE: [signature] TITLE: Quality Technician DATE: 4-25-95

GM586 Att C 30 00000938

MAR 24 2000 14:15

ATTACHMENT "D"

00000939

General Motors Corporation

EA99-013; GM586

"GM CONFIDENTIAL" MATERIAL HAS BEEN REMOVED FROM THIS ATTACHMENT AND SUPPLIED TO THE OFFICE OF THE CHIEF COUNSEL.

Attachment D

ATTACHMENT "E"

00000941

General Motors Corporation

EA99-013; GM586

Attachment E

□□□

□ Engineering Standards Thru 30JN99(Documents may not be the Current Version)
□ Fuels & Lubricants

9985406: Lubricant, Rubber (Diluted Material)

Fuels & Lubricants

Assembly Aids Rubber

Lubricant, Rubber (Diluted Material)

March 1989

9985406

Scope.

This specification describes a mixture of wetting agent and water, suitable for use as a lubricant to facilitate assembly of rubber parts.

2.1

A uniform mixture of 0.5% wetting agent and the remainder primarily water. Small quantities of fungicide or other additives may be added to meet requirements of 2.4.

2.2

The wetting agent portion of mixture shall be sodium lauryl sulfate.

2.3

The rubber lubricant is to be supplied ready to use without any mixing, agitation or dilution with water.

2.4

Materials shall not exhibit any settling or stratication after 6 months storage. Containers shall be free of any particulate matter or other foreign material.

2.5

Rubber lubricant is to be supplied in either 1, 5 or 55 gallon containers.

3

00000943

Initial Source Approval.

GM586 Att E 5001

No shipment shall be made by any supplier until representative initial production samples have been approved by engineering as meeting the requirements of this specification.

3.1

Completed copies of the GM Material Safety Data Sheet and Critical Material Register (available from the engineering department or laboratory) must be submitted with any new submissions or where a composition change has occurred.

4

Inspection and Rejection.

All shipments of material or parts under contract or purchase order manufactured to this specification shall be equivalent in every respect to the initial samples approved by engineering. There shall be no changes in either formulation or manufacturing processes permitted without prior notification and approval by engineering. Lack of notification by the supplier constitutes grounds for rejection of any shipment. While samples may be taken from incoming shipments and checked for conformance to this specification, the supplier shall accept the responsibility for incoming shipments meeting this specification without dependence upon purchaser's inspection.

5

Approved Sources.

Engineering qualification of an approved source is required for this specification. Only sources listed in the GM Corporate Materials File under this specification number have been qualified by the control division as meeting the requirements of this specification.

This specification was issued in March 1979 by Pontiac and was completely revised by CPC in March 1988. Editorial changes made March 1989.

☐☐☐

00000944

GM586 Att E 5802

□□□

□ Engineering Standards Thru 30JN99(Documents may not be the Current Version)
□ Fuels & Lubricants

9985406: Lubricant, Rubber (Diluted Material)

Fuels & Lubricants

Assembly Aids Rubber

Lubricant, Rubber (Diluted Material)

March 1989

9985406

Scope.

This specification describes a mixture of wetting agent and water, suitable for use as a lubricant to facilitate assembly of rubber parts.

2.1

A uniform mixture of 0.5% wetting agent and the remainder primarily water. Small quantities of fungicide or other additives may be added to meet requirements of 2.4.

2.2

The wetting agent portion of mixture shall be sodium lauryl sulfate.

2.3

The rubber lubricant is to be supplied ready to use without any mixing, agitation or dilution with water.

2.4

Materials shall not exhibit any settling or stratication after 6 months storage. Containers shall be free of any particulate matter or other foreign material.

2.5

Rubber lubricant is to be supplied in either 1, 5 or 55 gallon containers.

3

Initial Source Approval.

GM586 Att E 58800000945

No shipment shall be made by any supplier until representative initial production samples have been approved by engineering as meeting the requirements of this specification.

3.1

Completed copies of the GM Material Safety Data Sheet and Critical Material Register (available from the engineering department or laboratory) must be submitted with any new submissions or where a composition change has occurred.

4

Inspection and Rejection.

All shipments of material or parts under contract or purchase order manufactured to this specification shall be equivalent in every respect to the initial samples approved by engineering. There shall be no changes in either formulation or manufacturing processes permitted without prior notification and approval by engineering. Lack of notification by the supplier constitutes grounds for rejection of any shipment. While samples may be taken from incoming shipments and checked for conformance to this specification, the supplier shall accept the responsibility for incoming shipments meeting this specification without dependence upon purchaser's inspection.

5

Approved Sources.

Engineering qualification of an approved source is required for this specification. Only sources listed in the GM Corporate Materials File under this specification number have been qualified by the control division as meeting the requirements of this specification.

This specification was issued in March 1979 by Pontiac and was completely revised by CPC in March 1988. Editorial changes made March 1989.

□□□

GM586 Att E 5884 0000946

ATTACHMENT "F"

00000947

General Motors Corporation

EA99-013; GM586

Attachment F

00000948

GM586 Att F 6000

Vehicle Identification – Make, Model, Model Year, Options, Date of Inspection	**EWB**	**RWB**

Wheel base of vehicle	120"	112"
Rated fuel capacity	24.7 ('97-'98), 25 ('99-'00)	20 All
Location of fuel fill tube (right or left side)	Left	Left
Location of fill opening Center Line on sheet metal		
Fore-Aft position of opening to rear axle Center Line (in 'Y')	19.2	19.2
Up-Down position of opening to top of rear wheel opening (above axle Center Line, in 'Z')	170.0	170.0
Description of fuel tank location in vehicle		
Position of rear edge of tank to rear axle Center Line	195.1	195.1
Position of front edge of tank to rear axle Center line	1636.0	1636.0
Position of left outboard edge to outboard side of left sill (rocker flange)	370.0	370.0
Position of right outboard edge to outboard side of right sill	650.0	650.0
Position of left outboard edge to inboard side of left rail	0	0
Position of right outboard edge to inboard side of right rail	280.0	280.0
Any additional comments?	No	No
Fill venting and valving		
ORVR, internal/external	No	No
Location on tank and fill tube	Top of tank, beside tube	Top of tank, beside tube
Material, attachment, size, valving	HDPE welded, 5/8", None	HDPE welded, 5/8", None
Fuel tank material type (metal or plastic)	Plastic HDPE	Plastic HDPE
Unique suspension or other chassis interface?	Unknown	Unknown
Fuel Tank		
Location of fuel filler tube entry (Rear, side, top?)	Side	Side
Submerged fill (yes or no?)	Yes	Yes
Any tank shields? Note if thermal or impact (skid plate), attached to tank, body or exhaust	None ('97, '98) Thermal ('99, '00)	None ('97, '98) Thermal ('99, '00)
Any additional comments?	No	No
Fuel tank straps		
How many straps?	3	3
Fore/aft or lateral?	Lateral	Lateral
Any additional comments?	No	No
Are they fastened to fixed dimension to torque?	Torque	Torque

GM586 Att F 6981

Vehicle Identification – Make, Model, Model Year, Options, Date of Inspection	EWB	RWB

Fill Pipe		
Housing at body side: Fixed or breakaway?	Fixed	Fixed
Approximate overall length	892 mm	892 mm
Number of bends	5	5
Pipe material	Steel	Steel
Pipe OD	35 mm	35 mm
Routed above rail, below rail, through rail?	Below rail	Below rail
Connection type to tank	Hose clamp	Hose clamp
Pipe attachment to BIW structure (yes or no)	Yes	Yes
Comments pertaining to venting hoses	No	No
Unique rollover valves or plumbing?	Unknown	Unknown
Any shielding? For impact? (yes or no)	Splash only	Splash only
Any additional comments?	No	No
Fill Pipe Hose		
Hose OD	See drawings	See drawings
Length	See drawings	See drawings
Number of bends	1	1
Corrugated or not	No	No
Hose reinforced (yes or no)	Yes	Yes
Any additional comments?	No	No
Fill pipe attachment to tank		
Type: Spud? Note material, how attached to tank, length, diameter, diameter of bead	Type: Spud Mat'l: HDPE Attmt: Welded Length: 44.0 Dia.: 41.0 (OD) Bead dia.: 42.0	Type: Spud Mat'l: HDPE Attmt: Welded Length: 44.0 Dia.: 41.0 (OD) Bead dia.: 42.0
Clamp? Style of clamp?	Yes, slotted worm screw	Yes, slotted worm screw
Bead type on spud	See drawing	See drawing
Any additional comments?	No	No
Fuel cap		
Type (screw-on, quick-on, etc.)	Screw-on ('97), ¼ turn ('98-'00)	Screw-on ('97), ¼ turn ('98-'00)
Valving	Vacuum & pressure	Vacuum & pressure
Cap attachment – metal/plastic?	Metal threads ('97), plastic insert ('98-'00)	Metal threads ('97), plastic insert ('98-'00)

GM586 Att F 0660F0950

Vehicle Identification – Make, Model, Model Year, Options, Date of Inspection	EWB	RWB

Vehicle attitude – Vertical from top of wheel opening above axle Center Line (as received; no additional loading)		
Left Front	N/A	N/A
Left Rear	N/A	N/A
Right Front	N/A	N/A
Right Rear	N/A	N/A

00000951

GM586 Att F 6003

AMERICAN HONDA MOTOR CO., INC.
1919 Torrance Boulevard • Torrance, CA 90501-2746
(310) 783-2000

April 26, 2000

NSA-12jlq
EA99-013

Ms. Kathleen C. DeMeter,
Director
Office of Defects Investigation Safety Assurance
U.S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
400 Seventh Street, S.W.
Washington, DC 20590

Dear Ms. DeMeter:

The following responses supplement our letter of April 14, 2000 regarding your request for peer vehicle information on the filler neck of Honda Odysseys.

4. PROVIDE THE FOLLOWING INFORMATION REGARDING THE DESIGN AND ASSEMBLY OF THE SUBJECT PEER FUEL FILLER NECK ASSEMBLIES AND TANK SPUDS. ALL DESIGN DIMENSIONS SHOULD INCLUDE BOTH THE NOMINAL VALUE AND THE ALLOWED TOLERANCES.

   C. TANK SPUD BEAD DIAMETER, BACK ANGLE, AND RAMP ANGLE;

   Corrected Response to 4-C: *See Attachment #6.*

   In response to your notification that we did not provide the correct ramp angle measurement in our initial response, the attached drawing addresses this measurement.

9. FURNISH COPIES OF ALL ENGINEERING STANDARDS, SPECIFICATIONS, AND GUIDELINES REGARDING FUEL TANK AND FILLER NECK ASSEMBLY PACKAGING. "PACKAGING" SHOULD BE INTERPRETED IN THE CONTEXT USED IN SECTION 4.12 OF THE ENCLOSED COPY OF SOCIETY OF AUTOMOTIVE ENGINEERS INFORMATION REPORT SAE J1664, "PASSENGER CAR AND LIGHT TRUCK FUEL CONTAINMENT."

   Response:

   Honda's basic design policy regarding fuel tank and filler neck assembly packaging is as follows:

   - The fuel tank should be located in a position that will not be affected in a collision. (Basically, the location should be within the side frames and between the front and rear axle.)

   (Continued on the next page.)

- Parts located around the fuel tank should have sufficient clearance to prevent interference or pinching during a collision.

Sincerely,

AMERICAN HONDA MOTOR CO., INC.

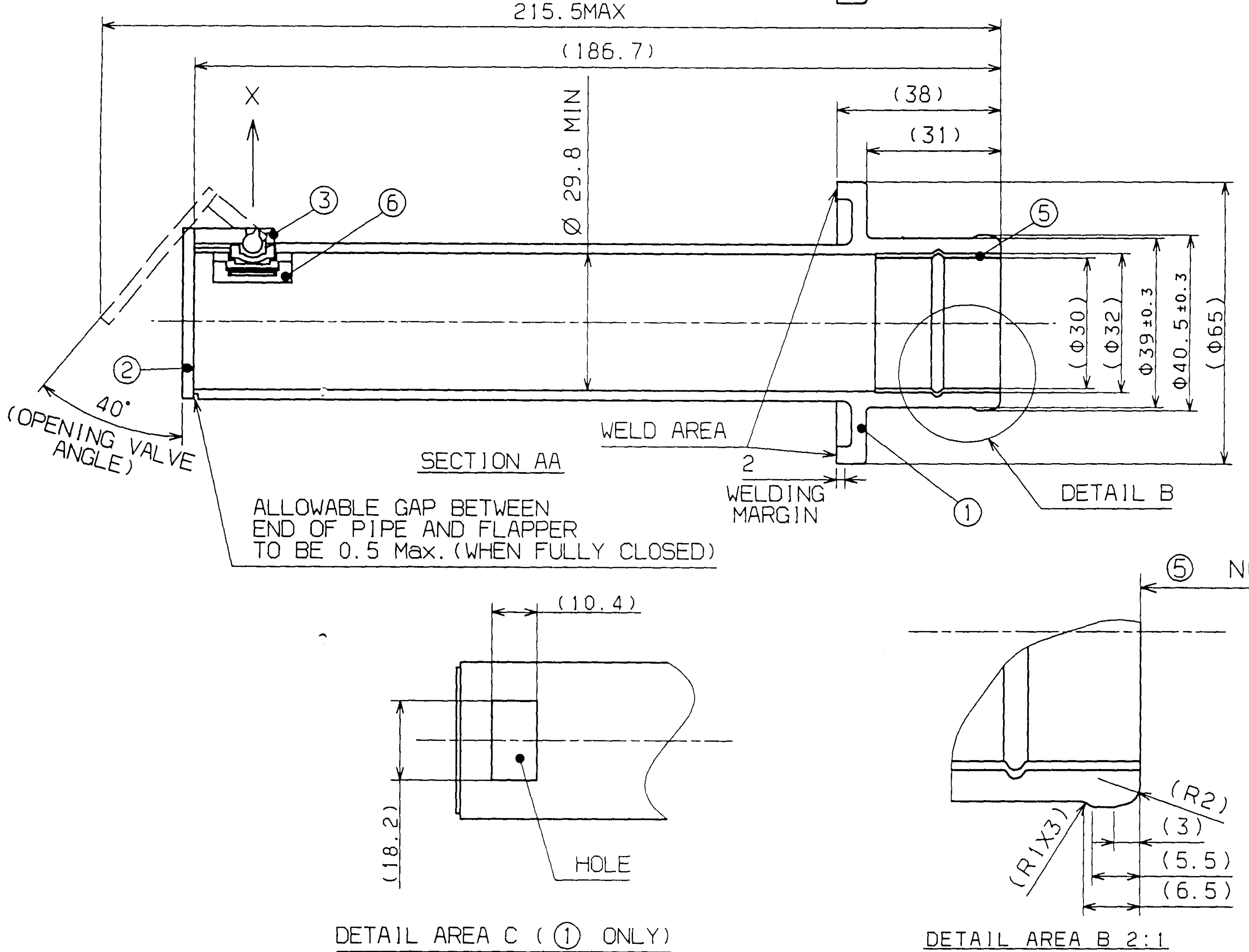
William R. Willen

William R. Willen
Managing Counsel
Product Regulatory Office

WRW:ke

Attachment

Attachment #6


215.5MAX
(186.7)
(38)
(31)
X
Ø 29.8 MIN
3
6
5
2
40°
(OPENING VALVE ANGLE)
(Φ30)
(Φ32)
Φ39 ±0.3
Φ40.5 ±0.3
(Φ65)
WELD AREA
2
WELDING MARGIN
1
DETAIL B
SECTION AA
ALLOWABLE GAP BETWEEN END OF PIPE AND FLAPPER TO BE 0.5 Max. (WHEN FULLY CLOSED)
(10.4)
(18.2)
HOLE
DETAIL AREA C (1 ONLY)
5 N(
(R2)
(R1X3)
(3)
(5.5)
(6.5)
DETAIL AREA B 2:1

00000955

17

NISSAN

NISSAN NORTH AMERICA, INC.

RECEIVED
00 MAY -8 PM 1:15
OFFICE
DEFECTS INVESTIGATION

April 28, 2000

Ms. Kathleen C. DeMeter, Director
Office of Defects Investigation
National Highway Traffic Safety Administration
400 Seventh St. S.W.
Washington, D.C. 20590

Re: NSA-12jlq, EA99-013

Dear Ms. DeMeter:

Enclosed is Nissan's response to a question related to the referenced NHTSA peer vehicle Information Request of March 8, 2000 and follow up question of April 10, 2000 concerning the agency's investigation of crash induced fuel filler neck failure in certain DaimlerChrysler NS model minivans. Mr. Jeff Quandt of the ODI staff informed Nissan that it would be more beneficial to NHTSA if we provided a certain specification rather than reply to question number 9. Therefore, instead of responding to question 9, we are providing the requested information as follows:

The dimension from the rear axle centerline to the forwardmost edge of the filler tube (outside of the frame rail) is 470.5mm.

****

Please contact Donald Neff at (310) 771-5463 if you have any questions.

Sincerely,

Frank D. Slaveter

Frank D. Slaveter
Corporate Manager, Technical Compliance

956

5

GENERAL MOTORS NORTH AMERICA
Safety Center

May 9, 2000

Ms. Kathleen C. DeMeter, Director
Office of Defects Investigation
NHTSA Safety Assurance
400 Seventh Street, S.W.
Washington, D.C. 20590

GM-586 Part 2

NSA-122jlq
EA99-013

Dear Ms. DeMeter:

This letter supplements and completes GM's response to your information request (IR) pertaining to the agency's investigation of crash induced fuel filler neck failures in 1996 through current production DaimlerChrysler NS-minivans vehicles.

Your request and our reply follows:

9. Furnish copies of all engineering standards, specifications and guidelines regarding fuel tank and filler neck assembly packaging. "Packaging" should be interpreted in the context used in Section 4.12 of the enclosed copy of Society of Automotive Engineers Information Report SAE J1664, "Passenger Car and Light Truck Fuel Containment."

Attachment A contains documents responsive to this request.

* * *

General Motors requests that the documents stamped "GM Confidential" included in Attachments A be afforded confidential treatment by the NHTSA. This information is not customarily made public by General Motors and contains trade secrets and commercial information which is privileged or confidential under 5 U.S.C. Section 552(b)(4), 49 CFR Part 512 and 49 U.S.C. Section 30167(a).

Attachment A contains product specifications utilized by General Motors during development of the subject vehicles. The information has commercial value and can be obtained independently only at considerable cost. This information can be used by competitors to identify testing and specification differences, thereby enabling them to improve their own test procedures and products, without expenditures associated with the evaluation of testing parameters, all at the expense of General Motors. Attachment A therefore, contains commercial information whose disclosure will likely result in substantial competitive harm.

General Motors treats the above material as confidential proprietary information available only to authorized General Motors personnel and not otherwise available to the public. The documents are maintained under a record-keeping system which is intended to control dissemination of this material within General Motors, and to assure that it is not disseminated outside the Corporation, except as described in the attached certification made pursuant to 49 CFR Part 512.4(e).

Product Investigations
Mail Code: 480-106-304 • 30500 Mound Road • Warren, MI 48090-9055
Phone: (810) 986-8029 • Fax: (810) 947-2318

To the best of our knowledge, no prior determinations of the confidentiality of these documents have been made by the NHTSA, other Federal Agencies, or the Federal Courts. Documents such as those contained in Attachments A, however, have, to the best of our knowledge, normally been granted confidential treatment by the NHTSA in the past.

The documents for which confidential treatment are being requested, with a copy of this letter, are being submitted to your Office of the Chief Counsel. It is requested that notice concerning the Agency's determination of confidentiality for this material and any questions relating to confidentiality be addressed to Howard Silverman, Attorney, GM Legal Staff, MC 480-106-304, 30500 Mound Rd., Warren, MI 48090; [(810) 986-8424]. Confidential treatment of this material is requested for an indefinite period.

The documents subject to this request for confidentiality have been clearly stamped "GM CONFIDENTIAL". If a request for disclosure of any or all of this information is received by the NHTSA, General Motors requests notification of receipt of each such request and, if necessary, an opportunity to further explain the reasons why such material is trade secret and commercial information which should not be disclosed under the applicable statutes and regulations.

Please contact me if you require further information about this response or the nature or scope of our searches.

Sincerely,

F C Sonye

Frank C. Sonye, Jr.
Director
Product Investigations

attachment

CERTIFICATE IN SUPPORT OF REQUEST FOR CONFIDENTIALITY

EA99-013 / GM-586

I, Frank C. Sonye, Jr., pursuant to the provisions of 49 CFR Part 512 state as follows:

(1) I am Director of Product Investigations, and I am authorized by General Motors Corporation (GM) to execute documents on its behalf;

(2) The information stamped "GM Confidential" contained in Attachments A to this document is confidential and proprietary data and is being submitted with the claim that it is entitled to confidential treatment of 5 USC §552(b)(4), 49 U.S.C. Section 30167(a) and implemented in 49 CFR Part 512;

(3) I, or members of my staff, have personally inquired of the responsible GM personnel who have authority in the normal course of business to release the information for which a claim of confidentiality has been made to ascertain whether such information has ever been released outside GM;

(4) Based upon such inquiries to the best of my knowledge, information and belief, the information for which GM has claimed confidential treatment has never been released or become available outside GM, except as hereinafter specified: None.

(5) I make no representations beyond those contained in this certificate and in particular, I make no representations as to whether this information may become available outside GM because of unauthorized or inadvertent disclosure except as stated in Paragraph 4; and,

(6) I certify under penalty of perjury that the foregoing is true and correct. Executed on this the 9th day of May 2000.

F C Sonye

Frank C. Sonye, Jr.
Director
Product Investigations

959

ATTACHMENT "A"

960

General Motors Corporation

EA99-013; GM586

"GM CONFIDENTIAL" MATERIAL HAS BEEN REMOVED FROM THIS ATTACHMENT AND SUPPLIED TO THE OFFICE OF THE CHIEF COUNSEL.

Attachment A

DAIMLERCHRYSLER

RECEIVED

00 MAY 23 AM 11:07

OFFICE
DEFECTS INVESTIGATION

May 16, 2000

DaimlerChrysler Corporation
Matthew C. Reynolds
Director
Vehicle Compliance & Safety Affairs

Kathleen C. DeMeter, Director
Office of Defects Investigation, Safety Assurance
National Highway Traffic Safety Administration
400 Seventh Street S.W. (NSA-12; Room 5326)
Washington, D.C. 20590

Re: NSA-122jlq;
EA99-013

Dear Ms. DeMeter:

This responds to March 8 and March 31, 2000 requests for additional information regarding Engineering Analysis (EA) 99-013 investigating fuel system integrity in side impact collision tests with 1996 through 2000 model year DaimlerChrysler minivan vehicles.

DaimlerChrysler is continuing its review of NHTSA's laboratory crash tests and believes that the results obtained in those crashes do not predict a real world risk of loss of fuel system integrity. DaimlerChrysler has conducted an extensive review, paralleled by that of NHTSA, of the available real world crash data. That data confirms the excellent performance of the minivan fuel system in collisions. After well over 60 billion Vehicle Miles Traveled there are no known incidents of post collision fires under conditions similar to those assumed by NHTSA's laboratory tests. In fact, the few instances of post-collision fires in these vehicles were under conditions far more severe than those encompassed by NHTSA's laboratory procedures.

Particularly, in the absence of real world occurrences of post collision fire, there is no reason to question the adequacy of the FMVSS 301 side impact test for fuel system integrity for these vehicles. We look forward to resolving this issue with the Agency.

Sincerely,

Matthew C. Reynolds

Matthew C. Reynolds

Attachment
Enclosures

000962

DaimlerChrysler Corporation
800 Chrysler Drive CIMS 482-00-91
Auburn Hills MI USA 48326-2757
Phone 248.512.4188
Fax 248.576.7321
e-mail: mcr1@daimlerchrysler.com

ATTACHMENT

Q1 Provide an update of the number of subject vehicles DaimlerChrysler has sold in the United States by model, wheel base, door option, and model year.

A1 Numbers of subject vehicles were previously provided in Enclosure 1 of the November 26, 1999 response to EA99-013. The requested update is provided in Enclosure 1 of this response, for vehicles built through March 28, 2000.

Q2 State the number and provide copies of all of the following, from all sources, of which DaimlerChrysler is aware and which allege incidents of crash-induced fuel spillage or fire originating in the vicinity of the fuel tank assembly of the subject vehicles [Please note that this question concerns all such incidents, and is not limited to specific allegations of filler neck assembly failure]. For each such incident provided, state the crash mode, impact speed (if known), and alleged fuel system failure mode:

a.owner/fleet complaints;
b.field reports;
c.fire incident claims;
d.subrogation claims;
e.lawsuits; and
f.third-party arbitration proceedings (where DaimlerChrysler is a party to the arbitration).

Please list and collate your responses for each category ("a" through "f") by model year and date of claim. Please provide for each item in this response the incident date, mileage of vehicle at time of incident (if known), vehicle date of build, disposition of matter, and, where a fleet vehicle is involved, the name of the fleet, and the name and telephone number of a contact person at that fleet. For items "a" through "d," please provide all related information and reports whether or not DaimlerChrysler has verified each one. For items "e" and "f," summaries are acceptable. Please identify in the summary the caption, court, docket number, and filing date of each lawsuit if a copy of the Complaint initiating the lawsuit is not provided.

A2 DaimlerChrysler provided available information for all incidents alleging side-collision-induced fuel leakage or fire with Enclosure 2 to the November 26, 1999 EA99-013 response. The current request limits incidents to those "which allege incidents of crash-induced fuel spillage or fire originating in the vicinity of the fuel tank assembly...." Question 3, below, requests any additional documents related to incidents reported in the November 26, 1999 response, so please see information provided at A3, below.

A2a DaimlerChrysler reported all known instances of owner/fleet complaints in the November 26, 1999 response to this investigation. Supplemental information available concerning one complaint is in Enclosure 2, as noted at A3, below.

A2b DaimlerChrysler has still received no other field reports of crash-induced fuel spillage or fire originating near the fuel tank.

A2c DaimlerChrysler has received no fire incident claims alleging crash-induced fuel spillage or fire originating near the fuel tank.

ATTACHMENT

A2d DaimlerChrysler reported one subrogation claim in the November 26, 1999 response alleging fuel spillage or fire originating near the fuel tank. Investigation of this incident with VIN XR196325 found that the fire did not originate near the fuel tank, but at the left front of the vehicle, as noted in A3, below.

A2e DaimlerChrysler is aware of one lawsuit alleging crash induced fuel spillage or fire. A summary is provided in Enclosure 3. This crash corresponds to the Fatality Analysis Reporting System (FARS) item cited in NHTSA's supplemental inquiry dated March 31, 2000. DaimlerChrysler was not able to inspect the vehicle, which has been crushed. Available information indicates this was an extremely severe, high-speed, single-vehicle crash involving multiple impacts with guardrails on both sides of an Interstate highway. The vehicle slid completely across the highway on its left side after crashing into a median guardrail. Conditions of this crash appear to bear no resemblance to FMVSS 214 laboratory test conditions.

A2f DaimlerChrysler is still not a party to any arbitration related to allegations of crash-induced fuel spillage or fire originating near the fuel tank.

Q3 Describe, and provide copies of all documents related to, each and every investigation and other analyses conducted by, or for, DaimlerChrysler of left-side impact crash incidents involving subject vehicles. This should include:

a.all incidents identified in DaimlerChrysler's November 26, 1999, letter concerning this investigation;
b.the Roseburg, Oregon crash identified in a December 13, 1999, letter from NHTSA to DaimlerChrysler; and
c.any other incident or allegation of filler tube assembly leakage or post-crash fire involving a subject vehicle of which DaimlerChrysler is aware.

A3a Descriptions by occupants in the crash of vehicle VIN XR196325, reported in DaimlerChrysler's November 26, 1999 response, indicate that a fire was initially noted near the front left corner of the vehicle, far from the fuel tank, with other indications that fuel spillage or fire "originating in the vicinity of the fuel tank" was unlikely. Nonetheless, additional documents concerning this incident and DaimlerChrysler investigation of the incident are provided in Enclosure 2. Additional photos of the vehicle and accident site taken during a later investigation than that reported earlier are provided as digital images on a CD in Enclosure 2.

The other incident reported in the November 26, 1999 EA99-013 response concerned VIN XR221644. All available documents concerning this incident were provided with the November 26, 1999 response. As reported in that response, this crash did not involve any fire, and severe localized crush into the minivan did not cause separation at the fuel filler hose joint to the tank spud, the subject of this investigation. The fuel filler hose was found separated from the steel filler tube.

A3b January 7, 2000 and January 25, 2000 responses provided information available to DaimlerChrysler concerning a crash in Roseburg Oregon involving the vehicle with VIN TB504242. Our investigation of this crash is still continuing, but preliminary analysis confirms the full size contractor's work van was travelling more than 50 mph at the time it hit the left side of the minivan. Both the mass and the speed of this striking vehicle far exceeded the intentionally severe SINCAP test conditions.

000564

DaimlerChrysler will comply with NHTSA's December 13, 1999 request to notify ODI when our investigation is completed, and then provide our assessment and copies of all relevant documents.

Q4 Provide copies of all documents in DaimlerChrysler's possession or control which are related to NHTSA's January 6, 2000, side-impact test (MY0303) of a 2000 Dodge Caravan vehicle for the New Car Assessment Program (the SINCAP test).

A4 Copies of all DaimlerChrysler documents related to NHTSA's January 6, 2000 side-impact test are provided in Enclosure 4. These are notes and photos generated by DaimlerChrysler's observers at the January 6, 2000 test.

All other documents possessed by DaimlerChrysler related to NHTSA's test MY0303 have been provided to DaimlerChrysler by NHTSA. These are a letter from ODI dated March 31, 2000 describing damage observed when NHTSA disassembled the vehicle and a laboratory test report created by NHTSA's contractor.

DaimlerChrysler will value the opportunity to examine the tested vehicle and parts, but understands the vehicle is at VRTC while the parts have been removed to Washington. We expect to have related observations after examining the vehicle and parts together, but do not have such observations now.

The NHTSA laboratory report contains very little information useful for this investigation, since the subject fuel filler tube and hose were neither instrumented nor visible in any views of the test film.

Q5 Question 13.d of NHTSA's October 20, 1999, letter to DaimlerChrysler requested an assessment of the reasons for the differences in average pull-off forces between the subject hose joint and the metal filler tube end hose joint in test data that had been furnished by DaimlerChrysler, as follows:

Provide DaimlerChrysler's assessment of the factors responsible for the disparity in pull-off performance between the subject hose joint and the metal filler tube end hose joint in the test data furnished in Enclosure 7 of DaimlerChrysler's April 9, 1999 response to PE99-010 (Test Report No. 200-99).

DaimlerChrysler did not answer this question in its December 20, 1999, response to NHTSA. Provide a complete response to this question. Also, rank and weigh (by the approximate percentage of contribution) the factors identified in descending order of importance.

A5 DaimlerChrysler regrets that oversight resulted in our December 20, 1999 response missing an answer for the part 13d request. The primary factors related to differences in pull-off forces between the subject hose joint (between the rubber hose and the plastic fuel filler spud) and the joint at the other end of the same hose (to the steel filler tube) are judged to be differences in material properties between plastic and steel tubes. The plastic spud is less rigid than the steel filler tube.

DaimlerChrysler does not have information to provide concerning a rank and weighting of this rigidity difference, compared to other differences which might relate to different pull-off loads for the hose from the two parts to which it is joined.

000965

ATTACHMENT

Q6 Enclosure 18 to DaimlerChrysler's January 7, 2000, letter responding to EA99-013 contains several meeting notices. The most recent notice, regarding a December 10, 1999 meeting, had the following subject and purpose:

Subject: Contigency [sic] *Options for Actions*

Purpose: Brainstorm alternatives to improve system performance in SINCAP test

Provide the following information regarding the meetings held by DaimlerChrysler regarding the alleged defect in the subject vehicles:

a. List the date and subject matter of every meeting that DaimlerChrysler has conducted and state the agenda for each such meeting;
b. Describe all "contingency options," "actions," and "alternatives" that have been considered or discussed by DaimlerChrysler;
c. State the name, title, company, and division/group affiliation of each individual present at each of the meetings identified in Enclosure 18 of the January 7, 2000, letter or in response to Item 6.a of this letter; and
d. Provide copies of all documents related in any way to the December 10, 1999, meeting or otherwise related to the crash integrity or design of the subject hose joint from each of the individuals invited to the meeting. Furnish the information in separate enclosures for each individual.

A6a DaimlerChrysler officials have held numerous meetings regarding the issues involved in this investigation. These meetings are informal in nature and intended, as the December 10, 1999 notice specifies, to invite participants to "brainstorm" very preliminary thoughts on issues under examination.

The same policy considerations relied on by NHTSA and other government agencies for withholding from public disclosure predecisional documents reflecting the agencies' deliberative processes underpins DaimlerChrysler's reluctance to furnish such detailed information to NHTSA. Any policy that requires a company's engineering community to share the fine details of its most preliminary and untested thought processes will certainly discourage the open and frank "brainstorming" that these reviews are intended to foster. Opening such meetings to government scrutiny, as this line of questioning requires, will necessarily turn all such inquiries into highly legalistic adversary proceedings, shrouded by all the protections available under the doctrines of attorney-client privilege and attorney work product. Such an outcome would be in neither NHTSA's nor the public interest.

Notwithstanding these concerns, DaimlerChrysler will update the information previously provided and identify the date, subject, and agenda (if such exists) for meetings held to discuss the alleged defect. It should be emphasized that none of these internal reviews has produced any data that would support even a preliminary finding of an unreasonable risk to safety. Nor have reviews identified any changes to the current fuel system that would be justified in light of the total absence of any real world failures of this system.

Other meetings concerning the review of hypothetical product changes that might affect the outcome of FMVSS 214 or SINCAP side impact tests have been conducted. Those meetings have

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not examined the question of whether NHTSA's side impact testing suggests the possibility of an unreasonable risk to safety, as we believe it does not.

A6b The "contingency options" subject of the December 10, 1999 meeting was, as the Purpose of that meeting notice states, potential actions which DaimlerChrysler might consider requesting that NHTSA take with the 2000 model year minivan to be crashed for SINCAP during January 2000. Checking fastener torques, checking vehicle attitude to ground, and specifying vehicle-mounted instrumentation placement were all discussed and rejected. DaimlerChrysler staff decided it was not necessary to make any advanced requests relating to the upcoming test conditions, and instead to leave to the discretion of DaimlerChrysler's observer whether any particular change was necessary on the day of the test.

A6c Please see response to 6a. Persons present at the meetings were from Vehicle Development, Body Structures, Fuel Systems Engineering, and the Vehicle Safety Offices of DaimlerChrysler Corporation.

A6d Please see response to 6a. Notwithstanding our concern about the level of detail requested at this time by NHTSA, DaimlerChrysler will provide documents identifying factual information relating to analyses and testing which has been completed. DaimlerChrysler does not believe it reasonable to require the production of predecisional documents reflecting the company's deliberative process.

Copies of all available requested non-confidential documents related to the December 10, 1999, meeting and earlier meetings related to the alleged defect of crash-induced fuel filler neck separation from the fuel tank, as observed in NHTSA crash tests, are in Enclosures 5 and 6, separate enclosures for each individual with relevant documents. Additional confidential documents will be provided separately with a request for treatment as confidential business information.

Q7 In its January 7, 2000, response to EA99-013, DaimlerChrysler stated that it has consulted with its suppliers concerning the subject hose joint and that the suppliers "agreed" that the subject hose joint design was "appropriate." However, DaimlerChrysler stated that no "relevant documents [were] available concerning clamped hose joint design beyond the design drawing and specification information supplied in portions of [the January 7, 2000] response:"

DaimlerChrysler did consult with suppliers of the hose clamp, the hose (which is supplied to DaimlerChrysler in assembly with the fuel filler tube), and the fuel tank as part of the normal design and development process for the minivan. Discussions have also occurred with these suppliers through the course of responding to ODI's investigation. DaimlerChrysler's suppliers agree that the ranges of interference fit and other aspects of the clamped hose joint design are appropriate. No relevant documents are available concerning clamped hose joint design beyond the design drawing and specification information supplied in portions of this response. No descriptions of oral discussions are available.

Provide the following information regarding DaimlerChrysler's communications with its fuel tank, fuel filler tube assembly, hose, or hose clamp suppliers, or any other entity, regarding the alleged defect in the subject vehicles:

a. Identify by company name, address, and contact person (name and telephone number) each supplier/entity with whom DaimlerChrysler has communicated regarding the alleged defect in the subject vehicles since January 5, 1999;

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b.Identify each DaimlerChrysler employee who has engaged in any such communication, by name of company contacted and name, title, and group affiliation of employee;

c.For each company contacted provide a chronology of communications, by date (state approximate month and year if actual date is not known), name(s) of DaimlerChrysler employee(s) involved, name(s) of supplier employee(s) involved, the nature the communication (i.e., written, electronic, telephone contact, meeting, etc.), and a summary of the issues discussed; and

d.Provide copies of all documents relating in any way to such communications, including employee desk calendars and/or other contemporaneous notations.

A7 DaimlerChrysler and its suppliers have previously provided responsive documents relating to the fuel filler system and related components as currently configured in the subject vehicles.

Company officials have had numerous discussions with current and potential suppliers relating to the viability of various concepts aimed at addressing the results of NHTSA's laboratory tests, should any such efforts be deemed appropriate in the future. While DaimlerChrysler will produce documents responsive to this request, DaimlerChrysler continues to believe it is unreasonable and not in the public interest to require the production of incomplete ideas or analyses reflecting the internal deliberative process within the company. To do so will chill the open and frank communications within the company, and between the company and its suppliers, that is necessary to the prompt development of responses to the agency's concerns.

Q8 Provide the design specifications for the filler tube assembly hose fitting, including bead diameter, bead back angle, bead ramp angle, and fitting diameter.

A8 A letter sent voluntarily to ODI on February 8, 1999 in response to oral requests by Jeff Quandt before DaimlerChrysler received any PE99-010 information request provided the filler hose design specifications (inside diameter and wall thickness) and fuel tank inlet bead and tube fitting diameters (outside diameters). Additional details and specifications, including bead back and ramp angles, were supplied in Enclosure 6 of an April 9, 1999 response, and in confidential faxes of engineering drawing details to ODI on April 26, 1999.

Drawing number 04880929AA for the Fuel Filler Tube Assembly, also provided with Enclosure 6 to the April 26, 1999 response, includes the hose fitting diameter, bead diameter, and bead ramp angle. The bead back angle is not directly called out, but indirectly controlled by related dimensions to be a nominal value of approximately 105 degrees from the longitudinal axis of the tube.

Q9 Complete the survey form provided in Enclosure 10 of DaimlerChrysler's December 20, 1999, letter to NHTSA (copy enclosed), for the short wheelbase and long wheelbase subject vehicles.

A9 The proposed technical review of vehicles survey form is provided in Enclosure 7 with available information for DaimlerChrysler 1996-2000 MY short and long wheelbase minivans added to the form.

Q10 State whether there have ever been any pull-off standards or specifications for the fuel filler hose joints and/or filler neck assemblies of any model year 1996 or later motor vehicles sold

by DaimlerChrysler. If the answer is affirmative, provide copies of all relevant standards, specifications, and related documents (e.g., design verification testing).

A10 There have not been pull-off standards or specifications relating specifically to pull-off load requirements for fuel filler hose joints or filler neck assemblies of any model year 1996 or later motor vehicles designed by DaimlerChrysler Corporation. Components of filler tube assemblies, e.g., fuel filler restrictor assemblies at the top of fill tubes and fittings crimped to the end of flexible hoses, have had push or pull-off requirements in component specifications. These load requirements serve as checks to ensure satisfactory durability in normal use or handling, or to validate proper manufacturing. Pull-off requirements have not been applied for fuel system integrity in crashes of DaimlerChrysler Corporation vehicles because integrity has been more directly, reasonably, and appropriately demonstrated by including the fuel systems in whole vehicle crash tests. Vehicle crash testing is the most comprehensive method available to evaluate such performance.

Q11 Provide copies of all other DaimlerChrysler documents relating to the design, pull-off resistance, or crash performance of the subject hose joint and/or subject filler neck assembly.

A11 DaimlerChrysler has conducted new investigations of pull-off resistance and crash performance of the subject hose joint to better understand questions arising from laboratory vehicle crash test results referred to in this investigation. These developmental investigations are not related to FMVSS compliance performance measurement or to NHTSA's SINCAP tests. Information is therefore being provided under separate cover with a request for treatment as confidential business information.

It should again be emphasized that none of these internal reviews and investigations has produced any data that would support even a preliminary finding of an unreasonable risk to safety. Nor have reviews and investigations identified any changes to the current fuel system that would be justified in light of the total absence of any real world failures of this system.

Q12 Provide DaimlerChrysler's assessment of all factors contributing to the filler hose separation incidents in the 1999 and 2000 Dodge Caravan vehicles crash-tested in NHTSA tests CX0305 and MY0303. Include in your response the following information:

a.a description of all loads applied to the filler tube assembly, ranked in order of magnitude (i.e., state the approximate magnitude - based on tube deformation and direction of each load and identify the component applying each load); and
b.state the lateral, longitudinal, and vertical movement of the fuel filler tube assembly (lower end connected to the filler hose).

A12 DaimlerChrysler does not possess any information concerning loads applied to the fuel filler tube assemblies in NHTSA tests CX0305 or MY0303. We do not possess any information concerning movement of the fuel filler tube lower end in those NHTSA tests. The only information available to DaimlerChrysler concerning these two tests is from NHTSA test reports and test films which provide no instrumentation or camera views of the fuel filler tube during the tests. Post-test observations of crashed vehicles by DaimlerChrysler representatives did not provide information relevant to loads and motion of the fuel filler tube during the NHTSA crash tests.

000969

From NHTSA's March 31, 2000 supplemental Information Request:

Q1 Furnish the following dimensions, in millimeters, for both the short- and long-wheelbase subject vehicles:

a.the longitudinal dimension from a vertical plane passing through the front axle centerline to the rear edge of the anchor plate for the left-middle seat belt (furnish these dimensions for each seating option available in the subject vehicles);

b.the longitudinal dimension from a vertical plane passing through the front axle centerline to the front and rear of the rail opening through which the fuel filler vent tube passes (vent tube pass-through);

c.the longitudinal dimension from a vertical plane passing through the front axle centerline to the interface between the sill inner wall and the left-rear wheelhouse extension;

d.the lateral dimension from a vertical plane passing through the vehicle centerline to the inner and outer edges of the fuel tank spud;

e.the minimum clearance between the fuel filler tube and: (1) the left rear wheelhouse; and (2) the sill inner wall;

f.the lateral dimension from a vertical plane passing through the vehicle centerline to the anchor bolt for the left-middle seat belt (furnish these dimensions for each seating option available in the subject vehicles); and

g.the vertical dimension from the bottom edge of the fuel tank nipple to the lower dimensions of the anchor plate for the left-middle seat belt (furnish these dimensions for each seating option available in the subject vehicles) and the vent tube pass-through.

A1 The requested dimensions for both short and long wheelbase minivans are provided in Enclosure 8.

Q2 Furnish copies of all engineering standards, specifications, and guidelines regarding fuel tank and filler neck assembly packaging in the subject vehicles. "Packaging" should be interpreted in the context used in Section 4.12 of the enclosed copy of Society of Automotive Engineers Information Report SAE J1664, "Passenger Car and Light Truck Fuel Containment."

A2 SAE J1664 Section 4.12 notes that crash testing required by FMVSS 301 is a method to assess the crashworthiness of a vehicle's fuel system. DaimlerChrysler has demonstrated excellent performance of the minivan fuel containment system in all FMVSS 301 tests, and has gone well beyond FMVSS requirements to address all the other recommendations, regulatory and non-regulatory, contained in the remainder of SAE J1664. Descriptions of how these recommendations were addressed in design and development of the subject vehicles were provided in A19 of the EA99-013 response dated December 20, 1999.

SAE J1664 Section 4.12 also notes that packaging of the fuel-containment system is very design dependent, and may differ with tank or component design or location, and with vehicle intended use. These multiple complexities to consider in fuel-containment system packaging have precluded definition of some general standards, specifications, or guidelines for fuel tank and filler assembly packaging. Each design, including the packaging for the subject vehicles, must be evaluated for all requirements taken together. Therefore, DaimlerChrysler does not have any relevant standards, specifications, or guidelines to provide.

ATTACHMENT

Q3 State whether DaimlerChrysler has ever considered the safety implications of the packaging of the subject vehicle fuel filler neck assembly relative to the left-middle seat belt anchor plate and, if so, provide copies of all related documents.

A3 As noted in A2 immediately above, DaimlerChrysler agrees with statements in SAE J1664 noting that many factors must be considered for packaging of fuel-containment systems. The peculiar conditions of the high speed moving barrier impact, SINCAP, appear to be the only instance when the subject fuel filler tube assembly might be sufficiently loaded to breech the integrity of the fuel filler assembly. Since DaimlerChrysler had not observed such a test, which is not related to FMVSS compliance performance measurement, before NHTSA conducted one on January 6, 2000, packaging of the seat belt anchor was not an explicit design or development concern. As noted in A11, above, new design and development investigations have been initiated, and relevant documents will be provided under separate cover with a request for treatment as confidential business information.

Correction to April 9, 1999 Answer 8b description of changes to the fuel tank assembly:

Review of production details and of earlier responses to this investigation revealed an error in a description of changes to fuel tank assemblies used in the subject vehicles. The fuel inlet spud (or nipple) was initially designed, and development tooling was constructed to make prototype tanks, with the spud blow molded integrally with the tank, then machined to final shape. Contrary to a statement in the April 9, 1999 response, this design was not used in volume production. Production fuel tanks for subject vehicles have all included an inlet spud injection molded separately from the body of the blow molded tank, which has then been welded onto the tank body.

This pre-production development change to the spud design was made in anticipation of the October 1995 production change to the tank body described in the April 9, 1999 response, from monolayer to coextruded construction, with an integral evaporative emission vapor control barrier.

1

000972

PRODUCTION FOR U.S.A. NOVEMBER 7, 1999 THROUGH MARCH 28, 2000

Model Year	Model Code	4 Doors	3 Doors
2000	NS H C 53	677	0
2000	NS H D 53	2798	0
2000	NS H H 52	4127	0
2000	NS H H 53	15882	0
2000	NS H K 52	12922	0
2000	NS H K 53	59650	0
2000	NS H Y 53	13399	0
2000	NS L H 52	9231	7884
2000	NS L H 53	4579	0
2000	NS L K 52	19886	16053
2000	NS L K 53	9937	0
2000	NS P C 53	1604	0
2000	NS P D 53	447	0
2000	NS P K 53	3030	0
2000	NS P Y 53	14822	0
2000	NS S C 53	2610	0
2000	NS S Y 53	11841	0
2000	NS X D 53	452	0
2000	NS X K 53	3080	0

NOTE: Wheelbase is indicated by the last two characters of the Model Code; 52 is for Short Wheel Base (SWB), 53 indicates Long Wheel Base (LWB)

4th Code =
- H Voyager & Grand Voyager
- P Voyager AWD
- K Caravan & Grand Caravan
- D Caravan AWD
- Y Town & Country
- C Town & Country AWD

0009973

2

DAIMLERCHRYSLER

Enclosure 2
EA99-013 - May 5, 2000
CAIR 5909595

C-LINE #61958 CD HOLDER
PATENT NUMBER 5,556,683

Disc Available ~~upon~~ Request.

000975

Robert D Banta
12/09/99 05:24 PM

To: Clinton E Spevak/CTC/Chrysler@Chrysler
cc:

Subject: Re: Call to driver of crashed minivan

Clint:

I talked to Mr. and Mrs. day. They live in St. Petersburg, FL and are semi-retired. He is a part time Blue Cross / Blue Shield sales representative. Mr. and Mrs are 66 and 61 years old respectively. They are pleasant, bright and alert people and, although they communicate quite well, neither possesses a very high mechanical aptitude.

INJURIES:
The injuries to Mr. was a broken left rib - now healed. Mrs. received a fairly severe blow to the head producing swelling and a cut in her forehead between the left eye and nose that required 17 stitches to close. The stitches are tight and although the swelling is down there remains some tightness and a "spiderweb" appearance to that area. She also had a bone chip in her right knee. Last week she had orthoscopic surgery to clean the knee joint area and has some pain from the surgery. Overall, he is fine and she has a favorable prognosis.

ACCIDENT:
On the day of the crash they were visiting an elderly relative at a nearby nursing home. Both were wearing seat belts. The fuel tank had been filled just a few miles prior to the crash. Mr. appears to understand that he was responsible for this crash but believes that the impacting vehicle was traveling greatly in excess of 55 mph. He believes that the impact was perpendicular to the left side from the trailing edge of the drivers door back to about the filler cap area. He said that they were rotated 360 degrees CW by the impact to the point of rest. (I think it was actually CCW) There was a loud noise at impact from the hit and rotation, they were somewhat stunned, but claim to remember the events well.

FIRE:
About 10 to 15 seconds after rest he saw flames at the area of the left front windshield and A pillar. These flames were initially constant in size, neither increasing or decreasing. He did not smell the odor of gasoline. They both exited out the right front door and, fearing an explosion, immediately walked 25 to 35 yards down the roadway and away from the van.

They sat on a lowered tailgate of a passing pickup truck at the scene. The right side of the van was visible and the fire continued for about 20 minutes before the FD arrived. They did not devote a lot of attention to the progress of the fire, rather they were busy trying to stop the bleeding of Mrs. and insure that the others were being cared for. Neither ever saw any gasoline liquid, spillage, flow or any other such description. They did not leave the pickup tailgate area until the FD and PD arrived.

FOLLOW UP:
They have been contacted only by me and the EAA representative. After the crash they bought another 1999 Voyager identical to the accident example.

000976

MY ANALYSIS:

The physical evidence observed at the scene along with the observations during the vehicle exam do not indicate that this fire had its origin at the fuel tank. Rather, the fire appears to have started at the left front in the area of the wheel opening and transmission. An impact of this magnitude could have damaged the transmission housing releasing its fluid along with anti-freeze from the coolant system. These combined fluids may have sprayed onto the exhaust system surfaces and ignited, causing the initial production of flames. The final involvement of the fuel storage system is not well known but is believed to be a late event based on the limited damage to the polymer tank.

Facts that support those conclusions are:

1. The tank was largely intact after the fire.
2. The roadway surfaces at the scene does not reveal a concentrated fuel spillage burn area.
3. Mr. V did not observe the initial fire at the tank area.
4. No fuel spillage was observed
5. There was no fuel odor recognized at rest.

Bob Banta

responding to:
Clinton E Spevak 12/08/99 07:11 PM

3

000978

FILE TYPE:	Lawsuit
FILE NAME:	, et al. v. DaimlerChrysler Corporation, et al.
COURT:	16th Judicial District Court, St. Mary Parish, Louisiana
DOCKET NO:	104,532 (Div "E")
DATE OF SERVICE:	November 16, 1999
DATE OF INCIDENT:	August 22, 1998
VEHICLE:	1998 Dodge Grand Caravan
VIN:	2B4GP4439WR659485
MILEAGE:	Unknown
OWNER:	
ALLEGATION:	Negligent in producing a vehicle with the propensity to roll over in an accident and with a gas tank in a location that would cause a fire if it hit another vehicle or object during a crash
DESCRIPTION:	Ellen rented a 1998 Dodge Grand Caravan from in Kenner, Louisiana, to drive her infant grandson to his mother in California. Also present in the vehicle were four teenage relatives. At approximately 5:45 a.m. on August 22, 1998, Ms. was traveling on I-10 West near Crockett County, Texas, when she drove the minivan off the road to the left, over-corrected to the right, skidded broadside and struck an extruder guardrail. The minivan then rolled ¼ turn to the left side, spun across the roadway to the north, and struck another guardrail. The vehicle returned to an upright position and continued westbound backwards, coming to rest on the north side of the roadway facing southwest. At some point during the accident, it is alleged the minivan caught on fire, and two of the occupants were unable to be rescued from the vehicle.

000979

DaimlerChrysler Corporation has not yet inspected the subject vehicle, and at this point in time, has absolutely no information as to the alleged mode of failure of the fuel tank in this accident.

4

000981

FACILIT... [illegible] DATE: January [illegible]
TEST#: A267-0110
TITLE: SNCAP Test# 6 - 2000 Dodge Caravan
Version 1.00

========================

Incoming Test Weight = 3656.3 lbs
ual Test Weight = 4098.3 lbs
st Velocity = 38.2 mph

LEFT SIDE IMPACT

P1 TTI: 50 g 5th
Input channels: P1 Lower Rib Y (7) FIR_100
P1 Upper Rib y (5) FIR_100
P1 Lower Spine y (9) FIR_100

LF

P1 PEV: 71 g
Input channel: P1 Pelvic Y (11) FIR_100

CHN	NAME	UNIT	MAX	MSEC	MIN	MSEC	FILT
	P1 Upper Rib y	g	36.68	54.4	-11.72	95.7	FIR_100
6	P1 Upper Rib Ry	g	35.33	40.0	-12.49	95.7	FIR_100
7	P1 Lower Rib Y	g	36.86	38.1	-9.03	159.3	FIR_100
8	P1 Lower Rib YR	g	37.95	38.1	-10.02	159.4	FIR_100
9	P1 Lower Spine y	g	63.60	40.7	-8.00	113.8	FIR_100
10	P1 Lower Spine R y	g	64.43	40.7	-8.21	65.0	FIR_100
11	P1 Pelvic Y	g	70.82	38.1	-10.72	65.7	FIR_100
12	P1 Pelvic R Y	g	70.84	38.1	-10.99	66.3	FIR_100

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LEFT SIDE IMPACT 6th

P4 TTI: 54 g L-R
Input channels: P4 Lower Rib y (18) FIR_100
P4 Upper Rib y (16) FIR_100
P4 Lower Spine y (20) FIR_100

PEV: 116 g
Input channel: P4 Pelvic y (22) FIR_100

CHN	NAME	UNIT	MAX	MSEC	MIN	MSEC	FILT
16	P4 Upper Rib y	g	44.88	62.5	-8.64	33.8	FIR_100
17	P4 Upper Rib Ry	g	47.69	53.1	-12.71	31.9	FIR_100
18	P4 Lower Rib y	g	45.19	53.2	-9.75	31.9	FIR_100
19	P4 Lower Rib Ry	g	42.58	61.9	-9.74	33.8	FIR_100
20	P4 Lower Spine y	g	62.61	50.0	-8.84	75.6	FIR_100
21	P4 Lower Spine Ry	g	62.03	50.0	-9.21	75.0	FIR_100
22	P4 Pelvic y	g	115.56	44.4	-14.15	66.3	FIR_100
23	P4 Pelvic Ry	g	128.66	44.4	-15.43	66.3	FIR_100

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000982

COMPARISON OF CTC vs MGA MVSS214 IMPACT VEHICLES - SWB

1/6/00

ITEM	SWB-CTC	SWB-MGA	VERIDIAN PRE	POST
Fuel tank nipple weld pad to bottom of filler hose	69 mm	105 mm	2.2"	4.C
Bottom of hose clamp to bottom of hose	7 mm	12 mm	.53'	0.4
Sill pinch flange to filler tube (at fuel tank nipple)	70 mm	76 mm 4.8 +1.55"	"	4.3
Hose clamp teeth (peaks) from screw to end of clamp	15	15	15	—
Hose clamp teeth (peaks) in tension zone of hose clamp	27	26	27	—
Fuel tank to spring hanger bracket	80 mm	114.3 mm	3.8"	4.C
Pinch flange to pinch flange across vehicle	52 3/16"	54 1/4" 56 1/4		54.
Sill thickness at spring bolt	1.25"	1"	7.0'	1.3
Tank nipple base to top of clamp	86.5 mm	126 mm ≈	2.95'	4.3
Estimated displacement of hose up nipple	22 mm	64 mm	—	—
Rail to pinch flange (straight line, diagonal)	6.0 "	7.75"	9.25"	5.1
Spring bolt to tank nipple (centerline) X	4.0"	4.75"	4.8"	5.
Vertical wall of sill to outboard rail	160 mm	246 mm	4.5' + 3.8'	4.6
Tank nipple base to start of bead	82 mm	Av. 3.55-0.1		5.7
Tank nipple base to center of bead	88 mm		3.55'	3.4
CLAMP TOP TO BEAD CENTER			0.7"	
CLAMP TOP TO NIPPLE WELD PAD			2.55"	

JAW
1/21/99

WIDTH OF CLAMP = .34"

000983

NHTSA SINCAP TEST
1/6/00
Dodge Caravan YR530409

Occupant Position

	Reference	Driver	Passenger
Seat Back Angle	4 degrees from full incline (55mm ref point) 24 degrees	24°	24°
Seat Position	100mm aft from full forward	~~24 Ck~~	OK
ATL Position	3rd position down	OK	OK
Column Mid position	4 notches 5 clicks down	Ctr Tilt	

Occupant Dimensions

		DRIVER Reference	Actual	Passenger Reference	Actual
HZ	Top of header to roof liner	4.5	4 1/4	6	5 5/8
HR	Ear target to side header	7.8	6.5	8.9	7.0
HS	Ear target to side glass	11.2	10.5	14.5	13.0
AD	Lower arm to trim	5.7	6.0"	8.2	7.5
AR	Lower arm to trim panel	2.5	3.5	N/A	6.0
HD	Hip target to trim panel	4.9	5.5	11.3	N/A
H	H-point to floor	29.4	29 1/2	N/A	
	Sill Flange from floor	14.6		N/A	

3 accelerometers in chair
1 Midrear
1 Belt Center
1 1 Mid Forward

Vehicle / Barrier Position

	Reference	Left	RT
Front Wheel Lip	35	29 1/8	29 9/16
Rear Aperture	35.8	25 3/4	29 1/8
Bottom or Rear Rails	21.9		
Barrier forward point	19	61" Center Barrier to Rear Axle.	
Barrier height Flange	11	11" Front	
Barrier height surface	13	13" Bumper	
Barrier Serial Number		A2Ø7-11-1551	

000984

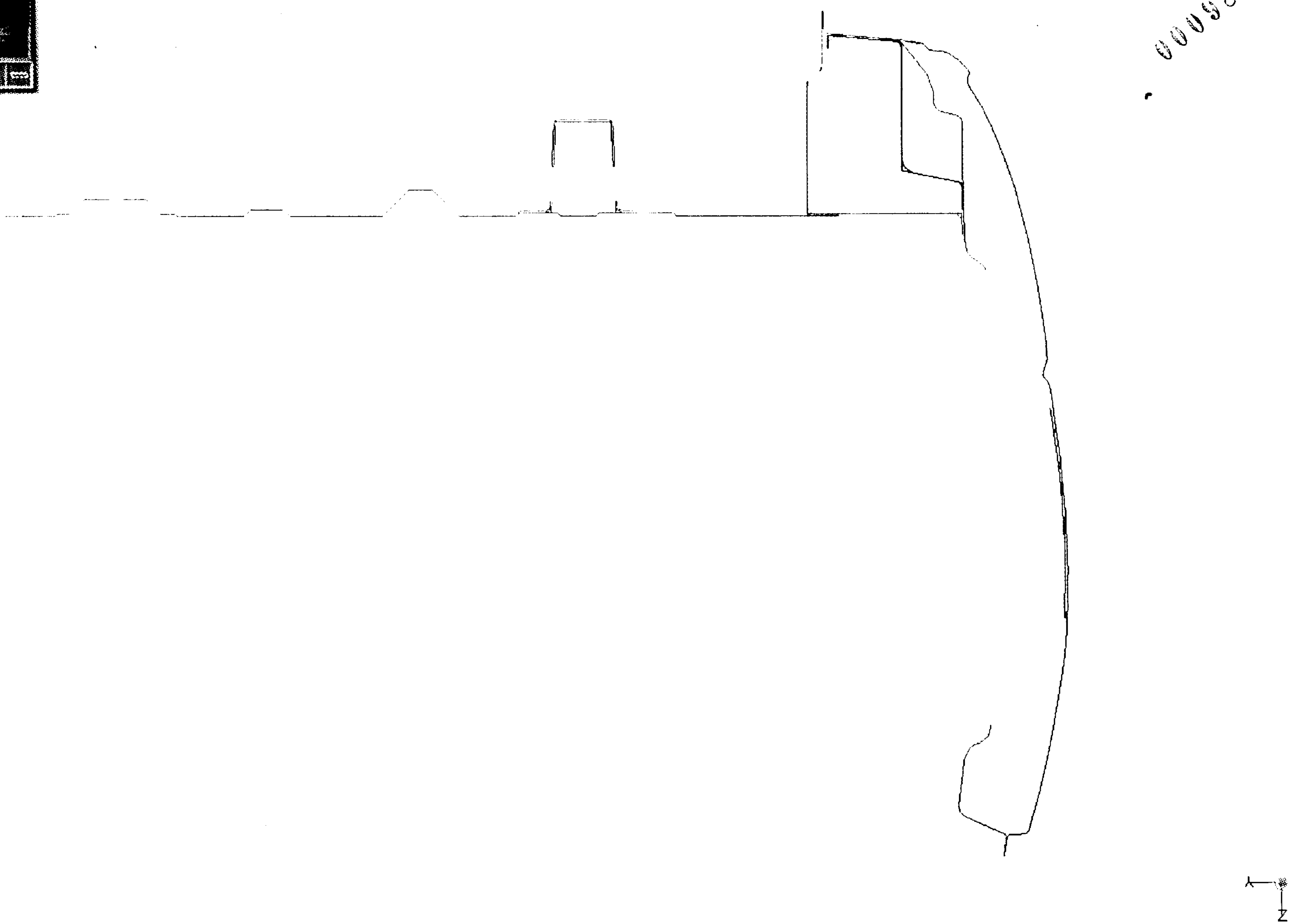
Calspan NS Survey 1/7/00 2:00 PM
- ... Review of VC 5486
- Archi Rock Letter to NHTSA
- Data Review a contents for Pretest Measures

1/6/00
Tank Filler separated from tank @ Clam
Filler separated from Quarter Panel Outer
Door Outer separated from Inner on front Door
Wheels turned to right
Trim Panel, Arm Rest Separated from Quarter Trim
Gap Closed between Front Seats.
Sill Rolled over Spring hanger Bracket.
6mm Forward / vertical
Speed 38.2
Head Calk on the Driver left Shoulder
Rear Quarter Glass.

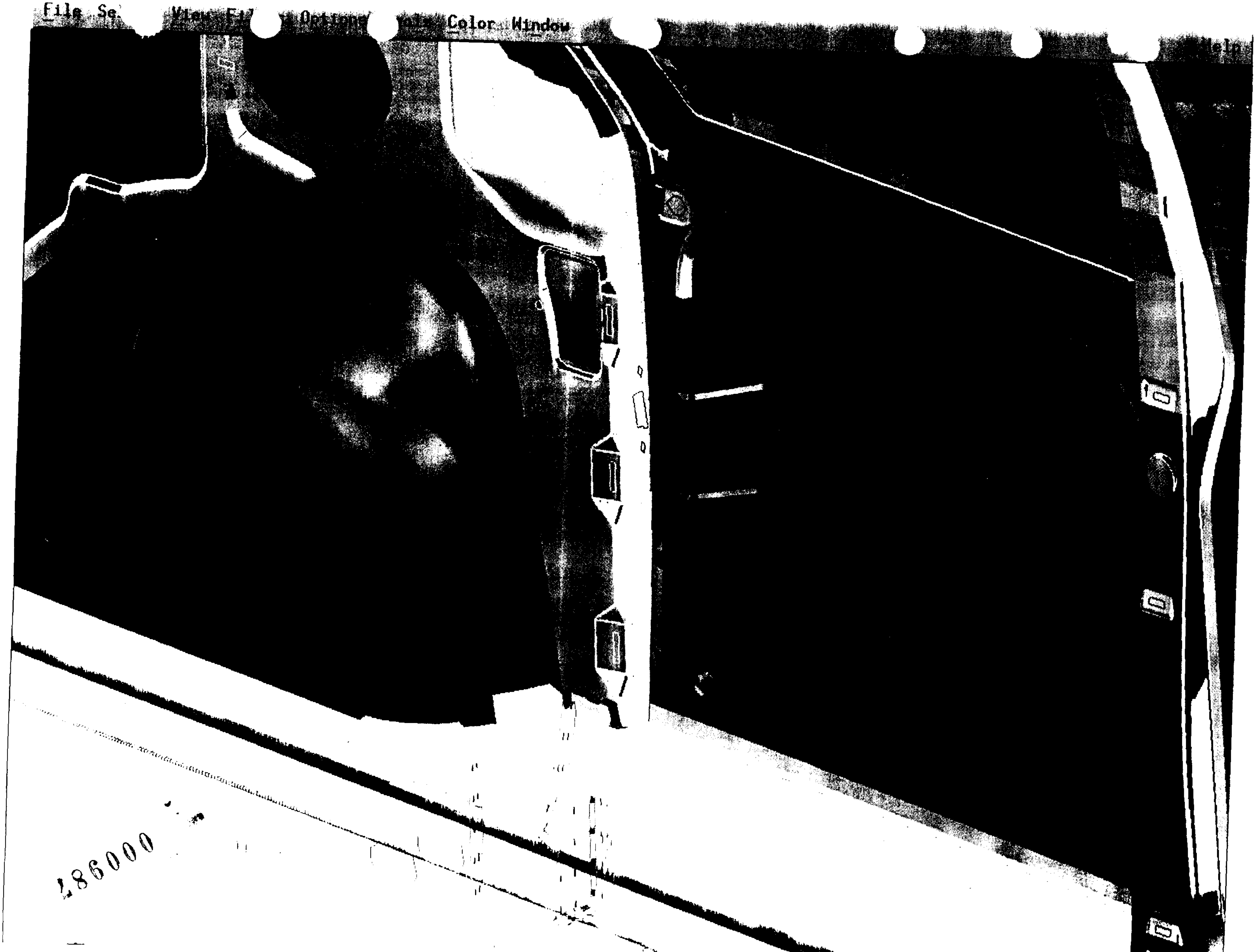
1/7/00

1:00PM Safety Office Review
i) Test Tear-down of VC5486
2) Test Baseline condition with Photographic Coverage
3) Static Crush test
3

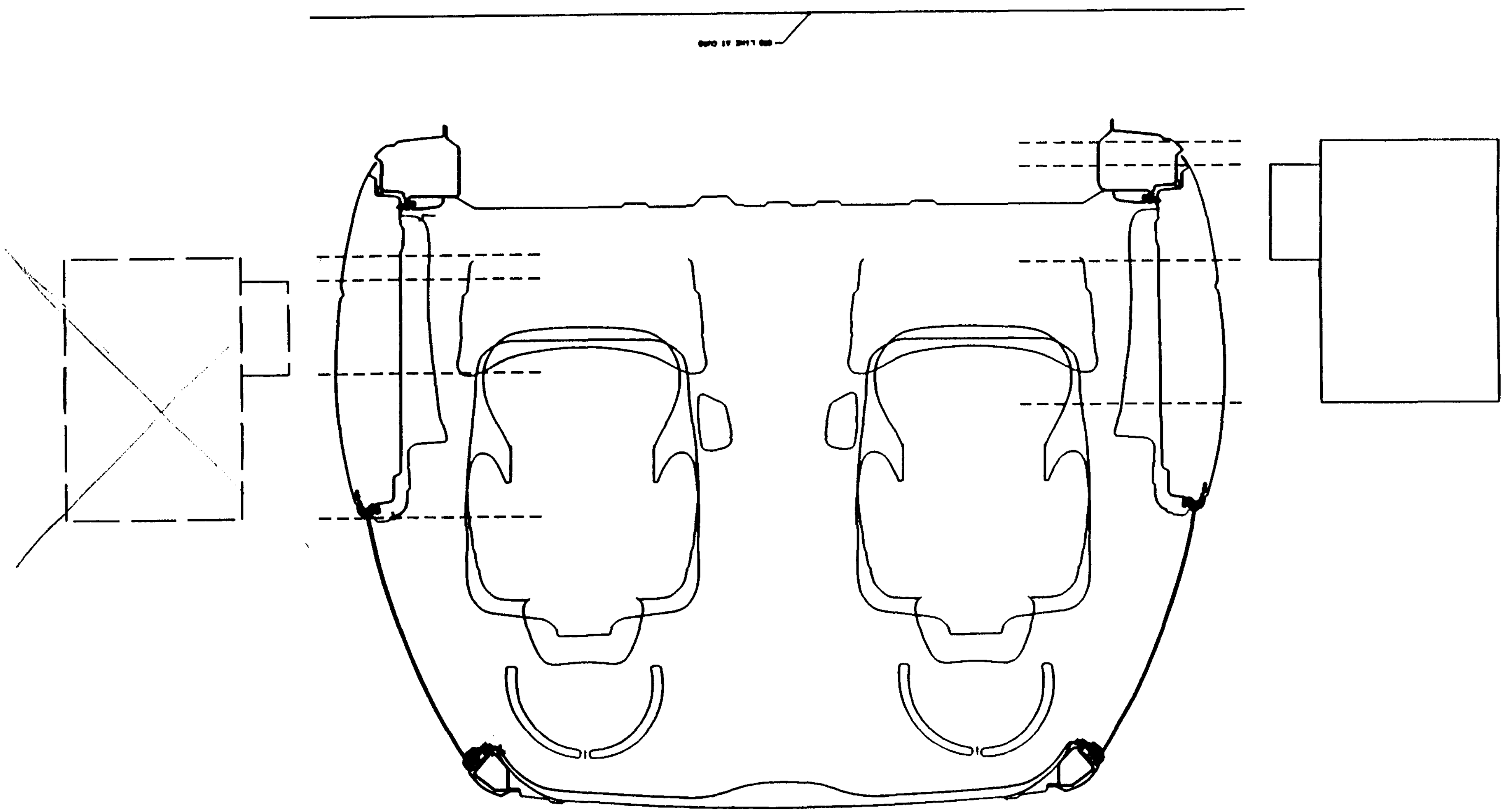
000985



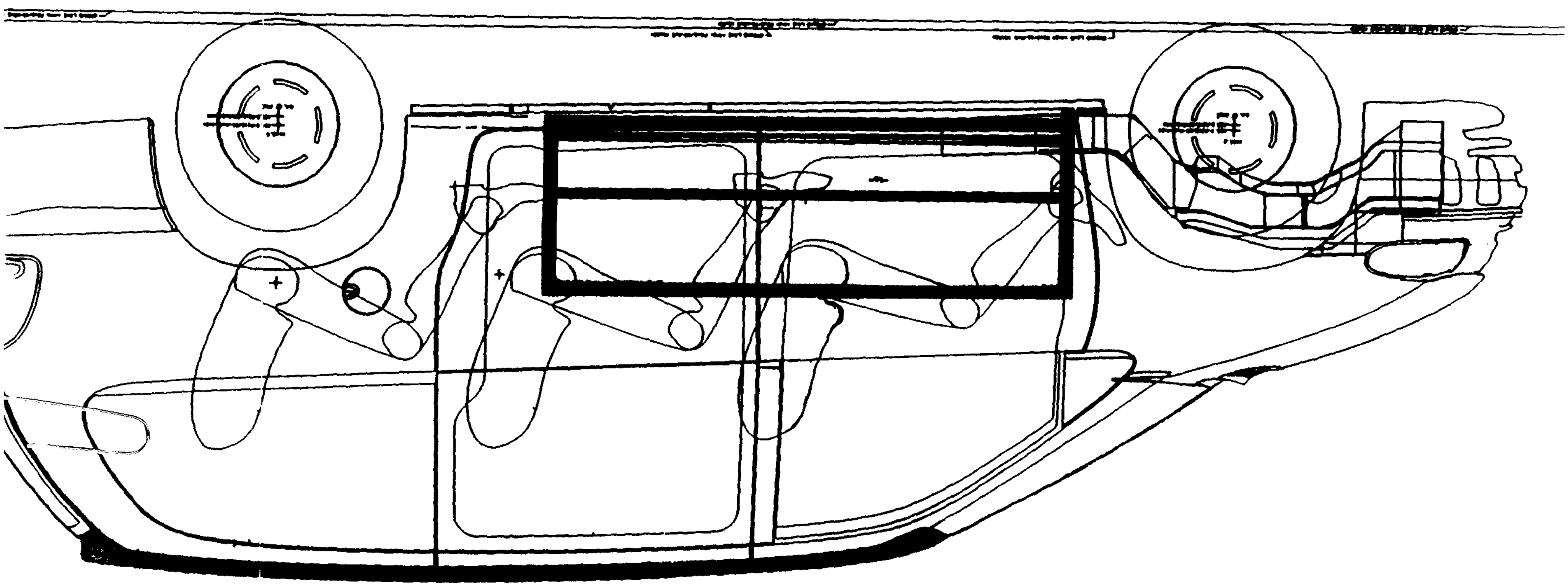
000986



000987



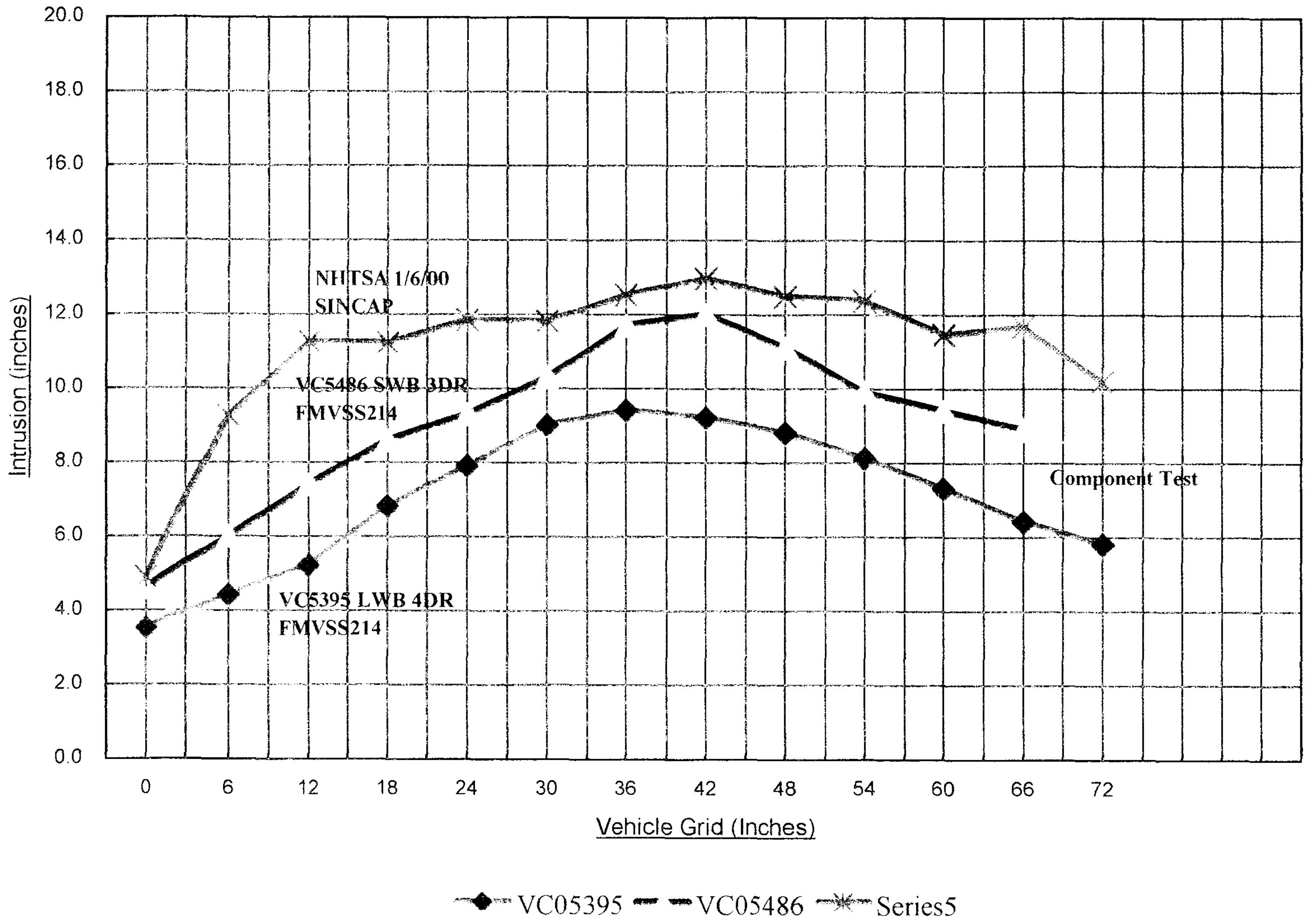
000988



000989

NS Post-Test Crush Measurements

Door Sill Plane



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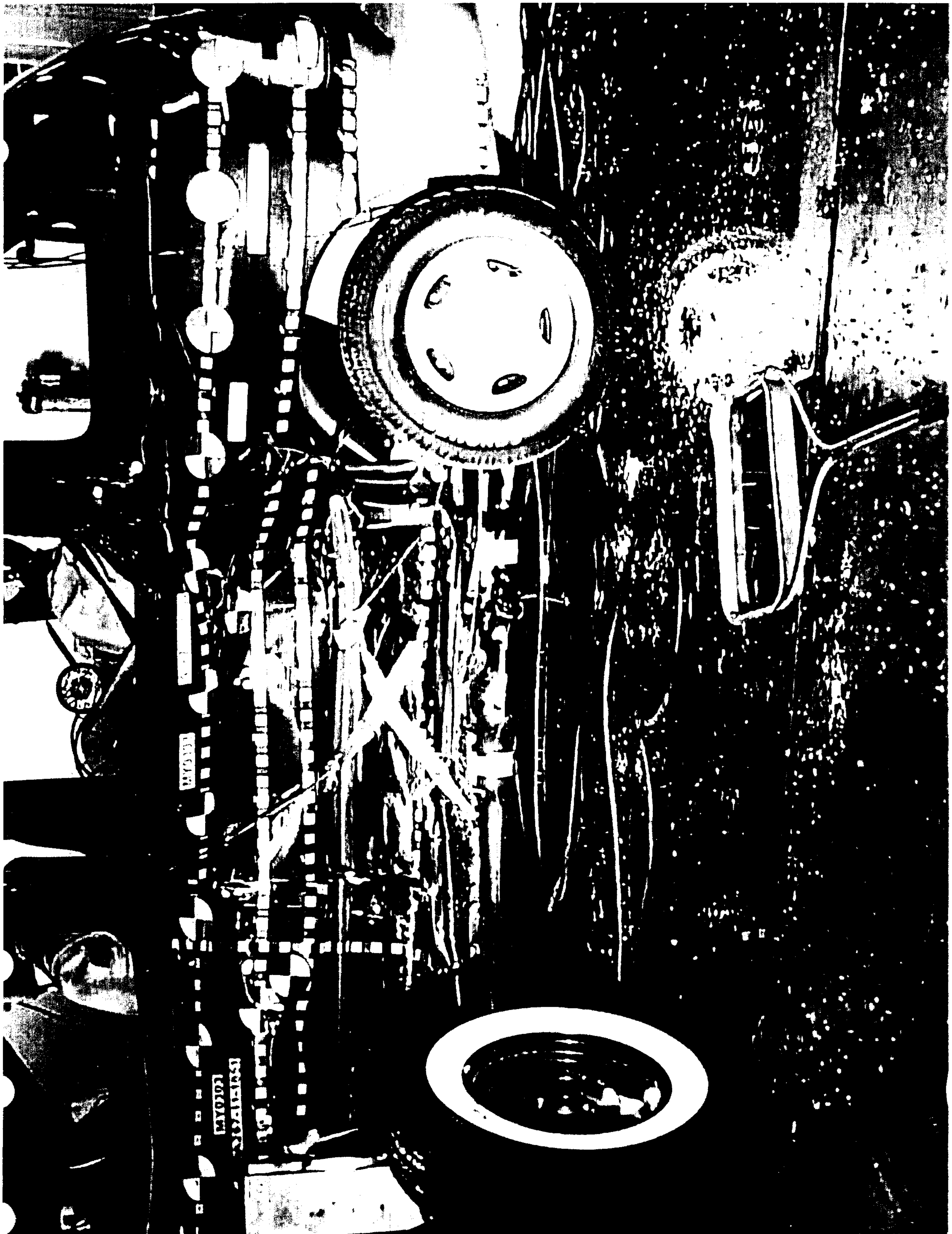
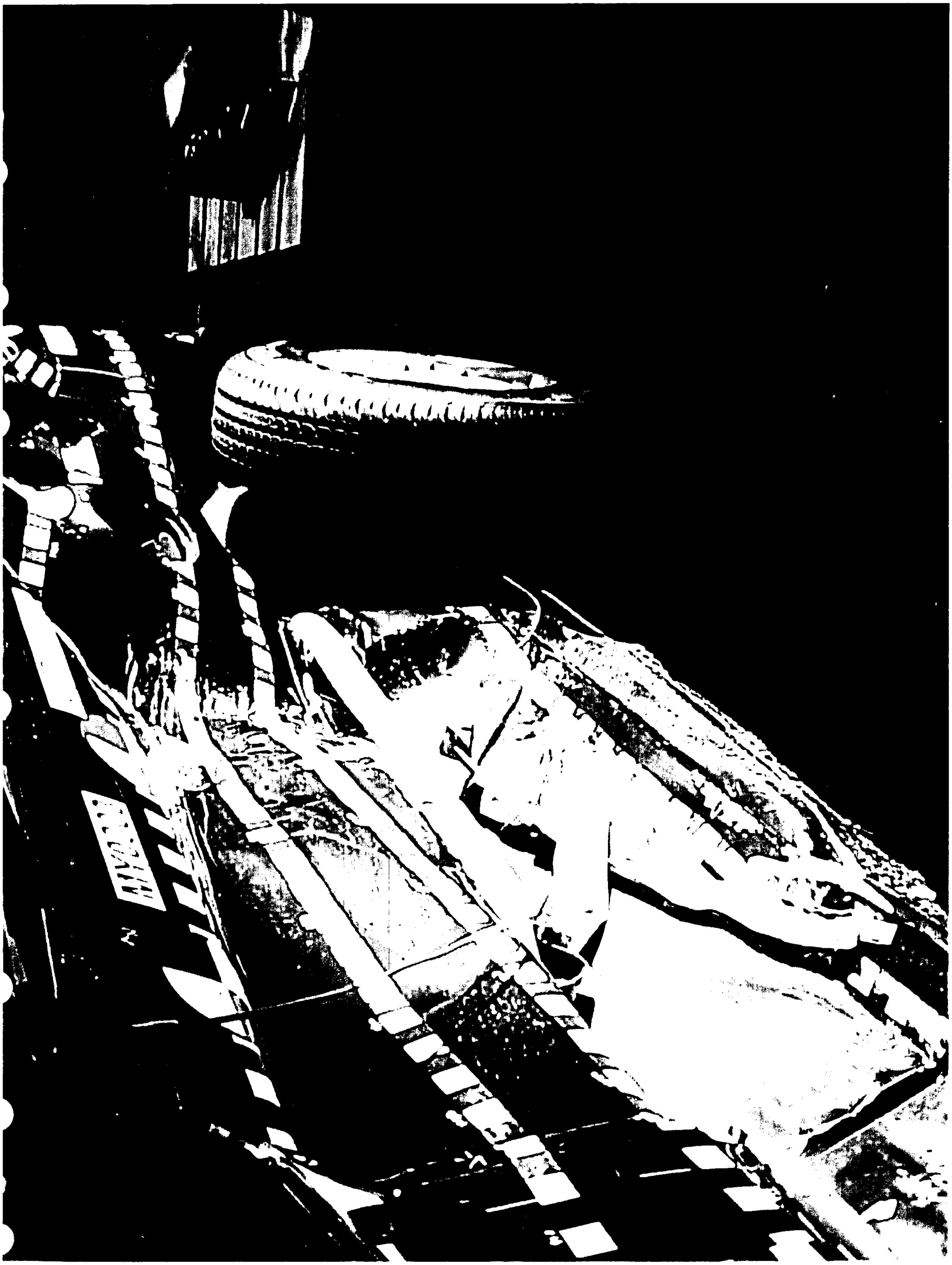
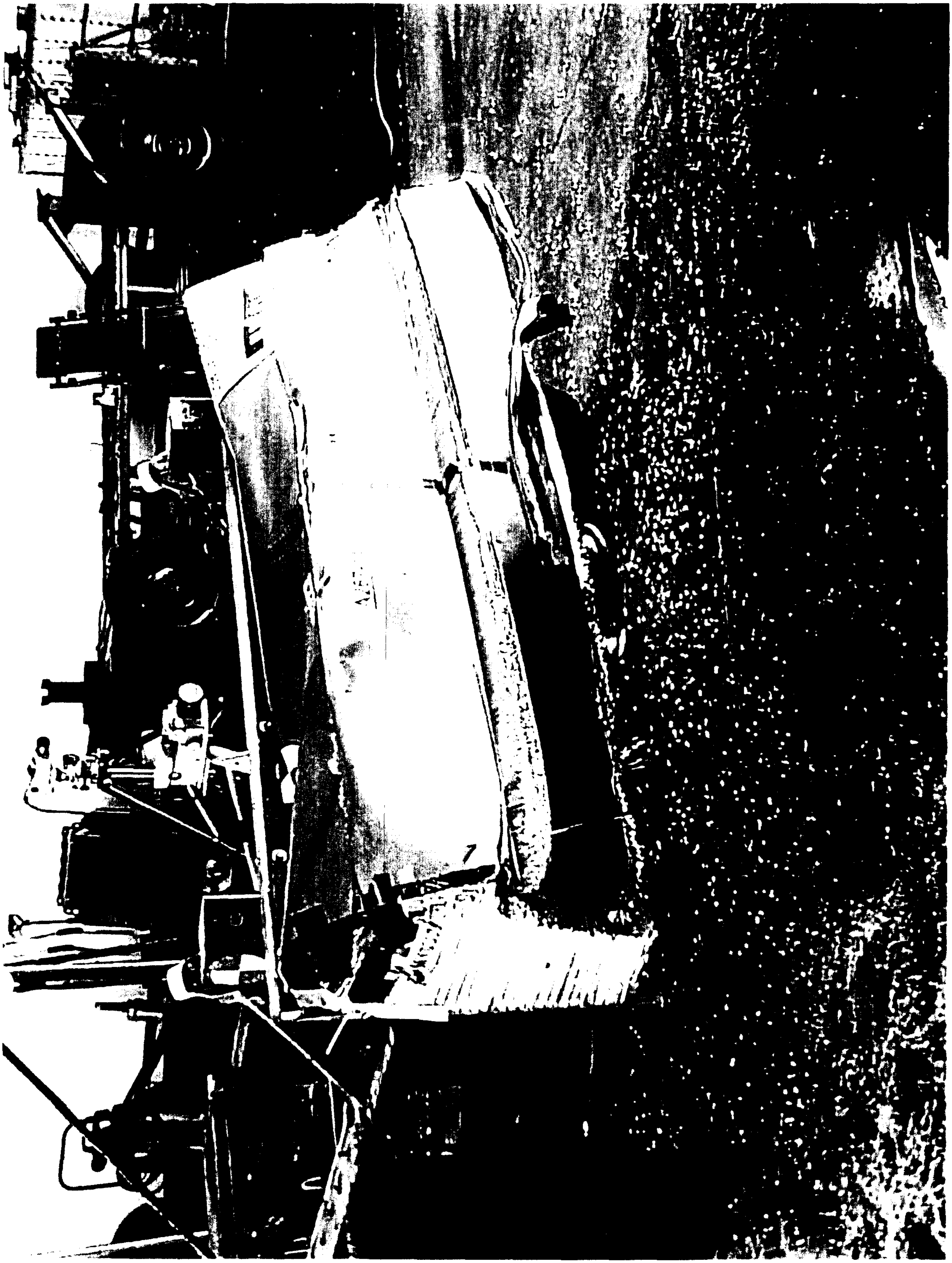


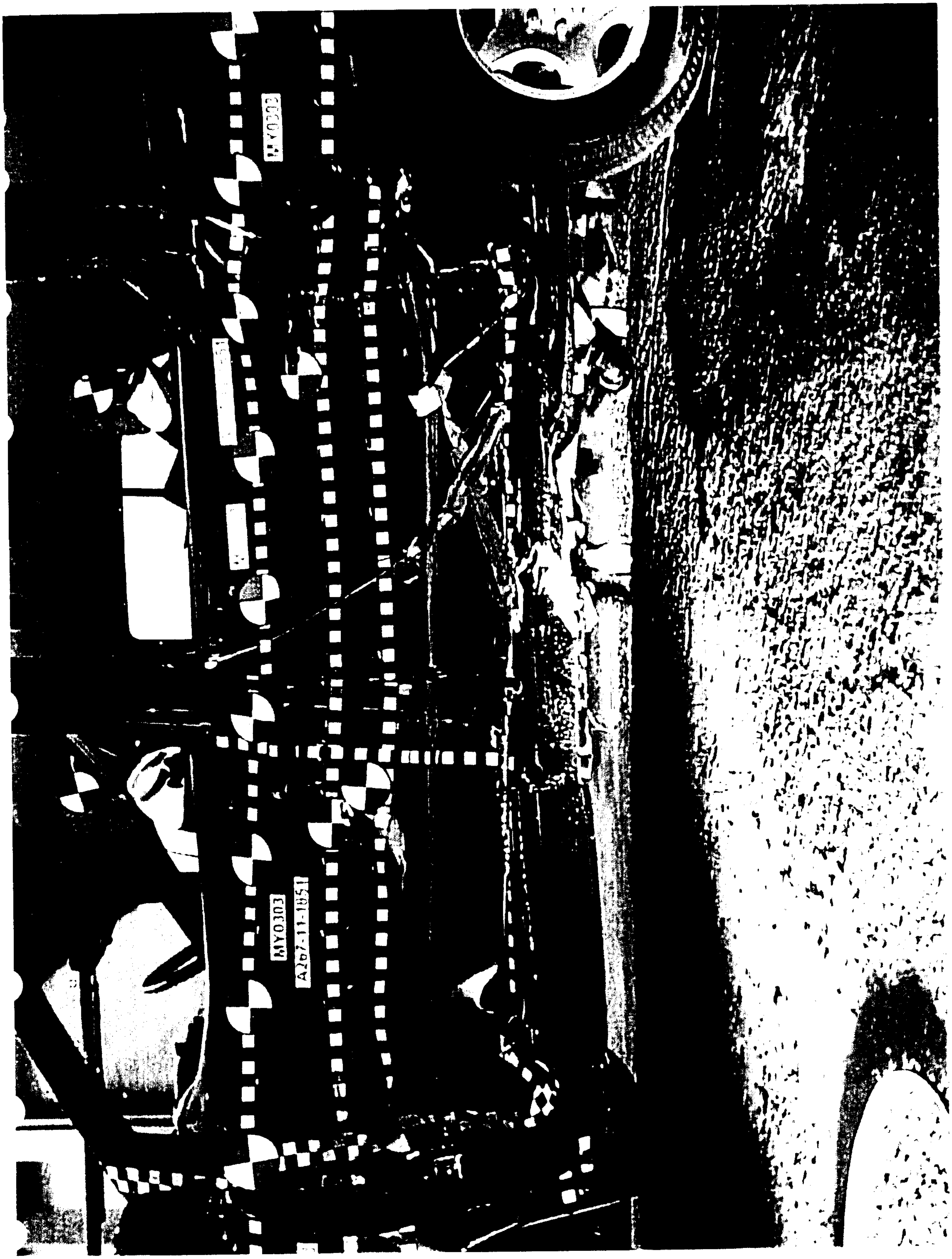
000991





000998

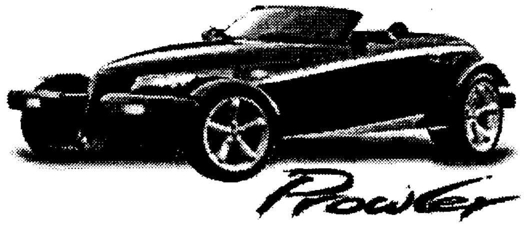
000999


MY0303

001001

5

001002



Mark W Crossman 01/06/99 06:48 PM

To: Gordon L Rinschler/MVP/Chrysler@Chrysler, Douglas E Shepherd/MVP/Chrysler@Chrysler, Guy L Cowing/SCI/Chrysler@Chrysler, Frank M Fodale/LCP/Chrysler@Chrysler, James A Walendzik/MVP/Chrysler@Chrysler, Robert A Gasparovich/MVP/Chrysler@Chrysler, Diana A Cernis/MVP/Chrysler@Chrysler
cc: Antonius H Brenders/CTC/Chrysler@Chrysler, William R Edwards/CTC/Chrysler@Chrysler, Clinton E Spevak/CTC/Chrysler@Chrysler

Subject: Pictures of Caravan - FMVSS 214D test

NHTSA conducted an FMVSS-214 Dvnamic Side Impact (left side struck) on a 1999 Caravan on 1/5/99.

Dummy numbers were satisfactory, meeting the 214 Dynamic requirements.

The fuel filler tube separated from the fuel tank nipple, creating a stoddard solvent leak.

We have not observed this event in the apx (5-6) NS-Body FMVSS-214 DSI tests we have conducted at CPG. We have impacted NS vehicles on the left side and the right side using the 214 barrier.

Technically, this stoddard leakage is not a violation of the 214 standard, since 214 does not specify fuel system performance requirements (these reside in FMVSS-301). However, we want to understand what happened and why it happened.

The test site was MGA. Incidentally, MGA just completed two NHTSA-sponsored SINCAP side impacts (11/30/98 and 12/18/98) on Grand Caravans at the +5 mph SINCAP barrier speed, with no fuel system issues.

A small group of DaimlerChrysler engineers met today to review available information, including a post-test hoist review of a Chelsea-tested LWB 214 side impact. We will meet again after gathering all pertinent data from our internal 214 tests, to further review this data and finish constructing a plan. On Tuesday, January 12, three DC engineers (Clint Spevak, Frank Fodale, and me) will visit MGA to review the vehicle. A NHTSA engineer will also be at MGA that day.

Post-test photos from the NHTSA test are attached.
To save time go to the third photo - #30504 - for the best view of fill tube and tank nipple.

---------------------- Forwarded by Mark W Crossman/MVP/Chrysler on 01/06/99 06:08 PM ---------------------------

Archie J Rock
01/06/99 03:11 PM

001003

To: Mark W Crossman/MVP/Chrysler@Chrysler, Clinton E Spevak/CTC/Chrysler@Chrysler, Guy L Cowing/SCI/Chrysler@Chrysler, Frank M Fodale/LCP/Chrysler@Chrysler

cc:

Subject: Pictures of Caravan - FMVSS 214D test

---------------------- Forwarded by Archie J Rock/CTC/Chrysler on 01/06/99 03:06 PM ---------------------------

"Giuseppe, Jeff <NHTSA>" <Jeff.Giuseppe@nhtsa.dot.gov> on 01/06/99 07:56:28 PM

To: ajr6@daimlerchrysler.com

cc:

Subject: Pictures of Caravan - FMVSS 214D test

See attachments - If you are wondering there is no CX030503 or CX030505.

Hope everything goes well with your dad....

- Cx030507.jpg

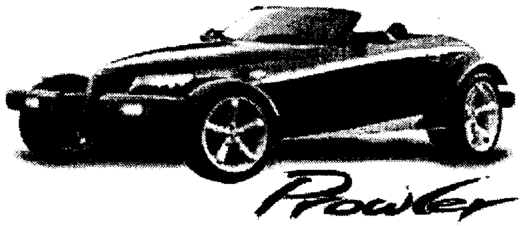
- cx030502.jpg

- cx030504.jpg

- cx030506.jpg

- CX030501.jpg

001004



Mark W Crossman 01/29/99 01:38 PM

To: Clinton E Spevak/CTC/Chrysler@Chrysler
cc: Troy M Cornell/MVP/Chrysler@Chrysler, Diana A Cernis/MVP/Chrysler@Chrysler, James A Walendzik/MVP/Chrysler@Chrysler

Subject: Side Impact Data matrix

Clint -

Here's the matrix describing the LEFT SIDE impact vehicles in more detail, minus the two tests for which we lack any support documentation: VC-5143 and VC-5178. Those files should be coming to DCTC early next week. They are currently in storage at Iron Mountain.

Troy Cornell constructed the matrix to help us understand body configurations and results.

Based on the test files reviewed thus far, we see no indication of fill tube separation from the tank on any of the tests.

Note that two of the impact test units - XT-528 and VC-5600 - were CNG vehicles, which possess an entirely different fuel system than the gasoline vehicles. Because they showed in the VCRecords search, we include detail in this matrix.

We'll update the matrix next week when VC-5143 and VC-5178 files arrive.

Mark

---------------------- Forwarded by Mark W Crossman/MVP/Chrysler on 01/29/99 01:19 PM ---------------------------

From: Troy M Cornell on 01/29/99 01:16 PM

Sent by: Troy M Cornell

To: Mark W Crossman/MVP/Chrysler@Chrysler
cc:

Subject: Side Impact Data matrix

SIDE IMPACT TESTS.doc

001005

DKC → MWC

FAX TRANSMISSION

DaimlerChrysler Corporation
VEHICLE SAFETY OFFICE
800 CHRYSLER DRIVE
AUBURN HILLS, MICHIGAN 48326-2757
FAX: 248-576-7321

To: G. L. Rinschler
D. E. Shepherd
G. L. Cowing
R. A. Gasparovich
[redacted]

Date: February 3, 1999

Fax #: 6-2257
6-2256
6-2250

Pages: 2, including this cover sheet.

From: W. R. Edwards WRE

Subject: **NHTSA Defect Investigation PE99-010; '96-'99 NS Fuel System Integrity**

COMMENTS:

Attached for your information is the NHTSA ODI Resume for PE99-010, regarding post collision fuel system integrity on '96-'99 MY NS vehicles. During an FMVSS 214 dynamic side impact compliance test of a '99 MY NS run January 5, 1999 at MGA in Burlington WI, the fuel filler tube hose separated from the nipple on the fuel tank, spilling approximately 11.0 gallons. While this in not a non compliance event, it has caused NHTSA to open a defect investigation. The formal inquiry will arrive shortly and we will require your assistance in preparing DaimlerChrysler's response. Thank you in advance for your help.!

CC: AHO
SMC
WKE

L. Goldfarb
S. McLean

U.S. Department of Transportation
National Highway Traffic Safety Administration

ODI RESUME

INVESTIGATION. PE99-010 DATE OPENED: 3 -Feb-99
SUBJECT: Post-Collision Fuel System Integrity
PROMPTED BY: IE99-001
PRINCIPAL ENGINEER: J. L. Quandt

MANUFACTURER: DaimlerChrysler Corporation
MODEL(S): NS-minivans (Dodge Caravan and Grand Caravan, Plymouth Voyager and Grand Voyager, and Chrysler Town and Country)
MODEL YEAR(S): 1996-99
VEHICLE POPULATION: 2,000,000 estimated

PROBLEM DESCRIPTION: The filler tube hose may separate from the fuel tank in certain crash modes.

FAILURE REPORT SUMMARY

	ODI	MANUFACTURER	TOTAL
COMPLAINTS:	0	Unknown	0
FIRES:	0	"	0
INJ INCID:	0	"	0
# INJURIES:	0	"	0
FAT INCID:	0	"	0
# FATALS:	0	"	0
OTHER:	1	-	1

DESCRIPTION OF OTHER: Fuel filler tube hose separation in a left-side impact test conducted for a NHTSA FMVSS No. 214, Side Impact Protection, compliance test.

ACTION: A Preliminary Evaluation has been opened.

ENGINEER: [signature] DIV CHF: [signature] OFC DIR: [signature]

2/2/99 2/2/99 2/3/99
DATE DATE DATE

SUMMARY: On January 5, 1999, a 1999 Dodge Caravan minivan was crash tested at the MGA Proving Ground in Burlington, Wisconsin to assess compliance with the Federal Motor Vehicle Safety Standard regarding side impact occupant protection (FMVSS No. 214). During the crash test the fuel filler tube hose separated from the fuel tank fill nipple causing approximately 11 gallons of test fuel to leak from the tank assembly. The tank, which has a nominal capacity of 20 gallons, had been filled with 18.43 gallons of Stoddard solvent for the test.

2/3/99

#

To: Clinton E Spevak/CTC/Chrysler@Chrysler
cc: Troy M Cornell/MVP/Chrysler@Chrysler, Diana A Cernis/MVP/Chrysler@Chrysler, James A Walendzik/MVP/Chrysler@Chrysler

Subject: Side Impact Data matrix

Clint -

Here's the matrix describing the LEFT SIDE impact vehicles in more detail, minus the two tests for which we lack any support documentation: VC-5143 and VC-5178. Those files should be coming to DCTC early next week. They are currently in storage at Iron Mountain.

Troy Cornell constructed the matrix to help us understand body configurations and results.

Based on the test files reviewed thus far, we see no indication of fill tube separation from the tank on any of the tests.

Note that two of the impact test units - XT-528 and VC-5600 - were CNG vehicles, which possess an entirely different fuel system than the gasoline vehicles. Because they showed in the VCRecords search, we include detail in this matrix.

We'll update the matrix next week when VC-5143 and VC-5178 files arrive.

Mark

---------------------- Forwarded by Mark W Crossman/MVP/Chrysler on 01/29/99 01:19 PM ---------------------------

From: Troy M Cornell on 01/29/99 01:16 PM

Sent by: Troy M Cornell

To: Mark W Crossman/MVP/Chrysler@Chrysler
cc:

Subject: Side Impact Data matrix

SIDE IMPACT TESTS.doc

001008

6

001009

MVSS 214 SIDE IMPACT TEST

- During an FMVSS 214 dynamic side impact compliance test of a 1999 MY 'three door' SWB NS, run at MGA, the fuel filler tube hose separated from the fuel tank nipple, spilling approximately 11 gallons of Stoddard (SINCAP tests at the same facility on two 1999 MY LWB 'four door' vehicles were run without incident).
- Although not a 214 compliance issue, NHTSA has opened up a defect investigation on 1996-1999 MY NS vehicles.
- No field failures of this type are known. The Safety Office is conducting a record search to confirm.
- The vehicle was reviewed by Fuel Systems Engrg, Safety Office and Safety Development personnel at MGA on 1/19/99. It appeared that the clamp was properly tightened and all correct components were on the vehicle.
- No fuel system leakage has been observed in any of the ten 214/Euro barrier/301 lateral impact tests run by DaimlerChrysler (two of the ten tests were run on CNG vehicles). See attached matrix.
- This joint is not presently safety shielded for NS. However, CN 90203-M04 is in process to add the shield to this joint. SLAP and WAP are now processing as though this joint is already shielded. WAP started doing this on 1/7/99. SLAP started on 2/1/99.
- Filler hose pull-off testing is now in process. Results are due Friday, 2/12/99.
- Information NHTSA has asked for so far seems to be concentrating on the joint components and the robustness of the joint.

JAW
2/9/99

DAIMLERCHRYSLER

Jerry L Coval 12/01/99 12:33 PM

To: Clinton E Spevak/CTC/Chrysler@Chrysler
cc: Namir A Konja/MVP/Chrysler@Chrysler

Subject: clamp ID measurements

Clint ---

Below is the info you requested from Norma at our last meeting. If you need anything else, please call me at 6-4851.

---------------------- Forwarded by Jerry L Coval/MVP/Chrysler on 12/01/99 12:15 PM ---------------------------

Bob Ristovski <bristovs@normatech.com> on 12/01/99 11:02:01 AM

To: jc79@daimlerchrysler.com
cc: bward@normatech.com, lcallon@normatech.com

Subject: clamp ID measurements

Hello Jerry,

The following is the measurements of the clamp ID's as requested:

Old hose, old spud, clamp torqued to 35"-lbs = 51.3mm
New hose, new spud, clamp torqued to 25"-lbs = 52.70mm

I will forward your request to Lee regarding the addition of the latest pull test to the bar graphs.

Best Regards,
Bob

001011

7

0010012

Fuel System Survey - SWB/LWB

Vehicle Identification - Make, Model, Model Year, options. Date of Inspection.	Dodge Caravan, 2000 MY, April 2000	Plymouth Grand Voyager, 1996 MY, April 2000
Wheel base of vehicle	2878mm	3030mm
Rated fuel capacity	76 liters	76 liters
Location of fuel fill tube (right or left side)	Left	Left
Location of fill opening CntrLine on sheet metal		
Fore-Aft position of opening to rear axle CntrLine (in 'X')	214mm	213mm
Up_Down position of opening to top of rear wheel opening (above axle CntrLine, in 'Z')	-9mm	-10mm
Description of fuel tank location in vehicle		
Position of rear edge of tank to rear axle CntrLine	187mm	187mm
Position of front edge of tank to rear axle CntrLine	1451mm	1451mm
Position of left outboard edge to outboard side of left sill	0mm	0mm
Position of right outboard edge to outboard side of right sill	480mm	480mm
Position of left outboard edge to inboard side of left rail	-55mm	-55mm
Position of right outboard edge to inboard side of right rail	425mm	425mm
Any additional comments ?		
Fill venting and valving		
ORVR, internal/external	None	None
Location on tank and fill tube	Top to top	Top to top
Material, attachment, size, valving: Nylon 12 convolute weld to tank, quick connect to tube; 9/16" and 3/8" dia; no valve		
Fuel tank material type (metal or plastic)	Plastic	Plastic
Unique suspension or other chassis interface ?	No	No
Fuel tank		
Location of fuel filler tube entry (Rear, side, top?)	Side	Side
Submerged fill (yes or no?)	Yes	Yes
Any tank shields ? Note if thermal or impact (skid plate), attached to tank, body or exhaust.	None	None
Any additional comments ?		
Fuel tank straps		
How many straps ?	2	2
Fore/aft or lateral ?	Lateral	Lateral
Any additional comments ?		
Are they fastened to fixed dimension or to torque?	Torque	Torque

001013

Fuel System Survey - SWB/LWB

Fill Pipe		
Housing at body side: Fixed or breakaway ?	Breakaway	Breakaway
Approximate overall length	474mm	483mm
Number of bends	3	3
Pipe Material	Steel	Steel
Pipe OD	44.5mm	44.5mm
Routed above rail, below rail, through rail?	Below	Below
Connection type to tank	Hose, clamp	Hose, clamp
Pipe attachment to BIW structure (yes or no)	No	No
Comments pertaining to venting hoses		
Unique rollover valves or plumbing ?	No	No
Any shielding? For impact? (yes or no): Shield toward leaf spring; not for side impact		
Any additional comments ?		
Fill Pipe Hose		
Hose OD	50mm	50mm
Length	127mm	127mm
Number of bends	0	0
Corrugated or not	No	No
Hose reinforced (yes or no)	Yes	Yes
Any additional comments ?		
Fill pipe attachment to tank		
Type: Spud ? Note material, how attached to tank, length, diameter, diameter of bead.	Spud, HDPE, welded	
Clamp ? Style of clamp ?	Screw clamp	Screw clamp
Bead type on spud	ramped	ramped
Any additional comments ?		
Fuel cap		
Type (screw-on, quick-on, etc.)	Quick	Screw
Valving	Press/Vac	Press/Vac
Cap attachment - metal/plastic?	Plastic	Plastic
Vehicle Attitude - Vertical from top of wheel opening above axle CntrLine (As received, no additional loading)		
Left Front	765mm	755mm
Left Rear	765mm	775mm
Right Front	765mm	755mm
Right Rear	765mm	760mm

001014

8

001015

Dimensions requested in March 31. 2000 Question 1 (mm):

		Short	Long
a	the longitudinal dimension from a vertical plane passing through the front axle centerline to the rear edge of the anchor plate for the left-middle seat belt (furnish these dimensions for each seating option available in the subject vehicles)	2413.6	2508.2
b	the longitudinal dimension from a vertical plane passing through the front axle centerline to the front and rear of the rail opening through which the fuel filler vent tube passes (vent tube pass-through)	2199.2, 2269.1	2677.3, 2447.2
c	the longitudinal dimension from a vertical plane passing through the front axle centerline to the interface between the sill inner wall and the left-rear wheelhouse extension	2410.3	2562.5
d	the lateral dimension from a vertical plane passing through the vehicle centerline to the inner and outer edges of the fuel tank spud	471.8, 549.7	471.8, 549.7
e	the minimum clearance between the fuel filler tube and: (1) the left rear wheelhouse; and (2) the sill inner wall	6.31, 8.28	7.78, 10.09
f	the lateral dimension from a vertical plane passing through the vehicle centerline to the anchor bolt for the left-middle seat belt (furnish these dimensions for each seating option available in the subject vehicles)	688.2, all options	688.2, all options
g	the vertical dimension from the bottom edge of the fuel tank nipple to the lower dimensions of the anchor plate for the left-middle seat belt (furnish these dimensions for each seating option available in the subject vehicles) and the vent tube pass-through	174.8, 181.4	172.0, 182.7

DAIMLERCHRYSLER

EA99-013

JUNE 1, 2000 DAIMLERCHRYSLER PRESENTATION TO NHTSA

1017

DAIMLERCHRYSLER

DaimlerChrysler Corporation
Matthew C. Reynolds
Director
Vehicle Compliance & Safety Affairs

Thomas Z. Cooper, Chief
Vehicle Integrity Division
Office of Defect Investigations
National Highway Traffic Safety Administration
400 Seventh Street, S.W. (NSA-12; Room 5326)
Washington, D.C. 20590
June 23, 2000

RECEIVED
00 JUN 26 AM 10: 19
OFFICE
DEFECTS INVESTIGATION

Re: NSA-122jlq; EA99-013

Dear Mr. Cooper:

On June 1, 2000, DaimlerChrysler Corporation met with NHTSA to discuss EA 99-013. The attached materials were part of that discussion and were intended to illustrate why the crash energy inflicted in NHTSA's laboratory tests differs from that which occurs in the real world. This difference, while perhaps not significant for occupant injury analysis, is significant when attempting (without the benefit of rulemaking) to apply the laboratory tests beyond their intended purpose. As the evidence has shown, DaimlerChrysler Corporation minivans have an exemplary real world performance record.

We look forward to discussing this material with you further.

Sincerely,

Matt C. Reynolds

Attachments and Enclosures

1018

DaimlerChrysler Corporation
800 Chrysler Drive CIMS 482-00-91
Auburn Hills MI USA 48326-2757
Phone 248.512.4188
Fax 248.576.7321
e-mail: mcr1@daimlerchrysler.com

ATTACHMENT

Enclosure #1 contains the slides that were discussed. DaimlerChrysler presented the attached slides to show that the FMVSS 214-style barrier test produces a different intrusion profile that would occur in a typical vehicle crash. DaimlerChrysler minivans have an exemplary real world track record. The laboratory test artifact at issue has never occurred in over 80 billion vehicle miles traveled. The real world performance evidences the minivans' real world safety, and compliance with FMVSS 301 evidences that the minivans meet the need for motor vehicle safety as defined in the Safety Act.

A typical vehicle has more front-end sweep than does the FMVSS 214 barrier. The intrusion caused by the vehicle is typically greater at the more rigid center than at the softer corners. By comparison, the barrier face has no sweep and will show uniform load distribution across its entire face. This is shown in the load distribution curves for vehicle and barrier testing (see pages 1 - 14). The vehicle is much softer at the outside and does not pick up significant loads at the edges. The FMVSS 214 barrier, on the other hand, picks up consistent load across its entire face. It is this rigid edge of the barrier that creates the intrusion that created the NS fuel filler hose separation in the laboratory tests.

To further illustrate the difference between the side barrier tests and real world impacts, NHTSA's test data of the Honda Accord was used (see page 15). NHTSA tests were run using various bullet vehicles and the moving deformable barrier in a FMVSS 214-type impact into the side of the Accord. The intrusion pattern shown on page 15 is data taken at sill height that represents the height of the intrusion in the laboratory tests. . The intrusion pattern of the FMVSS 214 barrier is not comparable to any of the bullet vehicle intrusion patterns. This data indicates that the FMVSS 214 barrier is not a good predictor of structural performance in this area of an actual vehicle to vehicle impact.

As the bullet vehicle strikes closer to the fuel filler system the center of impact moves rearward away from the longitudinal center of gravity of the vehicle. As the impact moves away from the center of gravity, the struck vehicle will experience greater rotational forces and more of the energy of the event will be absorbed by rotational energy and less on deformation and intrusion. A simple model was evaluated to demonstrate this principle. (See pages 16 - 19) The model was evaluated with the FMVSS 214 barrier impacting the vehicle in three locations: at the normal FMVSS 214 position, centered at the rear axle, and half way between the first two positions. As seen on the slides, pages 20 – 22, the angular velocity increases as the barrier moves rearward, away from the longitudinal center of gravity. As angular velocity increases less energy from the event is dissipated in deformational energy. Approximately 37% less energy goes into the intrusion of the vehicle in the rearmost impact when compared to the FMVSS 214 position.

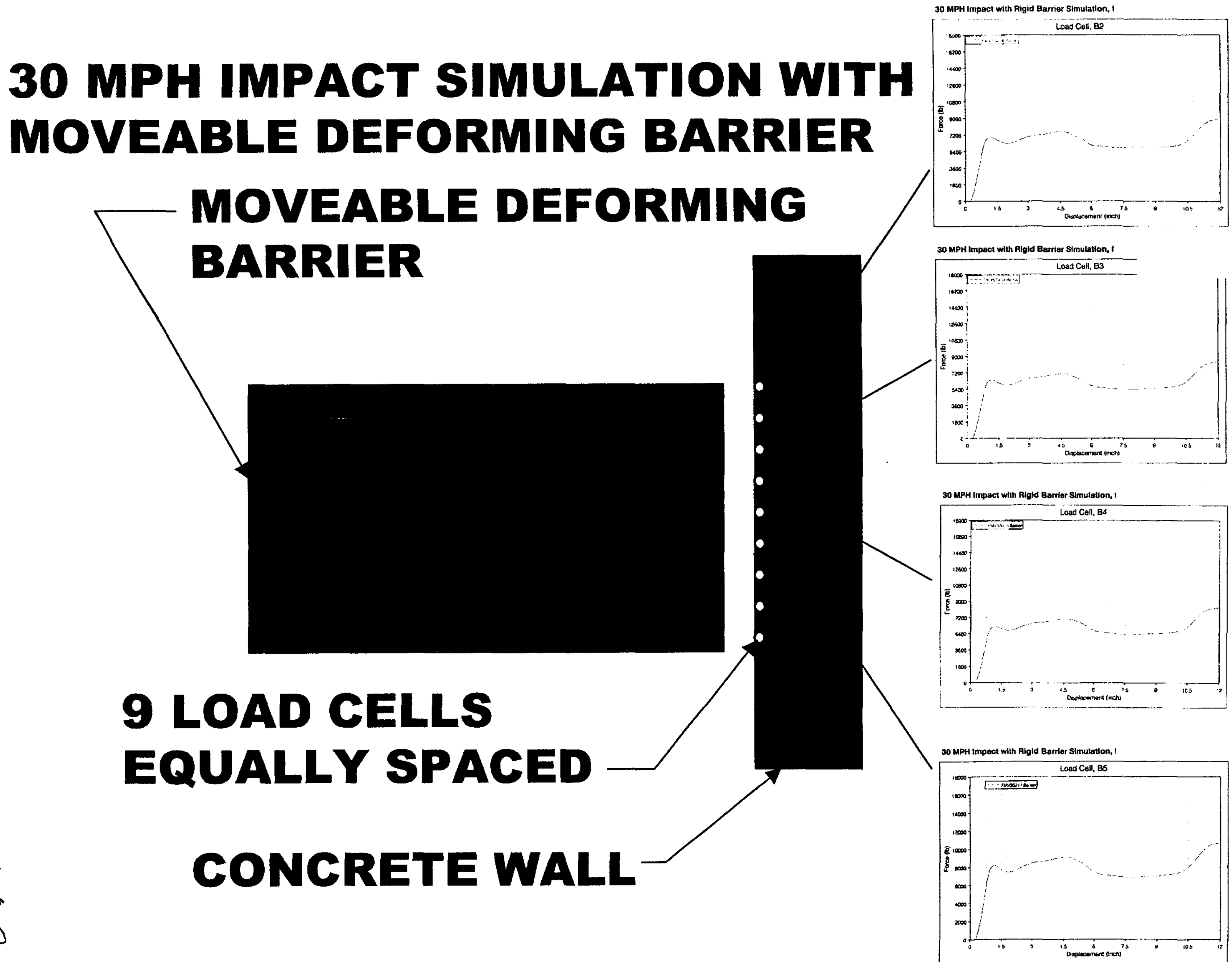
1019

ATTACHMENT

As evidenced through compliance with FMVSS 301, no unreasonable risk to motor vehicle safety can possibly be suggested here. FMVSS 301 is the fuel integrity standard that defines what constitutes an appropriate level of fuel integrity risk. There is no question here of compliance with that standard. The laboratory test artifact at issue is a product of the FMVSS 214 barrier, which differs for this purpose from what would be expected in the field. That expectation is confirmed through the real world performance of DaimlerChrysler minivans.

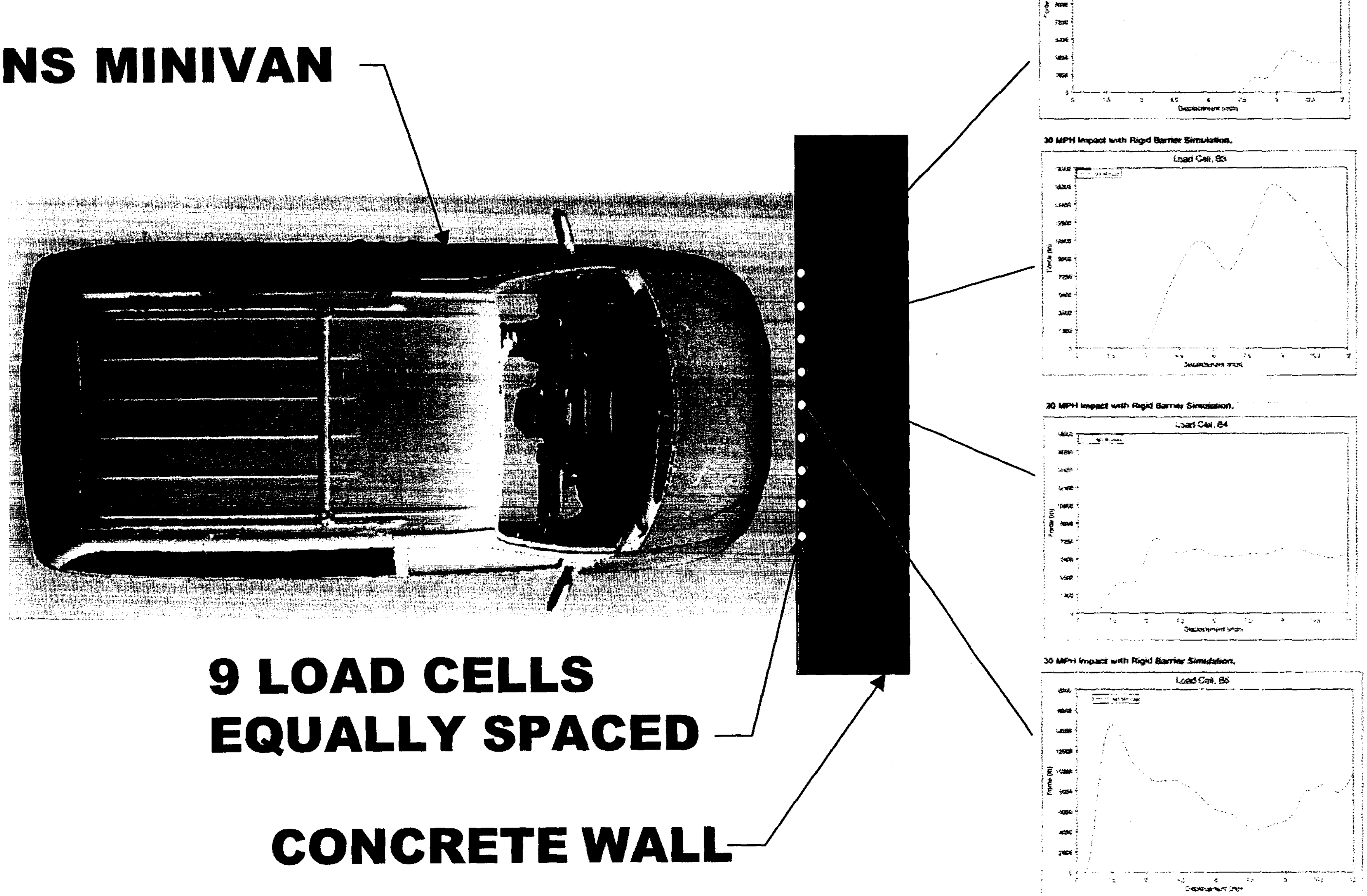
1

1021


30 MPH IMPACT SIMULATION WITH MOVEABLE DEFORMING BARRIER
MOVEABLE DEFORMING BARRIER
9 LOAD CELLS EQUALLY SPACED
CONCRETE WALL
30 MPH Impact with Rigid Barrier Simulation, I
Load Cell, B2
30 MPH Impact with Rigid Barrier Simulation, f
Load Cell, B3
30 MPH Impact with Rigid Barrier Simulation, I
Load Cell, B4
30 MPH Impact with Rigid Barrier Simulation, I
Load Cell, B5
Force (lb)
Displacement (inch)

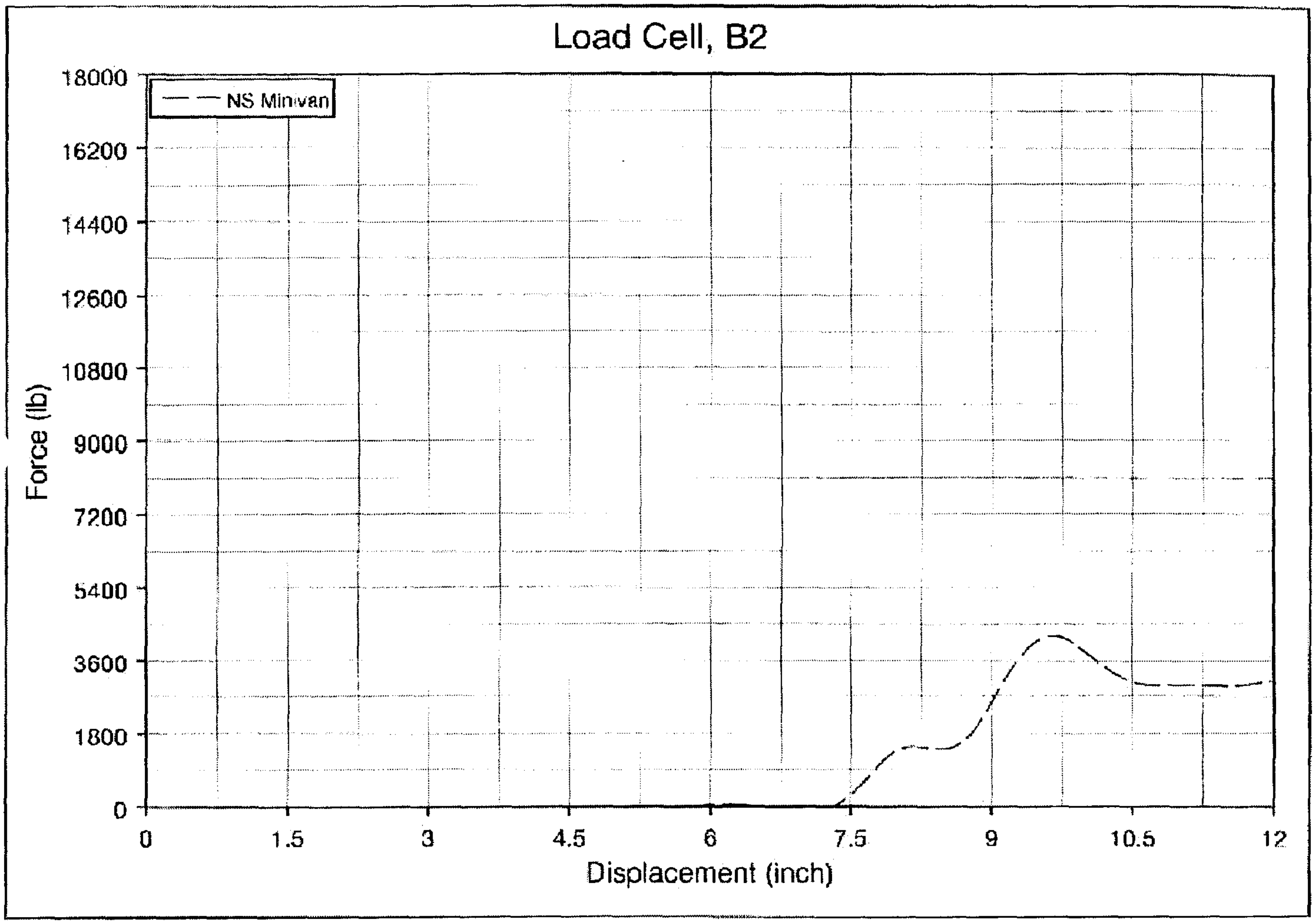
1022

30 MPH IMPACT SIMULATION WITH NS MINIVAN



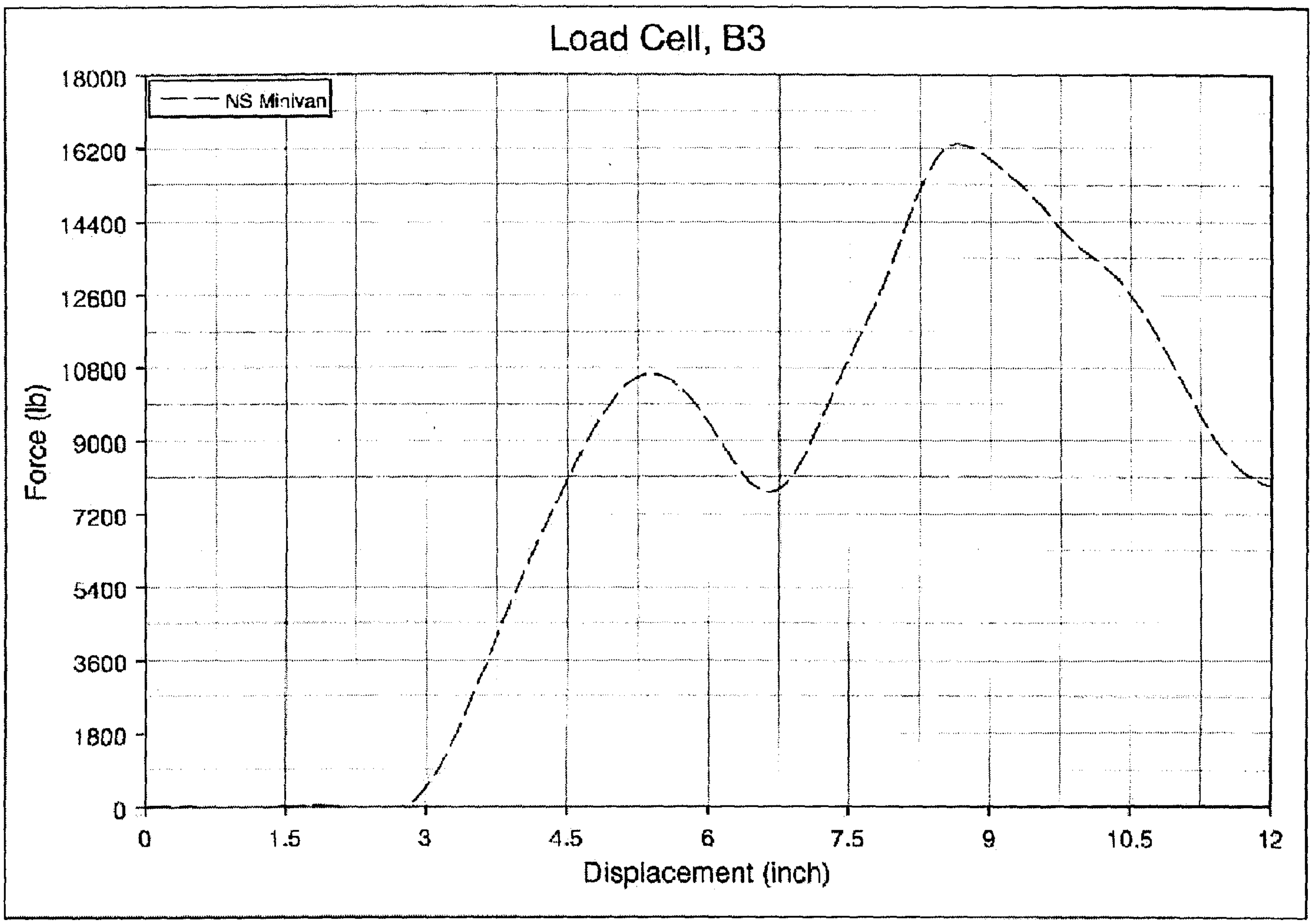
1023

30 MPH Impact with Rigid Barrier Simulation



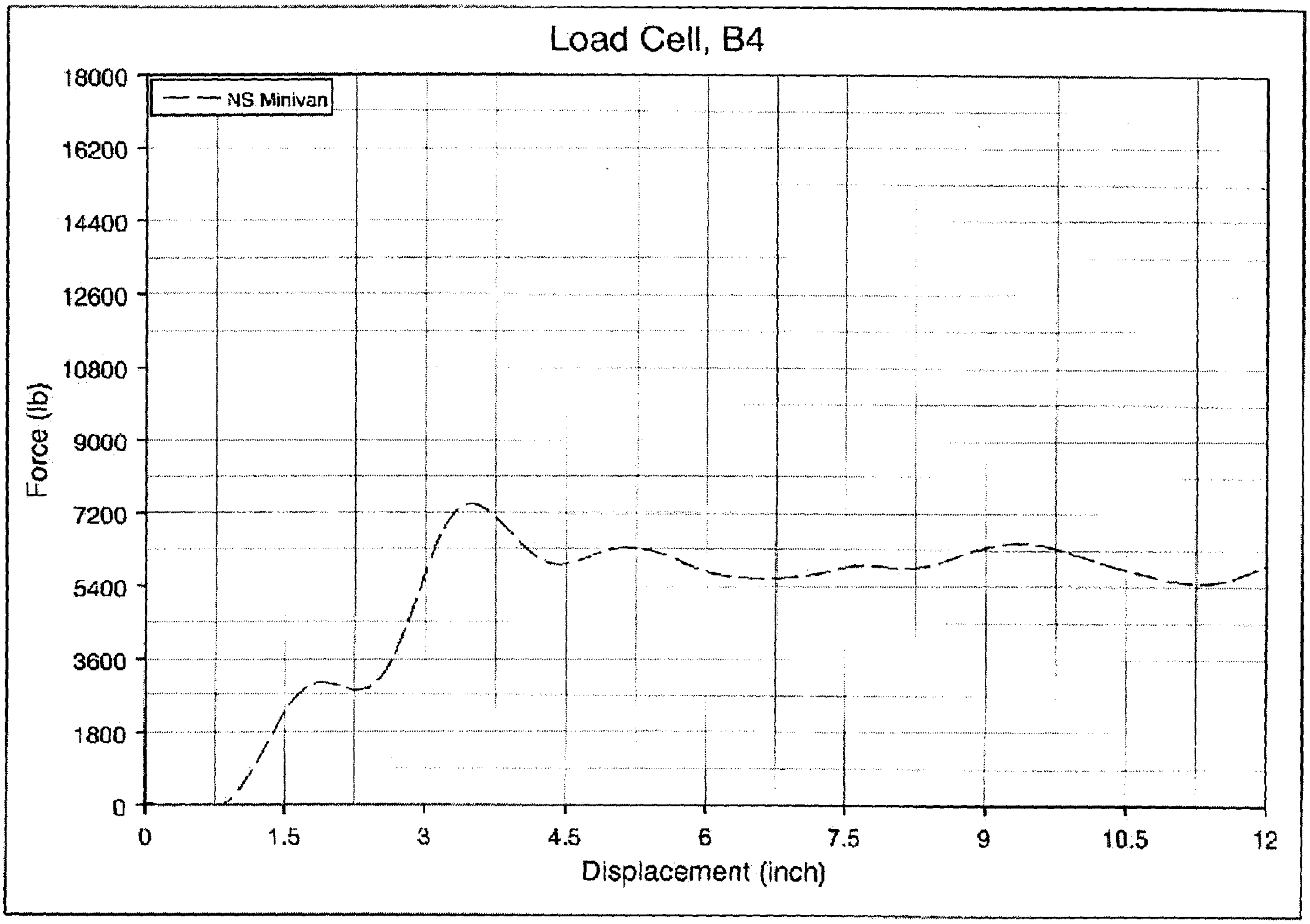
1024

30 MPH Impact with Rigid Barrier Simulation



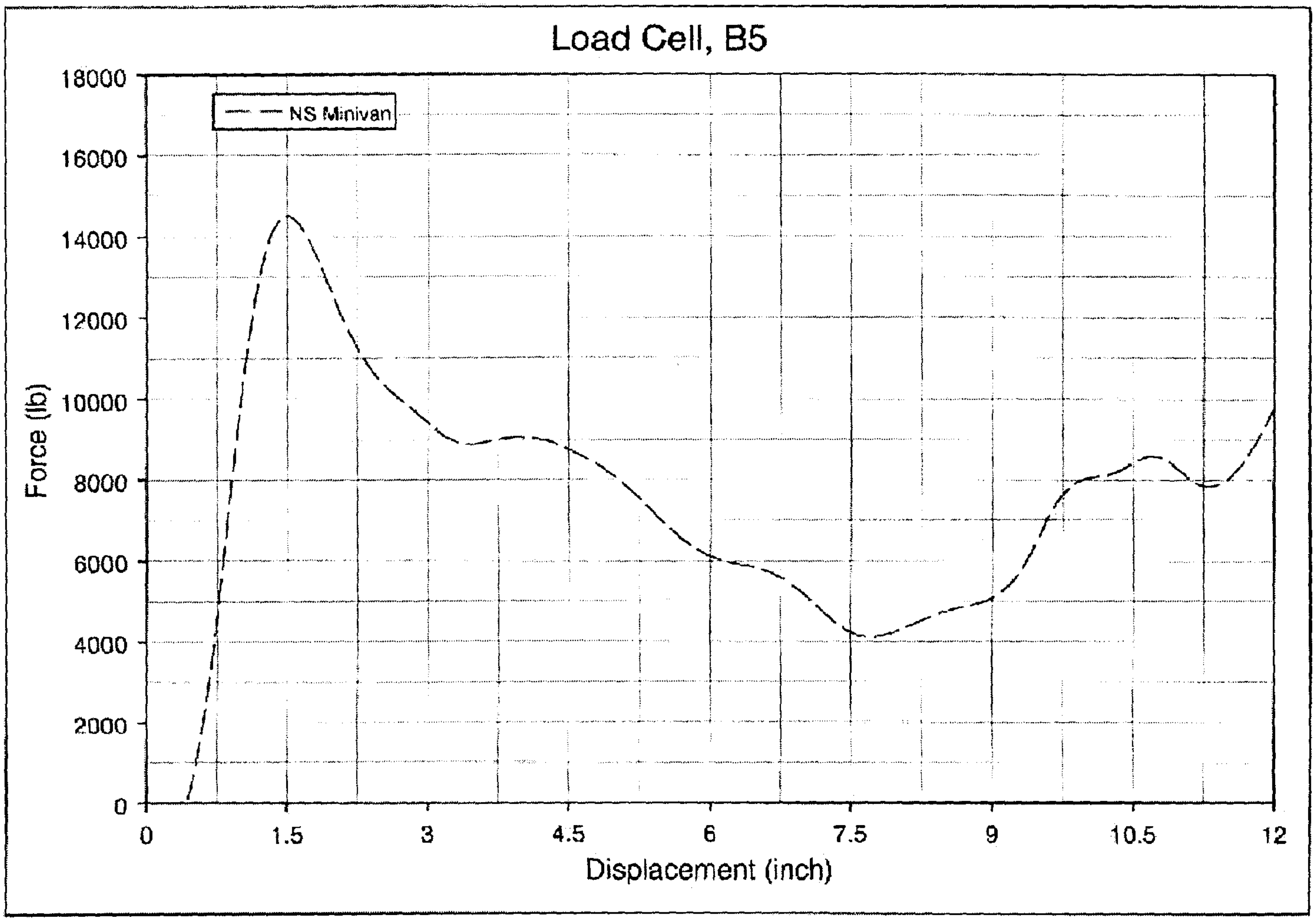
1025

30 MPH Impact with Rigid Barrier Simulation

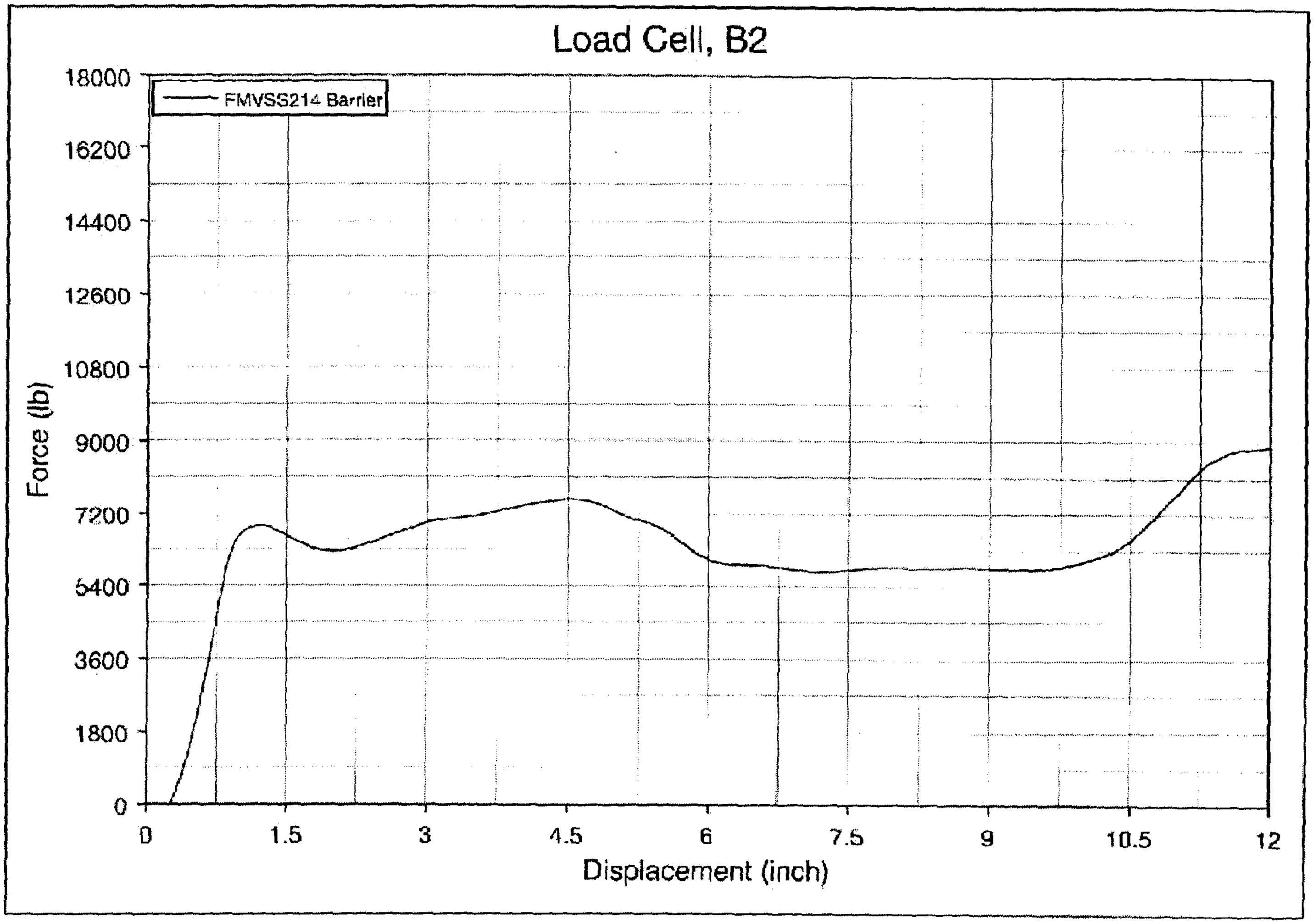


1026

30 MPH Impact with Rigid Barrier Simulation

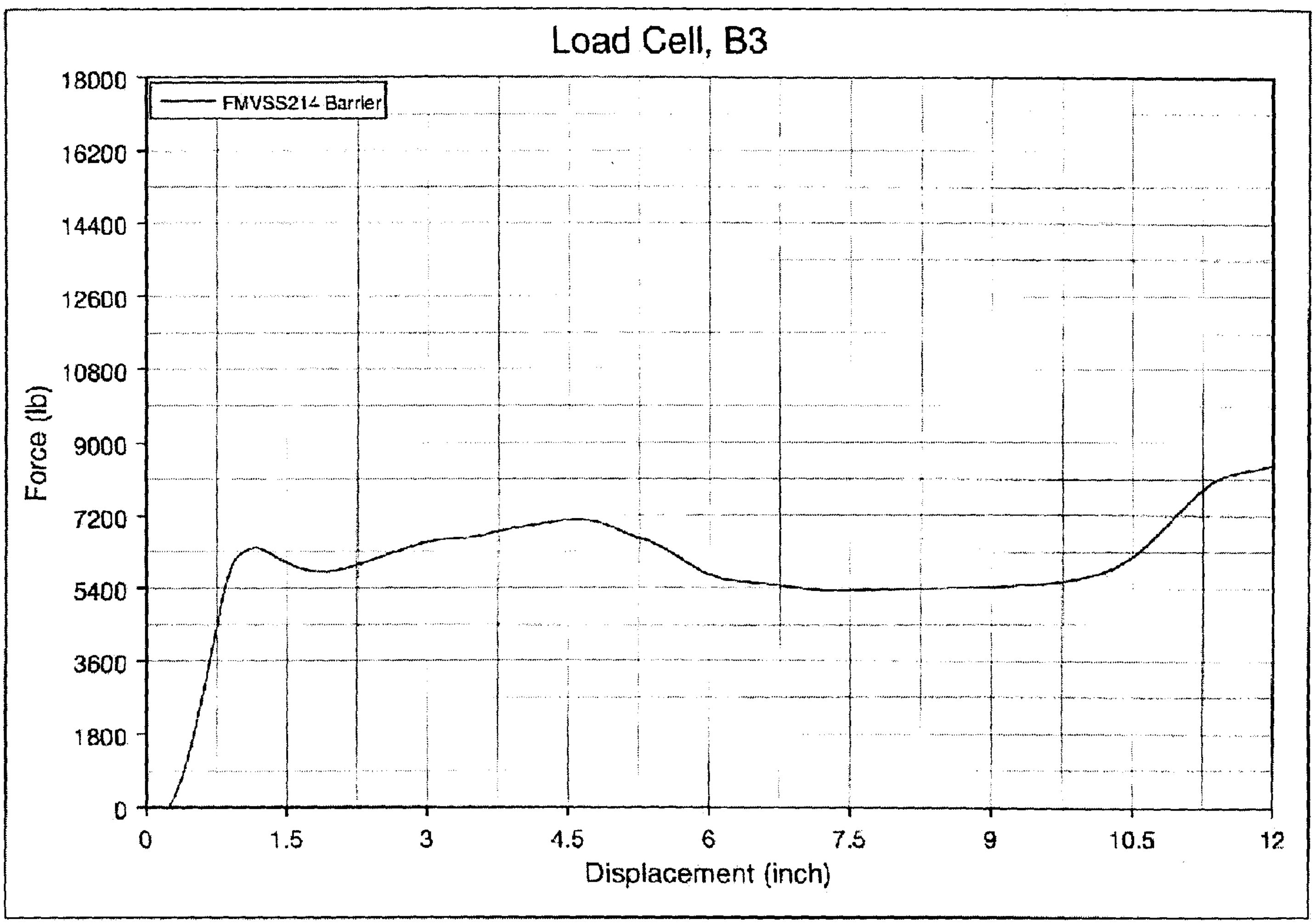


30 MPH Impact with Rigid Barrier Simulation

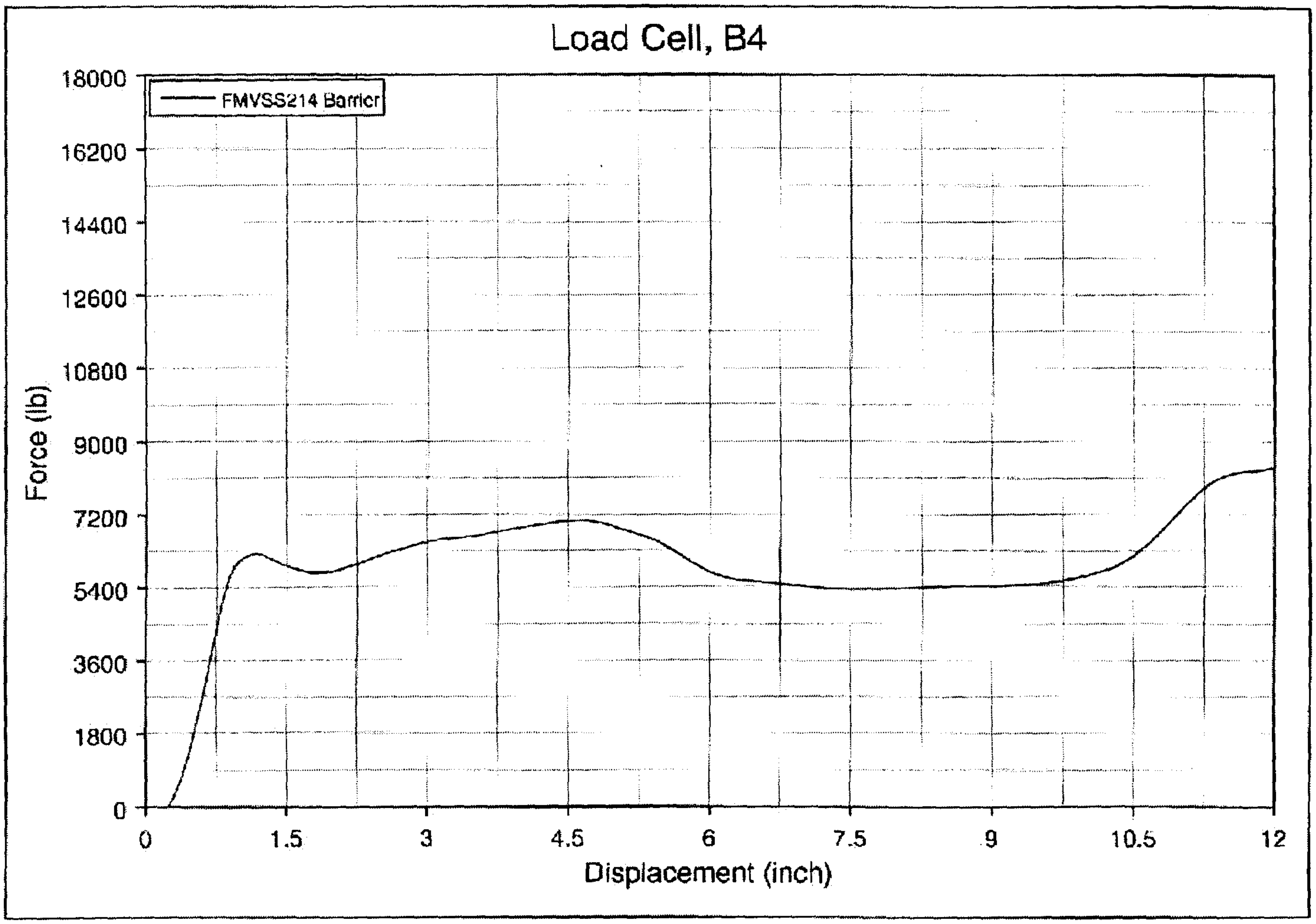


1028

30 MPH Impact with Rigid Barrier Simulation

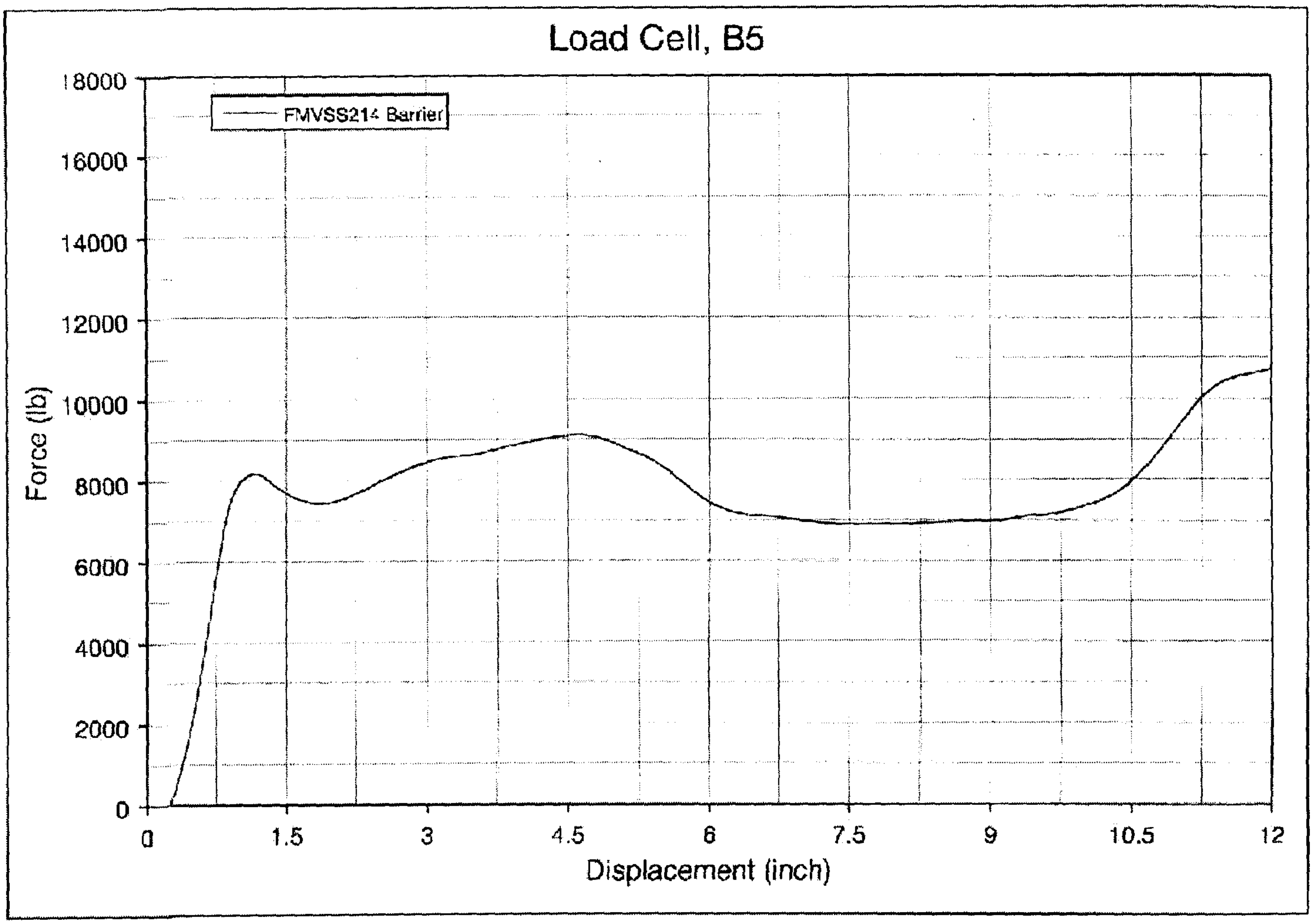


30 MPH Impact with Rigid Barrier Simulation



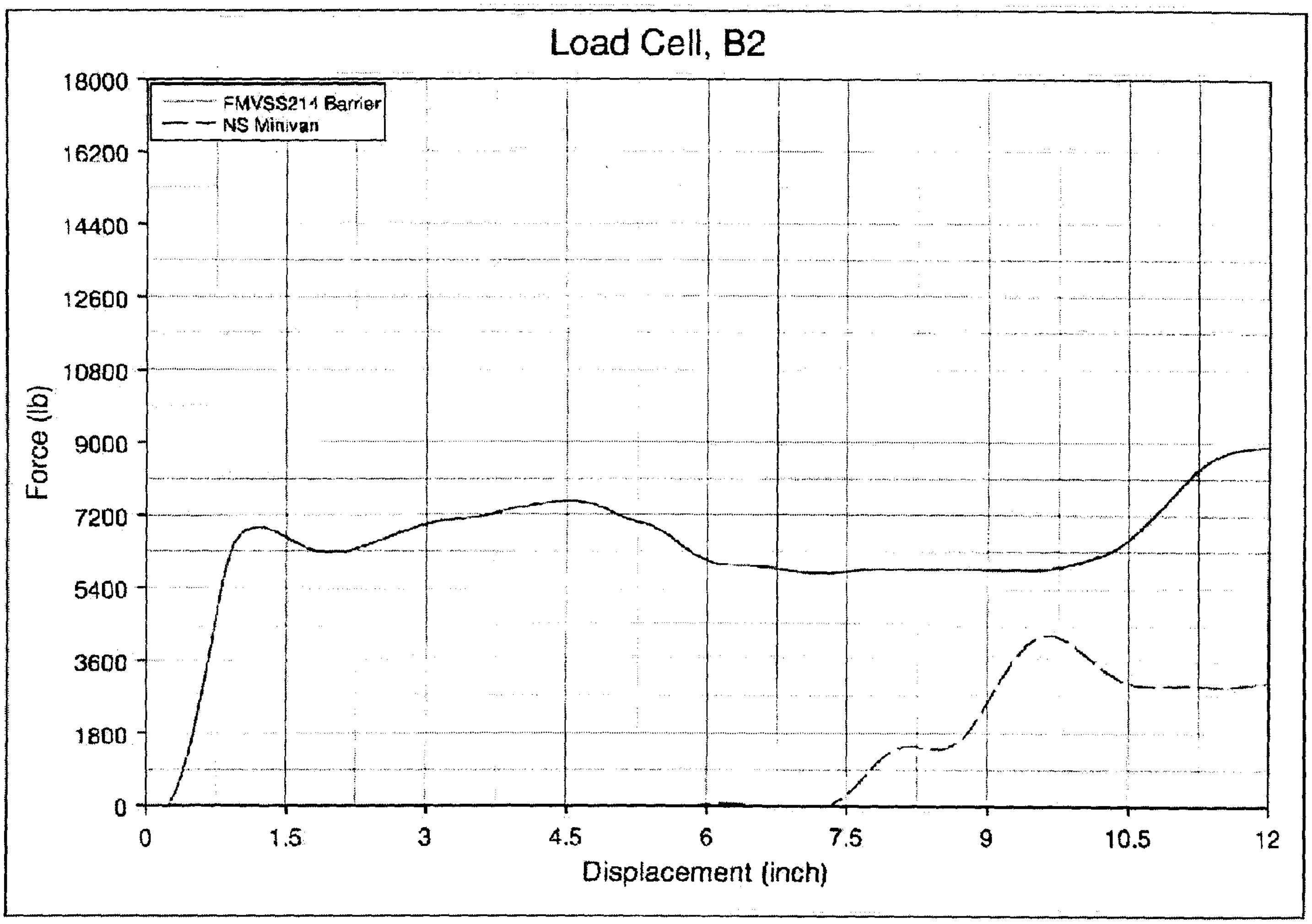
1030

30 MPH Impact with Rigid Barrier Simulation,



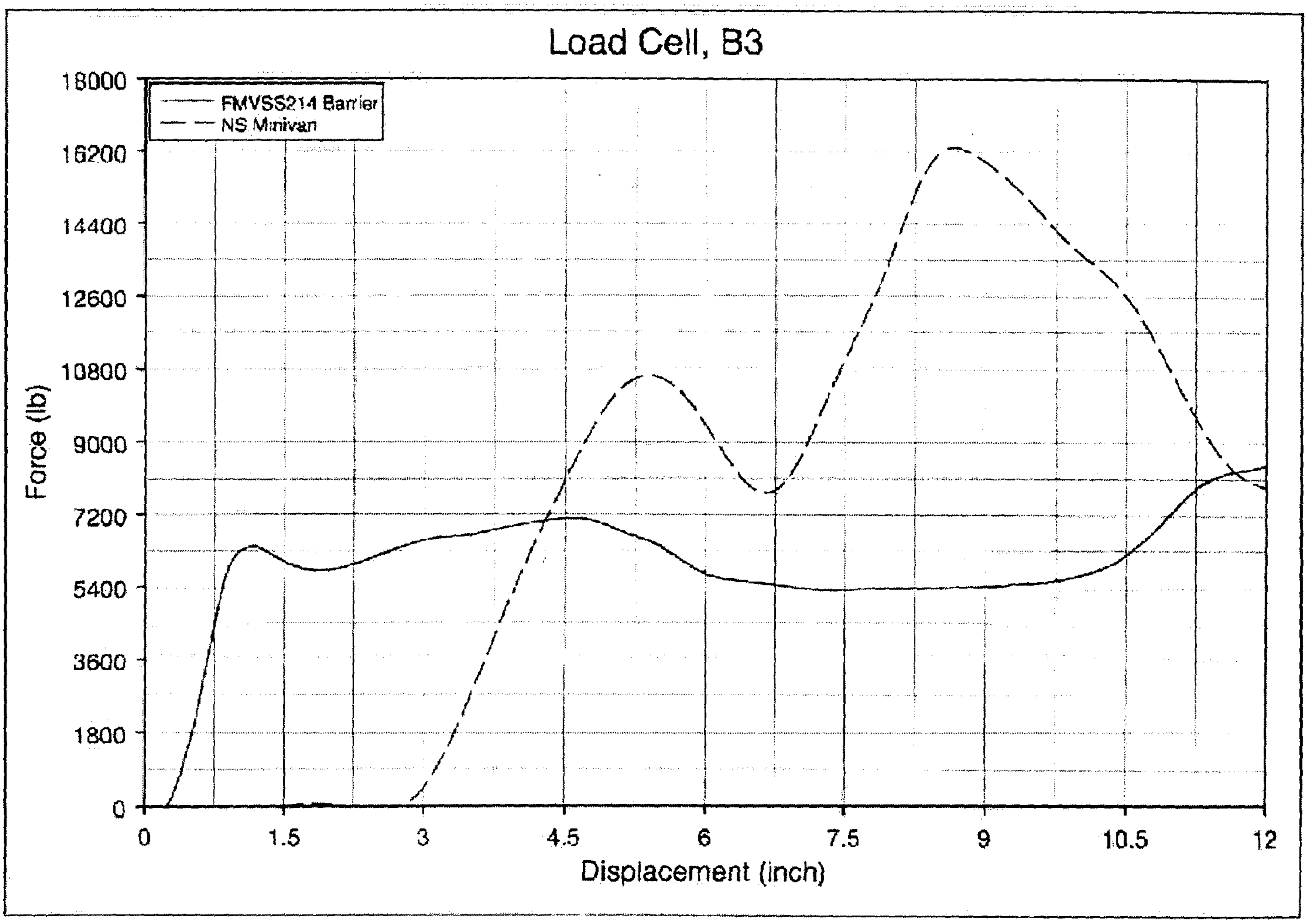
1031

30 MPH Impact with Rigid Barrier Simulation



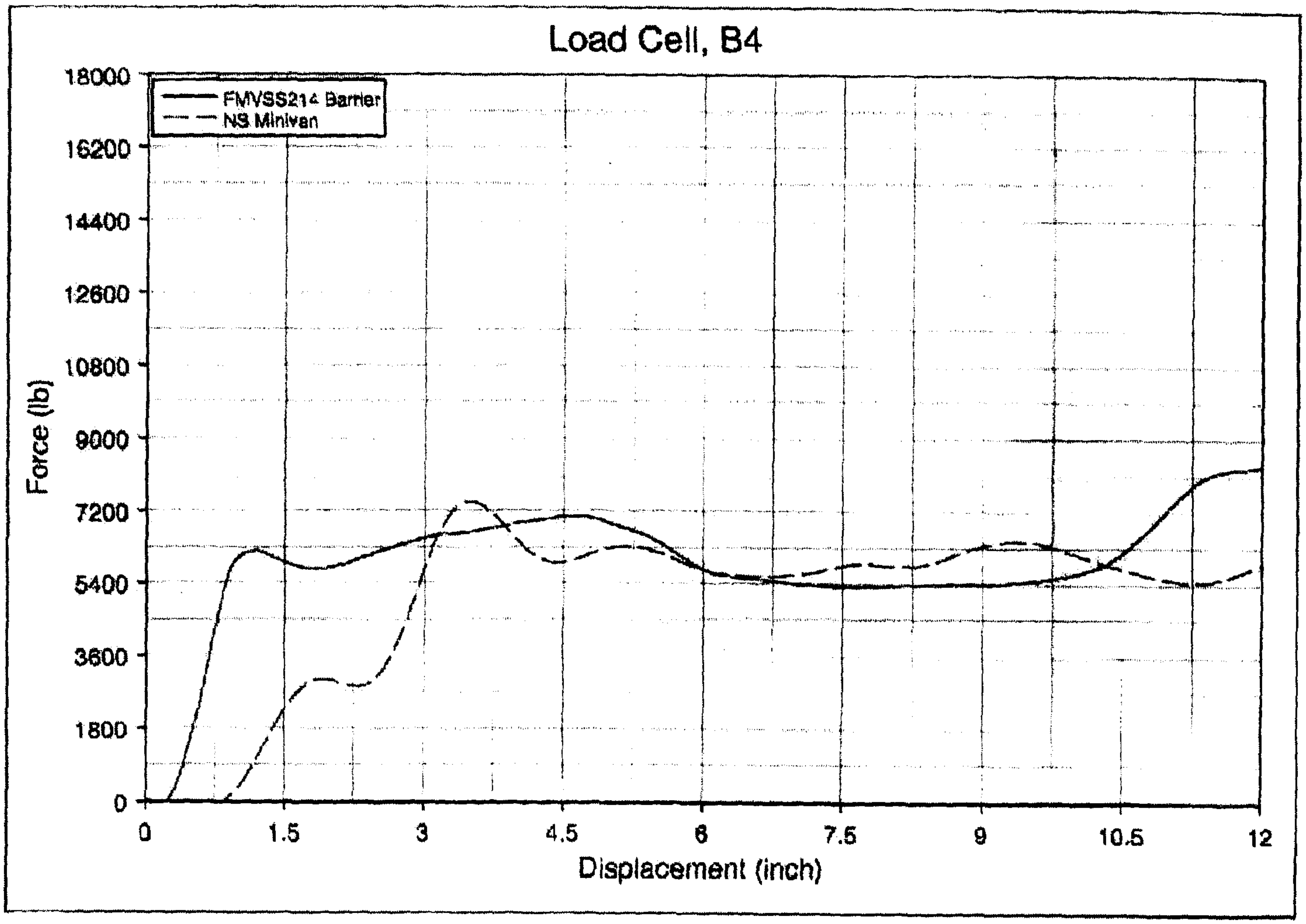
1032

30 MPH Impact with Rigid Barrier Simulation



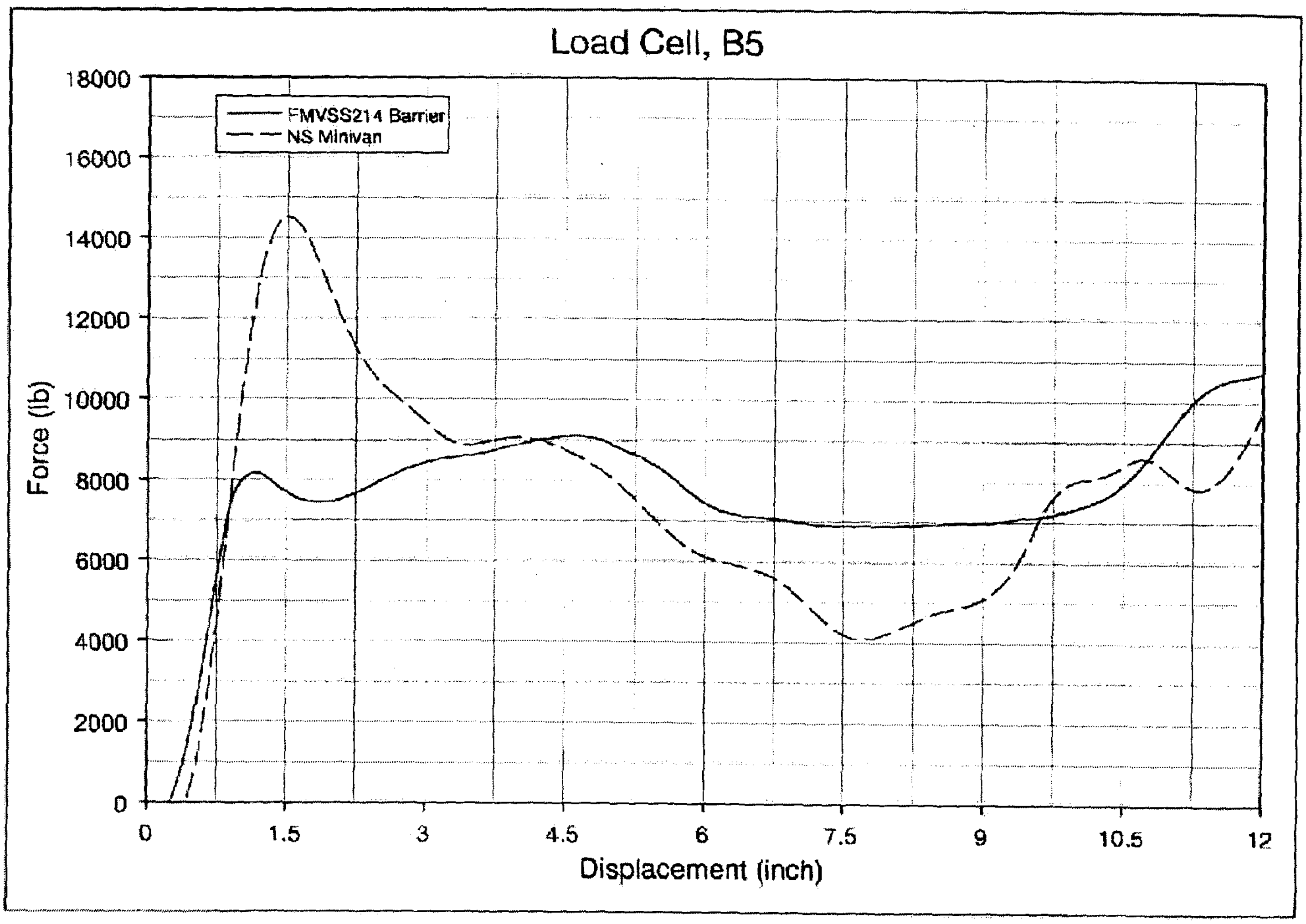
1033

30 MPH Impact with Rigid Barrier Simulation



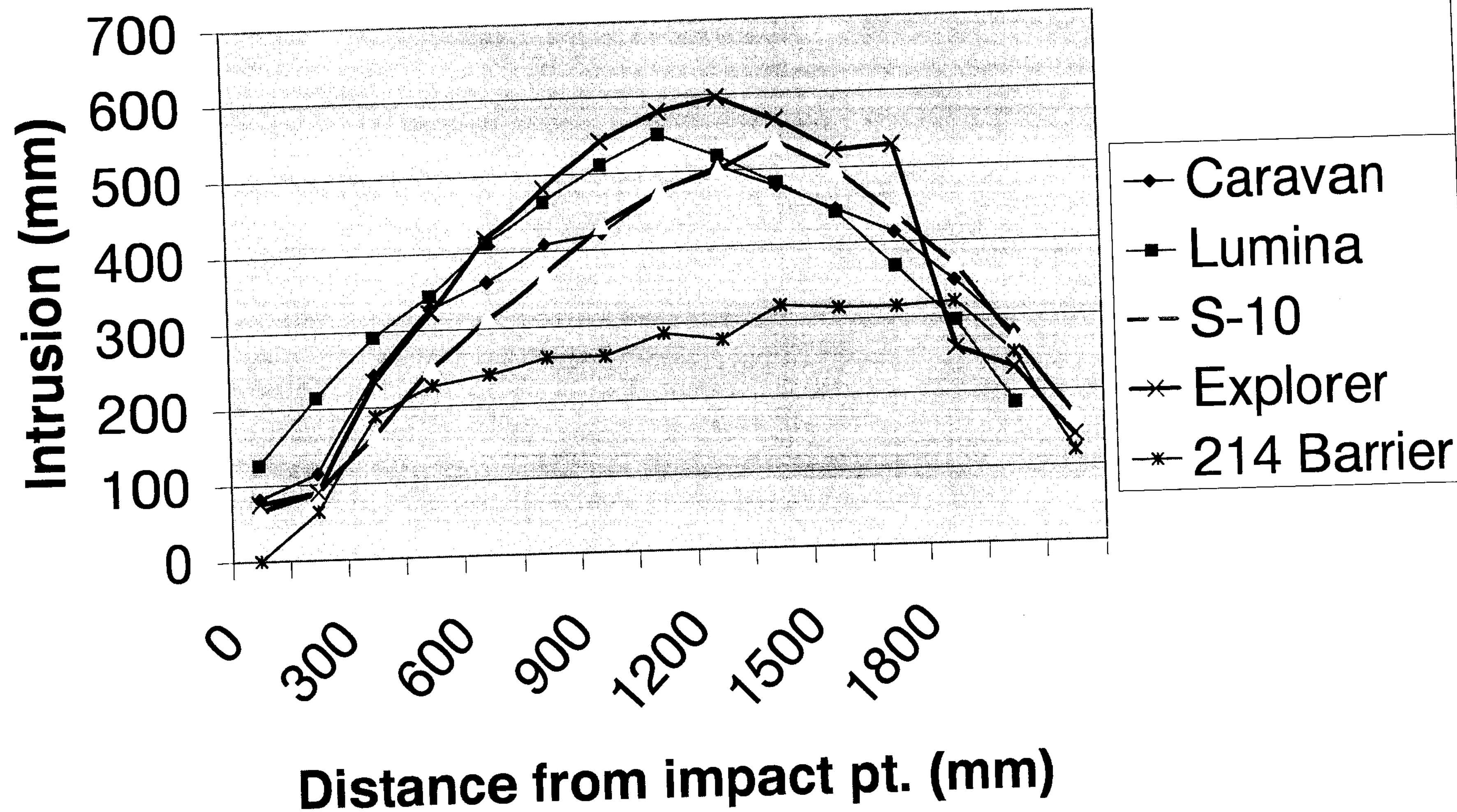
1034

30 MPH Impact with Rigid Barrier Simulation



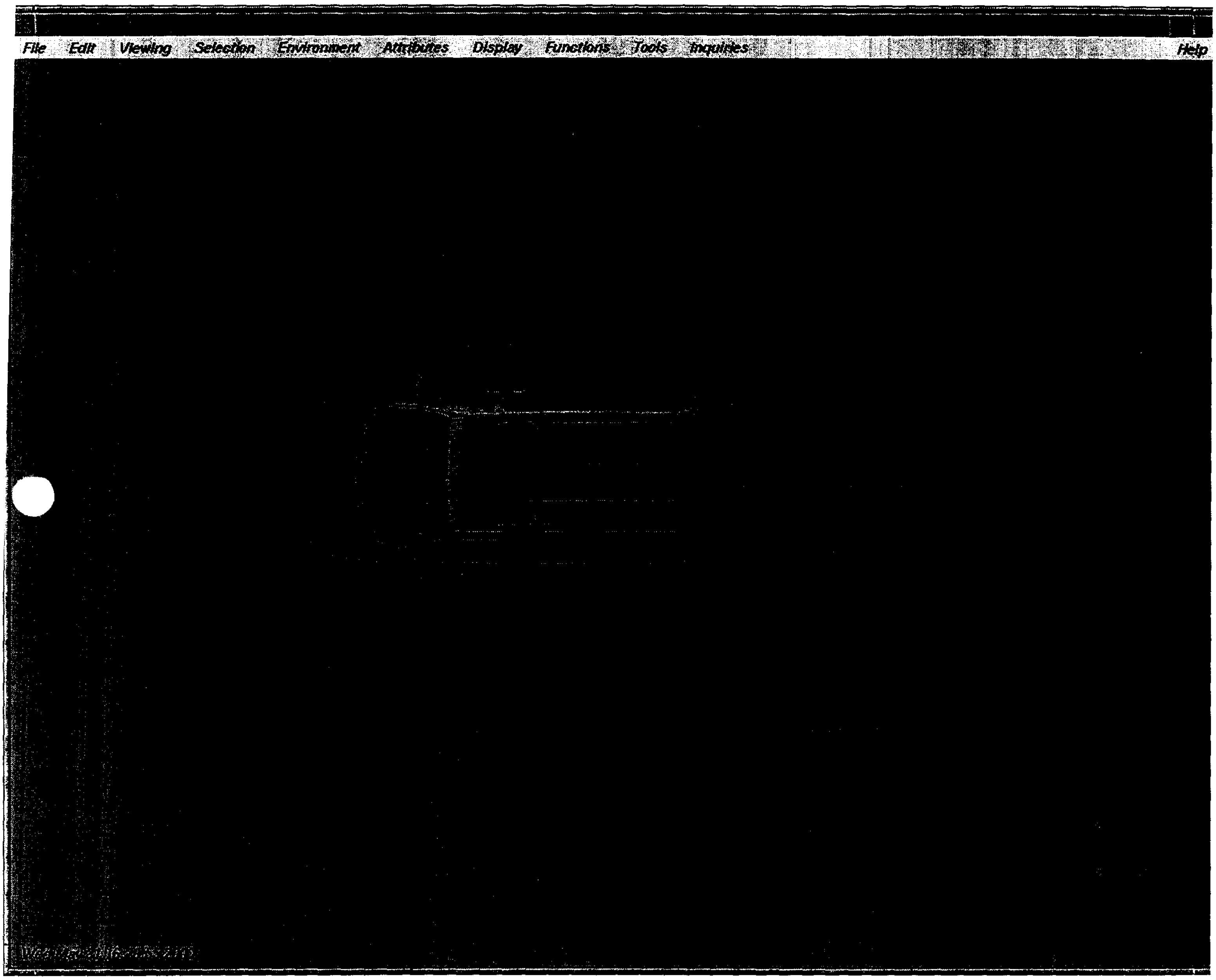
1035

Accord Mid-door Displacement Struck w/ Various Vehicles Using 214 Protocol



1036


File Edit Viewing Selection Environment Attributes Display Functions Tools Inquiries Help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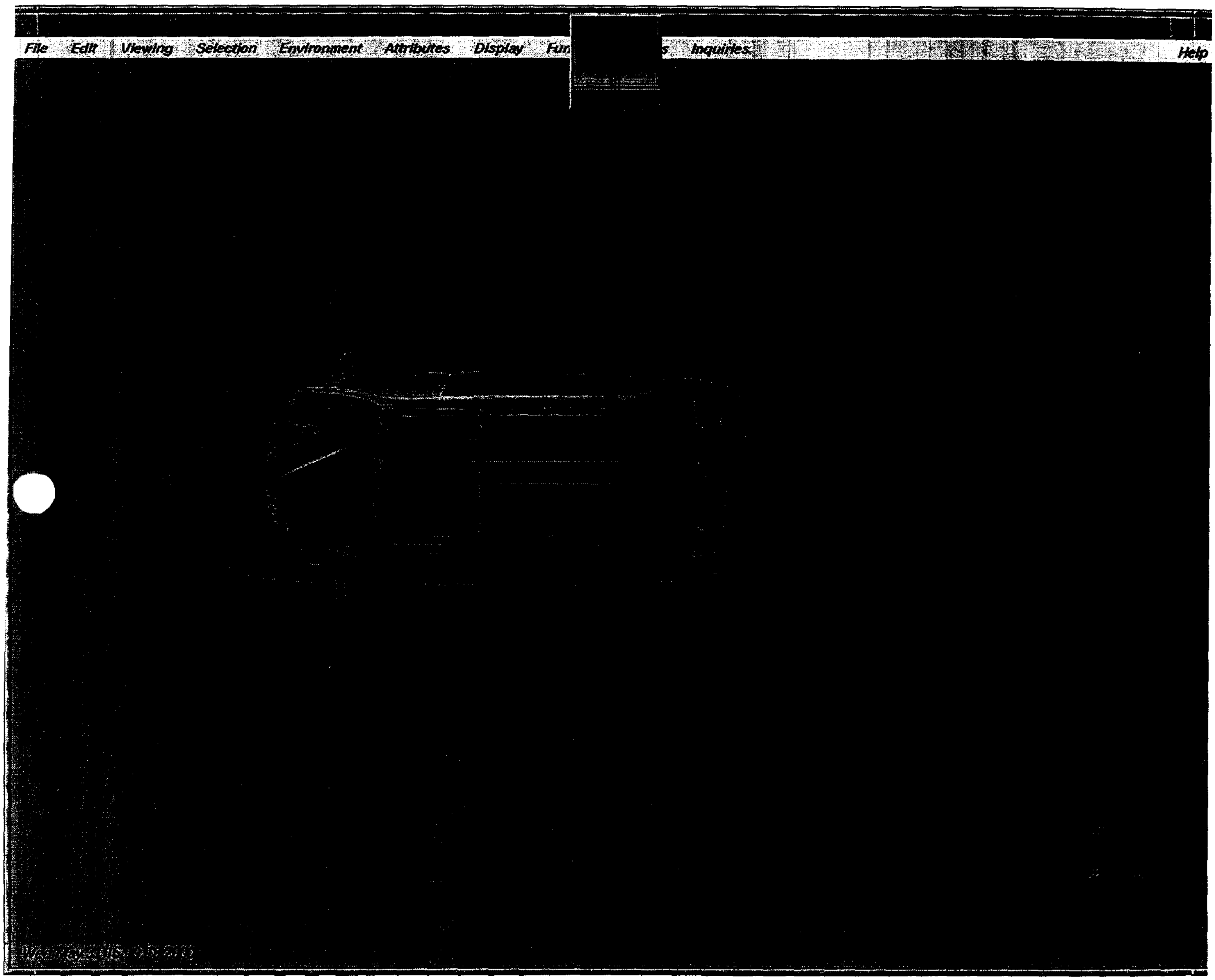
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1039


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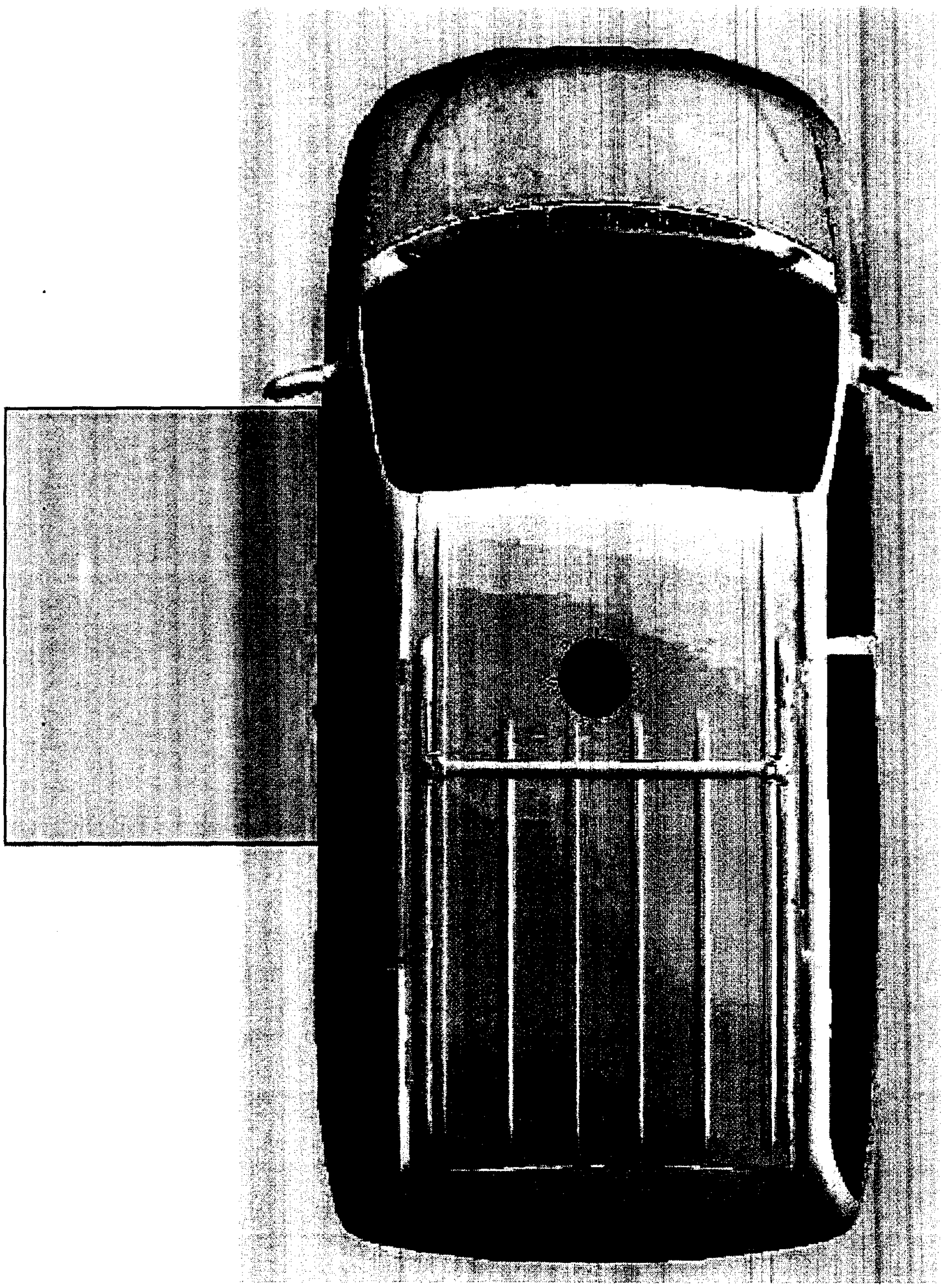
1040

NS LWB	At FMVSS-214 Location
Angular Velocity (rad/s)	0.47
Energy Dissipated *	73,717ft - lbf

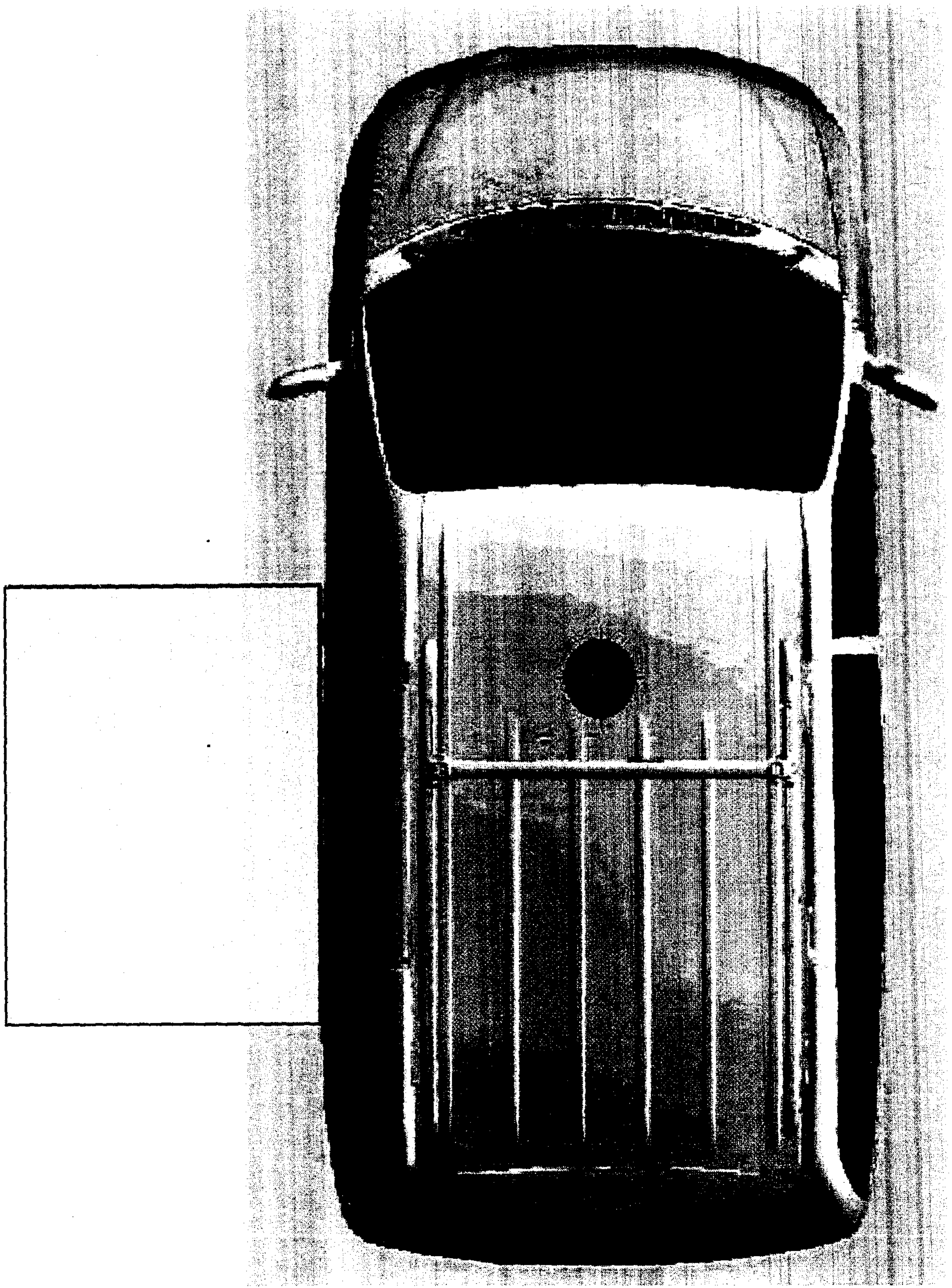
* Energy dissipated includes the crush of the barrier and the vehicle.



1041

NS LWB	Between 214 pos & Rear Axle
Angular Velocity (rad/s)	2.54
Energy Dissipated*	62,582 ft - lbf

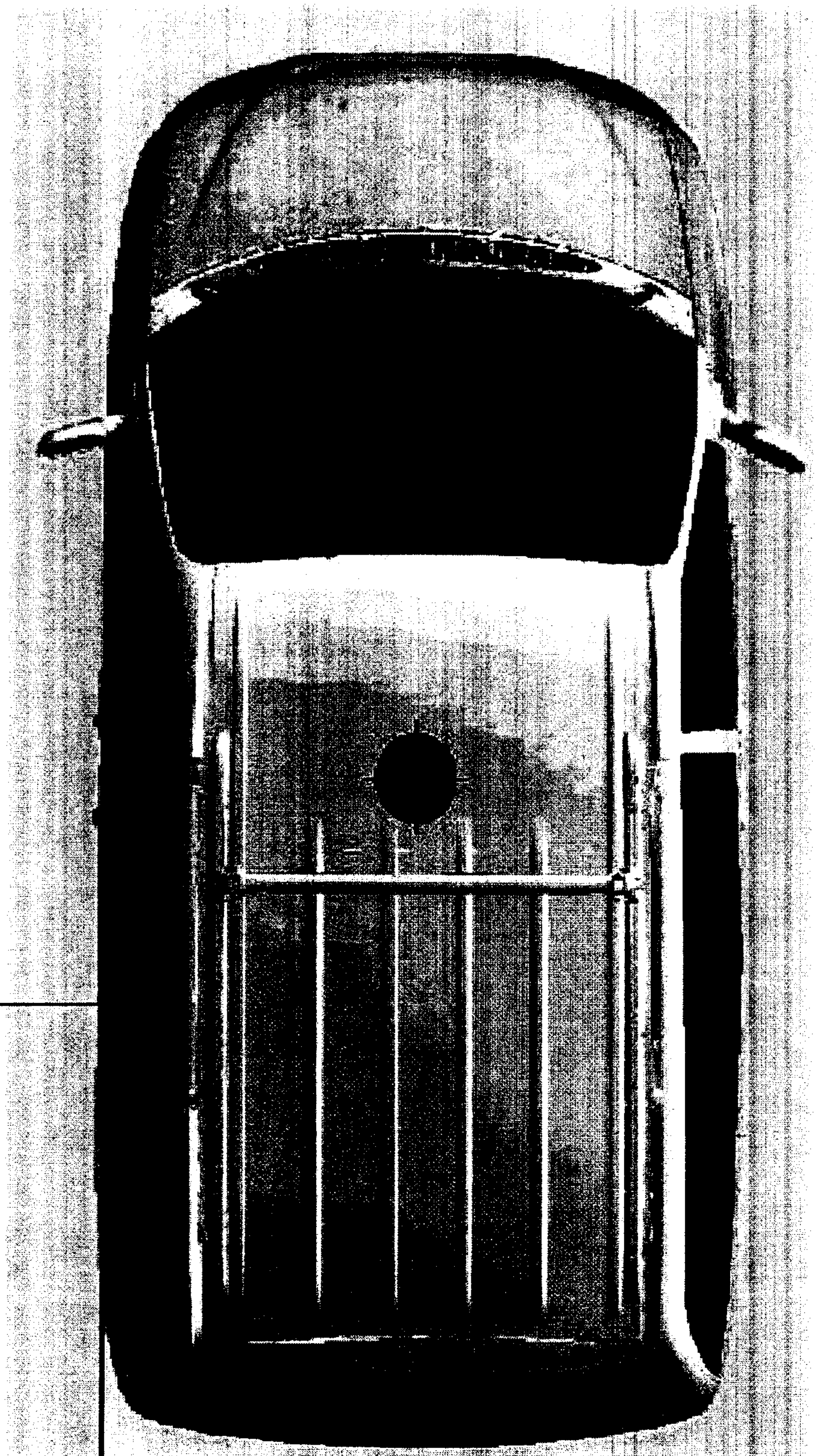
*Energy dissipated includes the crush of the barrier and the vehicle.



104

NS LWB	Centered on Rear Axle
Angular Velocity (rad/s)	3.40
Energy Dissipated*	46,041 ft - lbf

* Energy dissipated includes the crush of the barrier and the vehicle.



1043

DAIMLERCHRYSLER

EA99-013
ROSEBURG, OREGON
DAIMLERCHRYSLER
INSPECTION REPORTS

1044

DAIMLERCHRYSLER

RECEIVED

00 JUL 13 AM 10: 10

OFFICE
DEFECTS INVESTIGATION

DaimlerChrysler Corporation
Matthew C. Reynolds
Director
Vehicle Compliance & Safety Affairs

Mr. Thomas Z. Cooper
Vehicle Integrity Division
Office of Defect Investigations
National Highway Traffic Safety Administration
400 Seventh Street, S. W. (NSA-12; Room 5326)
Washington, D.C. 20590
July 11, 2000

Re: NSA-122jlq; EA99-013

The enclosed materials are in response to your request of December 13, 1999 in regard to the Roseburg, Oregon accident of August 19, 1999. As NHTSA already has copies of the Sheriff's report, the Douglas County Fire District #2 inspection report and associated photographs, they are not included here.

DaimlerChrysler has investigated the Roseburg, Oregon accident and has attached the following materials:

- Enclosure 1: DaimlerChrysler Vehicle Fire Investigation Report on ROM.
- Enclosure 2: Independent Accident Reconstruction Investigation, Noble Engineering on CD-ROM.

The independent investigation conducted by Noble Engineering, concluded that the speed of the GMC van just prior to braking was 63 mph and at impact was still moving at approximately 50 mph. This crash was far more severe than either the FMVSS 301 fuel integrity test, or the FMVSS 214 and Side Impact New Car Assessment Program tests. In fact, this impact is among the most severe of side impacts, which accounts for the medical opinion that the cause of death appeared to be from collision trauma.

Neither the DaimlerChrysler nor Noble Engineering reports could establish a clear cause for the post-crash fire. However, the pictures taken of the vehicle after the fire clearly show that the spare and rear tires are largely intact and the remaining paint on the vehicle only exists on the extreme rear portion of the vehicle. The unconsumed material suggests that the fire origin was not toward the rear of the vehicle, as the origin of the fire typically exhibits the most severe damage and moving away from the origin, less damage will be evident. This evidence suggests that the fuel tank was not breached in the impact and more likely that the fire, initiated from other sources, breached the tank. This is also supported by the total absence of any reference to fuel or fuel odor in the eyewitness accounts. It should be noted that the Douglas County Fire department report indicated that the force of the collision caused the rubber fuel supply hose to disconnect from the solid fuel line allowing fuel from the vehicle tank pump onto the ground. This report identifies a different fuel system connection than the subject fuel hose joint that has been the focus of this EA. DaimlerChrysler does not concur with the suggestion in the Douglas County Fire department report since the fuel pump will stop running when the engine stops.

Sincerely,

Matthew C. Reynolds

Matthew C. Reynolds

Enclosures

1045

DaimlerChrysler Corporation
800 Chrysler Drive CIMS 482-00-91
Auburn Hills MI USA 48326-2757
Phone 248.512.4188
Fax 248.576.7321
e-mail: mcr1@daimlerchrysler.com

1

1046

EA99-013

DISK AVAILABLE UPON REQUEST

1047

2

1048

EA99-013

DISK AVAILABLE UPON REQUEST

1049

NSA-12
Quandt

JUL 20 2000

Howard Silverman
Attorney
GM Legal Staff
General Motors North America
MC 480-106-304
30500 Mound Road
Warren, Michigan 48090

RE: Confidentiality Determination/EA99-013/NSA-122jlq/
GM-586 Part 2

Dear Mr. Silverman:

This is in response to a letter dated May 9, 2000, from Frank C. Sonye, Jr., Director of Product Investigations for General Motors North America (GM), in which he requested confidential treatment for Attachment A to his response. According to Mr. Sonye, Attachment A contains product specifications used by GM during development of the vehicles which are the subject of the above-referenced investigation. Mr. Sonye requested confidential treatment for the information contained in this attachment for an indefinite period of time.

GM asserts that the information contained in Attachment A has commercial value and can be obtained independently only at considerable cost. GM asserts also that this information can be used by competitors to identify testing and specification differences, thereby enabling them to improve their own test procedures and products, without expenditures associated with the evaluation of testing parameters, all at the expense of GM. GM asserts further that Attachment A contains commercial information whose disclosure will likely result in substantial competitive harm.

We have reviewed your submission, including the materials that you claim are entitled to confidential treatment and the arguments that you assert in support of your claim. While we have not reached a conclusion regarding each individual argument that you assert, we have concluded based upon your submission as a whole that the public release of the information contained in these materials is likely to cause substantial competitive harm to GM and, therefore is entitled to confidential treatment pursuant to Exemption 4 of the Freedom of Information Act, 5 U.S.C. §552(b)(4). This information will be protected for an indefinite period of time.

1050

This grant of confidential treatment is subject to certain conditions since this attachment was submitted in connection with a defect investigation by the agency. This information may be disclosed under the authority of 49 U.S.C. §30157(b) and 49 C.F.R. §512.9(a)(2), if the agency decides the disclosure will assist in carrying out the purposes of 49 U.S.C. Chapter 301.

In addition, this information may be disclosed under 49 C.F.R. §512.8, based upon newly discovered or changed facts, and you must inform the agency of any changed circumstances which may affect the protection of the information (49 C.F.R. §512.4(i)). Prior to the release of information under 49 C.F.R. §512.8 or §512.9, you would be notified in accordance with the procedures established by our regulations.

Sincerely,

/s/

Donaldson for

Heidi L. Coleman
Assistant Chief Counsel
for General Law

NSA-12
Quandt

JUL 25 2000

Howard Silverman
Attorney
GM Legal Staff
General Motors North America
MC 480-106-304
30500 Mound Road
Warren, Michigan 48090

RE: Confidentiality Determination/EA99-013/NSA-122jlq/GM-586

Dear Mr. Silverman:

This is in response to a letter dated April 14, 2000, from Frank C. Sonye, Jr., Director of Product Investigation for General Motors North America (GM), in which he requested confidential treatment for Attachments A, B, & D to his response. According to Mr. Sonye, Attachment A contains test procedures and product specifications used by GM during development of the vehicles which are the subject of the above-referenced investigation. Attachments B & D contain engineering drawings. Mr. Sonye requested confidential treatment for these materials for an indefinite period of time.

GM asserts that the information contained in Attachment A has commercial value and can be obtained independently only at considerable cost. GM asserts also that this information can be used by competitors to identify testing and specification differences, thereby enabling them to improve their own test procedures and products, without expenditures associated with the evaluation of testing parameters, all at the expense of GM. GM asserts further that Attachment A contains commercial information whose disclosure will likely result in substantial competitive harm. GM asserts that attachments B & D are within the class determination of confidentiality set forth in 49 CFR Part 512, Appendix B.

We have reviewed your submission, including the materials that you claim are entitled to confidential treatment and the arguments that you assert in support of your claim. We agree that the materials included in Attachments B and D are covered by the class determinations contained in 49 CFR Part 512, Appendix B. While we have not reached a conclusion regarding each of the other individual arguments that you assert, we have concluded based upon your submission as a whole that the public release of the information contained in these materials is likely to cause substantial competitive harm to GM and, therefore, is entitled to confidential treatment pursuant to Exemption 4 of the Freedom of Information Act, 5 U.S.C. §552(b)(4). This information will be protected for an indefinite period time.

This grant of confidential treatment is subject to certain conditions since these materials were submitted in connection with a defect investigation by the agency. These materials may be disclosed under the authority of 49 U.S.C. §30157(b) and 49 C.F.R. §512.9(a)(2), if the agency decides the disclosure will assist in carrying out the purposes of 49 U.S.C. Chapter 301.

In addition, these materials may be disclosed under 49 C.F.R. §512.8, based upon newly discovered or changed facts, and you must inform the agency of any changed circumstances which may affect the protection of the information (49 C.F.R. §512.4(i)). Prior to the release of information under 49 C.F.R. §512.8 or §512.9, you would be notified in accordance with the procedures established by our regulations.

Sincerely,

/s/

Donaldson for

Heidi L. Coleman
Assistant Chief Counsel
for General Law

NSA-12
Quandt

AUG - 2 2000

Jacqueline S. Glassman
Senior Staff Counsel
Regulation and Distribution
Office of the General Counsel
DaimlerChrysler Corporation
1000 Chrysler Drive
Auburn Hills, Michigan 48326-2766

RE: Confidentiality Determination/EA99-013

Dear Ms. Glassman:

This is in response to your letter dated May 26, 2000, in which you request confidential treatment for Enclosures 1 through 20 and a videotape enclosed with your letter. You request confidential treatment for these enclosures in their entirety and on a permanent basis. In your letter, you describe the contents of these enclosures as follows:

- Enclosure 1 contains development vehicle crash test plans from the file of an invitee to the December 10, 1999 meeting referenced in Question 6d of the March 8, 2000 information request.

- Enclosure 2 provides development vehicle crash test plans, component development test plans, test result data, test reports, and vehicle assembly plant processing details from the files of another invitee to the December 10, 1999 meeting.

- Enclosures 3 through 15 provide documents relating to past and ongoing potential product development programs which might effect test results in SINCAP tests of the DaimlerChrysler minivans.

- Enclosures 16 through 20 provide documents relating to DaimlerChrysler vehicle crash tests of DaimlerChrysler minivans in conditions and configurations other than any required by any FMVSS. Some of these tests are similar in several aspects to the SINCAP test NHTSA conducted on January 6, 2000.

- The videotape contains films from the tests described in Enclosures 16 through 20.

1054

In your letter, you assert that the engineering analysis and production process descriptions provided in Enclosures 1 through 20 contain results of DaimlerChrysler's internal product evaluation and production processes for fuel system integrity beyond that mandated by FMVSS 301, in addition to other product functional requirements. You assert also that these documents are confidential because they reveal competitively sensitive information about the product performance factors that DaimlerChrysler considers significant in developing, manufacturing, and marketing a product. You assert that a competitor of DaimlerChrysler would value this information because it would enable the competitor to improve its understanding of the performance factors that DaimlerChrysler believes are important to DaimlerChrysler vehicle customers, thus imposing significant competitive harm on DaimlerChrysler.

You assert that the engineering test data and analysis provided in Enclosures 16 through 20 contain results of DaimlerChrysler's voluntary product performance testing for fuel system integrity beyond that mandated by FMVSS 301, in addition to other product functional requirements. You assert also that product test data and measurements for which DaimlerChrysler claims confidentiality reveal the results of product performance testing conducted voluntarily by DaimlerChrysler at its expense. You assert further that these tests were conducted for the purpose of aiding in understanding the fuel system integrity and other usage performance of your vehicle designs.

In your letter, you assert that these performance measurements are entitled to protection because they reveal research conducted by DaimlerChrysler on its own vehicles at its own expense, the results of which could not be duplicated without significant reverse engineering effort and expense. You assert also that release of this information would allow a competitor to obtain the benefit of DaimlerChrysler's research without having to invest in conducting its own reverse engineering of the DaimlerChrysler product.

Finally, you assert that the engineering drawings contained in Enclosures 3 through 15 are entitled to protection pursuant to NHTSA's class determination contained in Appendix B to Part 512.

I have reviewed your submission, including the materials that you claim are entitled to confidential treatment and the arguments that you assert in support of your claim. While I have not reached a conclusion regarding each individual argument that you assert, I have concluded based upon your submission as a whole that the public release of these materials is likely to cause substantial competitive harm to DaimlerChrysler and, therefore, is entitled to confidential treatment pursuant to Exemption 4 of the Freedom of Information Act, 5 U.S.C. §552(b)(4). These materials will be protected for an indefinite period of time.

This grant of confidential treatment is subject to certain conditions since the information for which confidentiality has been granted was submitted pursuant to a defect investigation. The information may be disclosed under the authority of 49 U.S.C. §30167(b) and 49 C.F.R. §512.9(a)(2), if the agency decides the disclosure will assist in carrying out the purposes of the National Traffic and Motor Vehicle Safety Act.

1055

In addition, this material may be disclosed under 49 C.F.R. §512.8, based upon newly discovered or changed facts, and you must inform the agency of any changed circumstances that may affect the protection of the information (49 C.F.R. §512.4(i)). Prior to the release of information under 49 C.F.R. §512.8 or §512.9, you would be notified in accordance with the procedures established by our regulations.

Sincerely,

/S/

Heidi L. Coleman
Assistant Chief Counsel
for General Law

1056

OCT 27 2000

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Matthew C. Reynolds, Director
Vehicle Compliance and Safety Affairs
DaimlerChrysler Corporation
800 Chrysler Drive - CIMS 482-00-91
Auburn Hills, MI 48326-2757

NSA-122jlq
EA99-013

Dear Mr. Reynolds:

This letter is to request additional information regarding NHTSA's investigation of crash-induced fuel filler neck assembly failure in 1996 through 2000 DaimlerChrysler NS-minivan vehicles.

Unless otherwise stated in the text, the following definitions apply to this information request:

- **Subject vehicles**: all 1996 through 2000 model year DaimlerChrysler NS-minivans.

- **DaimlerChrysler**: DaimlerChrysler Corporation and Chrysler Corporation, all of its past and present officers and employees, whether assigned to its principal offices or any of its field or other locations, including all of its divisions, subsidiaries (whether or not incorporated) and affiliated enterprises and all of their headquarters, regional, zone and other offices and their employees, and all agents, contractors, consultants, attorneys and law firms and other persons engaged directly or indirectly (e.g., employee of a consultant) by or under the control of DaimlerChrysler (including all business units and persons previously referred to), who are or, in or after January 1994, were involved in any way with any of the following related to the alleged defect in the subject vehicles:

  a. design, engineering, analysis, modification or production (e.g. quality control);
  b. testing, assessment or evaluation;
  c. consideration, or recognition of potential or actual defects, reporting, record-keeping and information management, (e.g., complaints, field reports, warranty information, part sales), analysis, claims, or lawsuits; or
  d. communication to, from or intended for zone representatives, fleets, dealers, or other field locations, including but not limited to people who have the capacity to obtain information from dealers.

1057

- **Alleged defect**: crash-induced fuel filler neck assembly failure, resulting in loss of fuel system containment.

- **Documents**: "Document(s)" is used in the broadest sense of the word and shall mean all original written, printed, typed, recorded, or graphic matter whatsoever, however produced or reproduced, of every kind, nature, and description, and all nonidentical copies of both sides thereof, including, but not limited to, papers, letters, memoranda, correspondence, communications, electronic mail (e-mail) messages (existing in hard copy and/or in electronic storage), faxes, mailgrams, telegrams, cables, telex messages, notes, annotations, working papers, drafts, minutes, records, audio and video recordings, data, databases, other information bases, summaries, charts, tables, graphics, other visual displays, photographs, statements, interviews, opinions, reports, newspaper articles, studies, analyses, evaluations, interpretations, contracts, agreements, jottings, agendas, bulletins, notices, announcements, instructions, blueprints, drawings, as-builts, changes, manuals, publications, work schedules, journals, statistical data, desk, portable and computer calendars, appointment books, diaries, travel reports, lists, tabulations, computer printouts, data processing program libraries, data processing inputs and outputs, microfilms, microfiches, statements for services, resolutions, financial statements, governmental records, business records, personnel records, work orders, pleadings, discovery in any form, affidavits, motions, responses to discovery, all transcripts, administrative filings and all mechanical, magnetic, photographic and electronic records or recordings of any kind, including any storage media associated with computers, including, but not limited to, information on hard drives, floppy disks, backup tapes, and zip drives, electronic communications, including but not limited to, the Internet and shall include any drafts or revisions pertaining to any of the foregoing, all other things similar to any of the foregoing, however denominated by DaimlerChrysler, any other data compilations from which information can be obtained, translated if necessary, into a usable form and any other documents. For purposes of this request, any document which contains any note, comment, addition, deletion, insertion, annotation, or otherwise comprises a nonidentical copy of another document shall be treated as a separate document subject to production. In all cases where original and any non-identical copies are not available, "document(s)" also means any identical copies of the original and all non-identical copies thereof. Any document, record, graph, chart, film or photograph originally produced in color must be provided in color. Furnish all documents whether verified by the manufacturer or not. If a document is not in the English language, provide both the original document and an English translation of the document.

In order for my staff to evaluate the alleged defect, certain information is required. Pursuant to 49 U.S.C. § 30166, please provide numbered responses to the following information requests. Please repeat the applicable request verbatim above each response. After DaimlerChrysler's response to each request, identify the source of the information and indicate the last date the source updated the information prior to the preparation of the response. Insofar as DaimlerChrysler has previously provided a document to ODI, DaimlerChrysler may either produce it again, or identify the document, the document submission to ODI in which it was included and the precise location in that submission where the document is located. When documents are produced, the documents shall be produced in an identified, organized manner that corresponds with the Information Request letter (including the subparts). When documents are produced and the documents would not, standing alone, be self-explanatory, the production of documents shall be supplemented and accompanied by explanation.

If DaimlerChrysler cannot respond to any specific request or subpart thereof, please state the reason why it is unable to do so. If DaimlerChrysler claims that any document or other information or material responsive to any of the following items need not be provided to NHTSA because it is privileged or the work product of an attorney, separately by information request number, for each such document or other information or material, state the nature of that information or material and identify any document in which it is found by date, subject or title, name and position of the person from, and the person to whom it was sent, and the name and position of any other recipient. DaimlerChrysler must also describe the basis for the claim, and explain why DaimlerChrysler believes it applies.

1. State the number and provide copies of all of the following, from all sources, of which DaimlerChrysler is aware and which allege fuel spillage or fire in a subject vehicle that has received a left-side impact:

   a. owner/fleet complaints;
   b. field reports;
   c. fire incident claims;
   d. subrogation claims;
   e. lawsuits; and
   f. third-party arbitration proceedings (where DaimlerChrysler is a party to the arbitration).

   Please list and collate your responses for each category ("a" through "f") by model year and date of claim. Please provide for each item in this response the incident date, mileage of vehicle at time of incident (if known), vehicle date of build, disposition of matter, and, where a fleet vehicle is involved, the name of the fleet, and the name and telephone number of a contact person at that fleet. For items "a" through "d," please provide all related information and reports whether or not DaimlerChrysler has verified each one. For items "e" and "f," summaries are acceptable. Please identify in the summary the caption, court, docket number, and filing date of each lawsuit if a copy of the Complaint initiating the lawsuit is not provided.

2. Identify and provide copies of all documents relating to vehicle or component testing, countermeasure evaluation (including testing, cost, lead-time, and other analyses), and to any other study, survey, investigation, or analysis pertaining to the alleged defect conducted by, or for, DaimlerChrysler, including the information listed below. Include all pertinent documents, regardless of whether they are in interim, draft, or final form.

a. provide updated responses to DaimlerChrysler's May 16, 2000 and May 26, 2000 letters (confidential submission) responding to Items 6.a-d and 7.a-d of NHTSA's March 8, 2000 letter regarding the alleged defect in the subject vehicles; and
b. provide copies of all other documents relating to internal DaimlerChrysler meetings or other communications regarding the fuel filler neck assembly design or crash performance in the subject vehicles.

3. Describe the fuel tank and filler neck assembly of the model year 2001 DaimlerChrysler minivans. Include descriptions of all significant differences in tank spud design and filler neck design that could affect the fuel containment capability of the system in a crash. Furnish front, side, and top view drawings of the fuel tank and filler neck assembly in the same format used for the fuel tank and filler neck assembly of the subject vehicles in DaimlerChrysler's February 8, 1999 letter to NHTSA.

4. DaimlerChrysler has indicated, both in a June 1, 2000 meeting with NHTSA and a subsequent letter dated June 23, 2000, that the FMVSS 214 and SINCAP type tests that have resulted in fuel leakage incidents are not representative of crash energies and body intrusions that can occur in real world crashes because of the unique contour and stiffness characteristics of the Moving Deformable Barrier used in those tests. State whether DaimlerChrysler has tested this theory with any vehicle-to-vehicle crash tests into subject vehicles and, if so, provide copies of all relevant documents.

5. Furnish a breakdown of subject vehicle sales by model year, wheelbase, and service start month.

This letter is being sent to DaimlerChrysler pursuant to 49 U.S.C. § 30166, which authorizes NHTSA to conduct any investigation that may be necessary to enforce Chapter 301 of Title 49. DaimlerChrysler's failure to respond promptly and fully to this letter could subject DaimlerChrysler to civil penalties pursuant to 49 U.S.C. § 30165 or lead to an action for injunctive relief pursuant to 49 U.S.C. § 30163. Other remedies and sanctions are available as well.

DaimlerChrysler's response to this letter, in duplicate, must be submitted to this office by December 6, 2000. Please include in DaimlerChrysler's response the identification codes referenced on page one of this letter. If DaimlerChrysler finds that it is unable to provide all of the information requested within the time allotted, DaimlerChrysler must request an extension from Mr. Thomas Z. Cooper at (202) 366-5218 no later than five business days before the response due date. If DaimlerChrysler is unable to provide all of the information requested by the original deadline, it must submit a partial response by the original deadline with whatever information DaimlerChrysler then has available, even if DaimlerChrysler has received an extension.

If DaimlerChrysler considers any portion of its response to be confidential information, 49 CFR Part 512, "Confidential Business Information," requires that DaimlerChrysler submit two copies of those document(s) containing allegedly confidential information (except only one copy of blueprints) and one copy of the documents from which information claimed to be confidential has been deleted, to the Office of Chief Counsel, National Highway Traffic Safety Administration, Room 5219 (NCC-30), 400 Seventh Street, SW, Washington, D.C. 20590. In addition, DaimlerChrysler must provide supporting information for the request for confidential treatment in accordance with 49 CFR Section 512.4(b) and (e) and include the name, address, and telephone number of a representative to receive a response from the Chief Counsel.

If you have any technical questions concerning this matter, please call Mr. Jeff Quandt of my staff at (202) 366-5207. If you have any questions concerning confidentiality claims, please contact Ms. Heidi Coleman, Assistant Chief Counsel for General Law, at (202) 366-1834.

Sincerely,

Kathleen C. DeMeter, Director
Office of Defects Investigation
Safety Assurance

DAIMLERCHRYSLER

EA99-013 SUPPLEMENT
1996 TO 2000 DAIMLERCHRYSLER
MINIVANS FUEL INTEGRITY -
SIDE IMPACT COLLISION TESTS

1062

DAIMLERCHRYSLER

00 AUG ... 9:19

OFFICE
DEFECTS INVESTIGATION

1 [illegible]

DaimlerChrysler Corporation
Matthew C. Reynolds
Director
Vehicle Compliance & Safety Affairs

August 25, 2000

Kathleen C. DeMeter, Director
Office of Defect Investigation, Safety Assurance
National Highway traffic Safety Administration
400 Seventh Street, S.W. (NSA-12; Room 5326)
Washington, D.C. 20590

Re: NSA-122jlq; EA99-013

Dear Ms. DeMeter:

This supplements our November 26, 1999 response to the October 20, 1999 information request for EA99-013 investigation fuel system integrity with 1996 through 2000 model Year DaimlerChrysler minivan vehicles in FMVSS 214 side impact collision tests.

Per Mr. Quandt's phone request of August 16, 2000, Enclosure #1 contains the updated total number of Chrysler minivans produced from Model Year 1996 to Model Year 2000 for the United States market. This information will supplement the response given in Question #1 of the DaimlerChrysler response to EA99-013, dated November 26, 1999. The data has been presented by the build month and model wheelbase.

The incident reports regarding the December 13, 1999 request in regards to the Roseburg, Oregon accident were sent on June 23, 2000 to Ms. Heidi Coleman with a Request for Confidential Treatment. Included in these documents were copies of the DaimlerChrysler Vehicle Fire Investigation Report with inspection photographs, and an independent fire investigation report with inspection photographs.

Sincerely,

Matthew Reynolds

Matthew C. Reynolds, Director
Vehicle Compliance and safety Affairs

Enclosure

1063

DaimlerChrysler Corporation
800 Chrysler Drive CIMS 482-00-91
Auburn Hills MI USA 48326-2757
Phone 248.512.4188
Fax 248.576.7321
e-mail: mcr1@daimlerchrysler.com

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ENCLOSURE #1

1996 TO 2000 MODEL YEAR U.S. MARKET PRODUCTION:

MODEL YEAR:	BUILD MONTH/YEAR:	SWB:	LWB:	TOTAL:
1996	Jan-95	13	107	120
	Feb-95	13	487	500
	Mar-95	4	5,327	5,331
	Apr-95	2	9,235	9,237
	May-95	0	16,545	16,545
	Jun-95	6	22,545	22,551
	Jul-95	1,438	19,036	20,474
	Aug-95	12,078	27,115	39,193
	Sep-95	18,211	25,688	43,899
	Oct-95	24,183	27,002	51,185
	Nov-95	19,022	28,142	47,164
	Dec-95	15,441	26,278	41,719
	Jan-96	18,170	33,198	51,368
	Feb-96	16,016	34,752	50,768
	Mar-96	20,634	36,040	56,674
	Apr-96	20,073	28,345	48,418
	May-96	20,998	33,419	54,417
	Jun-96	22,834	32,018	54,852
	Jul-96	9,824	16,038	25,862
	Aug-96	1	2	3
	Sep-96	1	0	1
	TOTALS:	**218,962**	**421,319**	**640,281**

MODEL YEAR:	BUILD MONTH/YEAR:	SWB:	LWB:	TOTAL:
1997	Mar-96	2	8	10
	Apr-96	3	1	4
	May-96	0	6	6
	Jun-96	4	37	41
	Jul-96	829	6,901	7,730
	Aug-96	11,901	31,362	43,263
	Sep-96	14,501	34,709	49,210
	Oct-96	18,380	37,817	56,197
	Nov-96	20,589	28,534	49,123
	Dec-96	11,271	27,055	38,326
	Jan-97	15,672	33,377	49,049
	Feb-97	14,589	35,376	49,965
	Mar-97	15,282	27,196	42,478
	Apr-97	17,951	29,577	47,528
	May-97	14,135	28,010	42,145
	Jun-97	13,456	26,531	39,987
	Jul-97	2,736	3,854	6,590
	Aug-97	0	1	1
	TOTALS:	**171,301**	**350,352**	**521,653**

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ENCLOSURE #1

MODEL YEAR:	BUILD MONTH/YEAR:	SWB:	LWB:	TOTAL:
1998	Feb-97	4	6	10
	Mar-97	2	19	21
	Apr-97	1	6	7
	May-97	4	3	7
	Jun-97	6	28	34
	Jul-97	8,044	13,330	21,374
	Aug-97	17,440	25,542	42,982
	Sep-97	16,482	32,923	49,405
	Oct-97	13,603	32,714	46,317
	Nov-97	15,331	26,745	42,076
	Dec-97	14,416	27,449	41,865
	Jan-98	15,050	28,050	43,100
	Feb-98	14,481	29,287	43,768
	Mar-98	16,449	33,666	50,115
	Apr-98	16,192	27,953	44,145
	May-98	17,514	30,759	48,273
	Jun-98	23,178	29,800	52,978
	Jul-98	1,491	2,012	3,503
	TOTALS:	**189,688**	**340,292**	**529,980**

MODEL YEAR:	BUILD MONTH/YEAR:	SWB:	LWB:	TOTAL:
1999	Mar-98	4	32	36
	Apr-98	0	6	6
	May-98	1	4	5
	Jun-98	26	18	44
	Jul-98	7,797	10,876	18,673
	Aug-98	18,021	29,819	47,840
	Sep-98	16,855	36,050	52,905
	Oct-98	16,828	30,236	47,064
	Nov-98	13,619	26,758	40,377
	Dec-98	14,382	26,155	40,537
	Jan-99	15,269	27,536	42,805
	Feb-99	15,208	29,791	44,999
	Mar-99	24,040	28,822	52,862
	Apr-99	16,000	28,815	44,815
	May-99	17,778	29,411	47,189
	Jun-99	16,402	30,994	47,396
	Jul-99	399	51	450
	Aug-99	1	0	1
	TOTALS:	**192,630**	**335,374**	**528,004**

1066

ENCLOSURE #1

MODEL YEAR:	BUILD MONTH/YEAR:	SWB:	LWB:	TOTAL:
2000	Feb-99	1	2	3
	Mar-99	0	9	9
	Apr-99	0	0	0
	May-99	0	9	9
	Jun-99	1	1	2
	Jul-99	9,304	17,666	26,970
	Aug-99	19,609	30,518	50,127
	Sep-99	16,391	21,704	38,095
	Oct-99	15,447	33,697	49,144
	Nov-99	15,227	29,873	45,100
	Dec-99	12,170	26,071	38,241
	Jan-00	17,222	28,635	45,857
	Feb-00	15,005	35,523	50,528
	Mar-00	15,069	38,199	53,268
	Apr-00	14,964	25,680	40,644
	May-00	15,275	30,199	45,474
	Jun-00	20,659	26,836	47,495
	Jul-00	0	20,151	20,151
	Aug-00	0	3,435	3,435
	TOTALS:	**186,344**	**368,208**	**554,552**

SUMMARY TABLE:

MODEL YEAR:	SWB:	LWB:	TOTAL:
1996	218,962	421,319	640,281
1997	171,301	350,352	521,653
1998	189,688	340,292	529,980
1999	192,630	335,374	528,004
2000	186,344	368,208	554,552
TOTALS:	**958,925**	**1,815,545**	**2,774,470**

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DAIMLERCHRYSLER

RECEIVED

00 DEC 19 AM 10: 28

OFFICE
DEFECTS INVESTIGATION

DaimlerChrysler Corporation
Matthew C. Reynolds
Director
Vehicle Compliance & Safety Affairs

December 15, 2000

Kathleen C. DeMeter, Director
Office of Defect Investigation, Safety Assurance
National Highway Traffic Safety Administration
400 Seventh Street, S.W. (NSA-12; Room 5326)
Washington, D.C. 20590

Re: NSA-122jlq; EA99-013

Dear Ms. DeMeter:

The attached materials are in response to the October 27, 2000 supplemental information request for EA99-013 regarding fuel system integrity on 1996 through 2000 Model Year DaimlerChrysler minivan subjected to FMVSS 214 side impact collision tests.

There have been no additional incidents reported to DaimlerChrysler where, as the result of a left side impact, a fuel leak or fire resulted.

Sincerely,

Matthew C. Reynolds, Director
Vehicle Compliance and Safety Affairs

Attachments and Enclosures

DaimlerChrysler Corporation
800 Chrysler Drive CIMS 482-00-91
Auburn Hills MI USA 48326-2757
Phone 248.512.4188
Fax 248.576.7321
e-mail: mcr1@daimlerchrysler.com

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ATTACHMENT

Q1. State the number and provide copies of all of the following, from all sources, of which DaimlerChrysler is aware and which allege fuel spillage or fire in a subject vehicle that has received a left-side impact:

a.owner/fleet complaints;
b.field reports;
c.fire incident claims;
d.subrogation claims;
e.lawsuits; and
f.third-party arbitration proceedings (where DaimlerChrysler is a party to the arbitration).

Please list and collate your responses for each category ("a" through "f") by model year and date of claim. Please provide for each item in this response the incident date, mileage of vehicle at time of incident (if known), vehicle date of build, disposition of matter, and, where a fleet vehicle is involved, the name of the fleet, and the name and telephone number of a contact person at that fleet. For items "a" through "d," please provide all related information and reports whether or not DaimlerChrysler has verified each one. For items "e" and "f," summaries are acceptable. Please identify in the summary the caption, court, docket number, and filing date of each lawsuit if a copy of the Complaint initiating the lawsuit is not provided.

A1. a-f) There have been no new incidents of fire or fuel leakage resulting from a left side impact in 1996 to 2000 model year DaimlerChrysler minivans reported to DaimlerChrysler since the last submission of August 25, 2000.

Q2. Identify and provide copies of all documents relating to vehicle or component testing, countermeasure evaluation (including testing, cost, lead-time, and other analyses), and to any other study, survey, investigation, or analysis pertaining to the alleged defect conducted by, or for, DaimlerChrysler, including the information listed below. Include all pertinent documents, regardless of whether they are in interim, draft, or final form.

a. provide updated responses to DaimlerChrysler's May 16, 2000 and May 26, 2000 letters (confidential submission) responding to Items 6.a-d and 7.a-d of NHTSA's March 8, 2000 letter regarding the alleged defect in the subject vehicles; and
b. provide copies of all other documents relating to internal DaimlerChrysler meetings or other communications regarding the fuel filler neck assembly design or crash performance in the subject vehicles.

A2. a) The response to this question is being submitted under separate cover with a Request for Confidential Business Information.

ATTACHMENT

b) DaimlerChrysler has no further documents responsive to this question beyond those previously provided and other than those listed on the Privilege Log.

Enclosure #1 contains memos between DaimlerChrysler and Dynamic Technologies. These documents include meeting requests, information requests from Dynamic Technologies for technical information, and specifications.

Q3. Describe the fuel tank and filler neck assembly of the model year 2001 DaimlerChrysler minivans. Include descriptions of all significant differences in tank spud design and filler neck design that could affect the fuel containment capability of the system in a crash. Furnish front, side, and top view drawings of the fuel tank and filler neck assembly in the same format used for the fuel tank and filler neck assembly of the subject vehicles in DaimlerChrysler's February 8, 1999 letter to NHTSA.

A3. The response to this question is being submitted under separate cover with a Request for Confidential Business Information.

Q4. DaimlerChrysler has indicated, both in a June 1, 2000 meeting with NHTSA and a subsequent letter dated June 23, 2000, that the FMVSS 214 and SINCAP type tests that have resulted in fuel leakage incidents are not representative of crash energies and body intrusions that can occur in real world crashes because of the unique contour and stiffness characteristics of the Moving Deformable Barrier used in those tests. State whether DaimlerChrysler has tested this theory with any vehicle-to-vehicle crash tests into subject vehicles and, if so, provide copies of all relevant documents.

A4. DaimlerChrysler Corporation has not conducted any such tests. Outside counsel to DaimlerChrysler has conducted one or more tests for the purpose of providing advice to DaimlerChrysler with respect to potential litigation. DaimlerChrysler therefore considers that work product to be privileged. There is no documentation at this time relating to that testing.

Q5. Furnish a breakdown of subject vehicle sales by model year, wheelbase, and service start month.

A5. Per a phone conversation with Mr. Jeff Quandt, this question has been withdrawn.

To respond to this investigation DaimlerChrysler conducted through searches of locations likely to have relevant documents and inquires of responsible persons likely to know relevant information, in the same manner as we have cooperated with other NHTSA investigations. The scope of this search did not, nor could it reasonably, include all of DaimlerChrysler as defined in NHTSA's October 27, 2000 information request.

PRIVILEGE LOG:

1. Communications between J. Glassman and Platform Engineers, Re: Information requested to provide advice with respect to potential litigation.

2. Communications from S. Krystoff to Platform Engineer dated November 2000, Re: Information requested by Legal Counsel.

3. Updated chart containing data requested by Legal Counsel.

1

1072

To: sfk2@daimlerchrysler.com
cc:

Subject: Re: Request for information

Mr. Krystoff

Thank you for the information. We did acquire a used tank but wish to know the intended nominal size. As you see per your tolerance the diameter could vary 1.50 mm. We noticed this in the part we had. With this wide dimensional difference, sealing to all possible sizes and shape will still be achieved by our design.

We will keep you informed of our progress. Thanks again.

1073

To: sfk2@daimlerchrysler.com
cc: crc9@daimlerchrysler.com

Subject: Request for information

Dear Steve Krystoff,

I was informed by your associate, Clint Spevak, that you will be taking over the investigation of our proposal for a retrofit of an Inlet Check Valve.

We are requesting information on the inside dimension of the inlet port to the fuel tank. We also need the tolerance for this dimension. If a print could be obtained this would be the best situation. My associate Kimberlie Jones will be in the area Tuesday and could swing by to pick up this drawing. This information is important for our final sizing of our prototype which will be shown to you and your Engineers.

Please inform me if this is possible. Also, what is your direct telephone number were you could be reached. We would be happy to sit down with you personally to help update you on our proposal.

We're looking forward in working with you.

Best Regards,

n on 06/27/2000 10:14:33 AM

To: sfk2@daimlerchrysler.com
cc: crc9@daimlerchrysler.com

Subject: (no subject)

Dear Steve:

This is to bring you up-to-date on our ICV retrofit. We have finalized our patent and are ready to disclose our full design to you. We have also kicked off sample prototypes, which will be available the week following the holidays.

Due to the upcoming holiday, we are prepared to meet with your group on Friday to review the design, discuss testing requirements, and talk about how you would like to progress on this project. If Friday is not convenient, please propose an alternate date next week.

Due to the fact that you were not at the first meeting, we would be happy to sit down with you to bring you up-to-date and answer any questions that you may have prior to the next scheduled meeting. Please advise if this would be your preference.

We look forward to meeting with you soon.

Best Regards,

1075

. on 07/10/2000 09:27:34 AM

To: sfk2@daimlerchrysler.com
cc: KJones5656@aol.com

Subject: Confirmed meeting

Dear Steve,
A meeting at 10:00 tomorrow will work for us. I propose the meeting agenda will be:

1) Review of proposed design
2) Installation procedure
3) Preliminary DVP&R review
4) Progress status and availability of first prototype

This agenda should take a full hour of discussion. Miss Jones and myself are scheduled to make this meeting. Kim will make contact with you today for any final meeting arrangements.

We are looking forward on meeting you and with your group again.

Best Regards,

1076

07/12/2000 07:11 PM

To: Stephen F Krystoff/CTC/Chrysler@Chrysler
cc: Virginia J Fischbach/CTC/Chrysler@Chrysler

Subject: DYNAMICS TECH REQUEST

DC_Refueling.pd

If you have access to the ADDRES system on the Intranet, you can download or print PF-8950 and send it along with this attachment to Dynamics Technologies.

Thanks,
Namir

1077

.m on 08/14/2000 06:20:06 AM

To: sfk2@daimlerchrysler.com
cc: KJones5656@aol.com

Subject: Proposal submittal

Dear Steve,
We are ready to submit the ICV proposal. If Tuesday afternoon around 2 or 3 is OK we would like to meet for 15 to 30 minutes. This will give enough time to go over the proposal and answer any questions you may have. We will also give you some possible alternatives for consideration and the latest update on our testing results.

Kimberlie will try to contact you to arrange this meeting.

Thanks Again,

Ray

1078

)aol.com on 08/18/2000 04:38:23 PM

To: sfk2@daimlerchrysler.com
cc: KJones5656@aol.com

Subject: Thanks

Hi Steve,

Thanks for meeting with us. We were happy to meet Rob and see everyone again. Some thoughts that I had after leaving that maybe you could pass on. Some of the testing could be started in a week or so. Since the seal mold is completed and the other parts are a machined item, we would be able to start those tests ASAP. We have a meeting with Detroit Testing on Monday and will review a best case scenario.

Also we are starting to brain storm a few ways to make the tool fool proof as requested and came up with a few ideas. We hope to be ready to show you these ideas next week.

In closing, even though this is a different concept or approach to remedy the situation, it is not impossible and it is feasible to get it done in an expedited manner. We are aware and take seriously the importance of developing a very capable process and product. This I wish to assure everyone we will accomplish.

Thanks Again.
Ray

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01 JAN 17 AM 11:40

OFFICE
DEFECTS INVESTIGATION

DAIMLERCHRYSLER

DaimlerChrysler Corporation
Matthew C. Reynolds
Director
Vehicle Compliance & Safety Affairs

January 12, 2001

Ms. Kathleen C. DeMeter, Director
Office of Defect Investigations, Safety Assurance
National Highway Traffic Safety Administration
400 Seventh Street, S.W. (NSA-12; Room 5326)
Washington, D.C. 20590

Re: NSA-122jlq: EA99-013

Dear Ms. DeMeter:

This document completes DaimlerChrysler's response to the referenced inquiry, dated October 27, 2000 supplemental information request for EA99-013 regarding fuel system integrity on 1996 through 2000 Model Year DaimlerChrysler minivans subjected to FMVSS 214 side impact collision tests.

Portions of the response to Question 2 are provided in Enclosure 1, Enclosure 2 and Enclosure 3. Enclosure 4 is in response to Question 3. All of these enclosures are marked "confidential", and have been withheld from this submission and have been sent directly to the NHTSA's Office of Chief Counsel in a separate package pursuant to 49 CFR Part 512. That package contains a letter setting forth the justification for confidential treatment.

Sincerely,

Matthew C. Reynolds
Vehicle Compliance and Safety Affairs

Enclosures

1080

DaimlerChrysler Corporation
800 Chrysler Drive CIMS 482-00-91
Auburn Hills MI USA 48326-2757

DAIMLERCHRYSLER

DaimlerChrysler Corporation
Matthew C. Reynolds
Director
Vehicle Compliance & Safety Affairs

January 12, 2001

Ms. Heidi Coleman
Office of the Chief Counsel
National Highway Traffic Safety Administration
Room 5219
400 Seventh Street, S.W.
Washington, D.C. 20590

Re: <u>Request for Confidential Treatment for Certain Documents Provided in Response to EA99-013</u>

Dear Ms. Coleman:

DaimlerChrysler Corporation has submitted information to the Office of Defects Investigation relating to EA99-013. In connection with that submission, DaimlerChrysler is submitting certain documents to the Office of Chief Counsel and requesting that they be permanently protected from public release pursuant to 49 C.F.R. Part 512.

DaimlerChrysler has carefully reviewed its submission and has identified documents containing confidential information the disclosure of which would cause competitive harm. The justifications for confidential treatment are set forth below.

A. Evaluation and Remediation Protocols

The documents contain highly sensitive information relating to DaimlerChrysler's attempts to identify, evaluate, and remedy potential problems relating to 1996 to 2000 DaimlerChrysler minivan fuel systems. The information in the documents reveals DaimlerChrysler's processes for identifying and addressing fuel system issues. The disclosure of such information would permit DaimlerChrysler's competitors to duplicate DaimlerChrysler's design, research, and remediation protocols without incurring the substantial expense associated with the development of their own protocols. This information, therefore, is commercially valuable, and its release would cause DaimlerChrysler substantial competitive harm.[1]

---

[1] *See Worthington Compressors, Inc. v. Costle*, 662 F.2d 45, 52 (D.C. Cir. 1981) (in determining whether information should be withheld pursuant to Exemption 4, consideration should be given to "whether release of the requested information, given its commercial value to competitors, and the cost of acquiring it. through other means, will cause substantial competitive harm to the business that submitted it"); *Public Citizen Health Research Grp. v. FDA*, 997 F. Supp. 56, 63 (D.D.C. 1998) (finding competitive harm based on the fact that disclosure would allow competitors "to follow in [the submitters'] footsteps, and thereby get a competitive product to the market sooner than otherwise"), *aff'd in part & rev'd in part*, 185 F.3d 898

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B. ***Design Information and Performance Factors and Standards***

The documents also are exempt from disclosure under FOIA because they reveal competitively valuable design and performance factor information. A number of the documents set forth key design elements for the fuel system, and others reveal the performance factors that DaimlerChrysler considers significant in developing and marketing products and in investigating and remedying potential problems. Like the other information in this submission, the design and standards information reflected in these documents is the product of DaimlerChrysler's years of experience in the industry and reflects substantial investments of time and money in its development. Thus, disclosure of the information would be a windfall to DaimlerChrysler's competitors, as well as to would-be suppliers, because it would enable them to incorporate design elements and to discover the performance standards that DaimlerChrysler deems significant without incurring the substantial time and expense necessary to develop their own designs and standards. As a result, DaimlerChrysler would suffer substantial competitive harm.[2]

The design information also qualifies for trade secret status under Exemption 4 because it is "a secret, commercially valuable plan, formula, process or device that is used for the making * * * of trade commodities and that can be said to be the end product of either innovation or substantial effort." *Public Citizen I*, 704 F.2d at 1288. The information comes within this definition because it "reveal[s] a manufacturer's design decisions and judgments about" fuel system design and performance. *Center for Auto Safety*, 93 F. Supp. 2d at 15.

C. ***Class Determinations***

Engineering Blueprints and Drawings. The documents submitted contain engineering blueprints and/or drawings containing information relating to the process of production. DaimlerChrysler's the information contained on these renderings could not be otherwise obtained except after significant reverse engineering. Further, DaimlerChrysler Corporation has maintained the confidentiality of the information

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(D.C. Cir. 1999). "Valuable intellectual property," such as this information, is protected from disclosure under Exemption 4 of the Freedom of Information Act, 5 U.S.C. § 552(b)(4). *Occidental Petroleum Corp. v. SEC*, 873 F.2d 325, 341 (D.C. Cir. 1989).

[2] *See, e.g.*, *Worthington Compressors*, 662 F.2d at 51 ("Because competition in business turns on the relative costs and opportunities faced by members of the same industry, there is a potential windfall for competitors to whom valuable information is released under FOIA. If those competitors are charged only minimal FOIA retrieval costs for the information, rather than the considerable costs of private reproduction, they may be getting quite a bargain. Such bargains could easily have competitive consequences not contemplated as part of FOIA's principal aim of promoting openness in government.") (footnote omitted); *Public Citizen II*, 185 F.3d at 905.

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contained on these blueprints and drawings and has insisted that any suppliers who have received this information do the same.

D. Financial Data

The documents contain information relating to the cost of engineering, materials, and components, as well as costs associated with remedying defects and other sensitive financial information. The public release of this information would afford a competitor access to some of DaimlerChrysler Corporations fixed and variable costs, permitting the competitor to take advantage of this information to DaimlerChrysler Corporation's detriment.

****

As detailed above, the information for which DaimlerChrysler seeks confidential treatment has significant competitive value and would be harmful to DaimlerChrysler's competitive position if released. Accordingly, it should be withheld under Exemption 4 of FOIA. *See also, e.g., National Parks & Conservation Ass'n v. Morton*, 498 F.2d 765, 770 (D.C. Cir. 1974) (information is exempt if its release would cause "substantial harm to the competitive position" of submitter); *Worthington Compressors*, 662 F.2d at 52 (information should be withheld if its release, "given its commercial value to competitors and the cost of acquiring it through other means, will cause substantial competitive harm to the business that submitted it"). Moreover, some of the information also consists of protected trade secrets under Exemption 4.

The certification required by your regulations is attached to this letter. If you need any clarifications or additional information, please contact Jacqueline S. Glassman, Senior Staff Counsel at (248) 512-2781. If you receive a request for disclosure of these documents before you have completed your review of our claim for confidential treatment, DaimlerChrysler respectfully requests notification of the request and an opportunity to provide further justification for the confidential treatment of this information, if warranted.

Certificate in Support of Request for Confidentiality

I, Matthew C. Reynolds, pursuant to the provisions of 49 C.F.R. Part 512, state as follows:

(1) I am DaimlerChrysler Corporation's Director, Vehicle Certification, Compliance and Safety Affairs and I am authorized by DaimlerChrysler to execute documents on behalf of DaimlerChrysler;

(2) The information contained in the indicated documents is confidential and proprietary data and is being submitted with the claim that is entitled to confidential treatment under 5 U.S.C. § 552 (b) (4).

(3) I have personally inquired of the responsible DaimlerChrysler personnel who have authority in the normal course of business to release the information for which a claim of confidentiality has been made to ascertain whether such information has ever been released outside DaimlerChrysler, except as to DaimlerChrysler suppliers with the understanding that such information be kept confidential.

(4) Based upon such inquiries, to the best of my knowledge, information and belief the information for which DaimlerChrysler has claimed confidential treatment has never been released or become available outside DaimlerChrysler, except as stated in Paragraph 3; and

(5) I make no representations beyond those contained in this certificate and in particular, I make no representations as to whether this information may become available outside DaimlerChrysler because of unauthorized or inadvertent disclosure; and

(6) I certify under penalty of perjury that the foregoing is true and correct.

Executed on this 12 day of January, 2001.

Matthew C. Reynolds

Matthew C. Reynolds

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DAIMLERCHRYSLER

RECEIVED

01 APR 14 PM 3:02

OFFICE
DEFECTS INVESTIGATION

DaimlerChrysler Corporation

March 20, 2001

Mr. J. Quandt
Office of Defect Investigations
National Highway Traffic Safety Administration
400 Seventh Street, S. W. (NSA-12; Room 5326)
Washington, D. C. 20590

Re: NSA-122jlq: EA99-013

Dear Mr. Quandt;

Enclosed are two copies, on CD, of the Thompson Accident Police Photographs. The 4 photographs that you viewed when DaimlerChrysler was in your office on March 14, 2001 are also included on the CD.

Sincerely,

S.F. Krystoff

S. F. Krystoff

Enclosures

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DaimlerChrysler Corporation
800 Chrysler Drive CIMS 482-00-91
Auburn Hills MI USA 48326-2757

U.S. Department
of Transportation

**National Highway
Traffic Safety
Administration**

Memorandum

Subject: Defects Investigation EA99-013

Date: 8/9/01

From: Tom Cooper

Reply to
Attn of:

To: Public File for EA99-013

The attached information from DaimlerChrysler is submitted to the public file.

1. Test summary of FMVSS and SINCAP tests
2. Summary of Compliance Report for MY 2000 5/30/01
3. Overview drawings of fuel system for NS Minivan 4/30/01

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	SWB		LWB	
	214	**SINCAP**	**214**	**SINCAP**
3 Door	VC-5178 6/94 VC-5486 5/95 *NHTSA SWB #1 1/5/99*	*NHTSA SWB #2 1/6/00* *** VC-8147 1/14/00* *** VC-8207 2/22/00 spring brk't removed* **VC-8312 3/27/00 P-TEC convolute (vent sep)** **VC-8392 4/12/00 std ass'y with ICV ,** **LEAKAGE FROM TANK AGEA.**	No 214 test	No SINCAP test
4 Door	No 214 test EuroNCAP EDSI 3/99	*** VC-8171 2/2/00 (vent sep)*	VC-5395 2/95 VC-6761 1/98 (RG SAB mule built from 1997 NS)	**NHTSA LWB #1 11/98** **NHTSA LWB #2 12/98**

SINCAP SUMMARY:

*** Separation at Tank Spud* VC-8147, VC-8207, VC-8171.

NO SPUD SEPARATION, BUT FUEL LEAKAGE: VC-8312, VC-8392.

DAIMLERCHRYSLER

FACSIMILE COVER SHEET

TO: Mr. Thomas Z. Cooper

FAX #: 202 366-1767

RE: EA99-013

DATE: May 30, 2001

PAGES: 23

The enclosed materials are in response to your phone call regarding side impact testing on the 1996 - 2000 DaimlerChrysler Minivan.

From the desk of...

Stephen F. Krystoff
Government Safety Liaison Senior Specialist
DaimlerChrysler Corporation
800 DaimlerChrysler Drive CIMS 482-00-91
Auburn Hills, MI 48326-2757

Phone: 248-512-4224 (TL 722-4224)
Fax:248-576-7321

email: sfk2@daimlerchrysler.com

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Information

DAIMLERCHRYSLER

Report #: 00-NS-301

Compliance Report

Subject: Fuel Loss Limitations and Static Rollover Test Procedures (For CMVSR or FMVSS 301)

Model Year: 2000

Procedure: CP-246G CP-245F CP-234I CP-233H CP-232F CP-194K

Standard: MVSS 301

Standard Title: Fuel System integrity

Requirements: Fluid Loss Limitation and Static Rollover Test Procedures to Determine Vehicle Fuel System Integrity

Vehicle Type: MPV

Family Codes: NS

Approvals

Diana A Cernis **Department Manager**	DACe	05/25/99 01:03:33 PM **Approval Date**
Robert A Gasparovich **Executive Engineer**	Robert A Gasparovich	05/25/99 01:49:41 PM **Approval Date**

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Summary

DAIMLERCHRYSLER

Subject: Fuel Loss Limitations and Static Rollover Test Procedures (For CMVSR or FMVSS 301)

Objective: Verification of design Compliance with the Requirements of Safety Standard MVSS 301

Conclusion: Based on the information below, the 2000 NS-Body wagon, as design released, complies with the requirements of FMVSS 301 - Sections S5.2, S5.5 and S5.6.

Safety Documentation Compliance Report

Prepared By: Mark W Crossman **Date:** 05/25/99
Approved By: Diana A Cernis **Date:** 05/25/99

Issued By: 9940 - Minivan Safety Development & Quality (NS / EPIC)

Discussion

DAIMLERCHRYSLER

The Chrysler Corporation 2000 NS-Body wagons include the Dodge Caravan and Grand Caravan, Plymouth Voyager and Grand Voyager, and Chrysler Town & Country.

The NS-Body has unibody construction. Two wheelbase selections are available: 113" and 119". A right-side sliding door is standard equipment. A left-side sliding door is also standard equipment on the long-wheelbase models. An optional sliding door is available on the left side of short-wheelbase models. Side impact beams are located in all side doors (both hinged and sliding). The hood consists of an outer panel, reinforcing inner panel, and several local reinforcements welded and adhesively bonded together. Hood hinges have tubular construction. The windshield is bonded to the windshield opening with a urethane adhesive.

The NS-Body features transverse mounted gasoline-powered 3.8 liter, 3.3 liter, or 3.0 liter (V6) engines, or a 2.4 liter (I4) engine. All engines are equipped with multi-point injection fuel control systems. The 3.8, 3.3 and 3.0 liter engines are equipped with a 4-speed electronic automatic transaxle. The 2.4 liter engine is equipped with a 3-speed automatic transaxle. An optional all-wheel-drive 3.8 liter engine with 4-speed electronic automatic transaxle is available on long-wheelbase models only.

NS-Body wagons are equipped with supplemental driver and front passenger airbags. The airbags are activated by a single-point airbag electronic control module mounted on the dash panel in the area of the center tunnel. The driver airbag module mounts to the steering wheel. The passenger airbag module is in the instrument panel, concealed by seamless doors. Kneeblockers are incorporated into the instrument panel. A 3-point active unibelt system is standard at all outboard seating positions. The 3-point belt systems in the front and middle seat rows also have adjustable turning loops.

Tilt and non-tilt steering columns are available. A three-spoke steering wheel with center-blow horn is standard.

Front suspension includes a cast aluminum crossmember with stamped steel reinforcing underplate, anti-roll bar, cast lower control arms and McPherson struts. The rear suspension includes a beam axle, leaf springs and shock absorbers. Load-leveling rear suspension is available on some front-wheel-drive models, and is standard on all-wheel-drive models.

The fuel system consists of a 20 gallon plastic fuel tank and in-tank electric fuel pump. The threaded gas cap and fuel filler housing are mounted behind a door in the left side panel.

Anti-lock brakes are standard equipment on most models. The modulator is mounted under the floorpan, just behind the left rear leg of the front suspension crossmember. Non-ABS brakes are available on select models.

Nineteen tests were conducted for FMVSS 301 - Fuel System Integrity.

VC's 5338, 6363, and 6826 were prepared and tested in accordance with Chrysler Corporation Compliance Procedure:

CP-194 "Fixed Collision Barrier 30 MPH Frontal Impact Test," Change 'K.'

VC's 5341, 5367, 5899, and 6437 were prepared and tested in accordance with Chrysler Corporation Compliance Procedure:

CP-232 "Fixed Collision Barrier 30 MPH Angled Frontal Impact Test,"Change 'F.'

VC 5359 was prepared and tested in accordance with Chrysler Corporation Compliance Procedure:

CP-234 "Moving Barrier 30 MPH Rear Impact Test," Change 'H.'

VC's 5381 and 5538 were prepared and tested in accordance with Chrysler Corporation Compliance Procedure:
CP-233 "Moving Barrier 20 MPH Lateral Impact Test," Change 'H.'

Following barrier impact, VC's 5338 through 6826 were further tested in accordance with Chrysler Corporation Compliance Procedure:
CP-245 "Fuel System Integrity - Static Rollover Test," Change 'F.'

VC's 5338 through 6826 satisfied the fuel spillage criteria specified in Chrysler Corporation Compliance Procedure:
CP-246 "Fuel System Integrity," Change 'G.'

XT 406 (XTTR189) was prepared and tested in accordance with the Transportation Research Center, Inc's procedures for FMVSS-301 flat frontal tests. This vehicle exhibited no fuel leakage during the test, immediately following the test or during the post-test rollover.

XT 411 (IM 254) was prepared and tested in accordance with MGA's procedures for FMVSS-301 flat frontal tests. This vehicle exhibited no fuel leakage during the test, immediately following the test or during the post-test rollover.

XT 413 (6V53) was prepared and tested in accordance with MGA's procedures for FMVSS-301 angular rigid-barrier tests. This vehicle exhibited no fuel leakage during the test, immediately following the test or during the post-test rollover.

XT 418 (IM 270) was prepared and tested in accordance with MGA's procedures for FMVSS-301 lateral impact tests. This vehicle exhibited no fuel leakage during the test, immediately following the test or during the post-test rollover.

XT's 514 and 551 were prepared and tested in accordance with Calspan's procedures for FMVSS-301 angular rigid-barrier tests. These vehicles exhibited no fuel leakage during the test, immediately following the test or during the post-test rollover.

XT 517 was prepared and tested in accordance with Calspan's procedures for FMVSS-301 flat frontal rigid-barrier tests. This vehicle exhibited no fuel leakage during the test, immediately following the test or during the post-test rollover.

XT 520 and 521 were prepared and tested in accordance with Calspan's procedures for FMVSS-301 rear moving barrier tests. These vehicles exhibited no fuel leakage during the test, immediately following the test or during the post-test rollover.

For the nineteen tests listed above, fuel leakage during and following impact and during static rollover was within the limits specified in FMVSS 301, Sections S5.5 and S5.6.

"Summary 1" is provided in the Appendix with specific detail on test mode, build condition, and fuel system integrity performance observations during impact, immediately following impact, and during the post-test roll-over.

Based on the above, the 2000 NS-Body wagon, as design released, complies with the requirements of FMVSS 301 - Fuel System Integrity, Sections S5.2, S5.5, and S5.6.

Appendix

DAIMLERCHRYSLER

SUMMARY I

FUEL SYSTEM INTEGRITY
2000 NS-BODY - WAGON

Test No. (Date)	Impact Mode	Vehicle Model & Description	Vehicle Identification No.
VC 5338 (01/12/95)	Flat Frontal	Dodge Grand Caravan, 2WD, 3.8L MPI Engine, 4EATX.	1B4GP54L6TB100430
VC 5341 (01/24/95)	30o Left Angular	Plymouth Grand Voyager, 2WD, 3.3L MPI Engine, 4EATX.	1P4GP44R7TB100790
VC 5359 (02/03/95)	Rear without Hitch	Plymouth Grand Voyager, 2WD, 3.3L MPI Engine, 4EATX. Restrike of 30 mph Frontal.	1P4GP44R0TB100341
VC 5367 (02/09/95)	30o Right Angular	Plymouth Grand Voyager, 2WD, 3.3L MPI Engine, 4EATX.	1P4GP44R6TB100344
VC 5381 (02/15/95)	Left Lateral	Dodge Grand Caravan, 2WD, 3.8L MPI Engine, 4EATX. Restrike of 30 mph Frontal.	1B4GP54L6TB100430
VC 5538 (09/07/95)	Left Lateral	Dodge Caravan, 2WD, 2.4L MPI Engine, 3ATX. Restrike of 30 mph Right Angle.	1B4FP25B*TR999938
VC 5899 (04/27/96)	30o Left Angular	Chrysler Town & Country, AWD, 3.8L MPI Engine, 4EATX.	1C4GT64L?V*200001
VC 6363 (05/02/97)	Flat Frontal	Plymouth Grand Voyager, 2WD, 3.3L MPI Engine, 4EATX.	1P4GP44R?W*200006
VC 6437 (05/19/97)	30o Right Angular	Dodge Grand Caravan, 2WD, 3.8L MPI Engine, 4EATX.	1B4GP54L?W*365181
VC 6826 (02/23/98)	Flat Frontal	Plymouth Grand Voyager, 2WD, 3.3L MPI Engine, 4EATX.	2P4GP44R?X*500003
XT 406 XTTR189 (04/26/95) TRC	Flat Frontal	Dodge Caravan, 2WD, 2.4L MPI Engine, 3ATX.	1B4FP25B4TB101205
XT 411	Flat	Dodge Caravan, 2WD,	1B4FP453?T?999939

IM 254 (06/02/95) MGA	Frontal	3.0L MPI Engine, 3ATX.	
XT 413 6V53 (06/07/95) MGA	30o Left Angular	Dodge Caravan, 2WD, 3.0L MPI Engine, 3ATX.	1B4FP453*TR999915
XT 418 IM 270 (05/08/95) MGA	Left Lateral	Plymouth Grand Voyager, 2WD, 3.3L MPI Engine, 4EATX. Mopar aluminum running board on left (impacted) side of vehicle.	1P4GP44R5TB100528
XT 514 (09/28/95) Calspan	30o Right Angular	Dodge Grand Caravan, 2WD, 2.4L MPI Engine, 3ATX.	2B4GP24B9TR500084
XT 517 (10/23/95) Calspan	Flat Frontal	Dodge Grand Caravan, AWD, 3.8L MPI Engine, 4EATX.	1B4GP54L4TB146130
XT 520 (10/30/95) Calspan	Rear without Hitch	Dodge Caravan, 2WD, 3.0L MPI Engine, 3ATX. Restrike of 30 mph Left Angle.	1B4FP453*TB999915
XT 521 (10/31/95) Calspan	Rear with Hitch	Dodge Caravan, 2WD, 3.3L MPI Engine, 4EATX. Class II Mopar hitch with drawbar. Restrike of 30 mph Flat Front.	1B4GP45R4TB158193
XT 551 (02/12/96) Calspan	30o Right Angular	Dodge Grand Caravan, AWD, 3.8L MPI Engine, 4EATX.	1B4GP44R7TB123018

Remarks:

Vehicles above exhibited no fuel leakage: At impact, during the first thirty minutes immediately following impact, and during the post-test rollover evaluation.

Allowable leakage by weight:
1. One ounce at impact.
2. Five ounces in first five minute period immediately following impact.
3. Not more than one ounce per minute in the next 25 minutes.
4. During post-test rollover: Five ounces for first five minutes after each 90 degree rotation, and not more than one ounce per minute thereafter.

Tests conducted with 50th percentile male ATD's in driver and right front passenger seating positions, and 100 lbs. of secured luggage ballast in cargo area.

All tests are carryover from 1999 model year compliance report.

"Attachment A": VC 5338, 5341, 5359, 5367, 5381, XT 406 (XTTR189), XT 418 (IM 270), XT 411 (IM 254), XT413 (6V53), VC 5538, VC 5899, XT 514, XT 517, XT 520, XT 521, XT 551, VC 6363, VC 6437, and VC 6826 test reports (Pages A1 - A124) provided below.

SAFETY TEST
VEHICLE CRASH TEST LETTER

VC05381 20 MPH LATERAL, NSKP53 3.8L FWD ITEM IM205AR
1996 USA 301 COMPLIANCE, FUEL SYSTEM INTEGRITY
TEST DATE 02/15/95

TEST PURPOSE	PRIMARY, 1996 USA 301 COMPLIANCE. FUEL SYSTEM INTEGRITY.	
IMPACT TYPE	TARGET SPEED;	20.2 MPH
	DAMAGE LOCATION;	LEFT CENTER
	BARRIER TYPE;	LEFT TYPE IV
	BARRIER SURFACE;	PLYWOOD
VEHICLE	BODY CLASS;	NS
	CAR LINE;	KP
	BODY;	53
	ENGINE;	3.8 LITRE
	ENGINE NOTE;	MPI
	TRANSMISSION;	4 SPEED AUTO ELECTRONIC
	TRANS. NOTE;	41TE
	VIN AS TESTED;	1B4GP54L6TB100430 MOD.
	VIN AS BUILT;	1B4GP54L6TB100430 MOD.
TEST SPEED	20.1 MPH BY ELECTRONIC TRAP TIMER.	
TEST WEIGHT (LBS)	4655 TOTAL, 2281 FRONT, 2374 REAR	
OCCUPANTS	LEFT FRONT, 50TH MALE HYB II, BALLAST AD-53 RESTRAINT-UNIBELT.	
	RIGHT FRONT, 50TH MALE HYB II, BALLAST AD-63 RESTRAINT-UNIBELT.	

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SAFETY TEST
VEHICLE CRASH TEST LETTER

VC05381 20 MPH LATERAL, NSKP53 3.8L FWD ITEM IM205AR
1996 USA 301 COMPLIANCE, FUEL SYSTEM INTEGRITY
TEST DATE 02/15/95

BUILD CONDITION	1996 NSKP53 LWB FWD 3.8L 41TE. PVP BUILT AT SL. BODY: -119" WB, DOUBLE SLIDING DOORS. -HSS REAR RAILS WITH 0.5" X 1.5" SLOTS IN BOTH SIDES OF BOTH RAILS, JUST AFT OF SPLICE. CHASSIS: -FRONT SUSP. CROSSMEMBER W/REINFORCEMENT PLATE. -LEAF SPRING REAR SUSP. - STANDARD DUTY SPRINGS, NO REAR ANTI-SWAY BAR. -ROAD WHEELS: 215/65R16 TIRES ON ALUMINUM WHEELS. -SPARE: 215/65R16 TIRE ON STEEL WHEEL, LOCATED UNDER REAR FLOORPAN. -20 GALLON PLASTIC FUEL TANK. -ANTI-LOCK BRAKES. POWERTRAIN: -3.8L MPI V6, 41TE FRONT-WHEEL-DRIVE. ELECTRICAL: -LIVE AIRBAGS NOT INSTALLED FOR TEST. -AECM NOT INSTALLED OR MONITORED. INTERIOR: -DRIVER POWER AND PASSENGER MANUAL LOWBACK CLOTH BUCKET SEATS. -MIDDLE AND REAR SEATS REMOVED PRE-TEST TO ALLOW ROOM FOR INSTRUMENTATION. -FRONT AC SYSTEM. RESTRIKE OF 30 MPH FRONTAL, VC-5338.
TARGET WEIGHT (LBS)	4207 LBS TOTAL, 2412 FRONT, 1795 REAR. REPRESENTS MAX. OPTION WEIGHT OF 1996 NSKP53, NOT INCLUDING OCCUPANTS OR LUGGAGE.
FUEL AND BALLAST	19.0 GALLONS STODDARD SOLVENT. 100 LBS SECURED IN CARGO AREA. 225 LBS SECURED TO FLOORPAN BEHIND RF SEAT.
POST TEST REMARKS	THERE WAS NO FUEL LEAKAGE DURING IMPACT, NOR DURING THE SUBSEQUENT THIRTY MINUTES. A POST-TEST STATIC ROLLOVER WAS CONDUCTED WITHOUT FUEL LEAKAGE.

SAFETY TEST
VEHICLE CRASH TEST LETTER

VC05381 20 MPH LATERAL, NSKP53 3.8L FWD ITEM IM205AR
1996 USA 301 COMPLIANCE, FUEL SYSTEM INTEGRITY
TEST DATE 02/15/95

REPORT CODES	A = TRANSDUCER DATA	B = ALL FILM DATA
	C = HIGH SPEED FILM	D = ENGINEER'S REPORT
	E = DUMMY KINEMATICS	F = STEERING COLUMN
	G = UNDERBODY	H = A-POST
	I = DYNAMIC CRUSH	J = ENGINE COMPARTMENT
	K = DOOR CRUSH	L = FORCE/CRUSH/ENERGY
	M = SPECIAL	
DISTRIBUTION	M.W. CROSSMAN	482-02-13 (AB)
	D.J. MCKENZIE	422-05-01 (AB)

DATE 02/16/95 TIME 10.59.26.

FUEL SYSTEM AND STATIC ROLLOVER SUMMARY

TEST NUMBER VC5381, ITEM NUMBER IM305A, TEST ENGINEER MANNEY

V.I.N. 1B4GP54L6TB100430, TEST DATE 2/15/95, ROLL DATE 2/16/95

TEST TYPE; 20 MPH TYPE IV MOVING BARRIER LATERAL IMPACT

FUEL; TYPE AND QUANITY - .767 S.G. STODDARD SOLVENT, 19.0 GALLONS

TEST SPEED 20.1 MPH, TEST WEIGHT 4655 POUNDS.

POST TEST FUEL SYSTEM OBSERVATIONS OK

POST IMPACT LEAKAGE(OZ); AT IMPACT 0
1ST 5 MIN. 0
NEXT 25 MIN. 0

POST TEST PRESSURE CHECK N/A

ELECTRIC FUEL PUMP RUN N/A

STATIC ROLL LEAKAGE WITH VEHICLE LEFT SIDE DOWN FIRST

ROLL TIME		FUEL LEAKAGE LOCATIONS DURING STATIC ROLL				TOTAL	
0-90	1ST 5 MIN					0	*
2:08	POST 5 MIN					0	**
90-180	1ST 5 MIN					0	*
2:10	POST 5 MIN					0	**
180-270	1ST 5 MIN					0	*
2:07	POST 5 MIN					0	**
270-360	1ST 5 MIN					0	*
2:08	POST 5 MIN					0	**

* OUNCES IN 5 MINUTES, ** OUNCES PER MINUTE

LAST FORM MODIFICATION 5/27/93 - GAB

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DATE 09/08/95 ELECTRONIC DATA PROCESSING VEHICLE CRASH ENGINEERING
TIME 16.00.26. EDP TEST LETTER DEPT 5320

VC05538 ITEM IM255R
"C05538 20 MPH LATERAL, NSKL52, 2.4L FWD ITEM IM255R
ı96 USA 301 COMPLIANCE, FUEL SYSTEM INTEGRITY
TEST DATE 09/07/95

TEST PURPOSE	PRIMARY, 1996 USA 301 COMPLIANCE. FUEL SYSTEM INTEGRITY.
IMPACT TYPE	TARGET SPEED; 20.2 MPH DAMAGE LOCATION; LEFT CENTER BARRIER TYPE; LEFT TYPE IV BARRIER SURFACE; PLYWOOD
VEHICLE	BODY CLASS; NS CAR LINE; KL BODY; 52 ENGINE; 2.4 LITRE ENGINE NOTE; MPI TRANSMISSION; 3 SPEED AUTO TRANS. NOTE; VIN AS TESTED; 1B4FP25B*TR999938 MOD. VIN AS BUILT; 1B4FP25B*TB999938 MOD.
TEST SPEED	20.0 MPH - TRAP TIMER
TEST WEIGHT (LBS)	4299 TOTAL, 2263 FRONT, 2036 REAR
CUPANTS	LEFT FRONT, 50TH MALE HYB II, BALLAST AD-60 RESTRAINT-UNIBELT. RIGHT FRONT, 50TH MALE HYB II, BALLAST AD-76 RESTRAINT-UNIBELT.
BUILD CONDITION	1996 NSKL52 SWB FWD 2.4L 3ATX. C1 BODY FRAMED AT SLS. BODY: -113" WB, DOUBLE SLIDING DOORS. CHASSIS: -P205/75R14 TIRES ON STEEL WHEELS. -P215/65R16 SPARE ON STEEL WHEEL UNDER REAR FLOOR. -20 GALLON PLASTIC FUEL TANK. -ANTI-LOCK BRAKES. POWERTRAIN: -2.4L MPI I4, 3ATX FRONT-WHEEL-DRIVE. ELECTRICAL: -LIVE AIRBAGS NOT INSTALLED FOR TEST. INTERIOR: -DRIVER AND PASSENGER CLOTH BUCKET SEATS. -FRONT AC SYSTEM. RESTRIKE OF 30 MPH 30 DEGREE RIGHT ANGLE IMPACT TEST 6/1/95.

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DATE 09/08/95
TIME 16.00.26.

ELECTRONIC DATA PROCESSING
EDP TEST LETTER

VEHICLE CRASH ENGINEERING
DEPT 5320

VC05538 ITEM IM255R
VC05538 20 MPH LATERAL, NSKL52, 2.4L FWD ITEM IM255R
396 USA 301 COMPLIANCE, FUEL SYSTEM INTEGRITY
TEST DATE 09/07/95

TARGET WEIGHT (LBS) 3835 TOTAL, 2225 FRONT, 1610 REAR. REPRESENTS MAX OPTION WEIGHT OF NSKL52, NOT INCLUDING OCCUPANTS OR LUGGAGE BALLAST.

FUEL AND BALLAST 19.0 GALLONS STODDARD SOLVENT.
100 LBS LUGGAGE BALLAST INCLUDED IN THE INSTRUMENTATION WEIGHT SECURED IN THE CARGO AREA.
350 POUNDS IN REAR SEAT AREAS

POST TEST REMARKS THERE WAS NO FUEL LEAKAGE DURING IMPACT, POST IMPACT OR DURING THE POST TEST STATIC ROLL.

EDP TECHNICIAN S. MARCHENIA

No. of Pages 20
CC

M. W. CROSSMAN 482-02-13
D. J. MCKENZIE 422-05-01

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FUEL SYSTEM AND STATIC ROLLOVER SUMMARY

TEST NUMBER VC5538, ITEM NUMBER IM255R, TEST ENGINEER BUSS

V.I.N. 1B4FP25B*TR999938, TEST DATE 9/7/95 ROLL DATE 9/8/95 [redacted]

TEST TYPE; 20 MPH TYPE IV MOVING BARRIER RT. LEFT LAT. IMPACT

FUEL; TYPE AND QUANITY - .767 S.G. STODDARD SOLVENT, 19.0 GALLONS

TEST SPEED 20.0 MPH. TEST WEIGHT 4299 POUNDS.

POST TEST FUEL SYSTEM OBSERVATIONS NO OBVIOUS FUEL SYSTEM COMPONENT DAMAGE.

POST IMPACT LEAKAGE(OZ); AT IMPACT Ø
1ST 5 MIN. Ø
NEXT 25 MIN. Ø

POST TEST PRESSURE CHECK N/A

ELECTRIC FUEL PUMP RUN N/A

STATIC ROLL LEAKAGE WITH VEHICLE LEFT SIDE DOWN FIRST

ROLL TIME		FUEL LEAKAGE LOCATIONS DURING STATIC ROLL				TOTAL	
0-90	1ST 5 MIN					0	*
1:56	POST 5 MIN					0	**
90-180	1ST 5 MIN					0	*
1:57	POST 5 MIN					0	**
180-270	1ST 5 MIN					0	*
1:54	POST 5 MIN					0	**
270-360	1ST 5 MIN					0	*
1:51	POST 5 MIN					0	**

* OUNCES IN 5 MINUTES, ** OUNCES PER MINUTE

LAST FORM MODIFICATION 5/27/93 - GAB

LATERAL SECTION 2
~~FRONTAL~~ BARRIER IMPACT

A 199d Plymouth Grand Voyager was impacted by a FMVSS 301 moving barrier at a velocity of 20.3 mph. The barrier impacted the vehicle laterally in the left side. The test was performed at the MGA Proving Grounds and Crash Test Center on May 8, 1995. Pre- and post-test photographs of the vehicle and dummies can be found in Appendix A.

The left side lateral impact event was documented by one real-time camera and 12 high speed cameras. Camera locations and other pertinent camera information can be found in this report.

Two Hybrid II, 50th percentile male anthropomorphic test devices (ATDs) were placed in the driver and right-front passenger seating positions for ballast purposes only. Both dummies were restrained with seat belts. Appendix B contains the vehicle and load cell barrier data traces. The data was recorded on 1 computer.

No stoddard solvent leaked from the vehicle after impact. Details of FMVSS 301 "Fuel System Integrity" can be found on pages 3-2 through 3-6 of this report.

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GENERAL TEST AND VEHICLE PARAMETER DATA

Vehicle Yr/Make/Model/Body Style: 1996 Plymouth Grand Voyager 4 Door

Body color: White Test Date: Mry 8, 1995

VIN: 1P4GP44R5TB100528

Engine: 6 Cylinders; 3.8 Liter

X Gas; __Diesel; __Turbocharged

__Longitudinal; X Transverse

Transmission: 4 Speed; __ Manual; X Automatic; __Overdrive

Final Drive: X Front Wheel; __Rear Wheel; __Four Wheel

Odometer Reading: 19.0 miles

Vehicle Equipment:

X A/C; X P/S; X P/B; __P/wdo;

X Tilt Wheel; __P/seats; X Cruise Control

Type of Occupant Restraint: Type II Seatbelts with driver and passenger airbags

Driver Airbag: Yes Passenger Airbag: Yes

Tires on Vehicle: P215/75R15 ; Manufacturer: Michelin

Tire Pressure: 35 psi

Number of Occupants: 2 Front; 2 Rear; 3 3rd Seat; 7 TOTAL

Type of Front Seats: X Bucket; __Bench; __Split Bench

Type of Front Seat Back: __Fixed; X Adj. With Lever

GENERAL TEST AND VEHICLE PARAMETER DATA (Continued)

WEIGHT OF TEST VEHICLE AS RECEIVED - UDW (1):

Right Front = 1089 lb. Right Rear = 856 lb.

Left Front = 1241 lb. Left Rear = 849 lb.

TOTAL FRONT WEIGHT = 2330 lb. (57.7 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 1705 lb. (42.3 % of Total Vehicle Weight)

TOTAL UNLOADED DELIVERED WEIGHT (UDW) = 4035 lb.

CALCULATION FOR TARGET TEST WEIGHT:

Target Test Weight supplied by Chrysler: 4597 lbs.

WEIGHT OF TEST VEHICLE WITH REQUIRED DUMMIES AND CARGO:

Right Front = 1184 lb. Right Rear = 1059 lb.

Left Front = 1308 lb. Left Rear = 1045 lb.

TOTAL FRONT WEIGHT = 2492 lb. (54.2 % of Total Vehicle Weight)

TOTAL REAR WEIGHT = 2104 lb. (45.8 % of Total Vehicle Weight)

TOTAL TEST WEIGHT = 4596 lb.

Weight of ballast secured in vehicle = 250 lb.

Vehicle components removed for testing:

NONE

Wheel Base: 119.7 in; C.G. = 54.8 in rearward of front wheel C/L

(1) Weight of Vehicle As Received From Chrysler Corporation.

FUEL SYSTEM DATA

VEHICLE YR/MAKE/MODEL/BODY STYLE: 1996 Plymouth Grand Voyager 4 Door

TEST DATE: May 8, 1995

Fuel System Capacity = NR gallons

Actual Test Volume = 19.0 gallons

Test Fluid Type: Stoddard Solvent; Spec. Grav. = 0.77

Kinematic Viscosity = 1.788 centistokes; Color = Purple

Type of Fuel Pump: X Electric; __Mechanical

Does electric pump operate with ignition switch "On" and engine "Off"?*

__Yes X No

FMVSS 301 POST IMPACT TEST DATA

TEST REQUIREMENTS:

Test vehicle's fuel tank filled to 92 to 94% of manufacturer's usable capacity and with electric fuel pump operating (if it will operate without engine operation). Part 572E test dummies located at each front designated seating position.

TEST VEHICLE IMPACT TYPE:

__ Frontal (30 mph)

__ Oblique (30 mph) with __°barrier face first contacting (driver/passenger) side

__ Rear Moving Barrier (30 mph)

X Lateral Moving Barrier (20 mph)

FUEL SPILLAGE MEASUREMENT:

	POST IMPACT TEST	TEST RESULTS	MAXIMUM ALLOWABLE
1.	From impact until vehicle motion ceases	0 oz.	1 oz.
2.	For 5 minutes period after vehicle motion ceases	0 oz.	5 oz.
3.	For next 25 minutes	0 oz.	1 oz./1 min.

FUEL SPILLAGE LOCATION(S): NONE

* Fuel pump was directly connected to vehicle battery during the test.

NR = Not Recorded

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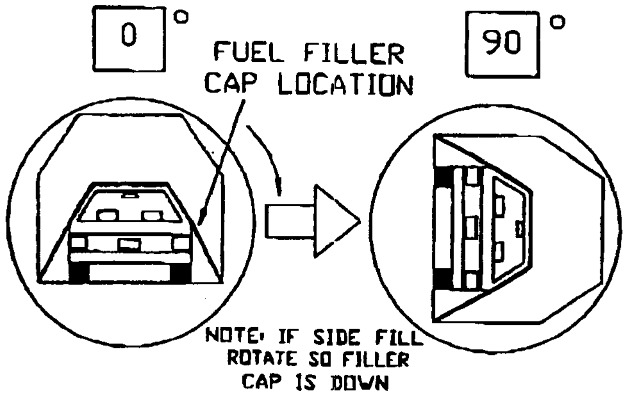
1. **FUEL SPILLAGE MEASUREMENT (0° - 90°):**



A. **DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:**

Rollover Fixture 90° Rotation Time: _2_ min., _43_ sec.
(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time: + _5_ min., _0_ sec.

TOTAL _7_ min., _43_ sec.

Next Whole Minute Interval _8_ minutes

B. **FMVSS 301 REQUIREMENTS AND ACTUAL TEST VEHICLE SOLVENT SPILLAGE:**

TIME PERIOD:

	ACTUAL	MAX. ALLOW.
1. First 5 min. FROM onset of rotation	0	5.0 oz.
2. 6th minute	0	1.0 oz.
2. 7th minute	0	1.0 oz.
3. 8th minute (if req'd)	0	1.0 oz.

NOTE: Record spillage for whole minute intervals only as determined above.

SOLVENT SPILLAGE LOCATIONS:

NONE

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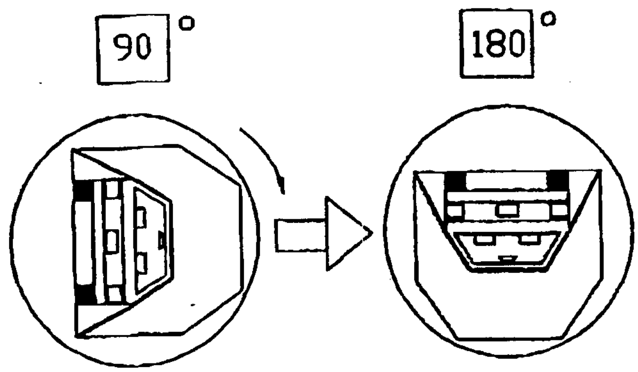
2. FUEL SPILLAGE MEASUREMENT (90° - 180°):



A. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time: 2 min., 30 sec.
(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time: + 5 min., 0 sec.

TOTAL 7 min., 30 sec.

Next Whole Minute Interval 8 minutes

B. FMVSS 301 REQUIREMENTS AND ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

TIME PERIOD:

	ACTUAL	MAX. ALLOW.
1. First 5 min. FROM onset of rotation	0	5.0 oz.
2. 6th minute	0	1.0 oz.
2. 7th minute	0	1.0 oz.
3. 8th minute (if req'd)	0	1.0 oz.

NOTE: Record spillage for whole minute intervals only as determined above.

SOLVENT SPILLAGE LOCATIONS:

NONE

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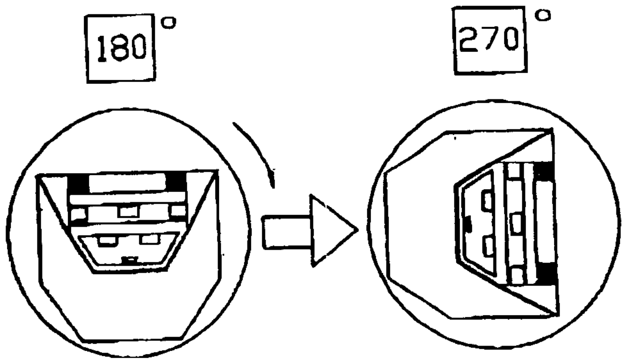
3. FUEL SPILLAGE MEASUREMENT (180° - 270°):



A. DETERMINATION OF SOLVENT COLLECTION TIME PERIOD:

Rollover Fixture 90° Rotation Time: 2 min., 15 sec.
(Spec. Range = 1 to 3 minutes)

FMVSS 301 Position Hold Time: + 5 min., 0 sec.

TOTAL 7 min., 15 sec.

Next Whole Minute Interval 8 minutes

B. FMVSS 301 REQUIREMENTS AND ACTUAL TEST VEHICLE SOLVENT SPILLAGE:

TIME PERIOD:

	ACTUAL	MAX. ALLOW.
1. First 5 min. FROM onset of rotation	0	5.0 oz.
2. 6th minute	0	1.0 oz.
2. 7th minute	0	1.0 oz.
3. 8th minute (if req'd)	0	1.0 oz.

NOTE: Record spillage for whole minute intervals only as determined above.

SOLVENT SPILLAGE LOCATIONS:

NONE

DAIMLERCHRYSLER

FACSIMILE COVER SHEET

TO: Mr. Thomas Z. Cooper

FAX #: 202 366-1767

RE: EA99-013

DATE: April 30, 2001

PAGES: 8

Following is a copy of DaimlerChrysler's response for the above referenced inquiry. The complete response is being sent overnight UPS and will be at your location tomorrow.

From the desk of...

Stephen F. Krystoff
Government Safety Liaison Specialist
DaimlerChrysler Corporation
800 DaimlerChrysler Drive CIMS 482-00-91
Auburn Hills, MI 48326-2757

Phone: 248-512-4224 (TL 722-4224)
Fax:248-576-7321

email: sfk2@daimlerchrysler.com

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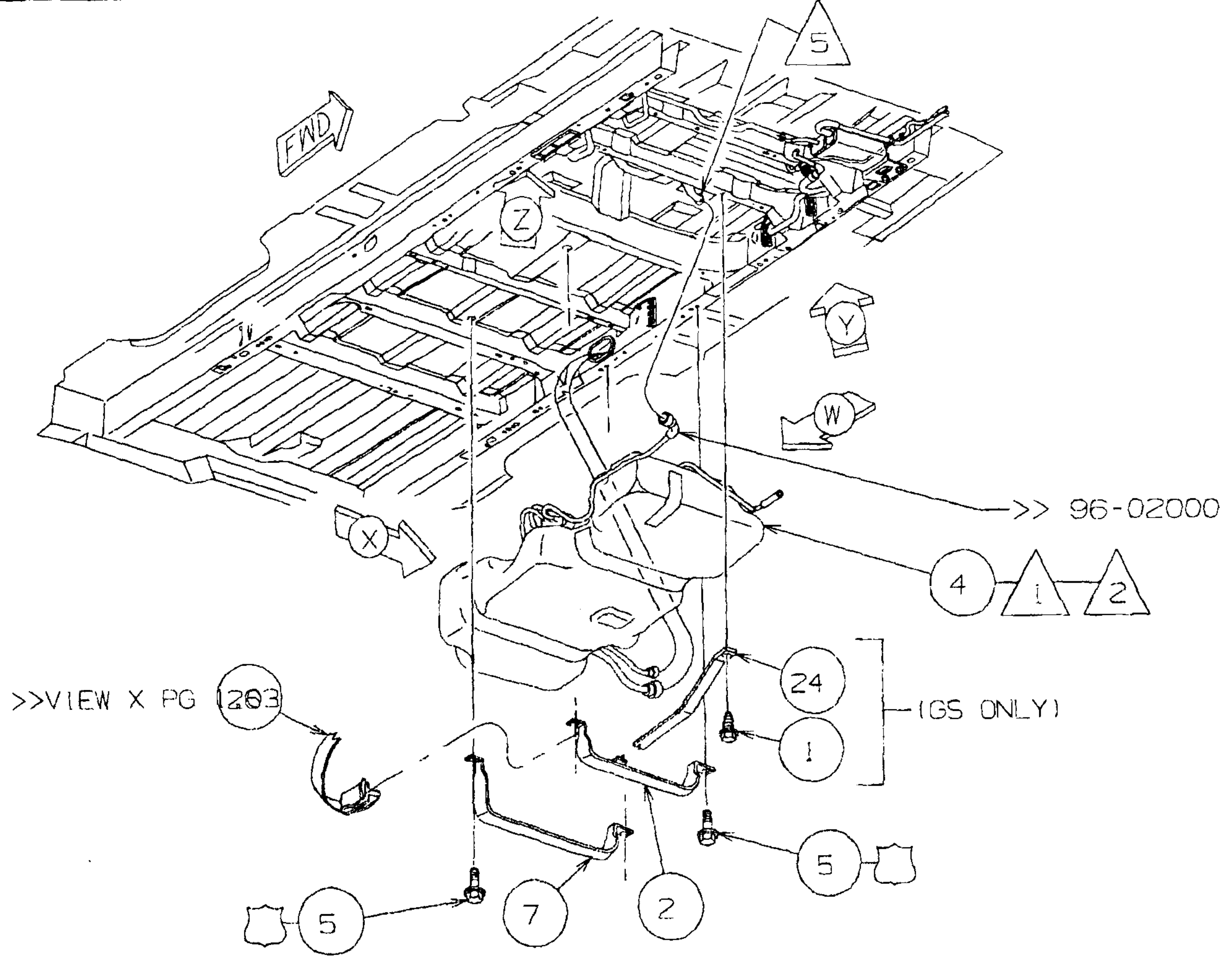
DAIMLERCHRYSLER

Released
Engineering Graphics System

Report Created: 1/31/01 10:19:40 AM



Rev	CN No.	Last Overview Package Revision: R	Date	By	Part VSC
R	80406M02	PCN-DRIVEN: PART REVISE/RELEASE/CANCEL	05/11/98	10	13110
		ITEM 4 4809594AF WAS AE			13220
Q	PER ENGR	NOTES REVISION NOTE 5 OPTIONAL ADDED	03/05/98	10	13305
P	80114M00	PCN-DRIVEN: PART REVISE/RELEASE/CANCEL	02/11/98	10	
		ITEM 8 4764917AA WAS 4279841			
O	71203M01	PCN-DRIVEN: PART REVISE/RELEASE/CANCEL	01/05/98	10	
		ITEM 1 WAS 00154554			
Rev	CN No.	Revisions Effecting This Page	Date	By	

Engineering Graphics
TCF Overview

GR Number:	98NG0165	GR Status:	Complete
Model-Year:	1998	Vehicles:	GS NS
Illustrator:	R. SCOTT	Rel Date:	5-Mar-98
Overview VSC:	13000 - FUEL SYSTEM		

Overview Title

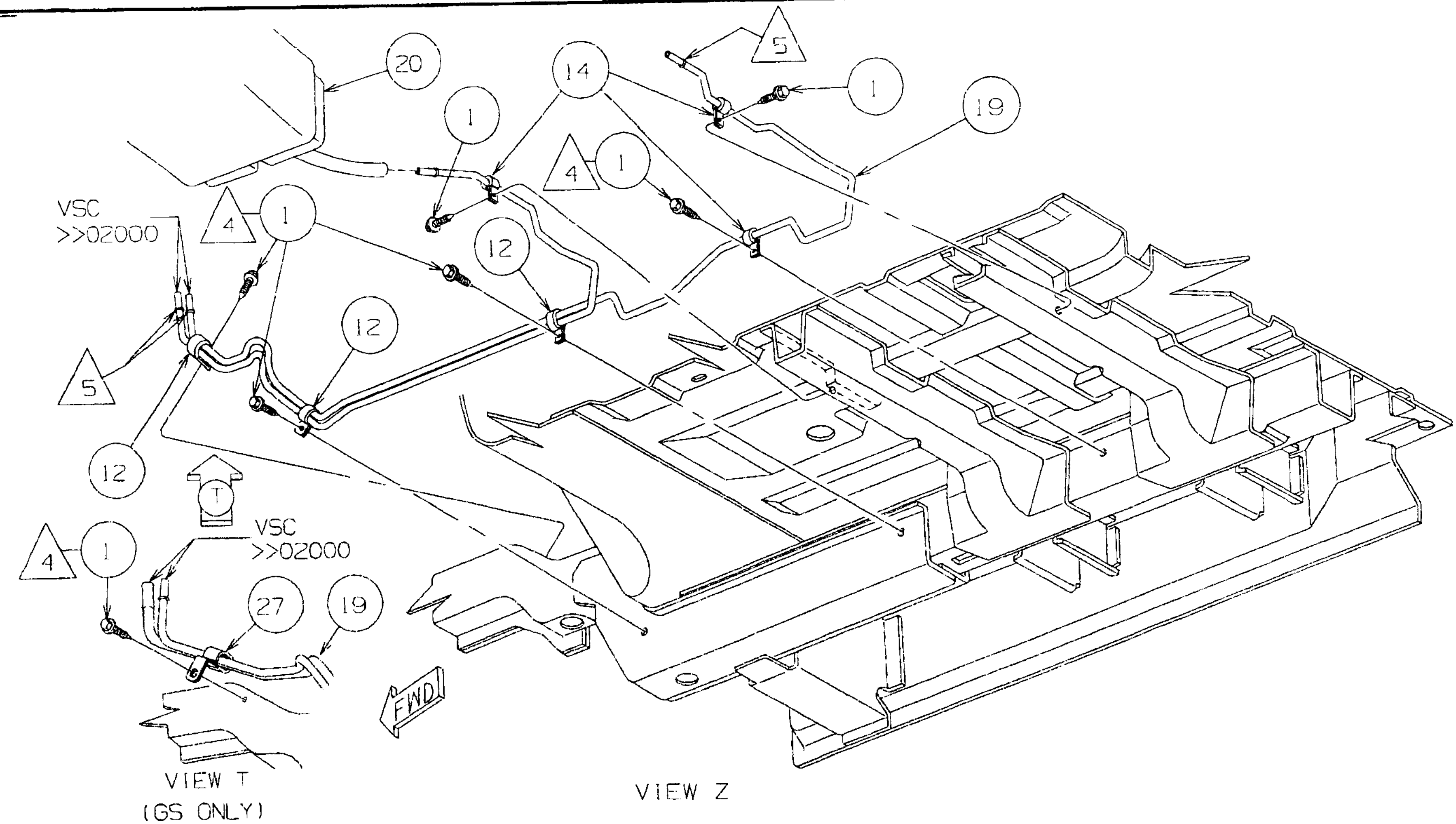
FUEL SYSTEM - EXCEPT DIESEL

1110

DAIMLERCHRYSLER

Released
Engineering Graphics System

Report Created: 1/31/01 10:19:40 AM



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B	PER ENGR	PCN-DRIVEN: NOTES REVISION NOTE 5 ADDED	01/23/97	10
A		INITIAL RELEASE OVERVIEW	01/16/97	BDB3

Revisions Effecting This Page

Part VSC
13110
13220
13305

Engineering Graphics
TCF Overview

GR Number:	98NG0166	GR Status:	Complete
Model-Year:	1998	Vehicles:	GS NS
Illustrator:	R. SCOTT	Rel Date:	5-Mar-98
Overview VSC:	13000 - FUEL SYSTEM		

Overview Title

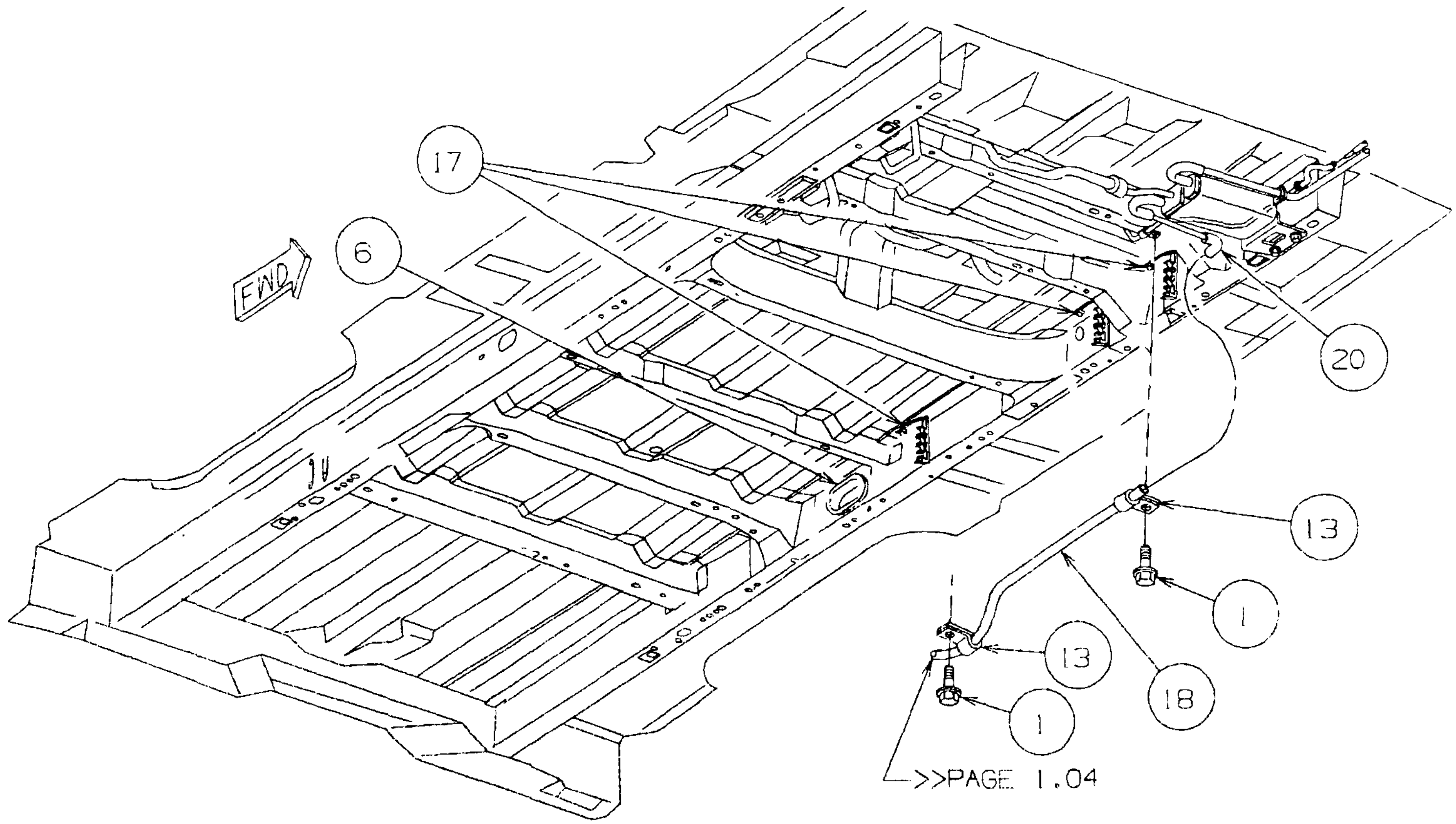
FUEL SYSTEM - EXCEPT DIESEL

1998-NG 13000 - Overview - 1 Page: 2 of: 13

DAIMLERCHRYSLER

Released
Engineering Graphics System

Report Created: 1/31/01 10:19:40 AM



VIEW Y

Rev	CN No.	Revisions Effecting This Page	Date	By	Part VSC
		Last Overview Package Revision: R			
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		ITEM 22 CANC			13220
A		INITIAL RELEASE OVERVIEW	01/16/97	BDB3	13305

Engineering Graphics
TCF Overview

GR Number:	98NG0167	GR Status:	Complete
Model-Year:	1998	Vehicles:	GS NS
Illustrator:	R. SCOTT	Rel Date:	5-Mar-98
Overview VSC:	13000 - FUEL SYSTEM		

Overview Title

FUEL SYSTEM - EXCEPT DIESEL

1998-NG 13000 - Overview - 1 Page: 3 of: 13

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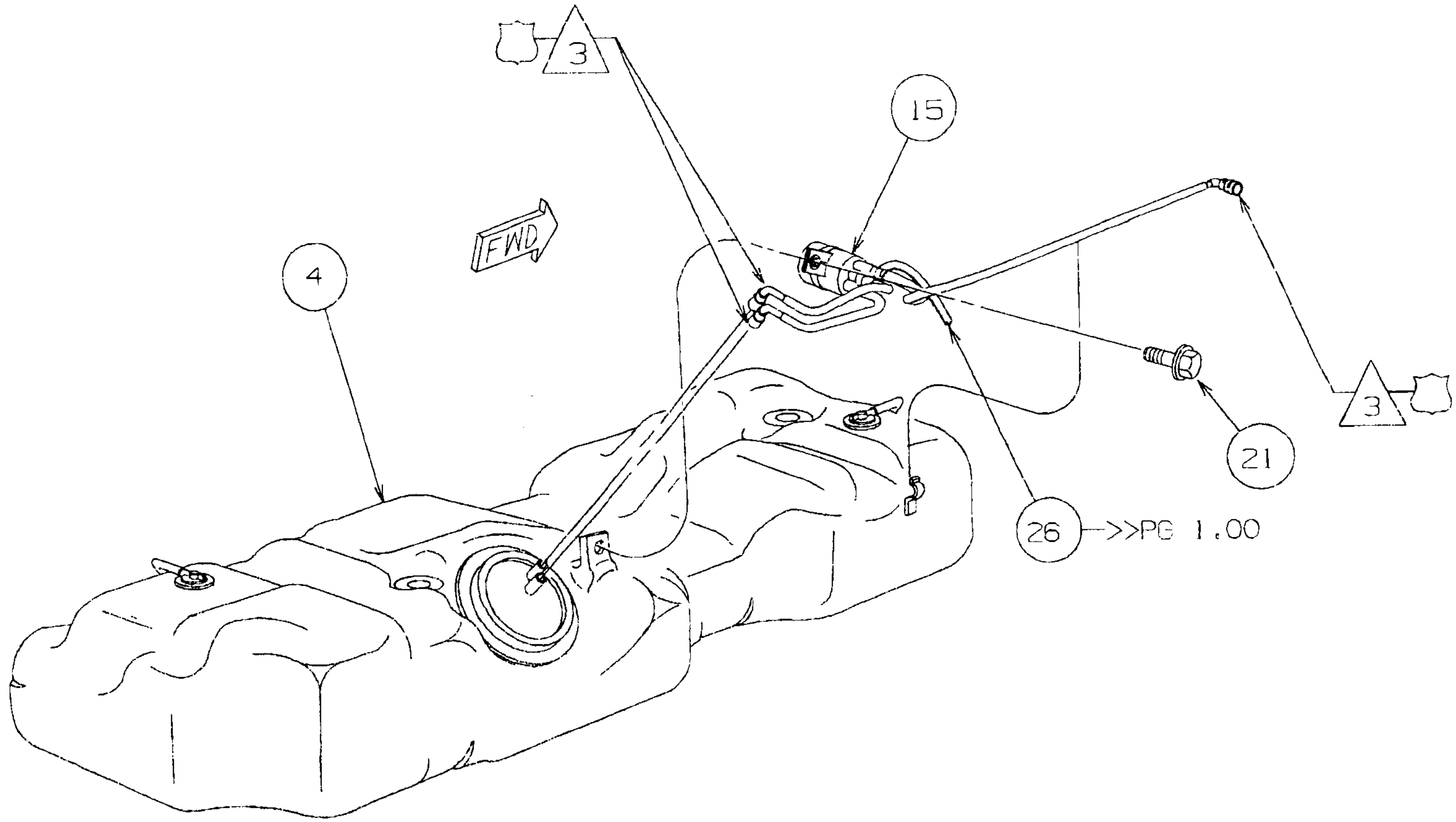
DAIMLERCHRYSLER

Released

Engineering Graphics System

Report Created: 1/31/01 10:19:40 AM



VIEW X

Rev	CN No.	Revisions Effecting This Page	Date	By	Part VSC
		Last Overview Package Revision: R			
A		INITIAL RELEASE OVERVIEW	01/16/97	BDB3	13110
					13220
					13305

Engineering Graphics
TCF Overview

GR Number:	98NG0168	**GR Status:**	Complete
Model-Year:	1998	**Vehicles:**	GS NS
Illustrator:	R. SCOTT	**Rel Date:**	5-Mar-98
Overview VSC:	13000 - FUEL SYSTEM		

Overview Title

FUEL SYSTEM - EXCEPT DIESEL

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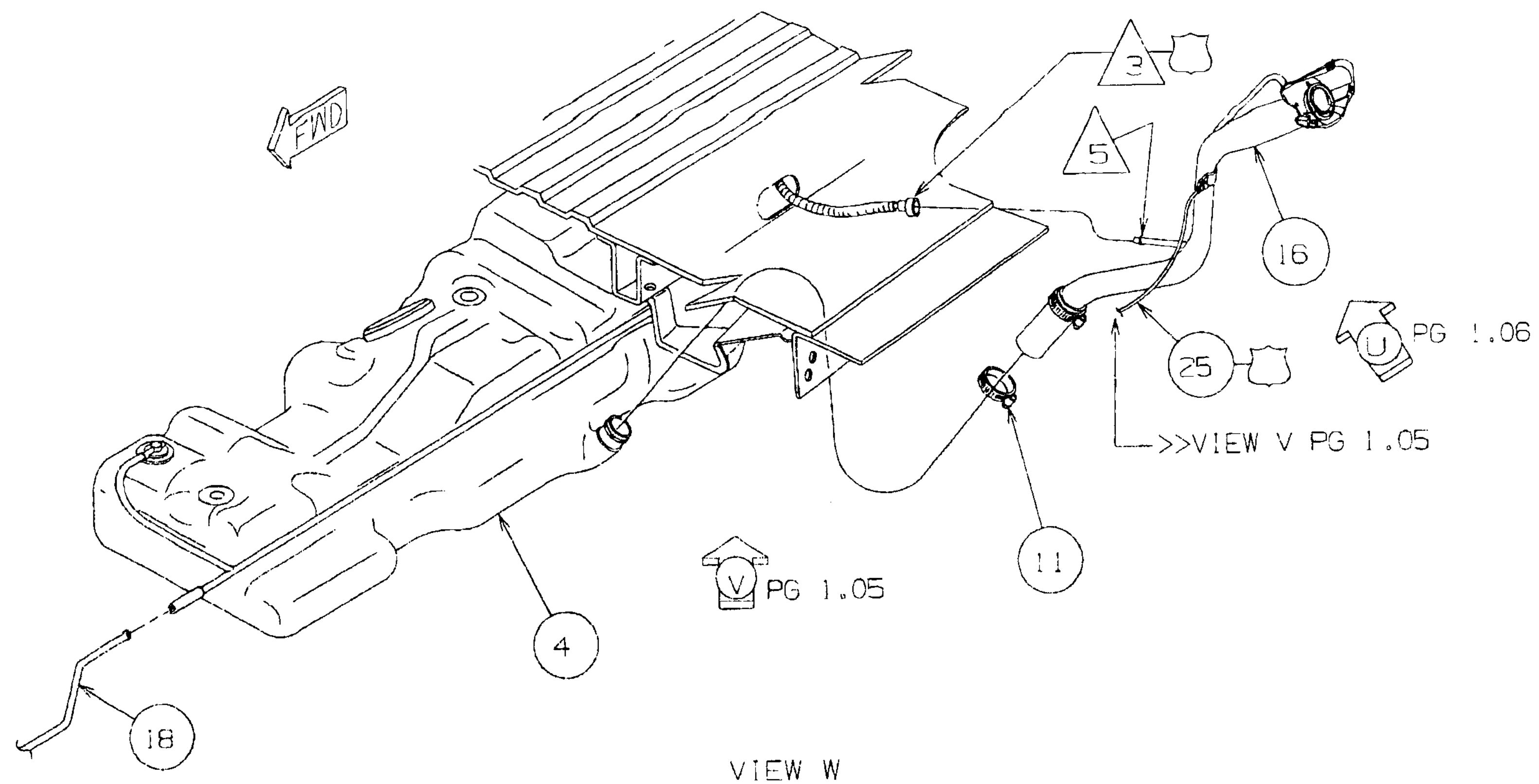
DAIMLERCHRYSLER

Released
Engineering Graphics System

Report Created: 1/31/01 10:19:40 AM



Rev	CN No.	Revisions Effecting This Page	Date	By	Part VSC
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C	UPDATE	ILLUSTRATION CONTENT ITEM 16 REVISED	01/25/97	10	13110
B	PER ENGR	NOTES REVISION NOTE 5 ADDED	01/23/97	10	13220
A		INITIAL RELEASE OVERVIEW	01/16/97	BDB3	13305

Engineering Graphics
TCF Overview

GR Number:	98NG0169	GR Status:	Complete
Model-Year:	1998	Vehicles:	GS NS
Illustrator:	R. SCOTT	Rel Date:	5-Mar-98
Overview VSC:	13000 - FUEL SYSTEM		

Overview Title

FUEL SYSTEM - EXCEPT DIESEL

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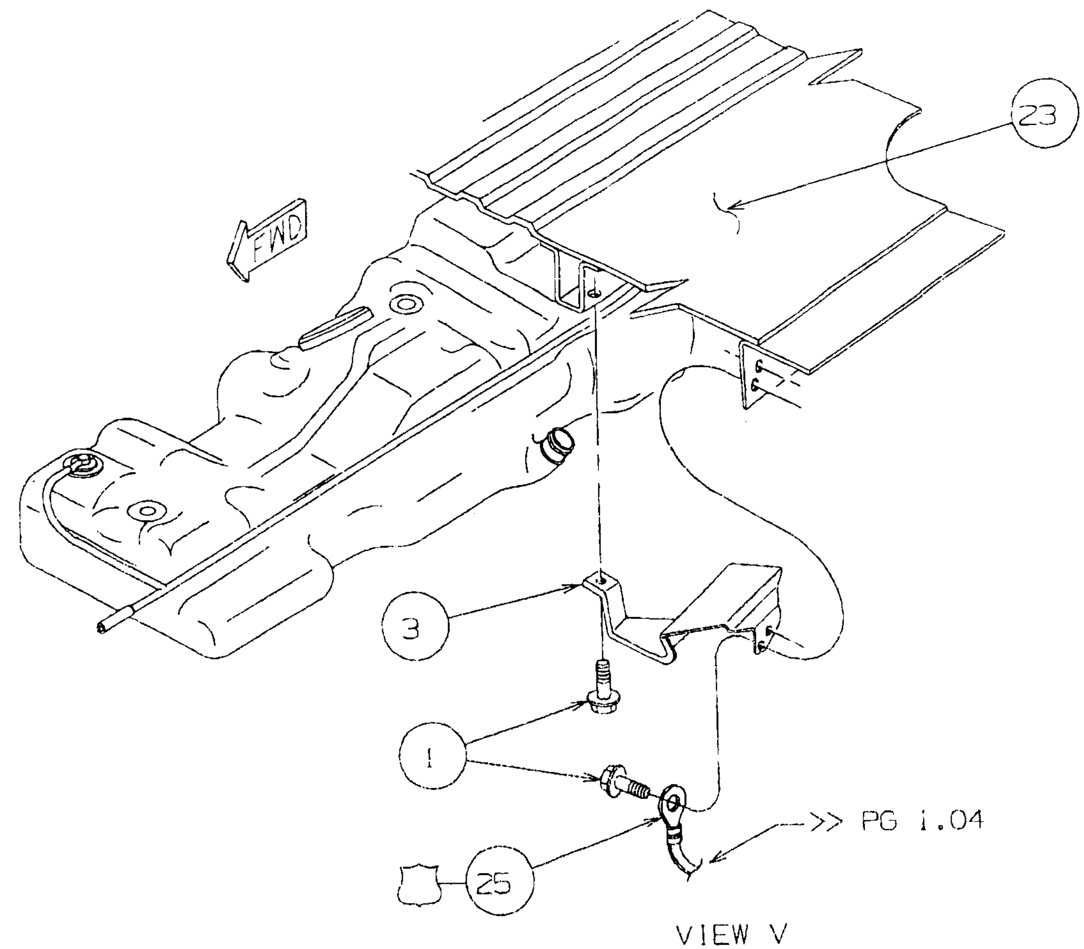
DAIMLERCHRYSLER

Released
Engineering Graphics System

Report Created: 1/31/01 10:19:40 AM



Rev	CN No.	Last Overview Package Revision: R (Revisions Effecting This Page)	Date	By	Part VSC
B	UPDATE	ILLUSTRATION CONTENT ITEM 12 REDRAWN &	01/23/97	10	13110
		RELOCATED			13220
A		INITIAL RELEASE OVERVIEW	01/16/97	BDB3	13305

Engineering Graphics
TCF Overview

GR Number:	98NG0170	GR Status:	Complete
Model-Year:	1998	Vehicles:	GS NS
Illustrator:	R. SCOTT	Rel Date:	5-Mar-98
Overview VSC:	13000 - FUEL SYSTEM		

Overview Title

FUEL SYSTEM - EXCEPT DIESEL

1998-NG 13000 - Overview - 1 Page: 6 of: 13

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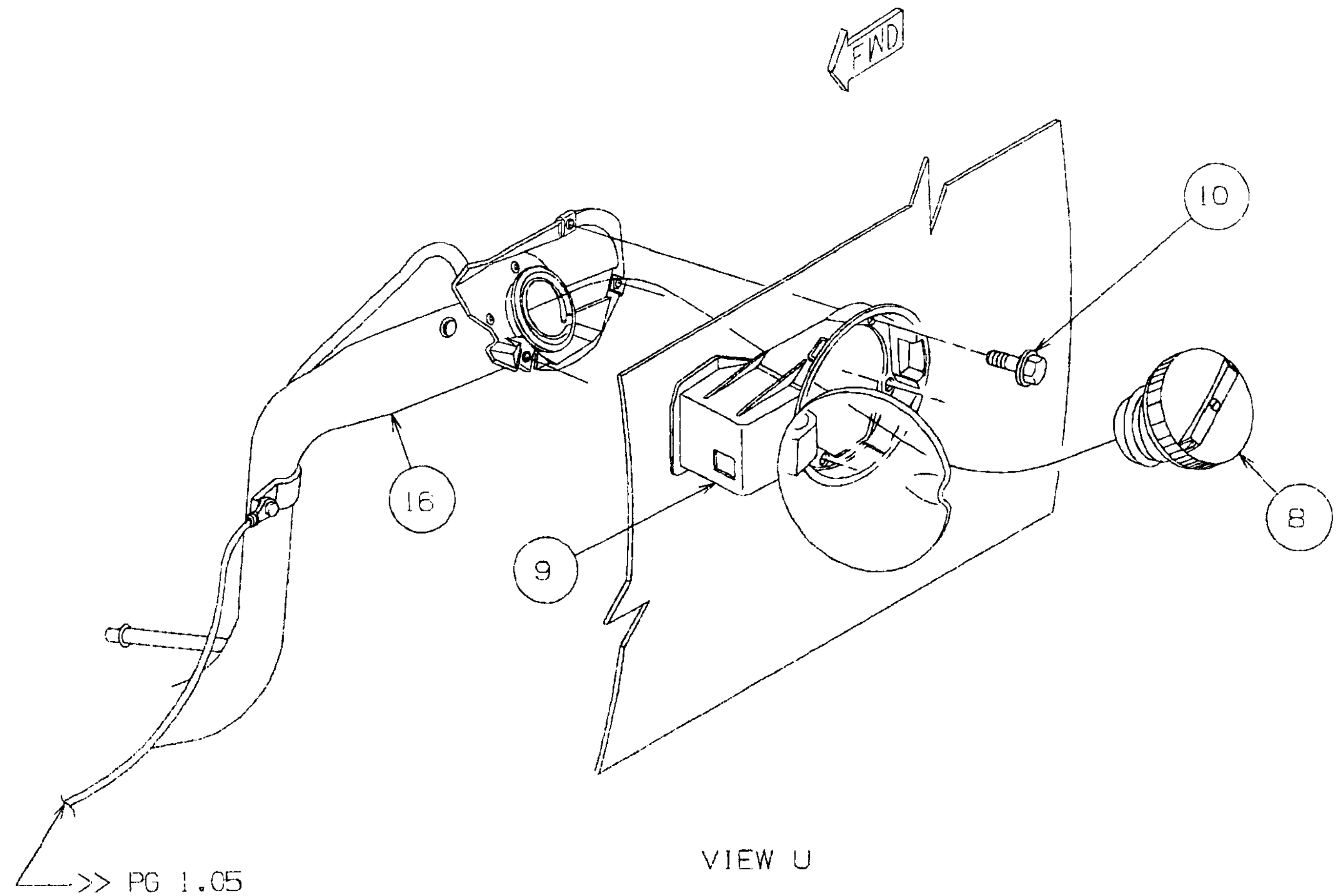
DAIMLERCHRYSLER

Released
Engineering Graphics System

Report Created: 1/31/01 10:19:40 AM



Rev	CN No.	Revisions Effecting This Page	Date	By	Part VSC	
		Last Overview Package Revision: R				
B	UPDATE	ILLUSTRATION CONTENT ITEM 16 REVISED	01/23/97	10	13110	
A		INITIAL RELEASE OVERVIEW	01/16/97	BDB3	13220	
					13305	

Engineering Graphics
TCF Overview

GR Number:	98NG0171	**GR Status:**	Complete
Model-Year:	1998	**Vehicles:**	GS NS
Illustrator:	R. SCOTT	**Rel Date:**	5-Mar-98
Overview VSC:	13000 - FUEL SYSTEM		

Overview Title

FUEL SYSTEM - EXCEPT DIESEL

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U.S. Department
of Transportation

**National Highway
Traffic Safety
Administration**

Memorandum

Subject: EA99-013/VRTC Test Report
VRTC-DCD9006

Date: 8/10/01

From: Tom Cooper

To: Public File EA99-013

Attached is the VRTC test report for the above referenced investigation. A copy of the 16mm crash film has been filed with NHTSA's National Crash Analysis Center, George Washington University, Virginia Campus, 20101 Academic Way, Ashburn Virginia 22011.

VIDEO TAPE AND CD

AVAILABLE UPON REQUEST

VIDEO TAPE AND CD AVAILABILITY

George Washington University
Virginia Campus
NHTSA/FHWA National Crash Analysis Center
20101 Academic Way, NCAC Library
Ashburn, VA 22011

Telephone: (703) 729-8236
Fax (703) 478-8983

Contact Person:
Ms. Amy Reagan, GWU Film Technician

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U.S. Department
of Transportation

**National Highway
Traffic Safety
Administration**

Memorandum

Vehicle Research and Test Center

P.O. Box 37
East Liberty, Ohio 43319-0337
(937) 666-4511

Subject: FINAL REPORT – VRTC-DCD9006 "Summary Of the Crash Test Program Concerning Fuel System Integrity of 1996-2000 Chrysler Minivans

Date: JUN 25 2001

From: Michael W. Monk
Director, Vehicle Research & Test Center

Reply to Attn. of: NRD-20

To: Kathleen C. DeMeter, NSA-10
Director, Office of Defects Investigation

Attached are four (4) copies of the subject report and two (2) copies of the Transportation Research Center Inc. (TRC) crash test film. This completes the requirements for this program.

#

Attachments

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VRTC-DCD9006
EA99-013

Summary of the Crash Test Program Concerning Fuel System Integrity of 1996-2000 Chrysler Minivans

VEHICLE RESEARCH AND TEST CENTER
EAST LIBERTY, OHIO 43319

FINAL REPORT
MARCH 2001

U. S. Department of Transportation
National Highway Traffic Safety Administration

1120

Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipients's Catalog No. EA99-013
4. Title and Subtitle Summary of the Crash Test Program Concerning Fuel System Integrity of 1996-2000 Chrysler Minivans		5. Report Date March 2001 6. Performing Organization Code NRD-23
7. Author(s) R. Kirkbride		8. Performing Organization Report No. VRTC-DCD9006
9. Performing Organization Name and Address National Highway Traffic Safety Administration Vehicle Research and Test Center P.O. Box B-37 East Liberty, OH 43319		10. Work Unit No. (TRAIS)n code 11. Contract of Grant No.
12. Sponsoring Agency Name and Address National Highway Traffic Safety Administration 400 Seventh Street, S.W. Washington, DC 20590		13. Type of Report and Period Covered FINAL 08/00-03/01 14. Sponsoring Agency Code
15. Supplementary Notes		

16. Abstract

This test program was performed to evaluate the fuel system integrity of 1996-2000 Chrysler minivans, especially of the fuel filler hose assembly, in certain side-impact crashes, and to ascertain the risk of occupant impact injury in those crashes, based on the responses of instrumented dummies. The vehicle-to-vehicle crash test performed was a 90 degree left-side impact and the procedures outlined in FMVSS No. 214, "Side Impact Protection" were used as a guideline. The struck test vehicle was a new 2000 Chrysler Voyager. The nominal impact speed of the striking vehicle, a 1996 Dodge Dakota, was 30 mph.

The results showed:

1) No Stoddard fluid loss was noted during the side impact or static rollover tests.

2) The maximum TTI reading was 63 (upper limit of 85) and the peak lateral acceleration of the pelvis was 90 g's (upper limit of 130 g's), both on the driver dummy.

3) The maximum dummy HIC readings and peak neck loads were high because the heads of the passenger and driver dummies collided about 119 msec after the Voyager was struck.

17. Key Words Fuel System Integrity Chrysler Minivans Crash Test		18. Distribution Statement Document is available to the public through the National Technical Information Service, Springfield, VA 22161	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No of Pages 13	22. Price

Form DOT F1700.7 (8-72) **Reproduction of completed page authorized**

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LIST OF FIGURES

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LIST OF TABLES

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1.0 INTRODUCTION

This test program was performed at the Vehicle Research and Test Center (VRTC) in response to a request by the Office of Defects Investigation (ODI), National Highway Traffic Safety Administration (NHTSA). The ODI requested a full-scale crash test to evaluate complaints concerning the fuel system integrity of 1996-2000 Chrysler minivans, especially during certain side-impact crashes.

2.0 DISCUSSION

The objective of the test program was to evaluate the fuel system integrity of 1996-2000 Chrysler minivans, especially of the fuel filler hose assembly, in certain side-impact crashes and to ascertain the risk of occupant impact injury in those crashes based on the responses of instrumented dummies.

The vehicle-to-vehicle crash test performed was a 90° left-side impact. The target or struck test vehicle was a new 2000 Chrysler Voyager. The nominal impact speed of the bullet or striking vehicle, a 1996 Dodge Dakota, was 30 mph.

2.1 Test Vehicles

Both test vehicles were purchased locally and inspected at VRTC prior to delivery to the Transportation Research Center (TRC) for the side-impact test.

The striking vehicle, a 1996 Dodge Dakota SLT pickup truck, was in very good condition and was tested "as received" except for the tires. The "as received" non-standard tires were replaced with tires recommended by the manufacturer prior to delivery of this vehicle to TRC for impact testing. The Vehicle Identification Number (VIN) of the Dakota was 1B7GL23X8TS686940 (Built 3/1996) and the odometer reading was approximately 47,000 miles. This bullet vehicle was selected as a

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typical medium-size pickup truck with popular options such as club cab, six-cylinder engine (3.9 L), automatic transmission, and 2-wheel drive. The bullet vehicle was also selected based on its weight which is comparable to the weight (4,000 lb) of the moving contoured barrier described in Federal Motor Vehicle Standard (FMVSS) No. 301, "Fuel System Integrity".

The target test vehicle, a 2000 Chrysler Voyager minivan, was in new condition. The VIN was 2C4FJ25BXYR783391 (Built 3/2000) and the odometer reading was approximately 100 miles. The ODI requested that the target vehicle be selected from 1996-2000 Chrysler minivans with the standard wheelbase (113 inches) and single sliding side door. A 2000 model was purchased to avoid used models with possible modifications to the fuel system or previous accident damage. Other options on the target vehicle, such as the four-cylinder engine (2.4 L) and the automatic transmission, were not considered to be critical factors.

Additional vehicle data may also be found in the comprehensive test report prepared by the TRC and identified as: Watters, V.L., "1996 Dodge Dakota Pickup into Left Side of a 2000 Chrysler Voyager", Final Report No. TRC 001026, February 2000.

2.2 Test Equipment

Prior to delivery of the Dakota pickup truck to TRC for impact testing, a series of tests was conducted by VRTC to determine the pitch attitude of this bullet vehicle during heavy braking. The instrumentation included a U-tube manometer (Ammco Model 7350) to measure vehicle deceleration and ultrasonic sensors (Massa Model 4000) to measure the change in height of the front and rear bumpers of the Dakota during the "panic" braking tests.

Detailed descriptions of the instrumentation for the crash test may be found in the comprehensive test report prepared by TRC. High-speed motion picture cameras were used to document the crash test. Four 50th-percentile adult male dummies were used. Two of these, provided by TRC, were uninstrumented Hybrid II Dummies (Part 572B) used for ballast in the driver and front passenger seats of the Dakota bullet vehicle.

Each of the other two test dummies (Part 572M) consisted of the torso of a Side-Impact Dummy (SID or Part 572F; provided by TRC) and the head and neck of a Hybrid III Dummy (Part 572E; provided by NHTSA). These instrumented dummies (SID-H3) were used in the driver and front passenger locations in the Voyager target vehicle. To evaluate the risk of occupant impact injury, dummy instrumentation included accelerometers on the head, spine, pelvis, and ribs, plus upper neck load cells and chest-displacement transducers. NHTSA provided the upper neck load cells and the accelerometers for the two Hybrid III heads and necks to TRC for use on their SID torsos. TRC provided the accelerometers for the vehicles and SID torsos.

A full calibration of each SID-H3 and all accelerometers and other test dummy instrumentation was performed prior to the crash test. The calibration of the SID-H3 included lateral tests on the head, neck, thorax, pelvis, and thoracic shock absorber. The TRC calibration reports are appended to the comprehensive test report prepared by TRC.

The accelerometers used on the Dakota bullet test vehicle included tri-axial accelerometers mounted on the floor at the vehicle center-of-gravity (CG) and longitudinal (x-axis) accelerometers on the door sills by the left and right rear seat cross-members. The accelerometers used on the target test vehicle (90° left-side impact) included tri-axial accelerometers mounted on the floor at the vehicle CG, at the right-side sill by the front and rear seats, and at the rear floorpan above the rear axle.

Eight high-speed (nominally 1,000 frames/sec) motion picture cameras and a panning camera (24 frames/sec) were used to document the crash test. Detailed descriptions of the instrumentation for the crash test may be found in the comprehensive test report by TRC.

2.3 Test Procedures

Prior to the crash testing, a series of tests was conducted by VRTC to determine the pitch attitude of the bullet vehicle during heavy braking. The "pitch" tests on the Dakota were conducted on a level dry surface (skid pad). The vehicle was driven up to 40 mph and then braked at various deceleration levels up to the point of wheel lockup. Three stops were made at each deceleration level (U-tube manometer) while measuring the change in height (ultrasonic sensors) of the front and rear bumpers of the Dakota. The maximum pitch attitude measured just prior to wheel lockup was used to simulate pre-impact braking of the bullet vehicle during the crash test.

During test vehicle preparation at TRC, the pre-test attitudes of the striking vehicle were adjusted (front springs were compressed and rear springs were blocked in an extended position) to simulate this heavy-braking attitude. Based on the previous "pitch" tests on the Dakota, the front was lowered 2.5 inches and the rear raised 1.2 inches as measured at the front and rear bumper centerlines.

Both test vehicles were placed on a level surface and the engine fuel pump was operated until it stopped pumping fuel, i.e., the tank "ran dry." Each tank was then filled to the "usable capacity" with Stoddard solvent using a metal funnel with a flexible tube attached to fit in the filler neck and a one-gallon pitcher (graduated in one-pint intervals). The tank's "usable capacity" (as defined in 49 CFR 571.3), as specified by the manufacturer, was supplied by ODI. The usable fuel capacities of the Dakota and Voyager were specified as 15 gal and 20 gal respectively. Each vehicle was weighed in order to determine the appropriate vehicle test weight. After obtaining the "delivered" vehicle test weights, seven percent of the fluid that had been added was removed.

The Dakota was loaded to a test weight of 4,168 lb, using the procedures outlined in FMVSS No. 208, "Occupant Crash Protection," as a guideline. The Voyager was loaded to a test weight of 4,079 lb, using the procedures outlined in FMVSS No. 214, "Side Impact Protection," as a guideline.

Only ballast dummies were used in the front seats (nominal seat back angle) of the Dakota. The instrumented dummies (SID-H3) in the Voyager were positioned in the driver and front passenger seating positions using the dummy placement procedure specified for FMVSS No. 214, "Side Impact Protection," as a guideline. Accelerometers were added to both vehicles to measure specified longitudinal, lateral, and vertical accelerations.

The moving 1996 Dodge Dakota was used to impact the stationary 2000 Chrysler Voyager on the left (driver's) side. The crash test was a 90° side-impact and the nominal impact speed of the striking vehicle was 30 mph. The impact point was near the fuel filler neck. The right edge of the Dakota front bumper was aligned near the centerline of fuel tank spud where the filler hose is attached. Dummy response data, fuel leakage measurements, and films of the tests were obtained. Static rollover tests were conducted under the test conditions specified in FMVSS No. 301, "Fuel System Integrity," after the impact test.

A sketch of the test setup for this crash test (excerpted from TRC report page showing camera positions) is shown in Figure 2.1

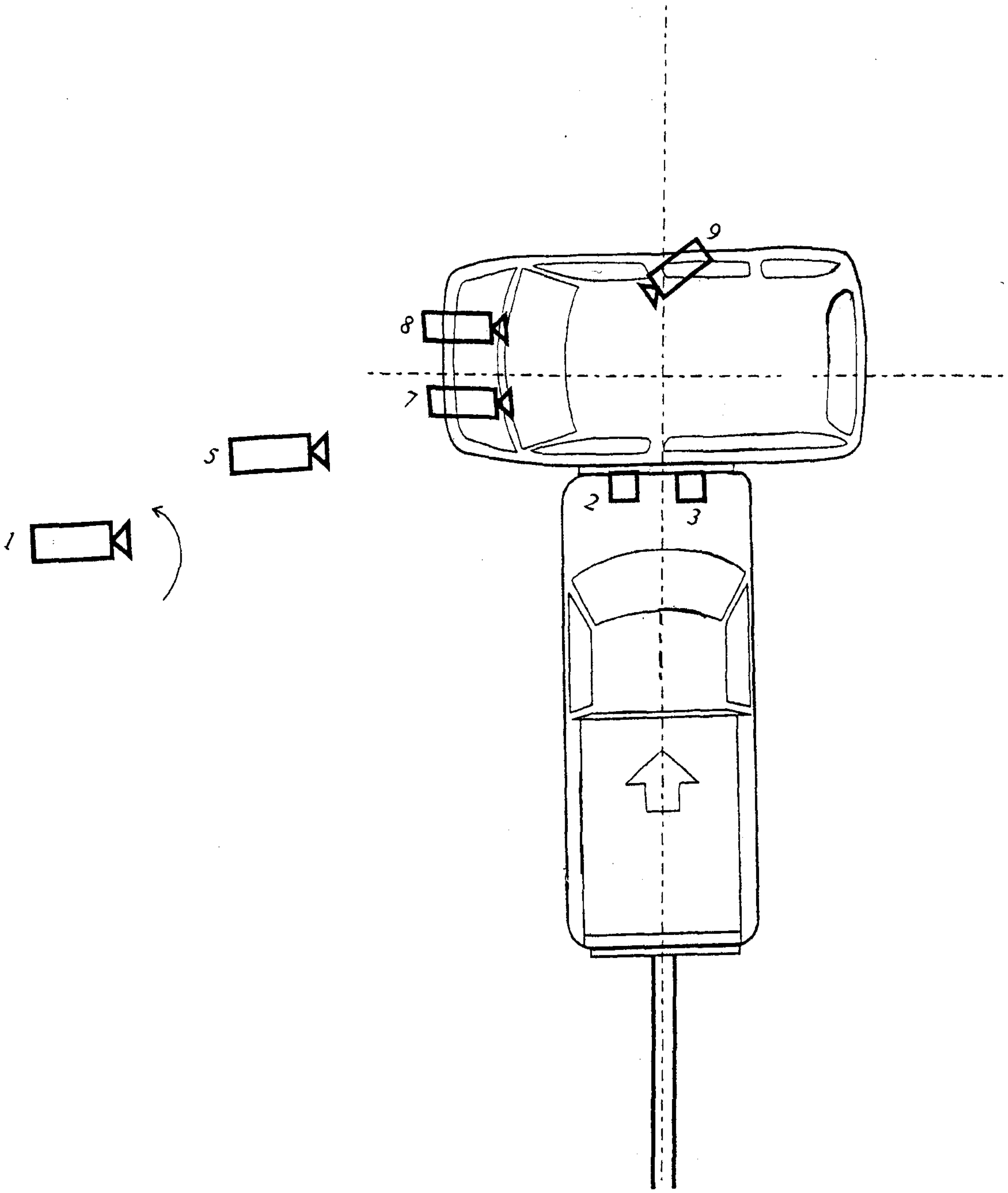

Figure 2.1 – Sketch of Test Setup for 90° Side Impact Test on a 2000 Chrysler Voyager

Note: 2, 3 were overhead cameras

3.0 TEST RESULTS

A summary of the test results for the vehicle performance during the crash test is presented in Table 3.1. The "Velocity Change" shown in the table was calculated from the vehicle test weights and impact speed. No Stoddard fluid loss was noted during the side impact or during the subsequent static rollover test. Although crash damage to the side of the Voyager was extensive, damage to the front of the Dakota was relatively light and the air bags in the Dakota did not deploy. Detailed test results and data plots can be found in the comprehensive test report prepared by the TRC.

Table 3.1 -- Summary of Test Results for Vehicles

2000 Chrysler Voyager Test Weight (lb)	1996 Dodge Dakota Test Weight (lb)	Impact Speed of the Dakota (mph)	Velocity Change (mph)	Voyager Fuel Tank Test Volume (gal)	Fluid Leakage
4079	4168	30.13	15.2	18.6	None
Max. g's at Vehicle CGs		Dakota (x-axis) = 14.1		Voyager (y-axis) = 17.1	
Note: Test No. 001026 was a 90° impact on the driver's side of a stationary Voyager.					

A summary of the major test results for the performance of the instrumented test dummies (SID-H3) in the Voyager during the crash test is presented in Table 3.2.

Table 3. 2 -- Summary of Test Results for Test Dummies in Voyager

SID-H3 Seating Position	TTI	Pelvis Y-max (g's)	HIC	Peak Neck Loads (N)	
				Tension	Compression
Injury Criteria	85	130	700 (15 msec)	4,170	4,000
Driver	62	90	786* (338)	3,302* (712)	736
Right Front Passenger	26	23	921*	1,102	4,390* (0)

Note: Test No. 001026 was a 90° impact by a Dakota on the driver's side of a stationary Voyager.
* - These HICs and peak neck loads resulted from the collision of the driver and passenger SID-H3 heads at approximately 119 msec; numbers in parentheses were measured just prior to collision of dummy heads.

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The risk of occupant impact injury was primarily based on Thoracic Trauma Index (TTI), which NHTSA uses as a measure of the risk of thoracic injury. A TTI of 85 is used as an upper limit for 4-door passenger cars and multi-purpose vehicles (MPVs) for the dynamic performance requirement in FMVSS No. 214. The dummy TTI readings never exceeded 85, with a maximum TTI of 62 (driver dummy). The peak lateral (Y-axis) acceleration of the pelvis, which has an upper limit of 130 g's, was 90 g's (driver dummy).

Also, Head Injury Criterion (HIC) was calculated and peak neck loads were measured. HIC has an upper limit of 700 (evaluated over a maximum interval of 15 msec) and peak neck loads have upper limits of 4,170 N (tension) and 4,000 N (compression), based on the advanced air bag upgrade to FMVSS No. 208 tests (30-mph <u>frontal</u> fixed-barrier impact). Although neither HIC nor neck injury criteria are listed for FMVSS No. 214 (<u>side</u> impacts), they are discussed here for comparative purposes.

Both of the HIC readings exceeded 700 because the heads of the passenger and driver dummies collided about 119 msec after the Voyager was struck. The HIC for the driver dummy was only 338 when recalculated during the interval prior to the heads of the dummies striking together.

The peak neck loads were also affected by the heads of the dummies striking together at about 119 msec after the Voyager was struck. For instance, the peak neck load (tension) of the driver dummy (3,302 N at 120 msec) was 712 N during the interval prior to the heads of the dummies striking together. The peak neck load (compression) of the passenger dummy (4,390 N at 121 msec) was essentially zero during the interval prior to the heads of the dummies striking together.

4.0 FINDINGS

The following findings are based on the results of the 90° side-impact crash test on a 2000 Chrysler minivan:

1) No Stoddard fluid loss was noted during the side impact or static rollover tests.

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2) The maximum TTI reading was 62 (upper limit of 85) and the peak lateral acceleration of the pelvis was 90 g's (upper limit of 130 g's), both on the driver dummy.

3) The maximum dummy HIC readings and peak neck loads were high because the heads of the passenger and driver dummies collided about 119 msec after the Voyager was struck.

U.S. Department of Transportation

National Highway Traffic Safety Administration

ODI RESUME

INVESTIGATION: EA99-013 DATE CLOSED: 10-AUG-01
SUBJECT: Post-Collision Fuel System Integrity DATE OPENED: 11-Jun-99
PROMPTED BY: PE99-010
PRINCIPAL ENGINEER: Jun 99 - Mar 01, J. Quandt; Mar 01-Aug 01, T. Cooper

MANUFACTURER: DaimlerChrysler Corporation
MODEL(S): NS-Minivans (Dodge Caravan/Grand Caravan; Plymouth Voyager/Grand Voyager; Chrysler Town and Country)
MODEL YEAR(S): 1996-2000
VEHICLE POPULATION: 2,774,470

PROBLEM DESCRIPTION: Collision-induced damage to the filler neck assembly leading to fuel leakage or fire.

FAILURE REPORT SUMMARY

	ODI	MANUFACTURER	TOTAL
COMPLAINTS:	2	3	5
CRASHES:	2	3	5
BURN INJ CRASHES:	0	0	0
# INJURIES:	0	0	0
BURN FATAL CRASHES:	1	1	2
# FATALS:	2	3	5
OTHER:	3	0	3

DESCRIPTION OF OTHER: FMVSS 214/SINCAP left-side impact tests resulting in filler neck assembly leakage.

ACTION: The Engineering Analysis has been closed.

Thomas Cooper — ENGINEER — 8/10/01 DATE
Thomas Cooper — DIVISION CHIEF — 8/10/01 DATE
OFFICE DIRECTOR — 8/10/01 DATE

SUMMARY: This investigation is closed. Further investigation would not likely produce evidence sufficient to demonstrate the existence of a safety-related defect. The closing of this investigation does not constitute a finding by NHTSA that no safety-related defect exists. The agency reserves the right to take further action if warranted by new or changed circumstances.

(continued next page) TLC 8/10/01

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Background: On February 3, 1999, ODI opened a Preliminary Evaluation (PE99-010) following a filler neck separation incident in a Federal Motor Vehicle Safety Standard (FMVSS) No. 214, "Side impact protection," compliance test of a model year (MY) 1999 Dodge Caravan (short wheelbase). The test, conducted by MGA Proving Ground in Burlington, Wisconsin for NHTSA's Office of Vehicle Safety Compliance (OVSC), was performed on January 5, 1999. The filler neck separation allowed approximately 11 gallons of test fuel (Stoddard solvent) to leak from the vehicle's fuel tank. The vehicle's fuel tank has a 20 gallon capacity and was filled with 18.43 gallons of Soddard solvent for the test in accordance with the procedures of FMVSS No. 214.

Prior to this, on December 18, 1998, NHTSA had tested a MY 1999 Dodge Grand Caravan (long wheelbase) under the Side Impact New Car Assessment Program (SINCAP), which resulted in trace leakage from a small split in a plastic segment of the filler vent tube.

On June 11, 1999, ODI upgraded the preliminary evaluation to an Engineering Analysis (EA99-013). On January 6, 2000, a second filler neck separation incident occurred in a SINCAP test of a MY 2000 Dodge Caravan.

The NS-body DaimlerChrysler minivan was introduced in MY 1996 and production continued through MY 2000. Prior to 1996, DaimlerChrylser produced its minivans on the AS-body platform. The earlier AS minivans do not share the same filler neck assembly design as the subject NS minivans. The fuel filler tube on the AS minivan is a one-piece steel tube connected to a metal fuel tank by a rubber grommet. The filler tube on the NS minivan is a steel tube connected to a plastic fuel tank by a 5-inch rubber hose. A more detailed description of the NS fuel system design is provided below.

System Description: The subject filler neck assembly is routed from the filler door through the forward portion of the left-rear wheelhouse. A plastic liner covers the assembly in the wheelhouse. The assembly extends forward from the bottom of the wheelhouse, through a space between the inner sill wall and the left rail structural member, to the fuel fill and vent fittings of the fuel storage tank (See Figure 1). The tank is mounted inboard of the left rail structural member forward of the rear axle. The filler neck assembly consists of the fuel filler tube and the fuel tank vent tube. A 5-inch long rubber hose (painted green in Figure 1) connects the steel filler tube (yellow) to a 1.6 inch, inner diameter high-density polyethylene (HDPE) nipple or spud (orange/red) on the side of the tank. The hose extends over the spud about 1¾ inches and over the steel tube about 1¾

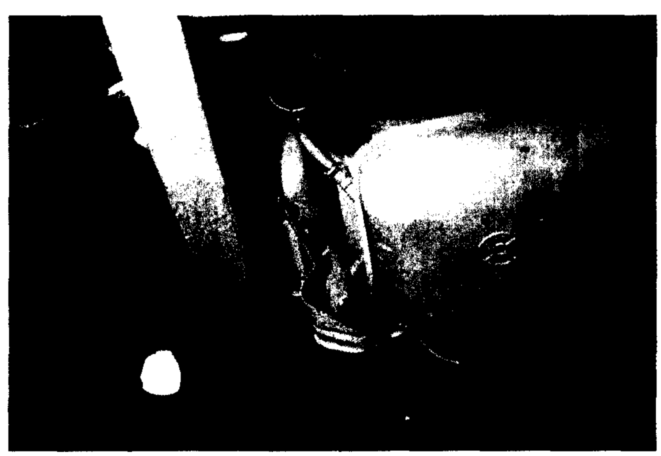

Figure 1 Filler hose connection to fuel tank

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inches. The rubber hose is secured to the filler tube and tank spud by standard worm drive type hose clamps (see Figure 2).

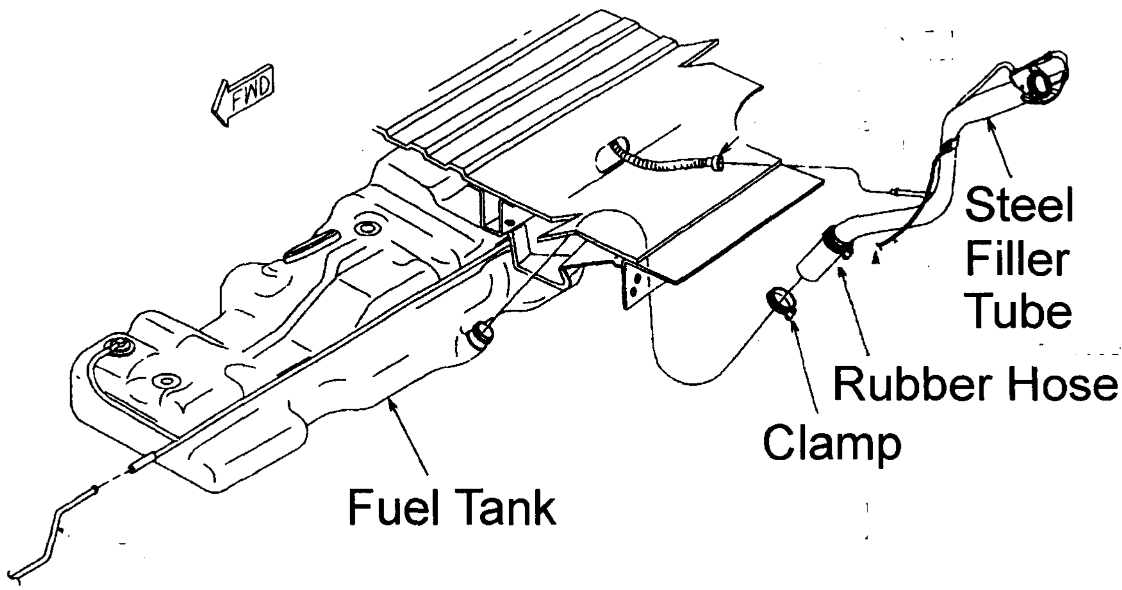

Figure 2 Fuel tank and filler pipe

Several aspects of DaimlerChrysler's design of the filler neck assembly for the subject minivans contribute to an overall lack of robustness in the design to withstand either a high tensile load or significant displacement input during a moderate to severe crash. This is confirmed by NHTSA's evaluation of data collected from other manufacturers of minivans (NHTSA sent peer information request letters to five other manufacturers to obtain information about their filler neck assembly designs). For example, the rubber hose connected to the fuel tank inlet is significantly shorter than the hose on other peer minivans (giving rise to higher tensile load for a given amount of displacement), and the bead on the tank spud (which provides resistance to pull-off force) is ramped with a shallower angle than peer minivans. The location of the filler neck assembly and the surrounding vehicle structure does not isolate the filler neck from crash forces as well as other minivans. For this reason, the filler neck assemblies of some other minivans will experience less loading and displacement on the filler neck during a crash. Also, DaimlerChrysler did not reinforce the tank spud on the subject minivans with a metal liner, as some other manufacturers did on their minivans, which would have reduced compression deformation of the tank spud during high tensile loading. Finally, DaimlerChrysler does not have performance specifications for the minimum pull-off force of the rubber hose from the filler pipe or fuel tank spud as do some other minivan manufacturers, and the company did not test the capability of the hose to withstand such a force during development of the subject minivans.

Crash Reports:

DaimlerChrysler has provided the following information to NHTSA concerning complaints of fuel spillage or fire arising out of left side collisions into the subject minivan in the vicinity of the fuel tank.

1. Name: [redacted]
   Date of Incident: 5/8/99 Location: Milford, Ohio
   Vehicle: 1999 Plymouth Grand Voyager VIN: 2P4GP24G6XR196325
   Fire: Yes Casualties: 2 - Non-burn trauma
   Summary: DaimlerChrysler reports the Voyager was traveling at low speed through an intersection and was impacted by a full sized pickup truck traveling at 55 mph. The point of impact was "perpendicular to the left side from the trailing edge of the driver's door extending back to about the filler cap area." Both occupants of the Voyager, driver and front seat passenger, received injuries. Chrysler's Vehicle Fire Investigation Report indicates the driver noticed "fire outside the van on the left rear and after getting out saw burning fuel leaking from tank." The fire continued about 20 minutes until the fire department arrived to extinguish the flames. DaimlerChrysler believes the fuel from the fuel tank did not start the fire. The plastic fuel tank is melted/burned at the area of the filler pipe connection and the rubber filler hose was consumed. It is not known whether the filler hose disconnected initially at impact or whether the rubber connecting hose was consumed during the spread of the fire, fueled by the release of flammable liquid from another source on the vehicle.

2. Name: [redacted]
   Date of Incident: 5/27/99 Location: Dortches, NC
   Vehicle: 1999 Grand Caravan VIN: 2B4GP44R8XR221644
   Fire: No Casualties: 1 - Non-burn trauma
   Summary: DaimlerChrysler reports that the subject vehicle "was struck as it pulled out of a gas station by a full size 4-door sedan traveling at a reported 40 mph." The impact was to the left rear door of the minivan and the "fuel filler steel tube separated from fuel filler rubber hose, and hose was still secure on plastic tank nipple." Gas leaked from the minivan; however, no fire occurred. The vehicle was occupied by the driver and right front passenger. DaimlerChrysler's report indicates the passenger suffered facial cuts and no injury is mentioned for the driver.

3. Name: [redacted]
   Date of Incident: 8/22/98 Location: Crockett County, Texas
   Vehicle: 1998 Dodge Grand Caravan VIN: 2B4GP4439WR659485
   Fire: Yes Casualties: 3 - Fatal burn injuries
   Summary: DaimlerChrysler is a defendant in a lawsuit alleging that the gas tank is "in a location that would cause a fire if it hit another vehicle or object during a crash." The incident involves a single vehicle crash in which the subject van was traveling on an

interstate highway, its speed estimated to be between 70 and 80 mph. The police report indicates the van departed the roadway into the left median, impacted the end of a guardrail, rolled 1/4 turn on its left side and spun across the highway striking another guardrail, became upright again, skidded backwards catching fire prior to coming to a rest on the right side of the highway. Two occupants were fatally burned.

ODI reviewed its complaint data base and the NASS (National Automotive Sampling System) for crashes involving the subject vehicles that appeared to be related to the alleged defect. From this review, ODI has identified the following crash reports.

1. Name: [redacted]
   Date of Incident: 8/19/99 Location: Roseburg, Oregon
   Vehicle: 1996 Chrysler Town and Country VIN: 1C4GP55L7TB504242
   Fire: Yes Casualties: 2 - Fatal burn injuries
   Summary: The subject van was impacted on the left side by a full-size van at a speed of about 50 mph. The impact crushed the left side driver's and passenger's doors and broke the left wheel hub from the axle. A intense fire consumed the vehicle. The two occupants, a driver and a front passenger were killed. NHTSA's Special Crash Investigation report indicates the subject vehicle caught on fire as it came to rest from the impact. An off duty policeman broke through the passenger side window, observed the driver was not moving and while attempting to remove the passenger, heard the passenger utter a couple of words, but was not able to remove the passenger and was driven back by the flames. The fire deformed or consumed the plastic fuel tank and rubber hose connecting the spud on the tank to the metal filler pipe. Examination of the metal fuel filler pipe revealed a deformation pattern very similar to the pattern exhibited in the 214 and SINCAP tests.

2. Name: [redacted]
   Date of Incident: 5/7/99 Location: Horsham, Pa
   Vehicle: 1996 Plymouth Voyager VIN: (first 10 characters) 2P4GP4531T
   Fire: No Casualties: 1 - Non-burn trauma
   Summary: The subject vehicle was impacted in the left side by a 1994 Dodge 3/4 ton pickup truck. The NASS reconstruction case report (#1999-005-052) indicates that the impact crushed the left side of the van from the rear portion of the driver's door to above the left rear wheel housing. The filler hose separated from the fuel tank inlet. The posted speed limit for the pickup truck was 45 mph, but police report does not provide a speed estimate of the truck at impact. The NASS investigator reported crush measurements and computed a delta V for the Voyager that indicates the impact was more severe than the 214/SINCAP tests.

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Fatality Analysis Reporting System (FARS): The FARS is a near census of all fatal crashes occurring on public highways in the United States.

ODI examined the 1995 through 1999 FARS data files to provide a comparison of the real-world performance of the subject minivans to other MY 1996 and newer minivans. The other minivans included:

1996-97 Ford Aerostar
1996-00 Ford Windstar
1996-00 GM Astro/Safari
1996 GM APV Van
1997-00 GM U-Van
1999-00 Honda Odyssey
1996-00 Mercury Villager/Nissan Quest
1996-00 Mazda MPV
1996-97 Toyota Previa
1998-00 Toyota Sienna
1996-00 VW Eurovan

ODI obtained counts of fatal crashes and fires by primary damage area: filler neck side, front, rear, opposite side, unknown, and total. For the period of time covering calendar years 1995 though 1999, the subject minivans are reported in 11 fires out of a total of 705 fatal crashes yielding a fire/crash ratio of 11/705 or 1.6%. Non-subject peer minivans are reported in 20 fires out of 791 crashes yielding a fire/crash ratio of 2.5%. (The individual fire/crash ratio of non-subject minivans – excluding those having only one crash fire – ranges from 1.0 to 5.7%)

For fires and crashes where the primary damage area is the filler neck side of the vehicle, the subject minivans are reported in 2 fires out of 65 fatal crashes for a ratio of 3%. Non-subject minivans are reported in 1 fire out of 66 crashes for a ratio of 1.5%. The two subject minivan fatal fire crashes are described above, in the Roseburg, Oregon crash and the Crockett County, Texas crash.

Five-State File Analysis: ODI examined the state crash data files for five states: Florida, Maryland, Ohio, Pennsylvania and Utah for the calendar years 1995 through 1998. NHTSA gets electronic data from 17 states. Only 8 contain decoded Vehicle Identification Numbers for all crashes. Data from three states, Missouri, New Mexico and North Carolina were not useful for analysis based on insufficient fire data and erroneous coding of fire data. Using the five-state data, the frequency of fires to crashes was essentially the same for the subject minivans and the group of all other minivans. This result was found for all crashes as well as for impacts only to the filler neck side of the minivans.

Automobile Club of Southern California (Auto Club): ODI contracted with the Auto Club to identify fuel leaks or fires in left side impacts to the subject minivans. The Auto Club has a large database consisting of crash repair records for members who insure a subject minivan with the Auto Club. It reviewed every claim from September 1995 to May 15, 2000. The Auto Club identified 973 collision claims (for impact damage to any part of the vehicle) of $1,000 or greater on the subject minivans. These included 65 crashes with an impact to the left side of a subject minivan from behind the driver's door to in front of the rear bumper. The crash claims to the left side contained no reports of fire or indication of a fuel leak.

Compliance with Safety Standards: Federal Motor Vehicle Safety Standard (FMVSS) No. 301, "Fuel system integrity" specifies requirements for the integrity and security of a vehicle's fuel system in front, rear and lateral barrier impact crash tests. The fuel loss may not exceed one ounce per minute both during and following these barrier crash tests. The lateral impact test is performed by impacting a test vehicle on either side of the vehicle using a flat faced barrier weighing 4,000 pounds, traveling at 20 mph in a direction perpendicular to the side of the test vehicle. The center of the barrier face contacts the side of the test vehicle on a line perpendicular to the test vehicle that passes through the driver's seating reference point. DaimlerChrysler certified that the subject minivans meet FMVSS No. 301 side impact requirements based on tests performed during 1995 and later.

As described in the background section above, the opening of this investigation was triggered by results from NHTSA testing of a subject minivan to measure compliance with FMVSS No. 214, "Side impact protection." The vehicle satisfied the requirements of that standard, in that the injury readings on the anthropomorphic dummies were below the maximums allowed by the standard. Although the procedures of FMVSS No. 214 require a test vehicle's fuel tank be filled with Stoddard solvent, the criteria for measuring compliance does not specify any limitation for unacceptable amounts of fuel leakage. Consequently, leakage of Stoddard solvent during a FMVSS No. 214 test does not constitute a noncompliance with that standard.

On April 12, 1995, NHTSA published an Advanced Notice of Proposed Rulemaking (ANPRM)(60 FR 18566) announcing plans to upgrade Standard No. 301. Regarding side impact testing for fuel system integrity, DaimlerChrysler, Ford, GM and others supported replacing the current Standard No. 301 side impact test with the current Standard No. 214 test for purposes of fuel system integrity. They argued that the moving deformable barrier (MDB) used in Standard No. 214 is more realistic than the one currently used in Standard No. 301 and that no new test development was necessary because the current Standard No. 214 is more stringent and more representative of real-world crash conditions than Standard No. 301.

On November 6, 2000, NHTSA issued a Notice of Proposed Rulemaking (NPRM) (65 FR 67693) to upgrade Standard No. 301 to replace the current side impact test procedures with the Standard No. 214 side impact test procedures. On February 9, 2001 DaimlerChrysler submitted the following comment in response to the NPRM:

> *. . .we are not fully inclined to support a belief that the current FMVSS 214 barrier is sufficient in representing actual crashes. We have provided data to the agency (developed*

for another purpose) which shows that fuel fed post collision fires are extremely rare, although side impact collisions are not. This data suggest that any potential benefit from the change would be de minimus. While we do not believe that there is either a demonstrated need nor a demonstrated safety benefit to replacing the MVSS 301 lateral test with the MVSS 214 side impact test, DaimlerChrysler Corporation and Mercedes-Benz USA, LLC do not object to a prospective change.

Additional DaimlerChrysler Testing: Prior to the opening of this investigation, DaimlerChrysler performed FMVSS No. 214 and FMVSS No. 301 side impact testing on several minivans at various levels of vehicle development (pre-production through production, testing dates from 5/94 through 1/98). On April 9, 1999, it stated, "DaimlerChrysler knows of no side crash tests resulting in leakage from the filler neck assembly other than those recently conducted by NHTSA."

In January and February 2000, DaimlerChrysler conducted three crash tests of NS minivans using a MDB and under conditions similar to SINCAP testing. All three vehicles tested were short wheelbase (113 inch) models, two without and one with the sliding door on the left side (impact side). In all 3 of these tests, the filler pipe detached from the fuel tank spud, allowing a significant amount of fluid to escape from the fuel tank.

Additional NHTSA Testing: During the investigation, Chrysler claimed that the FMVSS No. 214 barrier test was unrepresentative of real world crashes due to the stiffness of the MDB. It claimed that in real world crashes, vehicle impacts to the side of the subject vehicles produce impact deformation that is unlike the deformation produced by the MDB. Specifically, DaimlerChrysler stated, ". . . the load forces at a given displacement associated with the FMVSS 214 barrier differ significantly from those on a typical (or any) vehicle. The sill deformation that created the hose separation by the barrier in laboratory testing is not readily duplicated by actual vehicles." NHTSA performed additional testing to determine whether the fuel leak during the FMVSS No. 214 testing could be repeated in a test which substituted a motor vehicle for the MDB as the impacting object.

NHTSA's Vehicle Research and Test Center performed a crash test in which a MY 1996 Dodge Dakota pickup truck impacted the side of a new MY 2000 Chrysler Voyager. The Voyager was a standard wheelbase (113") 3-door minivan. The test performed was a 90 degree left-side impact using the procedures in FMVSS No. 214 as a guideline, but it did not precisely follow the FMVSS No. 214 procedures. Both vehicles' fuel tanks were filled with Stoddard fluid prior to the test. The bullet vehicle was aligned so that the impact point on the Voyager was near the fuel filler neck. The impact speed was 30 mph for the Dakota, and the Voyager was stationary. No fluid loss was noted during the side impact test or the static rollover test performed after the crash test.

Findings: The testing of the subject vehicles according to FMVSS No. 214 and SINCAP procedures has shown that in certain crash modes, the impact may damage the filler neck

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assembly and breach the integrity of the subject vehicle's fuel storage system. The design of the subject vehicle's filler neck assembly and its packaging in the structure of the vehicle leads to significant strain being placed on the short rubber hose connecting the fuel tank to the filler pipe when a side impact deforms this part of the vehicle. Comparable minivans present alternate design strategies that isolate the filler neck assembly from severe tensile loads and excessive strain in FMVSS No. 214 type impacts and also provide greater resistance to being pulled off.

The testing that produced fuel leaks was performed using a MDB and the lateral velocity of the barrier ranged from 30 to 35 mph. Examining individual cases of the subject minivans producing fuel leaks or fires from left-side impacts indicates that the leak or fire in the real-world appears to be associated with higher crash energy and/or speed.

Given that the subject vehicles have been on the road for up to 5 years in significant numbers, there has definitely been a large number of crashes into the left side of the subject vehicles. However, despite the shortcomings of the design of the subject vehicle's fuel filler neck assembly, ODI's search of complaint data, FARS data, NASS data, State data and certain insurance data indicates that these crashes have not produced a significant number of crash-related fires. The FARS data contains two incidents of fatal fires due to left side impacts to the subject vehicle. The overall fatal fire involvement for all crash modes of the subject minivans is essentially the same as or less than that of other minivans.

Conclusion: Under the circumstances, it is unlikely that further investigation would produce evidence sufficient to demonstrate the existence of a safety-related defect in the subject minivans. Therefore, this investigation is closed based on the evidence available at this time. The agency reserves the right to take further action if warranted by new or changed circumstances.

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