



GENERAL MOTORS NORTH AMERICA
Structure & Safety Integration

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OFFICE OF DEFECTS
INVESTIGATION

Thomas Z. Cooper, Chief
Vehicle Integrity Division
Office of Defects Investigation
National Highway Traffic Safety Administration
Room #5326
400 Seventh Street, S.W.
Washington, D.C. 20590

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PE07-025

Dear Mr. Cooper:

This letter completes General Motors' (GM) response to your information request (IR), dated May 15, 2007, regarding alleged failure, tearing, bending or loosening of the hitch receiver for 2002 Model Year (MY) C/K 2500 series Suburban/Yukon and Silverado/Sierra/Avalanche subject vehicles. GM answered questions 1 through 7 in its partial response on June 27, 2007.

GM is also providing information for the non-subject vehicles of MY 1999 through 2007 GMT800 1500 and 2500 series that are equipped with the same basic trailer hitch as installed in the subject vehicles, excluding MY 2002 GMT800 2500 series subject vehicles noted above.

Your questions, 8 through 19, and our corresponding replies are as follows:

8. Describe all assessments, analyses (PFMEA, FMEA), tests, test results, studies, surveys, simulations, investigations, inquiries and/or evaluations (collectively, "actions") including all manufacturing and assembly non-conformance reports (scrap rates, rework, in-house/supplier problem resolution and tracking system (PRTS) reports) that relate to, or may relate to, the alleged defect in the subject vehicles and/or the non-subject vehicles that have been conducted, are being conducted, are planned, or are being planned by, or for, GM. For each such action, provide the following information:
 - a. Action title or identifier;
 - b. The actual or planned start date;
 - c. The actual or expected end date;
 - d. Brief summary of the subject and objective of the action;
 - e. Engineering group(s)/supplier(s) responsible for designing and for conducting the action; and
 - f. A brief summary of the findings and/or conclusions resulting from the action.

For each action identified, provide copies of all documents related to the action, regardless of whether the documents are in interim, draft, or final form. Organize the documents chronologically by action.

The information listed in Table 8 below is a summary of actions performed by GM regarding the alleged defect on the subject vehicles. GM is also providing documents that relate to the initial validation and design release of the hitch assembly.

Product Investigations

Mail Code: 480-210-G11 • 30001 Van Dyke • Warren, MI 48090
PE07-025_N070146 Complete Response.doc



Copies of GM non-confidential documents related to each action are provided in ATT_1_GM Disc; folder labeled: "Q_08."

Copies of GM confidential documents related to the actions can be found in ATT_2_GM_CONF Disc; folder labeled: "Q_08." General Motors requests that this information, which has been stamped "GM Confidential" be afforded confidential treatment by NHTSA.

Copies of Supplier non-confidential documents related to each action are provided in ATT_3_SPLR Disc; folder labeled: "Q_08."

Copies of supplier confidential documents related to the actions can be found in ATT_4_SPLR_CONF Disc; folder labeled: "Q_08." Suppliers have requested that this information, which has been stamped "Confidential" be afforded confidential treatment by NHTSA.

<p>Action 8_A: Engineering test procedures, drawings and specifications. Start Date: February, 1991 End Date: August, 1998 Engineering Group: GM Engineering Objective: Test guideline and requirement on trailer hitches. Summary of Action: General Motors Uniform Test Specification (GMUTS) R-15-31 (9968): Trailer Towing Durability Desert Proving Ground, revised February 1991, GMUTS L-14L-1 (0689): Automotive Type Trailer Hitch Test, revised June, 1994, Hitch Platform Structural Durability Test Procedure 4576, approved 14APR98, GMT800 Subsystem Technical Specification, GMN4155TP and GMN4159TP Full Size Truck General Durability Test Procedures, GMN9964 Corrosion Test Procedure.</p>
<p>Action 8_B: Engineering test reports. Start Date: August 28, 1996 End Date: March 4, 2004 Engineering Group: GM Engineering Objective: Perform, develop and validate various sets of trailer hitches. Summary of Action: The tests were performed according to applicable test procedures listed in Q8_A. All requirements were met.</p>
<p>Action 8_C: Test Incident Reports Start Date: November 7, 1997 End Date: December 15, 2002 Engineering Group: GM Engineering Objective: Document durability and production vehicle performance. Summary of Action: See attached documents.</p>
<p>Action 8_D: Design Analysis Review, Finite Element Analyses (FEA), and Design Failure Mode Analysis (DFMA) Start Date: December 16, 1995 End Date: November 6, 2003 Engineering Group: General Motors Objective: Analyze to determine stress distribution and potential failure mode for the part design of the trailer hitch assembly. Summary of Action: Iterative engineering and design analysis resulted in production design release.</p>
<p>Action 8_E: Part Submission Warrant, Manufacturing quality control process, Process Failure Mode Effect Analysis (PFMEA), and measurements Start Date: June 24, 1996 End Date: July 25, 2007 Engineering Group: Production Stamping, Hawthorne, Talon, DoFasco, Copperweld, Northern Stamping, and General Motors Objective: Document part submission warrant for production vehicles and manufacturing assembly quality control process. Summary of Action: See attached documents.</p>

<p>Action 8_F: GM Engineering reviews Start Date: May 15, 2007 End Date: July 26, 2007 Engineering Group: GM Engineering Objective: Review investigation status. Summary of Action: GM reviewed the investigation status. GM's assessment is further described in response to question 19.</p>
<p>Action 8_G: GM Engineering Survey Start Date: June 5, 2007 End Date: July 12, 2007 Engineering Group: GM Engineering Objective: Conduct field survey with the customers reported in the field reports and warranty claims. Summary of Action: GM completed the survey and results are summarized in response to question 19.</p>

Table 8

9. **Describe the towing option(s) that are available to the owners for which the hitch receiver is installed as original equipment (OEM) on the vehicle including a description of other towing related accessories included in the package. Provide a copy of the owner manual towing section(s) and other available towing literatures that is provided to an owner of an OEM hitch receiver equipped vehicle and any other material that is available to the owner (on request or purchase) concerning towing limits and guides. If the material differs for GVWR groupings, please specify.**

GM trailering/towing options, instructions, guidelines, capacities and limitations can be found in the Owner's Manual in section 4, "Your Driving and the Road." Copies of the Owner's Manuals were provided in ATT_1_GM Disc; folder labeled: "Q_01" on GM's June 27, 2007 partial response letter attachment.

10. **Describe the process used to fabricate the hitch receiver including the material specification, heat treatment and base preparation leading to the final protective paint/coating. If multiple suppliers were used, identify the full name and address for each supplier and provide the means (part number stamping, label etc.) to identify the particular hitch supplier for each unit mounted on the vehicle. If a particular MY, model, GVWR or assembly plant is associated with a particular supplier, please provide the flow path detail.**

Except for the cross tube and receiver tube, all of the sub-assembly parts (safety chain plate, receiver [hat, bumper attaching] bracket, side mounting brackets, electrical connector bracket, and gusset plate) for the trailer hitch assembly are stamped. Heat treatment is not used for the sub-assembly of those parts. The receiver bracket and safety chain plate are welded to the receiver tube as sub-assembly and then this sub-assembly is welded to the cross tube. After this welding, the side mounting brackets are welded to the cross tube. After welding, the final protective paint/coating is applied and dried. The trailer weight rating label is applied after coating.

The full name and address for the suppliers that are associated with part numbers are provided in response to question 18. Information in identifying suppliers associated with vehicle models are provided in ATT_1_GM Disc; folder labeled: "Q_8_F"; file labeled: "C/K Trailer Hitch Status."

11. Describe the design and any differences in the hitch receiver for the various available hitch ratings used in the GMT-800 C/K 1500/2500 series vehicles for both the subject and nonsubject vehicles. In this response, please include any specifications or drawings for the hitch receiver subject vehicle.

Four different trailer hitch platform assemblies were used. The 'light duty' pickup design (LDPU), with maximum trailer weight rating of 12,000 lbs, was introduced in 1999 MY and was utilized on all 15 and 25 series pickups with Gross Vehicle Weight Ratings (GVWR) less than or equal to 8600 lbs.

The Sports Utility Vehicle (SUV) design, with maximum trailer weight rating of 12,000 lbs, was introduced in the 2000 MY and was utilized on all 15 and 25 series sport utility vehicles regardless of series or GVWR.

The 'heavy duty' short box (HDPUS) and 'heavy duty' long box (HDPUL) designs, each with maximum trailer weight rating of 12,000 lbs, were introduced in 2001 MY and were utilized on all 25HD and 35 series pickups.

Each of these designs consists of a common receiver tube, bumper attaching bracket, safety chain plate and electrical connector bracket. Each also uses the same raw cross tube, though bend profiles differ in order to provide clearance to surrounding parts. The side mounting brackets are unique for each design to mate to frame-rails of the respective models.

Specifically for the HD designs, a gusset plate is placed in the bumper attaching bracket and doubler plate reinforcements are placed to bridge the cutouts in the side mounting brackets. There were minor modifications to each of these four parts as identified in response to Question 16. These design architectures were maintained for all four models except the new GMT900 C/K trailer hitch platform was pulled ahead into GMT800 on LDPU (15 series) starting in 2006 MY.

Drawings featuring all part specifications are provided in ATT_2_GM_CONF Disc; folder labeled: "Q_8_A."

12. Describe all quality assurance measures (including QS-9000 documentation, job instruction, tool set-up requirements, quality check worksheets, layered audits and metallurgical evaluation) that are taken to ensure a properly welded hitch receiver assembly and/or a properly mounted hitch receiver assembly to the vehicle.

All available manufacturing quality assurance information including quality control plan, Potential Failure Mode Effect analyses, job instruction, set-up requirements, quality check worksheets, layered audits are provided in ATT_4_SPLR_CONF Disc; folder labeled: "Q_8_E."

13. Describe any stress analysis or finite element analysis performed to ensure that the hitch receiver will meet or exceed the towing rating as specified on the hitch receiver. Illustrate the location of the point of the highest stress area within the hitch receiver and any Factor of Safety established for the hitch receiver. Provide calculation and equation methodology employed to calculate the stresses in the hitch receiver.

Finite Element Analysis (FEA) was conducted during design development, from approximately 1996 to 2000, for each of the four designs identified in response to Question 11. The analyses were conducted to determine stress distributions in the parts when subjected to loads per SAE J684 (Automotive Type Trailer Hitch Test) at maximum trailer weight ratings. These FEA and

J684 analyses were used to assess specific design iterative changes prior to physical validation testing. These analysis reports are no longer available.

As stated in ATT_2_GM_CONF Disc; folder labeled: "Q_8_B", the four designs were tested in accordance with GMN0689 (based upon SAE J684) for static strength and GMN4576 for durability to 12,000 lb trailer weight rating. All requirements were met for all four designs and test reports are provided in ATT_2_GM_CONF Disc; folder labeled: "Q_8_B."

GM also recently conducted an analysis in accordance with SAE J684 (Automotive Type Trailer Hitch Test) on each of the four designs to demonstrate the type of information that would have been available during design development of each part. The analysis predicted that all requirements would be met for all four designs and the report is provided in ATT_2_GM_CONF Disc; folder labeled: "Q_8_F."

14. Describe all static, quasi-static, dynamic and field testing performed to ensure that the hitch receiver will meet or exceed the towing rating as specified on the hitch receiver?

The engineering test procedures performed for the hitch receiver are included in ATT_2_GM_CONF Disc; folder labeled: "Q_8_A."

15. Describe all corrosion related testing to ensure that the final protective coating meets the specification.

Vehicle Technical Specification (VTS), Subsystem Technical Specification (SSTS) and GM4350M-A336 corrosion test performance requirements are provided in ATT_2_GM_CONF Disc; folder labeled: "Q_8_A." Vehicle and component level tests were completed to demonstrate that the requirements were met. Test reports are attached in ATT_2_GM_CONF Disc; folder labeled: "Q_8_B."

16. Describe all modifications or changes made by, or on behalf of GM, in the design, material composition, manufacturing, quality control, supply, or installation of the subject component, from the start of production to date, which relate to, or may relate to, the alleged defect in the subject vehicles including material specification, heat treatment, additional strengthening of the pin box area, and/or base surface preparation leading to the final protective paint/coating application. For each such modification or change, provide the following information:

- a. The date or approximate date on which the modification or change was incorporated into vehicle production identifiable by MY, date of build or VIN in the production table of Request No. 1;
- b. A detailed description of the modification or change (including dimensional and pin box loading) and its effect on hitch rating
- c. The reason(s) for the modification or change;
- d. The part numbers (service and engineering) of the original component;
- e. The part number (service and engineering) of the modified component;
- f. Whether the original unmodified component was withdrawn from production and/or sale, and if so, when;
- g. When the modified component was made available as a service component; and
- h. Whether the modified component can be interchanged with earlier production components.

Also, provide the above information for any modification or change that GM is aware of which may be incorporated into vehicle production within the next 120 days.

GM is providing a summary table of the all design changes that occurred to both the subject and non-subject vehicle trailer hitch in ATT_1_GM Disc; folder labeled: "Q16." GM is also providing all available supplier process change information in ATT_1_GM Disc; folder labeled: "Q_8_E" and ATT_3_SPLR Disc; folder labeled: "Q_8_E."

GM is not planning to incorporate any modifications or changes into production of the subject and non-subject vehicles that relate to the alleged defect within the next 120 days.

17. Produce one each of the following (note: samples shall be shipped direct to NHTSA-VRTC, see address below):

- a. Field return sample of a subject vehicle hitch receiver assembly that includes an allegation of weld issue in the pin box area;
- b. An Exemplar sample of a subject vehicle hitch receiver assembly; and
- c. An Exemplar sample of a post MY2002 non-subject vehicle hitch receiver assembly containing the reinforced gusset plate in the pin box section.

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NHTSA VRTC Building 60
10820 State Route 347
East Liberty, Ohio 43319**

- a. GM received one sample of the subject vehicle hitch receiver assembly through the Warranty Parts Center to date. Since this is the only field return part on the subject vehicle that GM has obtained, GM is retaining the part for further analysis.
- b-c. GM is providing a new sample of the trailer hitch assembly with the reinforced gusset plate that is manufactured for both subject and non-subject 2500 series GMC Sierra and Chevrolet Silverado vehicles since start of production in 2001 MY.

18. State the number of subject component that GM has sold that may be used in the subject vehicles and non-subject vehicle by component name, part number (both service and engineering/production), model and model year of the vehicle in which it is used and month/year of sale (including the cut-off date for sales, if applicable). For each component part number, provide the supplier's name, address, and appropriate point of contact (name, title, and telephone number).

An electronic summary table of the requested service part information for the subject component is included in ATT_1_GM Disc; folder labeled: "Q_18."

These sales numbers represent sales to dealers in the US and Canada. This data has limited analytical value in analyzing the field performance of a motor vehicle component because the records do not contain sufficient information to establish the reason for the part sale. It is not possible from this data to determine the number of these parts that have been installed in the subject and non-subject vehicles or the number remaining in dealer or replacement part supplier inventory.

This table contains service part numbers, part description, part usage information, including other GM vehicles that contain the identical component, part sales figures by month and calendar year, and the supplier's name, address, contact name and phone number.

19. Furnish GM's assessment of the alleged defect in the subject vehicle, including:

- a. The causal or contributory factor(s);**
- b. The failure mechanism(s);**
- c. The failure mode(s) including hitch assembly detachment from the mounting bolts and pin box separation (assuming both the safety chain and emergency brake lock safety link were attached to the holes in the pin box section);**
- d. The risk to motor vehicle safety that it poses;**
- e. What warnings, if any, the operator and the other persons both inside and outside the vehicle would have that the alleged defect was occurring or subject component was malfunctioning; and**
- f. The reports included with this inquiry.**

GM's assessment is based on testing and analysis of the design, evaluation of manufacturing processes, and field performance of the hitch assembly.

Testing and analysis confirmed that the design met the engineering requirements:

- All four GMT800 trailer hitch platform designs meet requirements of SAE J684 (Automotive Type Trailer Hitch Test) at 12,000 pounds trailer rating when production-level parts are tested on rigid fixturing, as is common for similar aftermarket parts.
- All four GMT800 trailer hitch platform designs meet or exceed requirements of GMN4576 (Hitch Platform Structural Durability Test Procedure) at 12,000 pounds trailer rating when proper tongue weight percentage and weight distribution techniques are employed. This testing represents severe trailering usage over an estimated vehicle life cycle (refer to ATT_2_GM_CONF Disc; folder labeled: "Q_8_B").
- GMT800 trailer hitch platform designs represent a continuous improvement of durability performance compared to the previous generation C/K vehicle parts, which demonstrated more than a decade of meeting customers' expectations and GM's field performance requirements.

Detailed records pertaining to the stamping and welding process are no longer available for the subject vehicles. However, GM does have certain Part Submission Warrants indicating engineering and manufacturing process requirements were met for production. A single exception involving poor weld penetration on a subject vehicle was explained in the Field Performance Report (FPR) by the supplier as a part used for machine set-up that was inappropriately shipped for production.

GM's analysis of field performance includes a review of customer trailering practices. As concluded in ATT_2_GM_CONF Disc; folder labeled: "Q_8_G", GM Engineering Survey, 79% of the customers who responded to the survey did not know the trailer tongue weight, 47% of the customers did not know the total trailer weight, 30% of the customers with a trailer weight over 5,000 pounds were not familiar with the weight distribution system. Only 14% of the customers indicated awareness of proper trailering practices.

GM also conducted an analysis of all data available from the owner and field reports and warranty claims, including photographs of vehicles and crash scenes along with other relevant information. Through Warranty Part Center reviews of subject and non-subject parts, engineering assessment contradicts customer complaints. Refer to ATT_2_GM_CONF Disc; folder labeled: "Q_8_F." No evidence exists to suggest that these incidents are the result of any defect in design, material, manufacturing or performance of the subject component.

Based on the consideration of available information, GM believes that if the trailer hitch assembly is used within the trailer weight ratings published in the Owner's Manual, the subject component will perform without failure. There is no defect trend.

* * *

General Motors requested assistance and documents from suppliers in responding to items 8, 10, and 12 and this response includes those documents received from suppliers.

GM claims that certain information, in documents that are part of lawsuit and claims files maintained by the GM Legal Staff, is attorney work product and/or privileged. That information includes notes, memos, reports, photographs, and evaluations by attorneys (and by consultants, claims analysts, investigators, and engineers working at the request of attorneys). GM is producing responsive documents from claims files that are neither attorney work product nor privileged, and withholding those that are attorney work product and/or privileged.

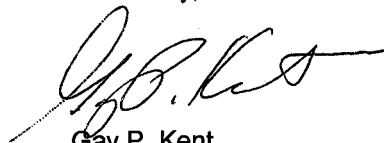
This response is based on searches of General Motors Corporation (GM) locations where documents determined to be responsive to your request would ordinarily be found. As a result, the scope of this search did not include, nor could it reasonably include, "all of its divisions, subsidiaries (whether or 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 business units and persons previously referred to), who are or, in or after September 1, 1999, 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."

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,



Gay P. Kent
Director
Product Investigations

Attachments

**N070146 COMPLETE
PE07-025**

GM CONFIDENTIALITY LETTER

**GM CONFIDENTIALITY LETTER
HAS BEEN REMOVED FROM THIS
ATTACHMENT AND SUPPLIED TO
THE OFFICE OF THE CHIEF COUNSEL**

**N070146 COMPLETE
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SUPPLIER CONFIDENTIAL LETTER

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ATTACHMENT "1"

GM NON-CONFIDENTIAL MATERIAL

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ATTACHMENT "2"

GM CONFIDENTIAL MATERIAL

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**ATTACHMENT "3"
SUPPLIER MATERIAL**

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ATTACHMENT "4"

SUPPLIER

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