

U.S. DEPARTMENT OF TRANSPORTATION

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

LABORATORY TEST PROCEDURE

FOR

FMVSS 223

Rear Impact Guards



SAFETY ASSURANCE
Office of Vehicle Safety Compliance
Room 6115, NSA-30
400 Seventh Street, SW
Washington, DC 20590

OVSC LABORATORY TEST PROCEDURE NO. 223
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1. PURPOSE AND APPLICATION

The Office of Vehicle Safety Compliance (OVSC) provides contractor laboratories with Laboratory Test Procedures as guidelines for obtaining compliance test data. The data are used to determine if a specific vehicle or item of motor vehicle equipment meets the minimum performance requirements of the subject Federal Motor Vehicle Safety Standard (FMVSS). The purpose of the OVSC Laboratory Test Procedures is to present a uniform testing and data recording format, and provide suggestions for the use of specific equipment and procedures. If any contractor views any part of an OVSC Laboratory Test Procedure to be in conflict with a Federal Motor Vehicle Safety Standard (FMVSS) or observes deficiencies in a Laboratory Test Procedure, the contractor is required to advise the Contracting Officer's Technical Representative (COTR) and resolve the discrepancy prior to the start of compliance testing.

Every contractor is required to submit a detailed test procedure to the COTR before initiating the compliance test program. The procedure must include a step-by-step description of the methodology to be used. The contractor's test procedure shall contain a complete listing of test equipment with make and model number and a detailed check-off sheet. The list of test equipment shall include instrument accuracy and calibration dates. All equipment shall be calibrated in accordance with the manufacturer's instructions. There shall be no contradictions between the Laboratory Test Procedure and the contractor's in-house test procedure. Written approval of the in-house test procedures shall be obtained from the COTR before initiating the compliance test program. The OVSC Laboratory Test Procedures are not intended to limit or restrain a contractor from developing or utilizing any testing techniques or equipment which will assist in procuring the required compliance test data. These Laboratory Test Procedures do not constitute an endorsement or recommendation for use of any product or method. However, the application of any such testing technique or equipment is subject to prior approval of the COTR.

NOTE: The OVSC Laboratory Test Procedures, prepared for the limited purpose of use by independent laboratories under contract to conduct compliance tests for the OVSC, are not rules, regulations or NHTSA interpretations regarding the meaning of a FMVSS. The Laboratory Test Procedures are not intended to limit the requirements of the applicable FMVSS(s). In some cases, the OVSC Laboratory Test Procedures do not include all of the various FMVSS minimum performance requirements. Recognizing applicable test tolerances, the Laboratory Test Procedures may specify test conditions that are less severe than the minimum requirements of the standard. In addition, the Laboratory Test Procedures may be modified by the OVSC at any time without notice, and the COTR may direct or authorize contractors to deviate from these procedures, as long as the tests are performed in a manner consistent with the standard itself and within the scope of the contract. Laboratory Test Procedures may not be relied upon to create any right or benefit in any person. Therefore, compliance of a vehicle or item of motor vehicle equipment is not necessarily guaranteed if the manufacturer limits its certification tests to those described in the OVSC Laboratory Test Procedures.

2. GENERAL REQUIREMENTS

Federal Motor Vehicle Safety Standard (FMVSS) No. 223, "Rear Impact Guards", specifies requirements for rear impact guards for trailers and semitrailers. The purpose of Standard 223 is to reduce the number of deaths and serious injuries that occur when light duty vehicles collide with the rear end of trailers and semitrailers. The standard applies to rear impact guards for trailers and semitrailers subject to FMVSS 224, "Rear Impact Protection".

This procedure provides requirements for compliance testing of rear impact guards for trailers and semitrailers to FMVSS 223. Each guard is required to meet the following requirements:

- A. **Cross Sectional Vertical Height** - The horizontal member of each guard is required to have a cross sectional vertical height of at least 100 mm at any point across the guard width.
- B. **Strength and Energy Absorption** - Each guard is required to comply with the strength requirements at each test location and the energy absorption requirements at either test location P3 when tested under the procedures of S6 of S223.

Guard Strength

The guard must resist the following force levels without deflecting by more than 125 mm.

- (1) A force of 50,000 N at test location P1 on either the left or right side of the guard.
- (2) A force of 50,000 N at test location P2.
- (3) A force of 100,000 N at test location P3 on either the left or the right side of the guard.

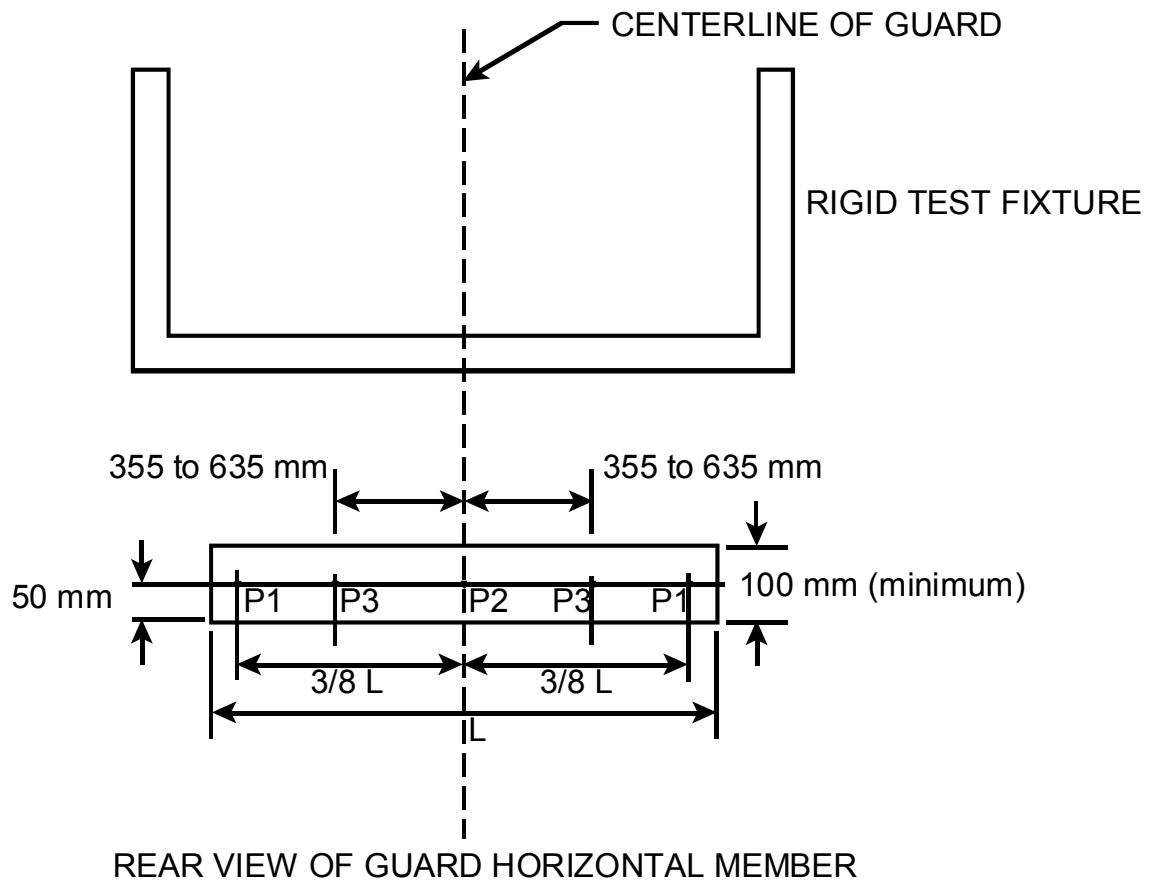
Guard Energy Absorption

A guard, other than a hydraulic guard, is required to absorb by plastic deformation within the first 125 mm of deflection at least 5650 J of energy at each test location P3.

Figure 1 shows the test locations. The method of determining test locations is specified in S6.4 of S223.

2. GENERAL REQUIREMENTS....Continued

FIGURE 1. TEST LOCATIONS



- C. **Labeling** - Each guard is required to be permanently labeled with the information below in English and in letters that are at least 2.5 mm high. The label is required to be placed on the forward facing surface of the horizontal member of the guard, 305 mm inboard of the right end of the guard.
- (1) The guard manufacturer's name and address.
 - (2) The statement: "Manufactured in _____" (inserting the month and year of guard manufacture).
 - (3) The letters "DOT", constituting a certification by the guard manufacturer that the guard conforms to all requirements of this standard.
- D. **Guard Attachment Hardware** - Each guard, other than a guard that is to be installed on a vehicle manufactured by the manufacturer of the guard, is required to be accompanied by all attachment hardware necessary for installation of the guard on the chassis of the motor vehicle for which it is intended.

2. GENERAL REQUIREMENTS....Continued

E. **Installation Instructions** - The manufacturer of rear impact guards for sale to vehicle manufacturers is required to include with each guard printed instructions in English for installing the guard, as well as a diagram or schematic depicting proper guard installation. The manufacturer of a rear impact guard for one of its own vehicles is required to prepare and keep a copy of installation procedures applicable to each vehicle/guard combination for a period of one year from the date of vehicle manufacture and provide them to NHTSA on request. The instructions or procedures are required to specify:

- (1) Vehicles on which the guard can be installed. Vehicles may be designated by listing the make and model of the vehicles for which the guard is suitable, or by specifying the design elements that would make any vehicle an appropriate host for the particular guard (e.g., vehicles with frame rails of certain spacing and gauge of steel).
- (2) A description of the chassis surface to which the guard will be attached, including frame design types with dimensions, material thickness, and tire track width. This description is required to be detailed enough to permit the agency to locate and duplicate the chassis surface during compliance testing.
- (3) An explanation of the method of attaching the guard to the chassis of each vehicle make and model listed to the design elements specified in the instructions and procedures. The principal aspects of vehicle chassis configuration that are necessary to the proper functioning of the guard are required to be specified. If the chassis strength is inadequate for the guard design, the instructions or procedures are required to specify methods for adequately reinforcing the vehicle chassis. Procedures for properly installing any guard attachment hardware are required to be specified.

NOTE: Hydraulic guards are excluded from the energy absorption requirements.

3. SECURITY

The contractor is required to provide appropriate security measures to protect the OVSC test samples from unauthorized personnel during the entire compliance testing program. The contractor is financially responsible for any acts of theft and/or vandalism which occur during the storage of test equipment. Any security problems which arise are required to be reported by telephone to the COTR within two working days after the incident. A letter containing specific details of the security problem will be sent to the COTR within 48 hours.

The contractor is required to protect and segregate the data that evolves from compliance testing before and after each test. No information concerning the safety compliance testing program is required to be released to anyone except the COTR, unless specifically authorized by the COTR, the COTR's Branch or Division Chief, or by the Contracting Officer.

NOTE: NO INDIVIDUALS, OTHER THAN CONTRACTOR PERSONNEL, ARE REQUIRED TO BE ALLOWED TO WITNESS ANY COMPLIANCE TEST UNLESS SPECIFICALLY AUTHORIZED BY THE COTR.

4. GOOD HOUSEKEEPING

Contractors are required to maintain the entire equipment compliance testing area, test fixtures and instrumentation in a neat and clean condition with test instruments arranged in an orderly manner consistent with good test laboratory housekeeping practices.

5. TEST SCHEDULING AND MONITORING

The contractor is required to submit a test schedule to the COTR prior to testing. Tests are required to be completed as required in the contract. All testing is required to be coordinated to allow monitoring by the COTR.

6. TEST DATA DISPOSITION

The contractor is required to make all preliminary compliance test data available to the COTR on location within four hours after the test. Final test data, including digital printouts and computer generated plots (if applicable), are required to be furnished to the COTR in accordance with the contract schedule.

All backup data sheets, strip charts, recordings, plots, technician's notes, etc., are required to be retained by the contractor for a minimum of five years after conclusion of each delivery order, purchase order, etc. The COTR is required to direct final disposition at that time.

7. GOVERNMENT FURNISHED PROPERTY (GFP)

The contractor may receive either a guard or a full trailer for a compliance test.

If a guard is received at the laboratory, the contractor is required to verify that it contains the following:

- A. Printed instructions in English for installing the guard, as well as a diagram or schematic depicting proper guard installation.
- B. All attachment hardware necessary for installation of the guard on the chassis of the motor vehicle for which it is intended.

If either of these items are missing, the COTR should be notified.

If a full trailer is received at the laboratory, the contractor is required to verify the following:

- A. There is no damage to the trailer.
- B. The warranty, owner's manual and any other information available from the manufacturer is included.

If the trailer is damaged, photographs of the damaged areas should be taken and the COTR should be notified.

An inventory is required to be made of the number, name, and condition of all GFTI received. The test samples are required to be stored in a dry, clean, area specifically designated by the Laboratory Project Manager.

Each guard or trailer is required to be assigned a laboratory test group number and is required to also be tagged with the make, model, and part number.

8. CALIBRATION OF TEST INSTRUMENTS

Before the contractor initiates the safety compliance test program, a test instrumentation calibration system will be implemented and maintained in accordance with established calibration practices. Guidelines for setting up and maintaining such calibration systems are described in MIL-C-45662A, "Calibration System Requirements". The calibration system is required to be set up and maintained as follows:

- A. Standards for calibrating the measuring and test equipment will be stored and used under appropriate environmental conditions to assure their accuracy and stability.
- B. All measuring instruments and standards are required to be calibrated by the contractor, or a commercial facility, against a higher order standard at periodic intervals NOT TO EXCEED TWELVE (12) MONTHS except for static types of measuring devices such as rulers, weights, etc., which are required to be calibrated at periodic intervals not to exceed two years. Records, showing the calibration traceability to the National Institute of Standards and Technology (NIST), are required to be maintained for all measuring and test equipment.
- C. All measuring and test equipment and measuring standards will be labeled with the following information:
 - (1) Date of calibration
 - (2) Date of next scheduled calibration
- D. A written calibration procedure is required to be provided by the contractor which includes as a minimum the following information for all measurement and test equipment unless the calibration is performed by a licensed commercial facility.
 - (1) Type of equipment, manufacturer, model number, etc.
 - (2) Measurement range
 - (3) Accuracy
 - (4) Calibration interval
 - (5) Type of standard used to calibrate the equipment (calibration traceability of the standard must be evident)
- E. Records of calibration for all test instrumentation are required to be kept by the contractor in a manner which assures the maintenance of established calibration schedules. All such records are required to be readily available for inspection when requested by the COTR. The calibration system will need the acceptance of the COTR before the test program commences.

9. PHOTOGRAPHIC DOCUMENTATION

Each final test report is required to include glossy photographs (minimum size 8 x 10 inches). One set of original photographs is required to be included in the final test report which will be used for optical scanning by the OVSC. Other copies of the final test report may contain multilith copies of the original photographs.

A tag, label, or placard identifying the test item make and model, NHTSA number, and compliance test date are required to appear in each photograph and be legible.

As a minimum the following photos are required to be included:

- A. The guard in the condition it was received (front, rear, and both sides).
- B. The guard certification label.
- C. The test setup.
- D. Pretest and post test side views of the force application device against the guard at each test location.
- E. Pretest and post test views of the guard attachments (front, rear, and both sides).
- F. Post test view of damage to the guard's members and/or parts.

10. DEFINITIONS

NOTE: In some cases, the definitions are not direct quotes from the standard but are paraphrased. For the exact language, please refer to the standard.

CHASSIS

The load supporting frame structure of a motor vehicle.

GUARD WIDTH

The maximum horizontal guard dimension that is perpendicular to the longitudinal vertical plane passing through the longitudinal centerline of the vehicle when the guard is installed on the vehicle according to the installation instructions provided by the manufacturer.

HORIZONTAL MEMBER

The structural member of the guard that meets the configuration requirements of S5.1.1 through 5.1.3 of 571.224, Rear Impact Protection, when the guard is installed on a vehicle according to the guard manufacturer's installation instructions.

HYDRAULIC GUARD

A guard designed to use fluid properties to provide resistance force to deformation.

REAR IMPACT GUARD

A device installed on or near the rear of a vehicle so that when the vehicle is struck from the rear, the device limits the distance that the striking vehicle's front end slides under the rear end of the impacted vehicle.

RIGID TEST FIXTURE

A supporting structure on which a rear impact guard can be mounted in the same manner it is mounted to a vehicle. The rigid test fixture is designed to resist the forces applied to the rear impact guard without significant deformation, such that a performance requirement of this standard must be met no matter how small an amount of energy is absorbed by the test fixture.

11. PRETEST REQUIREMENTS

IN-HOUSE TEST PROCEDURE

Prior to conducting any compliance test, the contractor is required to submit a detailed in-house compliance test procedure to the COTR which includes a step-by-step description of the methodology to be used. Written approval must be obtained from the COTR before initiating the compliance test program so that all parties are in agreement. The in-house procedure is required to contain the following:

- A. Sample tagging or marking system
- B. Sample stowage
- C. Testing setup
- D. Testing procedure (step-by-step)
- E. Data recording
- F. Failure description

TEST DATA LOSS

A compliance test is not to be conducted unless all of the various test conditions specified in the applicable OVSC Laboratory Test Procedure have been met. Failure of a contractor to obtain the required test data and to maintain acceptable limits on test parameters in the manner outlined in the applicable OVSC Laboratory Test Procedure may require a retest at the expense of the contractor. The retest costs will include the cost of the replacement item of motor vehicle equipment and all costs associated with conducting the retest. The original test specimen used for the invalid test is required to remain the property of OVSC, and the retest specimen is required to remain the property of the contractor. If there is a test failure, the contractor is required to retain the retest specimen for a period not exceeding two years. If there is no test failure, the Contractor may dispose of the test specimen upon notification from the COTR that the final test report has been accepted.

The Contracting Officer of NHTSA is the only NHTSA official authorized to notify the contractor that a retest is required. The retest is required to be completed within two (2) weeks after receipt of replacement equipment and notification by the Contracting Officer that a retest is required which ever is later. If a retest is conducted, no test report is required for the original test.

11. PRETEST REQUIREMENTS....Continued

TEST CONDITIONS

Unless otherwise specified, all tests and measurements are required to be conducted at a temperature of $75^{\circ}\text{F} \pm 15^{\circ}\text{F}$. Continuous recording of environmental temperature of the testing area is required to be available during all tests. Test samples, unless otherwise authorized by the COTR, are required to be stabilized at $75^{\circ}\text{F} \pm 15^{\circ}\text{F}$ for a period of at least 24 hours immediately prior to testing.

TEST PERSONNEL PERFORMANCE

Personnel supervising and/or performing the compliance test program is required to be thoroughly familiar with the requirements, test conditions, equipment for the test to be conducted, and safety requirements.

RECORDING OF TEST DATA

Environmental data and test data are required to be recorded on permanent strip charts, circular recording charts, or other acceptable print-out media. Where permanent trace recording is not required, data will be recorded on standard report forms. Changes or corrections are required to be made by drawing a line through the original entry, which must still remain legible, and adding the change alongside.

Data will be submitted on the Test Data Sheet forms specified for use in the final test report. Data will be typed before the sheets are submitted.

TEST SAMPLE INSPECTION

Prior to mounting the guard on the rigid test fixture or securing the trailer for the compliance test, complete the inspection data sheet. (Data Sheet 1)

12. COMPLIANCE TEST EXECUTION

TEST DEVICE OPTION

The rear impact guard is attached to a test device for the compliance test. The test device will be either a rigid test fixture or a complete trailer. Whichever of the two test devices the manufacturer used as a basis for its certification of the guard will be used for the compliance test. If the manufacturer did not use one of these devices or does not specify a device when asked by NHTSA, NHTSA may choose which test device to use.

SYSTEM REQUIREMENTS

- A. **Force Application Device** - The force application device will consist of a rectangular solid made of rigid steel. The steel solid is 203 mm in height, 203 mm in width, and 25 mm in thickness. Each edge of the 203 mm x 203 mm face has a radius of curvature of 5 mm \pm 1 mm. The forward displacement rate of the force application device must be constant and not less than 1 mm and not more than 1.5 mm per second. During each force application, the force application device is guided so that it does not rotate and the location of the longitudinal axis of the force application device remains constant.
- B. **Load Measuring Device** - A load cell of proper capacity with an accuracy of \pm 1 %, is required to be used for measuring load and will be placed in the loading system so that it measures the actual load being transmitted into the guard. The value of force is to be recorded at least ten times per 25 mm of displacement of the force application device.
- C. **Deflection Measuring Device** - Deflection of the force application device is required to be measured to \pm 3 mm using a linear displacement potentiometer.
- D. Equipment calibration is required to be verified following an apparent noncompliance unless otherwise approved by the COTR.
- E. Test fixtures and attachments are required to be subject to NHTSA approval.

12. COMPLIANCE TEST EXECUTION....Continued

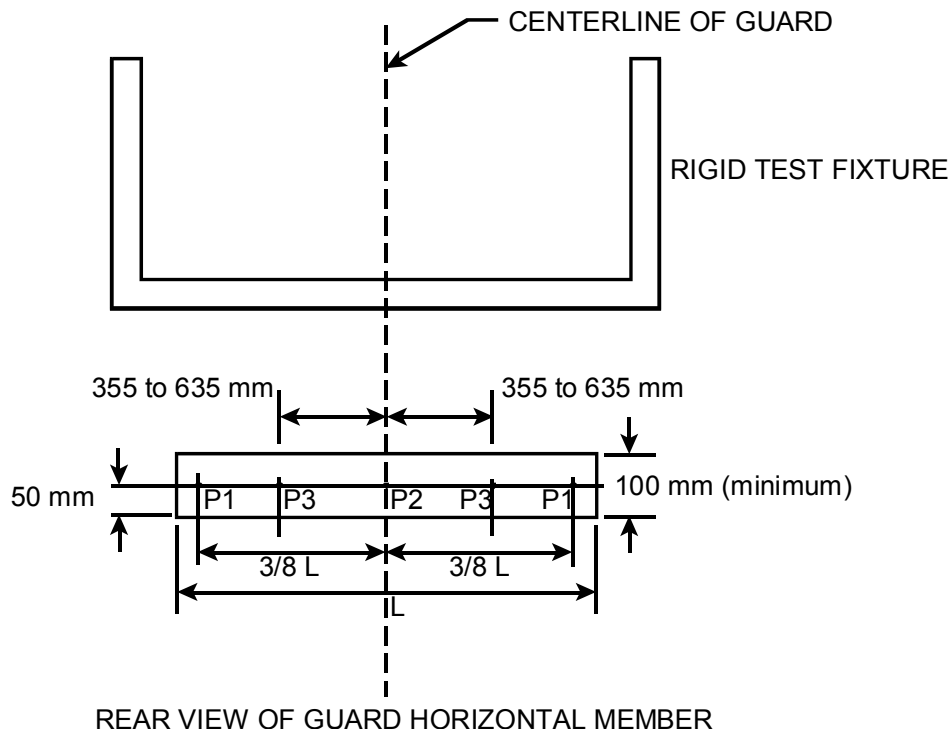
GUARD TEST LOCATIONS

There are three test locations used for the guard strength and guard energy absorption tests: test locations P1, P2, and P3. These test locations are to be determined with the guard mounted to the rigid test fixture or complete trailer. All test locations are positioned vertically 50 mm above the bottom of the guard. The horizontal position for each test location is described below.

- A. **Test Location P1** - The point on the rearmost surface of the horizontal member of the guard that is located at a distance of $\frac{3}{8}$ of the guard width from the vertical longitudinal plane passing through the center of the guard and lies on either side of the center of the guard's horizontal member.
- B. **Test Location P2** - The point on the rearmost surface of the horizontal member of the guard that lies in the longitudinal vertical plane passing through the center of the guard's horizontal member.
- C. **Test Location P3** - Any point on the rearmost surface of the horizontal member of the guard that is not less than 355 mm and not more than 635 mm from the vertical longitudinal plane passing through the center of the guard and lies on either the right or left side of the horizontal member of the guard. The exact location of P3 will be determined by the COTR.

The test locations are required to be labeled on the guard prior to testing. Figure 1 shows the test locations.

FIGURE 1. TEST LOCATIONS



12. COMPLIANCE TEST EXECUTION....Continued

TEST PROCEDURE

Guard Installation

Rigid Test Fixture - The guard will be attached to the rigid test fixture in accordance with the instructions or procedures for guard attachment provided by the guard manufacturer. The test fixture may need to be modified to simulate the mounting surface in the installation instruction.

Full Trailer - The trailer chassis will be secured so that it behaves essentially as a fixed object during the test, such that the test must be passed no matter how little it moves during the test.

Before applying any force to the guard, the force application device should be positioned such that the center point of the contact surface is aligned with and touching the guard test location and the longitudinal axis passes through the test location and is perpendicular to the transverse vertical plane that is tangent to the rearmost surface of the guard's horizontal member.

Guard Strength Test

Apply force to the guard in a forward direction such that the displacement rate of the force application device is constant and not less than 2 cm and not more than 9 cm per minute until the force specified for each test location below has been exceeded, or until the displacement of the force application device has reached 130 mm +0, -5 mm, whichever comes first.

TABLE 1 - GUARD STRENGTH LOAD APPLICATION

TEST LOCATION	FORCE
P1	50,000 N +0, -2500 N
P2	50,000 N +0, -2500 N
P3	100,000 N +0, -2500 N

Record the maximum force and maximum displacement for each test on Data Sheet 2. Include a force vs. displacement plot with the data sheet.

Hydraulic guards are to be compressed before application of force to the guard and remain compressed throughout the guard strength tests. The horizontal member of the guard is deflected in a forward direction until the hydraulic unit(s) have reached the full extent of their designated travel, or 610 mm whichever occurs first.

12. COMPLIANCE TEST EXECUTION....Continued

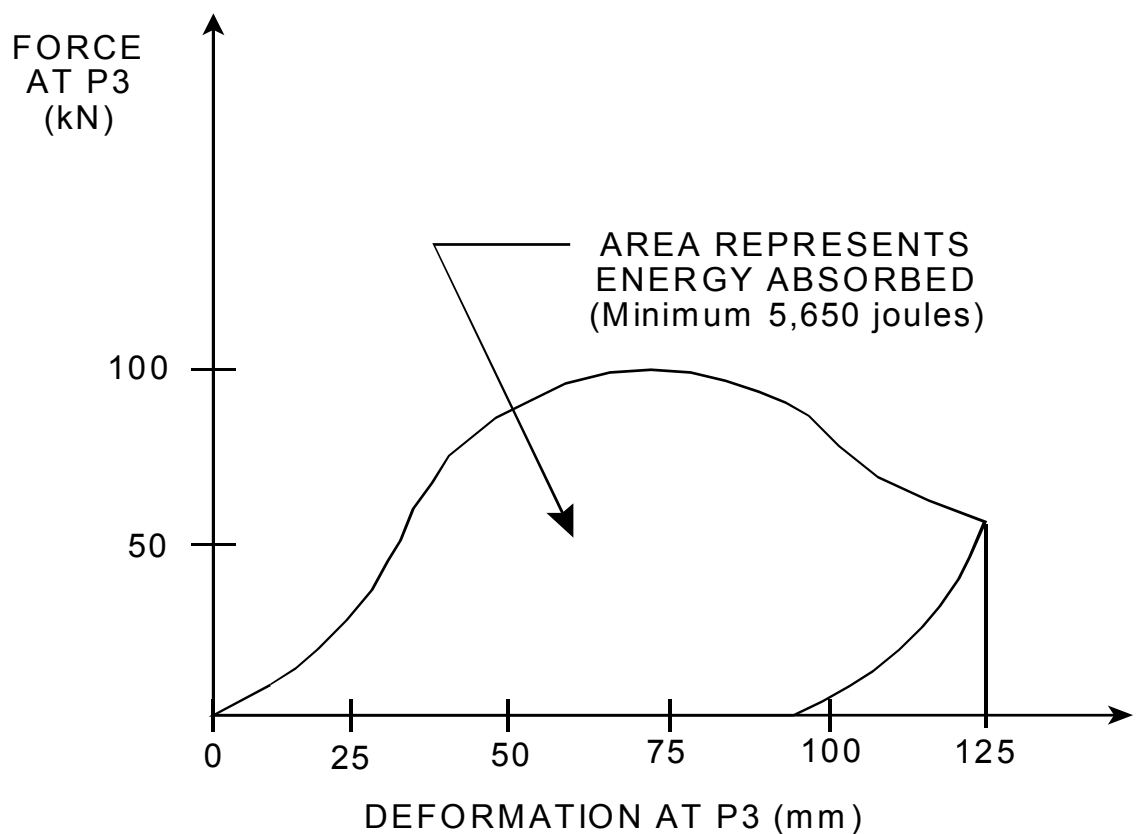
NOTE: The COTR may specify that a strength and energy absorption test be performed at one location P3 on a guard during one force application. The force will be applied according to the guard energy absorption procedure. The force vs. displacement curve will be used to determine if the guard met the guard strength requirements.

Guard Energy Absorption Test

Apply force to the guard in a forward direction such that the displacement rate of the force application device is constant and not less than 1 mm and not more than 1.5 mm per second until displacement of the force application device has reached 130 mm, + 0, - 5 mm. Then reduce the load until the guard no longer offers resistance to the force application device.

Determine the energy absorbed in the guard by calculating the area bounded by the curve in the force vs. displacement plot. See Figure 2. Record the energy absorbed, and the maximum load and displacement on Data Sheet 3. Include the force vs. displacement plot with the data sheet.

FIGURE 2. GUARD ENERGY ABSORPTION
(TYPICAL FORCE-DEFLECTION CURVE AT P3)



(Not actual test data - for illustrative purposes only.)

13. POST TEST REQUIREMENTS

The contractor is required to re-verify all instrumentation and check data sheets and photographs. Make sure data is recorded in all data blocks on every compliance test data sheet.

14. REPORTS

14.1 MONTHLY STATUS REPORTS

The contractor is required to submit a monthly Test Status Report and an Equipment Status Report to the COTR. The Equipment Status Report is required to be submitted until all final reports are accepted. Samples of the required Monthly Status Reports are contained in the report forms section.

14.2 APPARENT TEST FAILURE

Any indication of a test failure is required to be communicated by telephone to the COTR within 1 working day with written notification mailed within 2 working days. A Notice of Test Failure (see report forms section) with a copy of the particular compliance test data sheet(s) is required to be included.

In the event of a test failure, a post test calibration check of some critically sensitive test equipment and instrumentation may be required for verification of accuracy. The necessity for the calibration is required to be at the COTR's discretion and is required to be performed without additional costs to the OVSC.

14.3 FINAL TEST REPORTS

14.3.1 COPIES

In the case of a test failure, **SEVEN** copies of the Final Test Report are required to be submitted to the COTR for acceptance within three weeks of test completion. The Final Test Report format to be used by all contractors can be found in the attachment.

If there is no indication of a test failure, **FOUR** copies of each Final Test Report are required to be submitted to the COTR within three weeks of test completion. Payment of contractor's invoices for completed compliance tests may be withheld until the Final Test Report is accepted by the COTR. Contractors are requested to NOT submit invoices before submitting copies of the Final Test Report.

Contractors are required to submit the first Final Test Report in typed draft form within two weeks after the compliance test is conducted. The contractor and the COTR will then be able to discuss the details of both test conduct and report content early in the compliance test program.

Contractors are required to PROOF READ all Final Test Reports before submittal to the COTR. The OVSC will not act as a report quality control office for contractors. Reports containing a significant number of errors will be returned to the contractor for correction, and a "hold" will be placed on invoice payment for the particular test.

14. REPORTS....Continued

14.3.2 REQUIREMENTS

The Final Test Report, associated documentation (including photographs) are relied upon as the chronicle of the compliance test. The Final Test Report will be released to the public domain after review and acceptance by the COTR. For these reasons, each final report must be a complete document capable of standing by itself.

The contractor should use **detailed** descriptions of all compliance test events. Any events that are not directly associated with the standard but are of technical interest should also be included. The contractor should include as much **detail** as possible in the report.

Instructions for the preparation of the first three pages of the final test report are provided below for the purpose of standardization.

14.3.3 FIRST THREE PAGES

A. FRONT COVER

A heavy paperback cover (or transparency) is required to be provided for the protection of the final report. The information required on the cover is as follows:

- (1) Final Report Number such as 223-ABC-9X-001, where –
 223 is the FMVSS tested
 ABC are the initials for the laboratory
 9X is the Fiscal Year of the test program (or OX after 1999)
 001 is the Group Number (001 for the 1st brand,
 002 for the 2nd brand, etc.)

- (2) Final Report Title And Subtitle such as

SAFETY COMPLIANCE TESTING FOR FMVSS 223

Rear Impact Guards

* * * * *

Guard Manufacturer

Model XYZ

- (3) Contractor's Name and Address such as

COMPLIANCE TESTING LABORATORIES, INC.

4335 West Dearborn Street

Detroit, Michigan 48090-1234

NOTE: DOT SYMBOL WILL BE PLACED BETWEEN ITEMS (3) AND (4)

14. REPORTS....Continued

- (4) Date of Final Report completion
- (5) The words "FINAL REPORT"
- (6) The sponsoring agency's name and address as follows

U. S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Safety Assurance
Office of Vehicle Safety Compliance
Room 6115 (NSA-32)
400 Seventh Street, SW
Washington, DC 20590

14. REPORTS....Continued**B. FIRST PAGE AFTER FRONT COVER**

A disclaimer statement and an acceptance signature block for the COTR are required to be provided as follows:

This publication is distributed by the U. S. Department of Transportation, National Highway Traffic Safety Administration, in the interest of information exchange. The opinions, findings and conclusions expressed in this publication are those of the author(s) and not necessarily those of the Department of Transportation or the National Highway Traffic Safety Administration. The United States Government assumes no liability for its contents or use thereof. If trade or manufacturers' names or products are mentioned, it is only because they are considered essential to the object of the publication and should not be construed as an endorsement. The United States Government does not endorse products or manufacturers.

Prepared By: _____

Approved By: _____

Approval Date: _____

FINAL REPORT ACCEPTANCE BY OVSC:

Accepted By: _____

Acceptance Date: _____

14. REPORTS....Continued**C. SECOND PAGE AFTER FRONT COVER**

A completed Technical Report Documentation Page (Form DOT F1700.7) is required to be completed for those items that are applicable with the other spaces left blank. Sample data for the applicable block numbers of the title page follows.

Block 1 — REPORT NUMBER

223-ABC-9X-001

Block 2 — GOVERNMENT ACCESSION NUMBER

Leave blank

Block 3 — RECIPIENT'S CATALOG NUMBER

Leave blank

Block 4 — TITLE AND SUBTITLE

Final Report of FMVSS 223 Compliance Testing of Rear Impact
Guards from Guard Manufacturer, Model XYZ

Block 5 — REPORT DATE

March 1, 199X or 200X

Block 6 — PERFORMING ORGANIZATION CODE

ABC

Block 7 — AUTHOR(S)

John Smith, Project Manager / Bill Doe, Project Engineer

Block 8 — PERFORMING ORGANIZATION REPORT NUMBER

ABC-DOT-XXX-001

Block 9 — PERFORMING ORGANIZATION NAME AND ADDRESS

ABC Laboratories
405 Main Street
Detroit, MI 48070-1234

14. REPORTS....Continued

Block 10 — WORK UNIT NUMBER

Leave blank

Block 11 — CONTRACT OR GRANT NUMBER

DTNH22-9X-D-12345

Block 12 — SPONSORING AGENCY NAME AND ADDRESS

U.S. Department of Transportation
National Highway Traffic Safety Administration
Safety Assurance
Office of Vehicle Safety Compliance (NSA-32)
400 Seventh Street, SW, Room 6115
Washington, DC 20590

Block 13 — TYPE OF REPORT AND PERIOD COVERED

Final Test Report
Feb. 15 to Mar. 15, 199X or 200X

Block No. 14--SPONSORING AGENCY CODE

NSA-32

Block 15 — SUPPLEMENTARY NOTES

Leave blank

Block 16 — ABSTRACT

Compliance tests were conducted on Rear Impact Guards from [Guard Manufacturer] in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-223-0X for the determination of FMVSS 223 compliance. Test failures identified were as follows:

None

NOTE: Above wording must be shown with appropriate changes made for a particular compliance test. Any questions should be resolved with the COTR.

14. REPORTS....Continued

Block 17 — KEY WORDS

Compliance Testing
Safety Engineering
FMVSS 223

Block 18 — DISTRIBUTION STATEMENT

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14. REPORTS....Continued

14.3.4 TABLE OF CONTENTS

Final test report Table of Contents is required to include the following:

Section 1 —	Purpose of Compliance Test
Section 2 —	Compliance Test Data Summary
Section 3 —	Test Data
Section 4 —	Test Failure Details (if applicable)
Appendix A —	Photographs
Appendix B —	Test Equipment List and Calibration Information

15. DATA SHEETS

DATA SHEET 1

INSPECTION DATA - FMVSS 223

TEST GROUP NO.: _____ ; INSPECTION DATE: _____

TESTING LABORATORY: _____

LAB. TECHNICIAN(S) : _____

GUARD MANUFACTURER: _____

GUARD MODEL: _____

DATE OF MANUFACTURE: _____

CROSS-SECTIONAL VERTICAL HEIGHT

Record the minimum cross sectional vertical height of the horizontal member of the guard.
_____ mm (Requirement: At least 100 mm at any point across the guard width.)

GUARD LABELING

- A. Does the guard contain a certification label placed on the forward facing surface of the horizontal member of the guard, 305 mm inboard of the right end of the guard?
_____ Yes _____ No
- B. Is all information on the label printed in English and in letters that are at least 2.5 mm high?
_____ Yes _____ No
- C. Does each label contain the following information?
- (1) Guard manufacturer's name and address. _____ Yes _____ No
- (2) The statement: "Manufactured in _____" (inserting the month and year of guard manufacture). _____ Yes _____ No
- (3) The letters "DOT". _____ Yes _____ No

15. DATA SHEETS....Continued**GUARD ATTACHMENT HARDWARE**

NOTE: If a full trailer is provided, this section is not applicable.

Is the guard accompanied by all attachment hardware necessary for installation of the guard on the chassis of the motor vehicle for which it is intended?

_____ Yes _____ No

INSTALLATION INSTRUCTIONS

Rigid Test Fixture

- A. Does the guard include printed instructions in English for installing the guard, as well as a diagram or schematic depicting proper guard installation?
_____ Yes _____ No

- B. Fill in the following information from the instructions or procedures:

Vehicle make(s) and model(s) for which the guard is suitable:

Make/Model: _____

Make/Model: _____

Make/Model: _____

Make/Model: _____

Make/Model: _____

Design elements that may make any vehicle an appropriate host for the particular guard. (add details below)

15. DATA SHEETS....Continued

Description of the chassis surface to which the guard will be attached.

Frame design types with dimensions:

Materials thicknesses:

Tire track width:

Methods of attaching the guard to the chassis of each vehicle make and model listed.

Full Trailer

Description of the location and method used to secure the trailer.

RECORDED BY: _____;

DATE: _____

APPROVED BY: _____

15. DATA SHEETS....Continued

DATA SHEET 2

SUMMARY OF TEST RESULTS FOR GUARD STRENGTH TEST

TEST GROUP NO.: _____; TEST DATE: _____

Sample No.	Test Location	Load Requirement (N)	Displacement Requirement (mm)	Maximum Load (N)	Displacement at Maximum Load (mm)
	P1 Right	50,000	< 125		
	P1 Left	50,000	< 125		
	P2	50,000	< 125		
	P3 Right	100,000	< 125		
	P3 Left	100,000	< 125		

P3 Location: Left _____ Right _____

NOTE: Choice and location of test points will be as specified by the COTR.

Requirement: The load requirement must be reached prior to 125 mm of displacement.

Displacement Rate = _____ mm/sec.

Attach force vs. displacement plots for each test location to this data sheet.

REMARKS

Sample No.

Sample No.

15. DATA SHEETS....Continued

Sample No.

Sample No.

Sample No.

RECORDED BY: _____

DATE: _____

APPROVED BY: _____

15. DATA SHEETS....Continued

DATA SHEET 3

SUMMARY OF TEST RESULTS FOR GUARD ENERGY ABSORPTION TEST

TEST GROUP NO.: _____ ; TEST DATE: _____

Sample No.	Test Location	Reqmt (J)	Maximum Load (N)	Displacement at Max. Load (mm)	Energy Absorption (J)
	P3 Right	5650			
	P3 Left	5650			

P3 Location: Left _____ Right _____

NOTE: Choice and location of P3 test points will be as specified by the COTR.

Displacement Rate = _____ mm/sec.

Attach force vs. displacement plots for each test location to this data sheet.

REMARKS

RECORDED BY: _____

DATE: _____

APPROVED BY: _____

15. DATA SHEETS....Continued

DATA SHEET 4

EQUIPMENT LIST AND CALIBRATION RECORD

TEST GROUP NO.: _____ ; INSPECTION DATE: _____

TESTING LABORATORY: _____

NOTE: Information to be included for each item of test instrumentation is as follows:

EQUIPMENT DESCRIPTION: _____

EQUIPMENT MANUFACTURER: _____

TYPE AND/OR MODEL: _____

SERIAL NUMBER: _____

LIMITS: _____

ACCURACY: _____

FREQUENCY OF CALIBRATION: _____

EXPIRATION OF CALIBRATION: _____

USED ON TEST NUMBER: _____

REMARKS:

RECORDED BY: _____

DATE: _____

APPROVED BY: _____

16. FORMS

LABORATORY NOTICE OF TEST FAILURE TO OVSC

FMVSS No. 223 TEST DATE: _____

LABORATORY: _____

CONTRACT NO.: _____ DELV. ORDER NO.: _____

LABORATORY PROJECT ENGINEER'S NAME: _____

TEST SPECIMEN DESCRIPTION –

GUARD MFR. & MODEL: _____

PART NO. : _____

TEST FAILURE DESCRIPTION: _____

FMVSS No. 223 REQUIREMENT, PARAGRAPH §____ : _____

NOTIFICATION TO NHTSA (COTR) : _____

DATE: _____ BY: _____

REMARKS:

APPENDIX A
PHOTOGRAPHS

APPENDIX B

EQUIPMENT LIST AND CALIBRATION SCHEDULES