TP104-08
June 26, 1996

U.S. DEPARTMENT OF TRANSPORTATION

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

LABORATORY TEST PROCEDURE

FOR

FMVSS 104

Windshield Wiping and Washing Systems

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

OVSC LABORATORY TEST PROCEDURE NO. 104

TABLE OF CONTENTS

1. PURPOSE AND APPLICATION

The Office of Vehicle Safety Compliance (OVSC) provides contracted laboratories with Laboratory Test Procedures (TPs) which serve 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. Any contractor interpreting any part of an OVSC Laboratory Test Procedure to be in conflict with a Federal Motor Vehicle Safety Standard or observing any deficiencies in a Laboratory Test Procedure is required to advise the Contracting Officer's Technical Representative (COTR) and resolve the discrepancy prior to the start of compliance testing.

Contractors are 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 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.

NOTE: The OVSC Laboratory Test Procedures, prepared for use by independent laboratories under contract to conduct compliance tests for the OVSC, 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. Sometimes, recognizing applicable test tolerances, the Test Procedures specify test conditions which are less severe than the minimum requirements of the standards themselves. Therefore, compliance of a vehicle or item of motor vehicle equipment is not necessarily guaranteed if the manufacturer limits certification tests to those described in the OVSC Laboratory Test Procedures.

2. GENERAL REQUIREMENTS

FMVSS 104, Windshield Wiping and Washing Systems — Passenger Cars, Multipurpose Passenger Vehicles, Trucks, and Buses, specifies that each vehicle shall have a power-driven windshield wiping system with at least two speeds that meets the standard when tested in accordance with SAE Recommended Practice J903a, and a windshield washing system that meets the requirements of SAE Recommended Practice J942, Passenger Car Windshield Washer Systems, except that the reference to "the effective wipe pattern defined in SAE J903, paragraph 3.1.2" shall be deleted. The areas established in accordance with S4.1.2.1 of FMVSS 104 shall be used instead. A different exception applies to multipurpose passenger vehicles (MPVs), trucks and buses.

3. SECURITY

The contractor shall provide appropriate security measures to protect the OVSC test vehicles 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 vehicles. Any security problems which arise shall be reported by telephone to the Industrial Property Manager (IPM), Office of Contracts and Procurement, within two working days after the incident. A letter containing specific details of the security problem will be sent to the IPM (with copy to the COTR) within 48 hours.

The contractor shall protect and segregate the data that evolves from compliance testing before and after each vehicle test. No information concerning the vehicle safety compliance testing program shall be released to anyone except the COTR, unless specifically authorized by the COTR or the COTR's Branch Chief or Division Chief. **NO INDIVIDUALS, OTHER THAN CONTRACTOR PERSONNEL DIRECTLY INVOLVED IN THE COMPLIANCE TEST, SHALL BE ALLOWED TO WITNESS ANY COMPLIANCE TEST UNLESS SPECIFICALLY AUTHORIZED BY THE COTR.**

4. GOOD HOUSEKEEPING

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

5. TEST SCHEDULING AND MONITORING

The contractor shall submit a vehicle test schedule to the COTR prior to conducting the first compliance test. Tests shall be completed as required in the contract. Scheduling of vehicle tests shall be adjusted to permit vehicles to be tested to other FMVSSs as may be required by the OVSC. All vehicle compliance testing shall be coordinated with the COTR in order to allow monitoring by the COTR and/or other OVSC personnel if desired.

6. TEST DATA DISPOSITION

The contractor shall make all vehicle preliminary compliance test data available to the COTR at the test site within four hours after the test. Final test data shall be furnished to the COTR within five working days. Additionally, the contractor shall analyze the preliminary test results as directed by the COTR.

All backup data sheets, strip charts, recordings, plots, technician's notes, etc., shall be either sent to the COTR or destroyed at the conclusion of each delivery order, purchase order, etc..

7. GOVERNMENT FURNISHED PROPERTY (GFP)

ACCEPTANCE OF VEHICLE

The Contractor has the responsibility of accepting the test vehicle from either a new car dealer or a vehicle transporter. In both instances, the contractor acts in the OVSC's

behalf when signing an acceptance of the test vehicle. If the vehicle is delivered by a dealer, the contractor must check to verify the following:

A. All options listed on the "window sticker" are present on the test vehicle.

B. Tires and wheel rims are new and the same as listed.

C. There are no dents or other interior or exterior flaws.

D. The vehicle has been properly prepared and is in running condition.

E. The glove box contains an owner's manual, warranty document, consumer information, and extra set of keys.

F. Proper fuel filler cap is supplied on the test vehicle.

If the test vehicle is delivered by a government contracted transporter, the contractor should check for damage which may have occurred during transit.

A "Vehicle Condition" form will be supplied to the contractor by the COTR when the test vehicle is transferred from the new car dealer or between test contracts. The upper half of the form describes the vehicle in detail, and the lower half provides space for a detailed description of the post-test condition. Vehicle Condition forms must be returned to the COTR with the copies of the Final Test Report or the reports will NOT be accepted.

NOTIFICATION OF COTR

The COTR must be notified within 24 hours after a test vehicle has been delivered.

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 shall 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 shall be calibrated by the contractor, or a commercial facility, against a higher order standard at periodic intervals NOT TO EXCEED TWELVE (12) MONTHS! Records, showing the calibration traceability to the National Institute of Standards and Technology (NIST), shall 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
(3) Name of the technician who calibrated the equipment

D. A written calibration procedure shall be provided by the contractor which includes as a minimum the following information for all measurement and test equipment:

(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 shall be kept by the contractor in a manner which assures the maintenance of established calibration schedules. All such records shall be readily available for inspection when requested by the COTR. The calibration procedure must be approved by the COTR before the test program commences.

9. SUGGESTED TEST EQUIPMENT

A Stop watch or equivalent timing device, 0 to 60 minutes, with accuracy of ± 2 seconds in 60 minutes

B. Engine tachometer, 0 to 8,000 rpm, with accuracy of ± 15 rpm

C. Soft water, hardness. 12 grains/gallon

D. Water spray system with 2 nozzles, with 50 to 100 cubic inches/minute flow, and accuracy of ± 2.5 cubic inches/minute. System shall maintain temperature below 100◦F.

E. Nonabrasive windshield washing compound

F. Wiper cycle counting device, 0 to 1,000 cycles

G. Oscillograph recorder or equivalent continuous recorder, 10 ipm minimum chart speed, with an accuracy of ± 1%

H. Thermocouple or equivalent temperature sensing device, 0 to 250◦F, with an accuracy of ± 1◦F

I. Anemometer, 0 to 20 mph, with accuracy of ± 0.1 mph

J. Grease pencil

K. Camera

L. Nonabrasive windshield washing equipment

M. Test dust, fine grade, as described in SAE J726 or equivalent

N. Measuring device for volume of test dust and water, 0 to 32 fluid ounces, with an accuracy of ± 0.5 fluid ounces

O. Hand type atomizer or equivalent

P. Windshield washer fluid, as specified by vehicle manufacturer

10. PHOTOGRAPHIC DOCUMENTATION

Photographs shall be black and white, 8 x 10 inches, and properly focused for clear images. A tag, label or placard identifying the test vehicle model, NHTSA number and date or item of equipment part number and date shall appear in each photograph and must be legible. Each photograph shall be labeled as to the subject matter.

As a minimum the following photographs shall be included in each vehicle final test report:

A. Left side view of vehicle

B. Right side view of vehicle

C. 3/4 frontal view from left side of vehicle

D. 3/4 rear view from right side of vehicle

E. Vehicle's certification label

F. Vehicle's tire information label

G. Wiped Area Test Equipment setup

H. Wiped Windshield Area Test Pattern on vellum showing AREAS A, B and C

I. Washer Capability Test - Pretest Coated Windshield

J. Washer Capability Test - Post Test Cleared Windshield

K. Washer Capability Test, 1st Run - Cleared Windshield Area Test Pattern on vellum showing AREAS A, B and C

L. Washer Capability Test, 2nd Run - Cleared Windshield Area Test Pattern on vellum showing AREAS A, B and C

M. Any damage or apparent test failure that cannot be seen in the above photographs

11. DEFINITIONS

BALLOONING

Unwiped areas within the wiper pattern varying is size and usually round.

CHATTER

Irregular movement of the wiper blade usually accompanied by temporary visible radial lines and/or noise.

COMMERCIAL ADDITIVES

Materials which are compatible with the system and which may be added to depress the fluid freezing point, assist in cleansing, and/or increase the wetting capacity of the fluid.

HAZING

An aerated film spread by the blade and resulting in a transient trailing band on the windshield glazing surface.

LACE CURTAIN

A maze of fine individual water droplets which are formed after the wiper blade passes over the windshield glazing surface.

SCALLOPING

Uneven wipe at the outer periphery of pattern.

STREAKING

Fine arcuate lines of unwiped moisture within the wipe pattern.

TANDEM PATTERN

The pattern produced by the wiper blades operating in the same direction across the windshield glazing surface simultaneously.

WASHER SOLUTION

The fluid in the system consisting of water or water with appropriate commercial additives.

11. DEFINITIONS....Continued

WINDSHIELD WASHER SYSTEM

An apparatus for storing, filtering and applying fluid to the exterior of the windshield glazing surface together with the necessary controls to actuate and arrest operations.

WINDSHIELD WASHER SYSTEM CONTROL

A means for actuating and arresting the windshield washer system. The actuation may be coordinated or semicoordinated with components of the windshield wiper system or may be fully independent.

WINDSHIELD WIPER SYSTEM

An apparatus for clearing the exterior surface of windshield glazing together with the necessary devices and controls to actuate and arrest the operations.

WIPER CYCLE

The wiper blade movement during system operation from one extreme of the windshield wipe pattern to the other extreme and return.

12. PRETEST REQUIREMENTS

Prior to conducting any compliance tests, contractors are 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 contractor's test procedure shall contain a complete listing of test equipment and a detailed check-off list. There shall be no contradiction between the OVSC Laboratory Test Procedure and the contractor's in-house test procedure. The list of test equipment shall include instrument accuracy and calibration dates.

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 (such as impact velocity) in the manner outlined in the applicable OVSC Laboratory Test Procedure may require a retest at the expense of the contractor. The retest costs may include the cost of the replacement vehicle (with the same equipment as the original vehicle) or item of motor vehicle equipment and all costs associated with conducting the retest. The original test specimen (vehicle or equipment item) used for the invalid test shall remain the property of OVSC, and the retest specimen shall remain the property of the contractor.

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

13. COMPLIANCE TEST EXECUTION

13.1 WINDSHIELD WIPER SYSTEM

PREPARATION

A. Study the Owner's Manual. Visually and manually inspect the windshield wiping and washing system controls to determine if they are accessible.

B. Visually and manually inspect the windshield washer system fluid reservoir to ascertain that the reservoir filler opening is readily accessible and can be filled without the use of tools or special filling equipment.

C. Clean the windshield glazing surface of the test vehicle with a nonabrasive type cleaner, and position the test vehicle in a test area containing the water spray system.

D. Install a wiper cycle counting device on the windshield wiping system as shown in **Figure 1** below. Install a tachometer or equivalent engine r.p.m. monitoring instrument. The tachometer shall be capable of being monitored during the test from within the vehicle.

E. Provide a means to vent the engine exhaust from the test area without affecting the temperature or other conditions during the test. Verify that the test vehicle contains sufficient gasoline to operate the vehicle engine for the duration of the test.

TYPICAL WIPER CYCLE COUNTING DEVICE

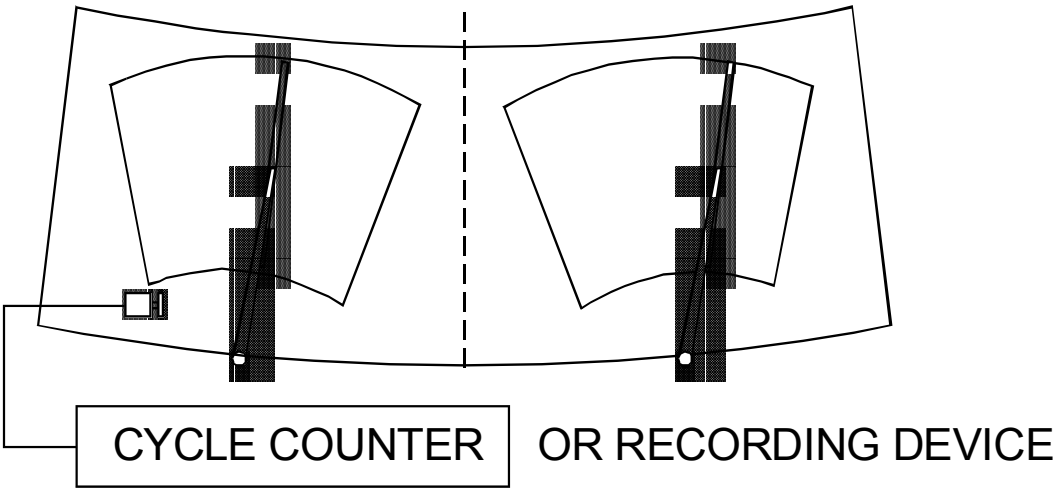

FIGURE 1

13. COMPLIANCE TEST EXECUTION....Continued

F. Verify that the hardness of the water does not exceed 12 grains per gallon. The water hardness certification may be obtained from the local water supplier. Otherwise, contractor shall obtain an equivalent certification or conduct such test within 60 days of beginning of compliance test run. A suitable water softener shall be used if required.

G. Calibrate the water flow applied to the windshield to ensure a minimum of spray of not less than 50 and not more than 100 cubic inches of water per minute. Adjust the spray nozzles to provide an approximately equal distribution of water spray over the entire windshield glazing surface. The water spray shall be applied to the windshield throughout the test. Verify that the water temperature does not exceed 100◦F.

H. A master windshield pattern containing AREAS A, B and C will be provided by the COTR. Make 3 working copies of the entire glass area pattern from heavy clear vellum paper. **NOTE:** 2 are required for the Washer Capability test runs.

FREQUENCY TEST

A. Maintain ambient temperature of 50 to 100◦F and engine speed constant within ± 50 rpm. Transmission shall be placed in neutral.

B. Start the test vehicle engine. Operate it at manufacturer's recommended idle speed. Actuate the Windshield wiper control to the high speed position, and subject the windshield wiper system to a 6 minute Frequency Test with the external water spray applied directly to the windshield. During the first 3 minutes, operate the wiper system at high speed with the test vehicle engine at the manufacturer's recommended idle speed. Upon conclusion of the 3 minute operational period, increase the engine speed to 2,000 rpm for another 3 minute period. Calculate the average frequency of the wiper for each 3 minute test period.

C. Readjust the engine speed to the manufacturer's recommended idle speed. Actuate the windshield wiper control to the lowest speed position with at least 20 cycles per minute, and subject the windshield wiper system to a 6 minute Frequency Test with the water spray applied directly to the windshield. During the first 3 minutes operate the wiper system at low speed and the engine at the manufacturer's recommended idle speed. Upon conclusion of the 3 minute operational period, increase the engine speed to 2,000 rpm for another 3 minute period. Calculate the average wiper frequency for each 3 minute test period.

13. COMPLIANCE TEST EXECUTION....Continued

WIPED AREA TEST

A. Clean the exterior and interior surfaces of the vehicle windshield prior to testing with a commercial nonabrasive glass cleaning agent to provide an oil and grease free surface for marking the dimensional area as required.

B. Start the engine and operate it at the manufacturer's recommended idle speed ± 50 rpm with transmission in neutral.

C. Ambient air flow should not exceed 1 mph to ensure consistent spray patterns. Verify the velocity of the air flow using an anemometer placed 12 inches in front of the center of the windshield. Maintain ambient air temperature at 50 to 100◦F.

D. Actuate the water spray system and adjust the windshield wiper control to the highest speed mode. Maintain water temperature below 100◦F.

E. Using a grease pencil, outline on the internal windshield glazing surface the areas of the windshield that are cleanly wiped by the wiper blades. The areas shall include the wiper blade pattern plus the growth due to the high speed operation and the 1 mph air flow.

F. After completing the wiped area patterns on the internal windshield surface, turn off the windshield wiper system, the water spray and air flow. Dry the windshield and surrounding areas of the test vehicle.

G. Place the clear vellum containing outlines of AREAS A, B and C, on the exterior windshield glazing surface. With a grease pencil, trace onto the vellum the wiped area patterns.

13. COMPLIANCE TEST EXECUTION....Continued

13.2 WINDSHIELD WASHER SYSTEM

PREPARATION

A. Verify that the windshield washer reservoir contains sufficient windshield washing fluid to perform the Windshield Washing Capability Test. The washing fluid shall be a commercial product specified by the manufacturer. Fluid temperature shall be 75◦F ± 5◦F immediately prior to the first test run.

B. With the vehicle in position for testing, actuate the windshield washing system. Verify that the washer nozzles are properly adjusted so the fluid spray is applied to the windshield glazing surface target areas recommended by the vehicle manufacturer. Air velocity at the windshield should not exceed 1 mph to ensure consistent spray patterns.

C. Clean the exterior and interior surfaces of the vehicle windshield.

D. Verify that 2 vellum windshield working patterns containing AREAS A, B and C (as made in preparation for the wiper test) are available.

E. Mix one part test dust and two parts water by volume.

(1) Fine grade test dust as described in SAE J726 is available from AC Division General Motors Corporation, Flint, Michigan, or from Owns Coring Fiberglass Co., Santa Clara, California — their 0.5" PF105, or equivalent.

CHEMICAL	PERCENT BY WEIGHT
SiO_2	69-76%
Fe_2O_3	3-5%
Al_2O_3	15-17%
CaO	2-4%
MgO	.5-1.5%
Total Alkalis	3-5%

SIZE MICRONS	PERCENT BY WEIGHT
0 - 5	39 ± 2
5 - 10	18 ± 3
10 - 20	16 ± 3
20 - 40	18 ± 3
40 - 80	9 ± 3

(2) Soft water temperature shall be 75◦F ± 5◦F and hardness shall be 12 grains/gallon.

13. COMPLIANCE TEST EXECUTION....Continued

WASHER CAPABILITY TEST

A. Start the test vehicle engine and operate it at idle speed for the remainder of the test.

B. Maintain ambient temperature of 75◦F ± 5◦F, and wind velocity at the windshield less than 1 mph.

C. Using a hand-type atomizer or equivalent, wet the entire exterior windshield glazing surface with a light film of the test dust/water mixture (freshly shaken) without coating the wiper blades. If the dust/water mixture does not uniformly adhere to the entire windshield, re-clean it.

D. Within 15 seconds after the completion of the dust and water application, actuate the window washer and wiper systems. At the completion of 10 wiper cycles maximum, turn off the windshield wipers.

E. Immediately mark on the interior glazing surface of the windshield the outline of the areas of the windshield that have been cleared of the test dust using a grease pencil.

F. Turn off the test vehicle engine and thoroughly dry the exterior windshield surface.

G. Using a clear vellum containing AREAS A, B and C, trace onto the vellum pattern the outline of the areas of the windshield cleared by the windshield washer system with a grease pencil.

H. Re-clean the exterior and interior surface of the windshield.

I. Repeat the windshield washer capability test procedures for a total of 2 capability tests at 10 wiper cycles each.

14. POST TEST REQUIREMENTS

A. The contractor shall re-verify all instrumentation and check data sheets and photographs (as required).

B. Make photographs of the marked vellum patterns from each test run.

C. Using the patterns traced onto the vellum windshield patterns, calculate the percentages of AREAS A, B and C representing the following:

(1) Wiped area test run

(2) Washer capability test run 1

(3) Washer capability test run 2

(4) Washer capability test averages

D. Copy applicable pages of Owner's Manual for inclusion in the final test report.

E. The contractor shall retain all original records in a secure and organized file unless otherwise directed by the COTR.

15. REPORTS

15.1. MONTHLY STATUS REPORTS

The contractor shall submit a monthly Test Status Report and a Vehicle Status Report to the COTR. The Vehicle Status report shall be submitted until all vehicles are transferred to another FMVSS or otherwise disposed of. Samples of the required reports are found in the report forms section.

15.2. APPARENT TEST FAILURE

Any indication of an test failure shall be communicated by telephone or to the COTR within 24 hours with written notification mailed within 48 hours (Saturday and Sunday hours excluded). A Notice of Test Failure (see report forms section) with a copy of the particular compliance test data sheet(s) and preliminary data plot(s) shall be included. If possible, repeat that portion of the test where the failure was noted to ensure that there is a test failure.

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

15.3 FINAL TEST REPORTS

15.3.1 COPIES

In the case of an apparent test failure, **SEVEN** copies of the Final Test Report shall be submitted to the COTR for acceptance within 3 weeks of test completion.

Where there has been no indication of an apparent noncompliance, **THREE** copies of each Final Test Report shall be submitted to the COTR for acceptance within 3 weeks of test completion. No payment of contractor's invoices for conducting compliance tests will be made prior to the Final Test Report acceptance by the COTR. Contractors are requested to NOT submit invoices before the COTR is provided with copies of the Final Test Report.

Contractors are required to submit the first Final Test Report in draft form within 1 week 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.

15. REPORTS....Continued

15.3.2 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 for standardization.

15.3.3 FIRST THREE PAGES

A. FRONT COVER

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

(1) Final Report Number such as 104-ABC-9X-001, where —

104 is the FMVSS tested
ABC are the initials for the laboratory
9X is the Fiscal Year of the test program
001 is the Group Number (001 for the 1st test, 002 for the 2nd test, etc.)

(2) Final Report Title And Subtitle such as

COMPLIANCE TESTING FOR FMVSS 104
Windshield Wiping and Washing Systems
* * * * * * * * * * * * * * * *
XYZ Motor Co.
199X Deluxe 4-door sedan
NHTSA No. CX0101

(3) Contractor's Name and Address such as

COMPLIANCE TESTING LABORATORIES, INC.
4335 West Dearborn Street
Detroit, Michigan 48090

15. REPORTS....Continued

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

(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
400 Seventh Street, SW
Room 6115 (NSA-30)
Washington, DC 20590

15. REPORTS....Continued

B. FIRST PAGE AFTER FRONT COVER

A disclaimer statement and an acceptance signature block for the COTR shall 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: _____

15. REPORTS....Continued

C. SECOND PAGE AFTER FRONT COVER
A completed Technical Report Documentation Page (Form DOT F1700.7) shall 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

104-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 104 Compliance Testing of 199X XYZ Deluxe 4-door sedan, NHTSA No. CX0101

Block 5 — REPORT DATE

March 1, 199X

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-104-001

Block 9 — PERFORMING ORGANIZATION NAME AND ADDRESS

ABC Laboratories
405 Main Street
Detroit, MI 48070

15. 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

US Department of Transportation
National Highway Traffic Safety Administration
Safety Assurance
Office of Vehicle Safety Compliance (NSA-30)
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

Block 14 — SPONSORING AGENCY CODE

NSA-30

Block 15 — SUPPLEMENTARY NOTES

Leave blank

Block 16 — ABSTRACT

Compliance tests were conducted on the subject 199X XYZ Deluxe 4-door sedan in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-104-XX for the determination of FMVSS 104 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.

15. REPORTS....Continued

Block 17 — KEY WORDS

Compliance Testing
Safety Engineering
FMVSS 104

Block 18 — DISTRIBUTION STATEMENT

Copies of this report are available from —

NHTSA Technical Reference Division
Room 5108 (NAD-52)
400 Seventh St., SW
Washington, DC 20590
Telephone No.: 202-366-4946

Block 19 — SECURITY CLASSIFICATION OF REPORT

Unclassified

Block 20 — SECURITY CLASSIFICATION OF PAGE

Unclassified

Block 21 — NUMBER OF PAGES

Add appropriate number

Block 22 — PRICE

Leave blank

15. REPORTS....Continued

15.3.4 TABLE OF CONTENTS

Final test report Table of Contents shall include the following:

Section 1 — Purpose of Compliance Test

Section 2 — Test Procedure and Discussion of Results

Section 3 — Test Data

Section 4 — Test Equipment List and Calibration Information

Section 5 — Photographs

Section 6 — Vehicle Owner's Manual (applicable pages only)

Section 7 — Notice of Test Failure (if applicable)

16. DATA SHEETS

SUMMARY OF DATA
FMVSS 104, WINDSHIELD WIPING AND WASHING SYSTEMS

VEH. MODEL YEAR/MAKE/MODEL/STYLE: _____

VEH. NHTSA No.: _____ ; VIN: _____ ; BUILD DATE: _____

TEST LABORATORY: _____

CONTRACT NO.: DTNH22-_____ ; DELIVERY ORDER NO.: _____

DATES OF TEST: _____

WIPER TYPE: _____ ; WASHER TYPE: _____

WINDSHIELD AREAS: A = _____ in²; B = _____ in²; C = _____ in²

MANUFACTURER'S WINDSHIELD PATTERN USED: Yes - ___ ; No - ___

ACCESSIBILITY:

(1) Washer Control Accessible: Yes - ___ ; No - ___

(2) Wiper Control Accessible: Yes - ___ ; No - ___

(3) Washer Reservoir Filler Accessible: Yes - ___ ; No - ___

DESCRIBE UNUSUAL FEATURES OF WIPING AND WASHING SYSTEMS:

PERFORMANCE:

TEST	**PASS**	**FAIL**
WIPER FREQUENCY		
WIPED AREA		
WASHER CAPABILITY		

RECORDED BY: _____ DATE: _____

APPROVED BY: _____

16. DATA SHEETS....Continued

FREQUENCY TEST DATA
FMVSS 104 — WINDSHIELD WIPER SYSTEM

VEH. NHTSA NO.: _____ : TEST DATE: _____

VEH. MY/MAKE/MODEL/BODY STYLE: _____

Water Hardness: _____ grains/gallon (12 max.); Date Certified: _____

Water Spray Flow Rate: _____ in³/min. (specified range = 50 to 100 in³/min.)

Ambient Air Temp.: ___ ◦F (50-100◦F); Water Temp.: ___ ◦F (100◦F max.)

Manufacturer's Recommended Engine Idle Speed: _____ rpm

RUN 1, MAXIMUM WIPER FREQUENCY TEST:

TIME	ENGINE SPEED	TOTAL CYCLES	AVG. CYCLES/MIN. (45 MINIMUM)
1st 3 minutes	(idle ± 50 rpm)		
2nd 3 minutes	(2000 rpm ± 50 rpm)		

Frequency at least 45 cycles/minute regardless of engine speed: Yes-___ ; No-____

RUN 2, LOWER WIPER FREQUENCY TEST:

TIME	ENGINE SPEED	TOTAL CYCLES	AVG. CYCLES/MIN. (20 MINIMUM)
1st 3 minutes	(idle ± 50 rpm)		
2nd 3 minutes	(2000 rpm ± 50 rpm)		

Highest and lower frequency differ by at least 15 cycles/minute, and lower frequency is at least 20 cycles/minute regardless of engine speed: Yes-___ ; No-____
REMARKS:

RECORDED BY: _____ DATE: _____

APPROVED BY: _____

16. DATA SHEETS....Continued

WIPED AREA TEST DATA
FMVSS 104 — WINDSHIELD WIPER SYSTEM

TEST LAB.: _____ ; TEST DATE: _____

VEH. MODEL YR/MAKE/MODEL/BODY STYLE: _____

VEH. NHTSA NO.: _____

Air temperature in test area = _____ ◦F (specified range of 50 to 100◦F)

Air velocity at windshield = _____ mph (specified range of 0 to 1 mph)

Engine speed = _____ rpm (manufacturer's recommended idle ± 50 rpm)

Temperature of water spray = _____ ◦F (100◦F maximum)

Water spray flow rate = _____ in^3/min. (specified range of 50 to 100 in^3/min.)

Windshield wiper frequency = _____ cycles/min. (45 cpm minimum)

TEST RESULTS:

PERCENT WIPED				
WINDSHIELD AREA	ACTUAL	REQUIRED	PASS	FAIL
A		80%		
B		94%		
C		99%		

REMARKS:

RECORDED BY: _____ DATE: _____

APPROVED BY: _____

16. DATA SHEETS....Continued

CAPABILITY TEST DATA
FMVSS 104 — WINDSHIELD WASHER SYSTEM

TEST LAB.: _____ ; TEST DATE: _____

VEH. MODEL YR/MAKE/MODEL/BODY STYLE: _____

VEH. NHTSA NO.: _____

Air temperature in test area = _____ ◦F (specified range of 70 to 80◦F)

Washer reservoir fluid temperature = _____ ◦F (specified range of 70 to 80◦F)

Air velocity at windshield = _____ mph (specified range of 0 to 1 mph)

Engine speed = _____ rpm (manufacturer's recommended idle ± 50 rpm)

Number of windshield washer nozzles on the vehicle = _____

Windshield washer system activation coordinated with components of the wiper system: Yes - _____ ; No - _____

TEST RESULTS:

CLEARED AREA PERCENTAGES						
WINDSHIELD AREA	**TEST 1**	**TEST 2**	**AVG**	**REQD***	**PASS**	**FAIL**
A				75%		
B				75%		
C				75%		

* NOTE FOR REFERENCE ONLY: SAE 942b, revised Jul72, recommends capability to clear 80% of the total wash area and 90% of the wash area included in AREA C.
REMARKS:

RECORDED BY: _____ DATE: _____

APPROVED BY: _____

17. FORMS

LABORATORY NOTICE OF TEST FAILURE TO OVSC

FMVSS NO.: 104 TEST DATE: _____

LABORATORY: _____

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

LABORATORY PROJECT ENGINEER'S NAME: _____

TEST VEHICLE DESCRIPTION: _____

_____

VEHICLE NHTSA NO.: _____ ; VIN: _____

VEHICLE MANUFACTURER: _____

TEST FAILURE DESCRIPTION: _____

_____

_____

FMVSS REQUIREMENT, PARAGRAPH §___ : _____

_____

_____

NOTIFICATION TO NHTSA (COTR): _____

DATE: _____ ; BY: _____

REMARKS:

17. FORMS....Continued

MONTHLY TEST STATUS REPORT

FMVSS 104

DATE OF REPORT:

No.	VEHICLE NHTSA No., MAKE & MODEL	COMPLIANCE TEST DATE	PASS/ FAIL	DATE REPORT SUBMITTED	DATE INVOICE SUBMITTED	INVOICE PAYMENT DATE
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						

17. REPORT FORMS....Continued

MONTHLY VEHICLE STATUS REPORT
FMVSS 104

DATE OF REPORT:

No.	VEHICLE NHTSA No., MAKE & MODEL	DATE OF DELIVERY	TEST COMPLETE DATE	VEHICLE SHIPMENT DATE	CONDITION OF VEHICLE
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					