TP-122-03
December 31, 2013

U.S. DEPARTMENT OF TRANSPORTATION

NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

LABORATORY TEST PROCEDURE

FOR

FMVSS 122

Motorcycle Brake Systems

ENFORCEMENT
Office of Vehicle Safety Compliance
Mail Code: NVS 220
1200 New Jersey Avenue, SE
Washington, DC 20590

REVISION CONTROL LOG

FOR OVSC LABORATORY TEST PROCEDURES

TP122 – Motorcycle Brake Systems

TEST PROCEDURE		FMVSS 122		DESCRIPTION
REV. No.	DATE	AMENDMENT	EFFECTIVE DATE	
01	3/30/1992	_	1/11/1974	Original release
02	8/01/2006	66 FR 42617 8/14/01	8/14/2002	Reduce minimum hand lever force and minimum foot pedal force requirements
03	12/31/13	77 FR51650 8/24/2012	10/23/2012	Global Technical Regulation (GTR)

OVSC LABORATORY TEST PROCEDURE NO. 122-03

TABLE OF CONTENTS

NOTE: Throughout test procedure, **S followed by a numerical designation as in S5 shown above,** identifies sections within the standard. It is also utilized to reference other TP sections.

PREFACE

On August 24, 2012, the National Highway Traffic Safety Administration (NHTSA) issued a final rule amending Federal motor vehicle safety standard (FMVSS) 122 on motorcycle brake systems, updating requirements and test procedures, and harmonizing with a global technical regulation (GTR) for motorcycle brakes. The GTR was developed under the United Nations 1998 Global Agreement with the U.S. as an active participant, and it was derived from various motorcycle braking reg1ulations from around the world, including the U.S. motorcycle brake systems FMVSS. The modifications in this final rule are substantial, but they primarily affect only test procedures, while the scope, applicability, and safety purpose of the motorcycle brake systems FMVSS are unaffected.

Specifically, the amended final rule in part, specifies an additional dry brake test procedure to test each service brake control individually and with the motorcycle in the fully loaded condition, provides a new test procedure for assessing performance of motorcycle brakes from high speeds, provides a new wet brake test that better simulates in-service conditions, provides an improved test procedure for evaluating heat fade, adds test procedures and performance requirements for antilock brake systems, if fitted, and adds a power-assisted braking system failure test, if equipped.

APPLICATION - This standard applies to category 3-1 motorcycles, category 3-2 motorcycles, category 3-3 motorcycles, and category 3-4 motorcycles manufactured on and after September 1, 2014. This standard applies to category 3-5 motorcycles manufactured on and after September 1, 2015. At the manufacturer's option, any motorcycle manufactured on or after October 23, 2012 may comply with this standard.

1. PURPOSE AND APPLICATION

This document is a laboratory test procedure provided by the National Highway Traffic Safety Administration (NHTSA), Office of Vehicle Safety Compliance (OVSC) for the purpose of presenting guidelines for a uniform testing data and information recording format, and providing suggestions for the use of specific equipment and procedures for contracted testing laboratories. The data correspond to specific requirements of the Federal Motor Vehicle Safety Standard(s) (FMVSS). The OVSC test procedures include requirements that are general in scope to provide flexibility for contracted laboratories to perform compliance testing and 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 test procedures do not constitute an endorsement or recommendation for use of any particular product or testing method.

Prior to conducting compliance testing, contracted laboratories are required to submit a detailed test procedure to the Contracting Officer's Technical Representative (COTR) to demonstrate concurrence with the OVSC laboratory test procedure and the applicable FMVSS. If any contractor views any part of an OVSC laboratory test procedure to be in conflict with a FMVSS or observes deficiencies in a laboratory test procedure, the contractor is required to advise the COTR and resolve the discrepancy prior to the start of compliance testing or as soon as practicable. The contractor’s test procedure must include a step-by-step description of the methodology and detailed check-off sheets. Detailed check-off sheets shall also be provided for the testing instrumentation including a complete listing of the test equipment with make and model numbers. 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.

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.

1. PURPOSE AND APPLICATION....Continued

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. 122 establishes requirements for motorcycle brake systems. The purpose of the standard is to ensure safe motorcycle braking performance under normal and emergency riding conditions.

METRIC SYSTEM OF MEASUREMENT

Section 5164 of the Omnibus Trade and Competitiveness Act (Pub. L. 100-418) establishes that the metric system of measurement is the preferred system of weights and measures for trade and commerce in the United States. Executive Order 12770 directs Federal agencies to comply with the Act by converting regulatory standards to the metric system after September 30, 1992. In a final rule published on March 15, 1990 (60 FR 13639), NHTSA completed the first phase of metrication, converting English measurements in several regulatory standards to the metric system. Since then, metrication has been applied to other regulatory standards (63 FR 28912).

Accordingly, the OVSC laboratory test procedures include revisions to comply with governmental directives in using the metric system. Regulatory standards converted to metric units are required to use metric measurements in the test procedures, whereas standards using English units are allowed to use English measurements or to use English measurements in combination with metric equivalents in parentheses.

All final compliance test reports are required to include metric measurements for standards using metrication.

NOTE: The methodology for rounding measurement in the test reports shall be made in accordance with ASTM E29-06b, “Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications.”
METRIC UNITS

In this Laboratory Test Procedure, metric values maybe followed by English units only for reference purposes (not necessarily equal). If test equipment is not available for direct measurement in metric units, the test laboratory shall calculate the exact metric equivalent by means of a conversion factor carried out to at least 5 significant digits before rounding consistent with the specified metric requirement.

3. SECURITY

The contractor shall provide appropriate security measures to protect the OVSC test vehicles and Government Furnished Property (GFP) 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 and GFP. Any security problems which arise shall be reported by telephone to the Industrial Property Manager (IPM), Office of Acquisition Management, within two working days after the incident. A letter containing specific details of the security problem shall 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 Division Chief.

NOTE: No individuals, other than contractor personnel directly involved in the compliance testing program or OVSC personnel, shall be allowed to witness any vehicle or equipment item compliance test or test dummy calibration unless specifically authorized by the COTR.

4. GOOD HOUSEKEEPING

Contractors shall maintain the entire vehicle compliance testing area, 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 test schedule to the COTR prior to conducting the first compliance test. Tests shall be completed at intervals as required in the contract. If not specified, the first test shall be conducted within 6 weeks after receiving the first delivered unit. Subsequent tests shall be completed in no longer that 1 week intervals unless otherwise specified by the COTR.

Scheduling of tests shall be adjusted to permit vehicles (or equipment, whichever applies) to be tested to other FMVSSs as may be required by the OVSC. All compliance testing shall be coordinated with the COTR in order to allow monitoring by the COTR and/or other OVSC personnel if desired. The contractor shall submit a monthly test status report and a vehicle status report (if applicable) to the COTR. The vehicle status report shall be submitted until all vehicles are disposed of. The status report forms are provided in the forms section.

6. TEST DATA DISPOSITION

The Contractor shall make all preliminary compliance test data available to the COTR if on location within 30 minutes after the test. Final test data, including digital printouts and computer generated plots (if applicable), shall be available to the COTR in accordance with the contract schedule or if not specified within two working days. Additionally, the Contractor shall analyze the preliminary test results as directed by the COTR.

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

The contractor shall protect and segregate the data that evolves from compliance testing before and after each test.

TEST DATA LOSS

A. INVALID TEST DESCRIPTION

An invalid compliance test is one, which does not conform precisely to all requirements/specifications of the OVSC Laboratory Test Procedure and Statement of Work applicable to the test.

B. INVALID TEST NOTIFICATION

The Contractor shall notify NHTSA of any test not meeting all requirements/specifications of the OVSC Laboratory Test Procedure and Statement of Work applicable to the test, by telephone, within 24 hours of the test and send written notice to the COTR within 48 hours or the test completion.

C. RETEST NOTIFICATION

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 2 weeks after receipt of notification by the Contracting Officer that a retest is required.

D. WAIVER OF RETEST

NHTSA, in its sole discretion, reserves the right to waive the retest requirement. This provision shall not constitute a basis for dispute over the NHTSA's waiving or not waiving any requirement.

6. TEST DATA DISPOSITION….Continued

E. TEST VEHICLE

NHTSA shall furnish only one vehicle for each test ordered. The Contractor shall furnish the test vehicle required for the retest. The retest vehicle shall be equipped as the original vehicle. The original vehicle used in the invalid test shall remain the property of NHTSA, and the retest vehicle shall remain the property of the Contractor. The Contractor shall retain the retest vehicle for a period not exceeding 180 days if it fails the test. If the retest vehicle passes the test, the Contractor may dispose of it upon notification from the COTR that the test report has been accepted.

F. TEST REPORT

No test report is required for any test that is determined to be invalid unless NHTSA specifically decides, in writing, to require the Contractor to submit such report. The test data from the invalid test must be safeguarded until the data from the retest has been accepted by the COTR. The report and other required deliverables for the retest vehicle are required to be submitted to the COTR within 3 weeks after completion of the retest.

G. DEFAULT

The Contractor is subject to the default and subsequent reprocurement costs for non-delivery of valid or conforming test (pursuant to the Termination For Default clause in the contract).

H. NHTSA'S RIGHTS

None of the requirements herein stated shall diminish or modify the rights of NHTSA to determine that any test submitted by the Contractor does not conform precisely to all requirements/specifications of the OVSC Laboratory Test Procedure and Statement of Work applicable to the test.

7. GOVERNMENT FURNISHED PROPERTY (GFP)

GFP consists of test vehicles. The handling and disposition of GFP is governed by contractual agreement. The Contractor is responsible for the following:

A. ACCEPTANCE OF VEHICLE

The Contractor has the responsibility of accepting the test vehicle from either a 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:

1. Tires and wheel rims are new and the same as listed.
2. There are no dents or other interior or exterior flaws in the vehicle body.
3. The vehicle has been properly prepared and is in running condition.
4. An owner's manual, warranty document, consumer information, and extra set of keys are included with the vehicle.
5. Proper fuel filler cap is supplied on the test vehicle.
6. Spare tire, jack, lug wrench and tool kit (if applicable) is included with the vehicle.
7. The VIN (vehicle identification number) on the vehicle matches that supplied by the COTR.
8. Seats are not deformed.
9. The vehicle is equipped as specified by the COTR.

A Vehicle Condition form will be supplied to the Contractor by the COTR when the test vehicle is transferred from a new vehicle dealership or between test contracts. The upper half of the form is used to describe the vehicle as initially accepted. The lower half of the Vehicle Condition form provides space for a detailed description of the post-test condition. The contractor must complete a Vehicle Condition form for each vehicle and deliver it to the COTR with the Final Test Report or the report will NOT be accepted for payment.

7. GOVERNMENT FURNISHED PROPERTY (GFP)….Continued

If the test vehicle is delivered by a government contracted transporter, the contractor should check for damage which may have occurred during transit. GFP vehicle(s) shall not be driven by the contractor on public roadways unless authorized by the COTR.

B. NOTIFICATION OF COTR

The COTR must be notified within 24 hours after a vehicle (and/or equipment item) has been delivered. In addition, if any discrepancy or damage is found at the time of delivery, a copy of the Vehicle Condition form shall be sent to the COTR immediately.

8. CALIBRATION OF TEST INSTRUMENTS

Before the Contractor initiates the vehicle safety compliance test program, a test instrumentation calibration system must be implemented and maintained in accordance with established calibration practices. The calibration system shall include the following as a minimum:

A. Standards for calibrating the measuring and test equipment shall 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 exceeding 12 months for instruments and 12 months for the calibration standards except for static types of measuring devices such as rulers, weights, etc., which shall be calibrated at periodic intervals not to exceed two years. Records, showing the calibration traceability to the National Institute of Standards and Technology (NIST), shall be maintained for all measuring and test equipment.

Accelerometers shall be calibrated every twelve months or after a test failure or after any indication from calibration checks that there may be a problem with the accelerometer whichever occurs sooner.

C. All measuring and test equipment and measuring standards shall be labeled with the following information:

1. Date of calibration

8. CALIBRATION OF TEST INSTRUMENTS ….Continued

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).

6. The actual procedures and forms used to perform the calibrations.

E. Records of calibration for all test instrumentation shall be kept by the Contractor in a manner that assures the maintenance of established calibration schedules.

F. All such records shall be readily available for inspection when requested by the COTR. The calibration system shall need the acceptance of the COTR before vehicle safety compliance testing commences.

G. Test equipment shall receive a system functional check out using a known test input immediately before and after the test. This check shall be recorded by the test technician(s) and submitted with the final report.

H. The Contractor may be directed by NHTSA to evaluate its data acquisition system.

Further guidance is provided in the International Standard ISO 10012-1, “Quality Assurance Requirements for Measuring Equipment” and American National Standard ANSI/NCSL Z540-1, “Calibration Laboratories and Measuring and Test Equipment General Requirements.”
NOTE: In the event of a failure to meet the standard's minimum performance requirements additional calibration checks of some critically sensitive test

8. CALIBRATION OF TEST INSTRUMENTS ….Continued

equipment and instrumentation may be required for verification of accuracy. The necessity for the calibration will be at the COTR's discretion and shall be performed without additional cost.

9. SUGGESTED TEST EQUIPMENT

The following is an abbreviated list of the minimum suggested test equipment or equivalent needed to evaluate the performance requirements as outlined in FMVSS 122. The applicable instrumentation is to be installed on the test vehicle according to standard engineering practices.

A. Fifth wheel (optical or contact) to measure vehicle velocity, 45.7 m/sec. (150 fps) range with accuracy of ±.21 m/sec at 26.8 m/sec. (± .7 fps at 88 fps), and maximum non-linearity of ±.46 m/sec (±1.5 fps) over the range.

B. Instrumentation to measure stopping distance, 610 meters (2,000 ft) range with accuracy of ±3 meters in 305 meters (± 10 ft in 1,000 ft), maximum non-linearity of ± 6.1 meters per 610 meter (± 20 ft, per 2,000 ft) increment.

C. Load cells to measure pedal force on foot brake pedal and hand brake lever (perpendicular to line of travel). 500 Newtons (112 lb) range with accuracy of ± 1 percent at 300 Newtons, and maximum non-linearity of ± 2 percent over the range.

D. Iron-constantan thermocouple, plug type. Maximum wire resistance variation ± 10% pyrometer calibrated value for non-compensated pyrometers.

E. Instrumentation (pyrometer) to measure brake lining temperatures, (649 C) 1,200 degree F range with ± 3.3% (10 degree F) accuracy at 149 C (300 degrees F), and maximum non-linearity of ± 2.7% (± 20 degrees F) over the range.

F. Decelerometer to measure vehicle deceleration rate, 1G range with ±.15 mpsps (± 0.5 fpsps) accuracy at 9.82 mpsps (32.2 fpsps), and maximum non-linearity o f ±.152mpsps (± 0.5 fpsps) over the range.

G. Ambient temperature gauge and stopwatch.

H. Platform scales to measure tire-road interface load on each wheel individually.

I. Anemometer to measure wind velocity, 40.2 kph (25 mph) range with ±1.6 kph (± 1 mph) accuracy at 24.1 kph (15 mph), and maximum non-linearity of ±3.2 kph (± 2 mph) over the range.

9. SUGGESTED TEST EQUIPMENT….Continued

J. Continuous recorder to provide supplemental records of service brake force, parking brake force, deceleration, distance and speed versus time. The recorder chart shall be calibrated at the same values and with the same accuracies as the previously discussed visual output meters.

K. Certified motorcycle helmet and other appropriate safety items for the rider.

L. Wheel lockup detector providing an electrical indication of wheel rotation (or wheel lockup) to a continuous recorder or digital data recorder with data acquisition software.

M. An on-board Global Positioning System (GPS) such as a V-box for data acquisition.

10. PHOTOGRAPHIC DOCUMENTATION

DIGITAL PHOTOGRAPHS

The contractor shall take digital photographs of the test execution procedures. Photographs shall be taken in color and contain clear images. A tag, label or placard identifying the test item, NHTSA number (if applicable) and date shall appear in each photograph and must be legible. Each photograph shall be labeled as to the subject matter. The required resolution for digital photographs is a minimum of 1,600 x 1,200 pixels. Digital photographs are required to be created in color and in a JPG format. Glare or light from any illuminated or reflective surface shall be minimized while taking photographs.

The test reports shall include a sufficient number of photographs to describe the testing in detail and shall be organized in a logical succession of consecutive pictures. The digital photographs should be included in the test report as 203 mm x 254 mm or 215.9 mm x 279 mm (8 x 10 or 8½ x 11 inch) pictures (or for equipment testing -- 125 mm x 175 mm (5 x 7 inch) pictures). All photographs are required to be included in the test report in the event of a test failure. Any failure must be photographed at various angles to assure complete coverage. Upon request, the photographs shall be sent to the COTR on a CD or DVD and saved in a “read only” format to ensure that the digital photographs are the exact pictures taken during testing and have not been altered from the original condition.

PHOTOGRAPHIC VIEWS -

As a minimum the following photographs shall be included in the final test report, as applicable:

A. 3/4 frontal - left side view.

B. 3/4 rear - right side view.

C. Vehicle Certification label, and FMVSS 120 tire & rim information label if required information is not included on the Certification label.

D. Other vehicle labeling (brake fluid reservoir, instruments, warnings, etc.).

E. Provisions for visual inspections of all brake lining thicknesses.

F. Thermocouple installations in front and rear wheel brakes.

T. ABS Components.

10. PHOTOGRAPHIC DOCUMENTATION ….Continued

G. Test instrumentation used in conducting this test with full description (may be a composite photograph with instrumentation removed from vehicle).

H. Test instrumentation installed on vehicle.

I. Close-up of water delivery system installed on motorcycle.

J. Close-up of brake actuator levers, and/or pedal.

K. Test track dimensions and layout (may be a scale drawing).

L. Condition of components after test .

M. Any apparent test failure.

11. DEFINITIONS (S4)

Antilock brake system or ABS -
means a system which senses wheel slip and automatically modulates the pressure producing the braking forces at the wheel(s) to limit the degree of wheel slip.

Baseline test -
means a stop or a series of stops carried out in order to confirm the performance of the brake prior to subjecting it to a further test such as the heating procedure or wet brake stop.

Brake -
means those parts of the brake system where the forces opposing the movement of the motorcycle are developed.

Brake system -
means the combination of parts consisting of the control, the brake, and the components that provided the functional link between the control and the brake, but excluding the engine, whose function it is to progressively reduce the speed of a moving motorcycle, bring it to a halt, and keep it stationary when halted.

Category 3-1 motorcycle-
means a two-wheeled motorcycle with an engine cylinder capacity in the case of a thermic engine not exceeding 50 cubic centimeters (cm^3) and whatever the means of propulsion a maximum design speed not exceeding 50 kilometers per hour (km/h).

Category 3-2 motorcycle-
means a three-wheeled motorcycle of any wheel arrangement with an engine cylinder capacity in the case of a thermic engine not exceeding 50 cm^3 and whatever the means of propulsion a maximum design speed not exceeding 50 km/h.

Category 3-3 motorcycle-
means a two-wheeled motorcycle with an engine cylinder capacity in the case of a thermic engine exceeding 50 cm^3 or whatever the means of propulsion a maximum design speed exceeding 50 km/h.

Category 3-4 motorcycle-
means a motorcycle manufactured with three wheels asymmetrically arranged in relation to the longitudinal median plane with an engine cylinder capacity in the case of a thermic engine exceeding 50 cm^3 or whatever the means of propulsion a maximum design speed exceeding 50 km/h. (This category definition is intended to include motorcycles with sidecars.)

Category 3-5 motorcycle-
means a motorcycle manufactured with three wheels symmetrically arranged in relation to the longitudinal median plane with an engine cylinder capacity in the case of a thermic engine exceeding 50 cm^3 or whatever the means of propulsion a maximum design speed exceeding 50 km/h.

Combined brake system or CBS-
means:
(a) For motorcycle categories 3-1 and 3-3: a service brake system where at least two brakes on different wheels are actuated by the operation of a single control.
(b) For motorcycle categories 3-2 and 3-5: a service brake system where the brakes on all wheels are actuated by the operation of a single control.
(c) For motorcycle category 3-4: a service brake system where the brakes on at least the front and rear wheels are actuated by the operation of a single control. (If the rear wheel and the asymmetrical wheel are braked by the same brake system, this is regarded as the rear brake.)

Control-
means the part actuated directly by the rider in order to supply and regulate the energy required for braking the motorcycle.

Driver mass-
means the nominal mass of a driver that equals 75 kg (68 kg occupant mass plus 7kg of luggage mass).

Engine disconnected-
means when the engine is no longer internally connected to the driving wheel(s), i.e., the clutch is disengaged and/or the transmission is in neutral.

Gross vehicle mass-
means the maximum mass of the fully laden solo vehicle, based on its construction and design performances, as declared by the manufacturer.

Initial brake temperature-
means the temperature of the hottest brake before any brake application.

Laden-
means the gross vehicle mass.

Lightly loaded-
means mass in running order plus 15 kg for test equipment, or the laden condition, whichever is less. In the case of ABS tests on a low friction surface (paragraphs S6.9.4 to S6.9.7), the mass for test equipment is increased to 30 kg to account for outriggers.

Mass in running order-
means the sum of unladen vehicle mass and driver mass.

Peak braking coefficient or PBC-
means the measure of tire-to-road surface friction based on the maximum deceleration of a rolling tire.

Power-assisted braking system –
means a brake system in which the energy necessary to produce the braking force is supplied by the physical effort of the rider assisted by one or more energy supplying devices, for example vacuum assisted (with vacuum booster).

Secondary brake system-
means the second service brake system on a motorcycle equipped with a combined brake system.

Service brake system-
means a brake system which is used for slowing the motorcycle when in motion.

Sidecar-
means a one-wheeled vehicle that is attached to the side of a motorcycle.

Single brake system-
means a brake system which acts on only one axle.

Split service brake system or SSBS-
means a brake system that operates the brakes on all wheels, consisting of two or more subsystems actuated by a single control designed so that a single failure in any subsystem (such as a leakage type failure of a hydraulic subsystem) does not impair the operation of any other subsystem.

Stopping distance-
means the distance traveled by the motorcycle from the point the rider begins to actuate the brake control to the point at which the motorcycle reaches full stop. For tests where simultaneous actuation of two controls is specified, the distance traveled is taken from the point the first control is actuated.

Test speed-
means the motorcycle speed measured the moment the rider begins to actuate the brake control. For tests where simultaneous actuation of two controls is specified, the motorcycle speed is taken from the moment the first control is actuated.

Unladen vehicle mass-
means the nominal mass of a complete vehicle as determined by the following criteria:
(a) Mass of the vehicle with bodywork and all factory fitted equipment, electrical and auxiliary equipment for normal operation of vehicle, including liquids, tools, fire extinguisher, standard spare parts, chocks and spare wheel, if fitted.
(b) The fuel tanks filled to at least 90 percent of rated capacity and the other liquid containing systems (except those for used water) to 100 percent of the capacity specified by the manufacturer.

Vmax-
means either the speed attainable by accelerating at a maximum rate from a standing start for a distance of 1.6 km on a level surface, with the vehicle lightly loaded, or the speed measured in accordance with International Organization for Standardization (ISO) 7117:1995.

Wheel lock –
means the condition that occurs when there is 100 percent wheel slip.

12. PRETEST REQUIREMENTS

Prior to conducting a compliance test, the contractor shall:

A. Verify COTR approval of contractor's In-house Test Procedure,

B. Verify the training of technicians for performance of this test,

C. Verify the calibration status of test equipment,

D. Review applicable revision of FMVSS 122

PERMANENT RECORDING OF DATA

Where permanent trace recording is not required, data shall be recorded on standard report forms. Changes or corrections shall be made by drawing a line through the original entry, which must remain legible, adding the change above or alongside, and initialed.

13. COMPLIANCE TEST EXECUTION

TEST SEQUENCE (where applicable)	FMVSS 122 Section	Test Procedure Section	Data Sheet #
Vehicle Information	-		1
Brake System General Requirements	S5.1.1 thru S5.1.8	13A.1	3
Instrumentation Check	-	13B.2	4
Max Speed	-	13B.2	5
Burnish (Pre-dynamic testing preparation)	S6.2.5	13B.2	6
Dry Stop single control actuation	S6.3	13B.3	7
Dry Stop all controls actuated	S6.4	13B.3	8
High Speed Test	S6.5	13B.3	9
Wet Brake Test	S6.6	13B.3	10
Parking Brake system Test	S6.8	13B.3	12
ABS Tests	S6.9	13B.3	13
Partial Failure Test – for split service brake system	S6.10	13B.3	14
Power-assisted braking system failure test	S6.11	13B.3	15
Heat Fade Test	S6.7	13B.3	11
Durability (Post Dynamic Testing)	S5.2	13A.2	16
Brake System Requirements Verification	S5.1.9 and S5.1.10	13A.1	17

13.A GENERAL REQUIREMENTS (S5)

Complete Data Sheet # **1** – Vehicle Information

Data Sheet **#2** – is Test Summary

13.A.1 - S5.1 Brake system requirements.

(Record results on DATA SHEET #3)

Verify the following:

Each motorcycle shall meet each of the test requirements specified for a motorcycle of its category and for those brake features on the motorcycle.

S5.1.1 Service brake system control operation. Each motorcycle shall have a configuration that enables a rider to actuate the service brake system control while seated in the normal driving position and with both hands on the steering control.

S5.1.2 Secondary brake system control operation. Each motorcycle shall have a configuration that enables a rider to actuate the secondary brake system control while seated in the normal driving position and with at least one hand on the steering control.

S5.1.3 Parking brake system.

(a) If a parking brake system is fitted, it shall hold the motorcycle stationary on the slope prescribed in S6.8.2. The parking brake system shall:

(1) have a control which is separate from the service brake system controls; and

(2) be held in the locked position by solely mechanical means.

(b) Each motorcycle equipped with a parking brake shall have a configuration that enables a rider to be able to actuate the parking brake system while seated in the normal driving position.

S5.1.4 Two-wheeled motorcycles of categories 3-1 and 3-3. Each category 3-1 and 3-3 two-wheeled motorcycle shall be equipped with either two separate service brake systems, or a split service brake system, with at least one brake operating on the front wheel and at least one brake operating on the rear wheel.

S5.1.5 Three-wheeled motorcycles of category 3-4. Each category 3-4 motorcycle shall comply with the brake system requirements in S5.1.4. A brake on the asymmetric wheel (with respect to the longitudinal axis) is not required.

S5.1.6 Three-wheeled motorcycles of category 3-2. Each category 3-2 motorcycle shall be equipped with a parking brake system plus one of the following service brake systems:

(a) two separate service brake systems, except CBS, which, when applied together, operate the brakes on all wheels; or

(b) a split service brake system; or

(c) a CBS that operates the brake on all wheels and a secondary brake system which may be the parking brake system.

S5.1.7 Three-wheeled motorcycles of categories 3-5. Each category 3-5 motorcycle shall be equipped with:

(a) a parking brake system; and

(b) a foot actuated service brake system which operates the brakes on all wheels by way of either:

(1) a split service brake system; or

(2) a CBS and a secondary brake system, which may be the parking brake system.

S5.1.8 Two separate service brake systems. For motorcycles where two separate service brake systems are installed, the systems may share a common brake, if a failure in one system does not affect the performance of the other.

NOTE:

[The following Hydraulic service brake system and Warning Light evaluations are conducted <u>after</u> completion of dynamic performance testing (13B.3) to assure that the vehicle master cylinder(s), reservoir(s) and indicator lights are not compromised prior to dynamic performance testing.]

(Record Results on Data Sheet #17)

S5.1.9 <u>Hydraulic service brake system</u>. For motorcycles that use hydraulic fluid for brake force transmission, the master cylinder shall:

(a) have a sealed, covered, separate reservoir for each brake system; and

(b) have a minimum reservoir capacity equivalent to 1.5 times the total fluid displacement required to satisfy the new to fully worn lining condition with the worst case brake adjustment conditions; and

(c) have a reservoir where the fluid level is visible for checking without removal of the cover.

(d) have a brake fluid warning statement that reads as follows, in letters at least 3/32 of an inch high: *Warning: Clean filler cap before removing. Use only _____ fluid from a sealed container* (inserting the recommended type of brake fluid as specified in accordance with 49 CFR 571.116, e.g., “DOT 3”). The lettering shall be:

(1) Permanently affixed, engraved, or embossed;

(2) Located so as to be visible by direct view, either on or within 4 inches of the brake-fluid reservoir filler plug or cap; and

(3) Of a color that contrasts with its background, if it is not engraved or embossed.

S5.1.10 Warning lamps. All warning lamps shall be mounted in the rider's view.

S5.1.10.1 Split service brake system warning lamps.

(a) Each motorcycle that is equipped with a split service brake system shall be fitted with a red warning lamp, which shall be activated:

(1) when there is a hydraulic failure on the application of a force of ≤ 90 N on the control; or

(2) without actuation of the brake control, when the brake fluid level in the master cylinder reservoir falls below the greater of:

(i) that which is specified by the manufacturer; or

(ii) that which is less than or equal to half of the fluid reservoir capacity.

(b) To permit function checking, the warning lamp shall be illuminated by the activation of the ignition switch and shall be extinguished when the check has been completed. The warning lamp shall remain on while a failure condition exists whenever the ignition switch is in the “on” position.

(c) Each indicator lamp shall have the legend “Brake Failure” on or adjacent to it in letters not less than 3/32 of an inch high that shall be legible to the driver in daylight when lighted.

S5.1.10.2 Antilock brake system warning lamps.

(a) Each motorcycle equipped with an ABS system shall be fitted with a yellow warning lamp. The lamp shall be activated whenever there is a malfunction that affects the generation or transmission of signals in the motorcycle’s ABS system.

(b) To permit function checking, the warning lamp shall be illuminated by the activation of the ignition switch and extinguished when the check has been completed. The warning lamp shall remain on while a failure condition exists whenever the ignition switch is in the “on” position.

(c) The indicator shall be labeled in letters at least 3/32 of an inch high with the words "Antilock" or "Anti-lock" or "ABS" in accordance with Table 1 of Standard No. 101 (49 CFR 571.101).

13.A.2 - S5.2 Durability:

NOTE:

[This testing/verification is conducted after the dynamic performance testing has been completed].

(Record Results on Data Sheet # 16)

S5.2.1 Compensation for wear. Wear of the brakes shall be compensated for by means of a system of automatic or manual adjustment.

S5.2.2 Notice of wear. The friction material thickness shall either be visible without disassembly, or where the friction material is not visible, wear shall be assessed by means of a device designed for that purpose.

S5.2.3 Testing. During all the tests in this standard and on their completion, there shall be no friction material detachment and no leakage of brake fluid.

13.A.3 - S5.3 Measurement of dynamic performance:

NOTE:

[The following applies to the performance testing which follows in Section 13B of this procedure.]

There are two ways in which brake system performance is measured. The particular method to be used is specified in the respective tests in S6.

S5.3.1 Stopping distance.

(a) Based on the basic equations of motion: $S = 0.1 \cdot V + (X) \cdot V^2$, where:

S = stopping distance in meters

V = initial vehicle speed in km/h

X = a variable based on the requirement for each test

(b) To calculate the corrected stopping distance using the actual vehicle test speed, the following formula is used: $Ss = 0.1 \cdot Vs + (Sa - 0.1 \cdot Va) \cdot Vs^2/Va^2$, where:

Ss = corrected stopping distance in meters

Vs = specified vehicle test speed in km/h

Sa = actual stopping distance in meters

Va = actual vehicle test speed in km/h

Note to S5.3.1(b): This equation is only valid when the actual test speed (Va) is within ± 5 km/h of the specified test speed (Vs).

S5.3.2 Continuous deceleration recording. The other method used to measure performance is the continuous recording of the vehicle instantaneous deceleration from the moment a force is applied to the brake control until the end of the stop.

13.B TEST CONDITIONS, PROCEDURES, AND PERFORMANCE REQUIREMENTS (S6)

13.B.1 - S6.1 General:

S6.1.1 Test surfaces.

S6.1.1.1 High friction surface. A high friction surface is used for all dynamic brake tests excluding the ABS tests where a low-friction surface is specified. The high-friction surface test area is a clean, dry and level surface, with a gradient of ≤ 1 percent. The high-friction surface has a peak braking coefficient (PBC) of 0.9.

S6.1.1.2 Low-friction surface. A low-friction surface is used for ABS tests where a low-friction surface is specified. The low-friction surface test area is a clean and level surface, which may be wet or dry, with a gradient of ≤ 1 percent. The low-friction surface has a PBC of ≤ 0.45.

S6.1.1.3 Measurement of PBC. The PBC is measured using the American Society for Testing and Materials (ASTM) E1136-93 (Reapproved 2003) standard reference test tire, in accordance with ASTM Method E1337-90 (Reapproved 2002), at a speed of 64 km/h (both publications incorporated by reference; see § 571.5).

S6.1.1.4 Parking brake system tests. The specified test slope has a clean and dry surface that does not deform under the weight of the motorcycle.

S6.1.1.5 Test lane width. For two-wheeled motorcycles (motorcycle categories 3-1 and 3-3) the test lane width is 2.5 meters. For three-wheeled motorcycles (motorcycle categories 3-2, 3-4 and 3-5) the test lane width is 2.5 meters plus the vehicle width.

S6.1.2 Ambient temperature. The ambient temperature is between 4° C and 45° C.

S6.1.3 Wind speed. The wind speed is not more than 5 meters per second (m/s).

S6.1.4 Test speed tolerance. The test speed tolerance is ± 5 km/h. In the event of the actual test speed deviating from the specified test speed (but within the ± 5 km/h tolerance), the actual stopping distance is corrected using the formula in S5.3.1(b) (13A.3).

S6.1.5 Automatic transmission. Motorcycles with automatic transmission shall meet all test requirements –whether they are for “engine connected” or “engine disconnected.” If an automatic transmission has a neutral position, the neutral position is selected for tests where “engine disconnected” is specified.

S6.1.6 Vehicle position and wheel lock. The vehicle is positioned in the center of the test lane for the beginning of each stop. Stops are made without the vehicle wheels passing outside the applicable test lane and without wheel lock.

S6.1.7 Test sequence. Test sequence is as specified in Table 1 and as shown in table at beginning of this Section 13.

13.B.2 - S6.2 Preparation:

S6.2.1 Engine idle speed. The engine idle speed is set to the manufacturer's specification.

S6.2.2 Tire pressures. The tires are inflated to the manufacturer's specification for the vehicle loading condition for the test.

S6.2.3 Control application points and direction. For a hand control lever, the input force (F) is applied on the control lever's forward surface perpendicular to the axis of the lever fulcrum and its outermost point on the plane along which the control lever rotates (see Figure 1). The input force is applied to a point located 50 millimeters (mm) from the outermost point of the control lever, measured along the axis between the central axis of the fulcrum of the lever and its outermost point. For a foot control pedal, the input force is applied to the center of, and at right angles to, the control pedal.

S6.2.4 Brake temperature measurement. The brake temperature is measured on the approximate center of the facing length and width of the most heavily loaded shoe or disc pad, one per brake, using plug-type thermocouple that is embedded in the friction material, as shown in Figure 2.

Instrumentation Check (Not Described in Standard)

(Record results on Data Sheet #4)

(Use all brake controls)
Conduct a general check of test instrumentation by making not more than 10 stops from a speed of not more than 50 kph mph at a deceleration rate of not more than 10 fpsps. If test instrument repair, replacement, or adjustment is necessary, make not more than 10 additional stops after such repair, replacement or adjustment.

Maximum Speed Determination (Not Described in Standard)

(Record results on Data Sheet #5).

Measure the speed that the motorcycle will attain in a distance of 1 km (one mile) from a standing start. Do not exceed 193 kph (120 mph).

S6.2.5 Burnishing procedure.

(Record Results on Data Sheet #6)

The vehicle brakes are burnished/conditioned prior to evaluating performance.

S6.2.5.1 Vehicle condition.

(a) Vehicle lightly loaded.

(b) Engine disconnected.

S6.2.5.2 Conditions and procedure.

(a) Initial brake temperature. Initial brake temperature before each brake application is ≤ 100 °C.

(b) Test speed.

(1) Initial speed: 50 km/h or 0.8 Vmax, whichever is lower.

(2) Final speed = 5 to 10 km/h.

(c) Brake application. Each service brake system control actuated separately.

(d) Vehicle deceleration.

(1) Single front brake system only:

(i) 3.0-3.5 meters per second squared (m/s^2) for motorcycle categories 3-3 and 3-4

(ii) 1.5-2.0 m/s^2 for motorcycle categories 3-1 and 3-2

(2) Single rear brake system only: 1.5-2.0 m/s^2

(3) CBS or split service brake system, and category 3-5: 3.5-4.0 m/s^2

(e) Number of decelerations. There shall be 100 decelerations per brake system.

(f) For the first stop, accelerate the vehicle to the initial speed and then actuate the brake control under the conditions specified until the final speed is reached. Then reaccelerate to the initial speed and maintain that speed until the brake temperature

falls to the specified initial value. When these conditions are met, reapply the brake as specified. Repeat this procedure for the number of specified decelerations. After burnishing, adjust the brakes in accordance with the manufacturer's recommendations.

13.B.3 - S6.3 to S6.11 PERFORMANCE/DYNAMIC TESTING:

S6.3 Dry stop test – single brake control actuated.

(Record Results on Data Sheet # 7)

S6.3.1 Vehicle condition.

(a) The test is applicable to all motorcycle categories.

(b) Laden. For vehicles fitted with CBS and split service brake system, the vehicle is tested in the lightly loaded condition in addition to the laden condition.

(c) Engine disconnected.

S6.3.2 Test conditions and procedure.

(a) Initial brake temperature. Initial brake temperature is ≥ 55 °C and ≤ 100 °C.

(b) Test speed.

(1) Motorcycle categories 3-1 and 3-2: 40 km/h or 0.9 Vmax, whichever is lower.

(2) Motorcycle categories 3-3, 3-4 and 3-5: 60 km/h or 0.9 Vmax, whichever is lower.

(c) Brake application. Each service brake system control actuated separately.

(d) Brake actuation force.

(1) Hand control: ≤ 200 N.

(2) Foot control:

(i) ≤ 350 N for motorcycle categories 3-1, 3-2, 3-3 and 3-5.

(ii) ≤ 500 N for motorcycle category 3-4.

(e) Number of stops: until the vehicle meets the performance requirements, with a maximum of 6 stops.

(f) For each stop, accelerate the vehicle to the test speed and then actuate the brake control under the conditions specified in this paragraph.

S6.3.3 Performance requirements. When the brakes are tested in accordance with the test procedure set out in paragraph S6.3.2., the stopping distance shall be as specified in column 2 of Table 2.

S6.4 Dry stop test – all service brake controls actuated.

(Record Results on Data Sheet # 8)

S6.4.1 Vehicle condition.

(a) The test is applicable to motorcycle categories 3-3, 3-4 and 3-5.

(b) Lightly loaded.

(c) Engine disconnected.

S6.4.2 Test conditions and procedure.

(a) Initial brake temperature. Initial brake temperature is ≥ 55 °C and ≤ 100 °C.

(b) Test speed. Test speed is 100 km/h or 0.9 Vmax, whichever is lower.

(c) Brake application. Simultaneous actuation of both service brake system controls, if so equipped, or of the single service brake system control in the case of a service brake system that operates on all wheels.

(d) Brake actuation force.

(1) Hand control: ≤ 250 N.

(2) Foot control:

(i) ≤ 400 N for motorcycle categories 3-3 and 3-4.

(ii) ≤ 500 N for motorcycle category 3-5.

(e) Number of stops: until the vehicle meets the performance requirements, with a maximum of 6 stops.

(f) For each stop, accelerate the vehicle to the test speed and then actuate the brake control under the conditions specified in this paragraph.

S6.4.3 Performance requirements. When the brakes are tested in accordance with the test procedure set out in paragraph S6.4.2., the stopping distance (S) shall be $S \leq 0.0060\ V^2$ (where V is the specified test speed in km/h and S is the required stopping distance in meters).

S6.5 High speed test.

(Record Results on Data Sheet # 9)

S6.5.1 Vehicle condition.

(a) The test is applicable to motorcycle categories 3-3, 3-4 and 3-5.

(b) Test is not required for vehicles with Vmax ≤ 125 km/h.

(c) Lightly loaded.

(d) Engine connected (clutch engaged) with the transmission in the highest gear.

S6.5.2 Test conditions and procedure.

(a) Initial brake temperature. Initial brake temperature is ≥ 55 °C and ≤ 100 °C.

(b) Test speed.

(1) Test speed is 0.8 Vmax for motorcycles with Vmax > 125 km/h and < 200 km/h.

(2) Test speed is 160 km/h for motorcycles with Vmax ≥ 200 km/h.

(c) Brake application. Simultaneous actuation of both service brake system controls, if so equipped, or of the single service brake system control in the case of a service brake system that operates on all wheels.

(d) Brake actuation force.

(1) Hand control: ≤ 200 N.

(2) Foot control:

(i) ≤ 350 N for motorcycle categories 3-3 and 3-4.

(ii) ≤ 500 N for motorcycle category 3-5.

(e) Number of stops: until the vehicle meets the performance requirements, with a maximum of 6 stops.

(f) For each stop, accelerate the vehicle to the test speed and then actuate the brake control(s) under the conditions specified in this paragraph.

S6.5.3 Performance requirements. When the brakes are tested in accordance with the test procedure set out in paragraph S6.5.2, the stopping distance (S) shall be ≤ 0.1 V + 0.0067 V^2 (where V is the specified test speed in km/h and S is the required stopping distance in meters).

S6.6 Wet brake test.

(Record Results on Data Sheet #10)

S6.6.1 General information.

(a) The test is comprised of two parts that are carried out consecutively for each brake system:

(1) A baseline test based on the dry stop test – single brake control actuated (S6.3).

(2) A single wet brake stop using the same test parameters as in (1), but with the brake(s) being continuously sprayed with water while the test is conducted in order to measure the brakes' performance in wet conditions.

(b) The test is not applicable to parking brake systems unless it is the secondary brake.

(c) Drum brakes or fully enclosed disc brakes are excluded from this test unless ventilation or open inspection ports are present.

(d) This test requires the vehicle to be fitted with instrumentation that gives a continuous recording of brake control force and vehicle deceleration.

S6.6.2 Vehicle condition.

(a) The test is applicable to all motorcycle categories.

(b) Laden. For vehicles fitted with CBS and split service brake system, the vehicle is tested in the lightly loaded condition in addition to the laden condition.

(c) Engine disconnected.

(d) Each brake is fitted with water spray equipment as shown in Figure 3.

(1) Disc brakes – sketch of water spray equipment. The disc brake water spray equipment is installed as follows:

(i) Water is sprayed onto each brake with a flow rate of 15 liters/hr. The water is equally distributed on each side of the rotor.

(ii) If the surface of the rotor has any shielding, the spray is applied 45° prior to the shield.

(iii) If it is not possible to locate the spray in the position shown on the sketch, or if the spray coincides with a brake ventilation hole or similar, the spray nozzle may be advanced by an additional 90° maximum from the edge of the pad, using the same radius.

(2) Drum brakes with ventilation and open inspection ports. The water spray equipment is installed as follows:

(i) Water is sprayed equally onto both sides of the drum brake assembly (on the stationary back plate and on the rotating drum) with a flow rate of 15 liters/hr.

(ii) The spray nozzles are positioned two thirds of the distance from the outer circumference of the rotating drum to the wheel hub center.

(iii) The nozzle position is $>$ 15 ° from the edge of any opening in the drum back plate.

S6.6.3 Baseline test – test conditions and procedure.

(a) The test in paragraph S6.3 (dry stop test - single brake control actuated) is carried out for each brake system but with the brake control force that results in a vehicle deceleration of 2.5 – 3.0 m/s^2, and the following is determined:

(1) The average brake control force measured when the vehicle is traveling between 80 percent and 10 percent of the specified test speed.

(2) The average vehicle deceleration in the period 0.5 to 1.0 seconds after the point of actuation of the brake control.

(3) The maximum vehicle deceleration during the complete stop but excluding the final 0.5 seconds.

(b) Conduct 3 baseline stops and average the values obtained in (1), (2), and (3).

S6.6.4 Wet brake test – test conditions and procedure.

(a) The vehicle is ridden at the test speed used in the baseline test set out in S6.6.3 with the water spray equipment operating on the brake(s) to be tested and with no application of the brake system.

(b) After a distance of ≥ 500 m, apply the average brake control force determined in the baseline test for the brake system being tested.

(c) Measure the average vehicle deceleration in the period 0.5 to 1.0 seconds after the point of actuation of the brake control.

(d) Measure the maximum vehicle deceleration during the complete stop but excluding the final 0.5 seconds.

S6.6.5 Performance requirements. When the brakes are tested in accordance with the test procedure set out in paragraph S6.6.4, the wet brake deceleration performance shall be:

(a) The value measured in paragraph S6.6.4(c) shall be ≥ 60 percent of the average deceleration values recorded in the baseline test in paragraph S6.6.3(a)(2), i.e., in the period 0.5 to 1.0 seconds after the point of actuation of the brake control; and

(b) The value measured in S6.6.4(d) shall be ≤ 120 percent of the average deceleration values recorded in the baseline test S6.6.3(a)(3), i.e., during the complete stop but excluding the final 0.5 seconds.

S6.7 Heat fade test.

Note:

[Although this test is delineated at this location in the test procedure to be consistent with the standard, it is the FINAL test to be conducted in the Performance/Dynamic test sequence]

(Record Results on Data Sheet #11)

S6.7.1 General information.

(a) The test comprises three parts that are carried out consecutively for each brake system:

(1) A baseline test using the dry stop test – single brake control actuated (S6.3).

(2) A heating procedure which consists of a series of repeated stops in order to heat the brake(s).

(3) A hot brake stop using the dry stop test – single brake control actuated (S6.3), to measure the brake's performance after the heating procedure.

(b) The test is applicable to motorcycle categories 3-3, 3-4 and 3-5.

(c) The test is not applicable to parking brake systems and secondary service brake systems.

(d) All stops are carried out with the motorcycle laden.

(e) The heating procedure requires the motorcycle to be fitted with instrumentation that gives a continuous recording of brake control force and vehicle deceleration.

S6.7.2 Baseline test.

S6.7.2.1 Vehicle condition – baseline test. Engine disconnected.

S6.7.2.2 Test conditions and procedure – baseline test.

(a) Initial brake temperature. Initial brake temperature is ≥ 55 °C and ≤ 100 °C.

(b) Test speed. Test speed is 60 km/h or 0.9 Vmax, whichever is the lower.

(c) Brake application. Each service brake system control is actuated separately.

(d) Brake actuation force.

(1) Hand control:≤ 200 N.

(2) Foot control:

(i) ≤ 350 N for motorcycle categories 3-3 and 3-4.

(ii) ≤ 500 N for motorcycle category 3-5.

(e) Accelerate the vehicle to the test speed, actuate the brake control under the conditions specified and record the control force required to achieve the vehicle braking performance specified in the table to S6.3.3 (Table 2).

S6.7.3 Heating procedure.

S6.7.3.1 Vehicle condition – heating procedure. Engine transmission:

(a) From the specified test speed to 50 per cent specified test speed: connected, with the highest appropriate gear selected such that the engine speed remains above the manufacturer's specified idle speed.

(b) From 50 per cent specified test speed to standstill: disconnected.

S6.7.3.2 Test conditions and procedure – heating procedure.

(a) Initial brake temperature. Initial brake temperature is (prior to first stop only) ≥ 55 °C and ≤ 100 °C.

(b) Test speed.

(1) Single brake system, front wheel braking only: 100 km/h or 0.7 Vmax, whichever is the lower.

(2) Single brake system, rear wheel braking only: 80 km/h or 0.7 Vmax, whichever is the lower.

(3) CBS or split service brake system: 100 km/h or 0.7 Vmax, whichever is the lower.

(c) Brake application. Each service brake system control actuated separately.

(d) Brake actuation force.

(1) For the first stop: The constant control force that achieves a vehicle deceleration rate of 3.0 - 3.5 m/s^2 while the vehicle is decelerating between 80 percent and 10 percent of the specified speed.

(2) For the remaining stops:

(i) The same constant brake control force as used for the first stop.

(ii) Number of stops: 10.

(iii) Interval between stops: 1000 m.

(e) Carry out a stop to the conditions specified in this paragraph and then immediately use maximum acceleration to reach the specified speed and maintain that speed until the next stop is made.

S6.7.4 Hot brake stop – test conditions and procedure. Perform a single stop under the conditions used in the baseline test (S6.7.2) for the brake system that has been heated during the procedure in accordance with S6.7.3. This stop is carried out within one minute of the completion of the procedure set out in S6.7.3 with a brake control application force less than or equal to the force used during the test set out in S6.7.2.

S6.7.5 Performance requirements. When the brakes are tested in accordance with the test procedure set out in S6.7.4, the stopping distance S_2 shall be ≤ $1.67\ S_1 – 0.67 \times 0.1V$, where:

S_1 = corrected stopping distance in meters achieved in the baseline test set out in S6.7.2.

S_2 = corrected stopping distance in meters achieved in the hot brake stop set out in S6.7.4.

V = specified test speed in km/h.

S6.8 Parking brake system test – for motorcycles with parking brakes.

(Record Results on Data Sheet #12)

S6.8.1 Vehicle condition.

(a) The test is applicable to motorcycle categories 3-2, 3-4 and 3-5.

(b) Laden.

(c) Engine disconnected.

S6.8.2 Test conditions and procedure.

(a) Initial brake temperature. Initial brake temperature is ≤ 100 °C.

(b) Test surface gradient. Test surface gradient is equal to 18 percent.

(c) Brake actuation force.

(1) Hand control:≤ 400 N.

(2) Foot control: ≤ 500 N.

(d) For the first part of the test, park the vehicle on the test surface gradient facing up the slope by applying the parking brake system under the conditions specified in this paragraph. If the vehicle remains stationary, start the measurement of the test period.

(e) The vehicle must remain stationary to the limits of traction of the braked wheels.

(f) On completion of the test with vehicle facing up the gradient, repeat the same test procedure with the vehicle facing down the gradient.

S6.8.3 Performance requirements. When tested in accordance with the test procedure set out in S6.8.2, the parking brake system shall hold the vehicle stationary for 5 minutes when the vehicle is both facing up and facing down the gradient.

S6.9 ABS tests.

NOTE:

[For these tests, where applicable, it is recommended that additional instrumentation be utilized which will provide a marker on the data trace collection for the point at which the test surface friction transition occurs]

(Record Results on Data Sheet # 13)

S6.9.1 General.

(a) The tests are only applicable to the ABS fitted on motorcycle categories 3-1 and 3-3.

(b) The tests are to confirm the performance of brake systems equipped with ABS and their performance in the event of ABS electrical failure.

(c) Fully cycling means that the anti-lock system is repeatedly modulating the brake force to prevent the directly controlled wheels from locking.

(d) Wheel-lock is allowed as long as the stability of the vehicle is not affected to the extent that it requires the operator to release the control or causes a vehicle wheel to pass outside the test lane.

(e) The test series comprises the individual tests in Table 3, which may be carried out in any order.

S6.9.2 Vehicle condition.

(a) Lightly loaded.

(b) Engine disconnected.

S6.9.3 Stops on a high friction surface.

S6.9.3.1 Test conditions and procedure.

(a) Initial brake temperature. Initial brake temperature is ≥ 55 °C and ≤ 100 °C.

(b) Test speed. Test speed is 60 km/h or 0.9 Vmax, whichever is lower.

(c) Brake application. Simultaneous actuation of both service brake system controls, if so equipped, or of the single service brake control in the case of a service brake system that operates on all wheels.

(d) Brake actuation force. The force applied is that which is necessary to ensure that the ABS will cycle fully throughout each stop, down to 10 km/h.

(e) If one wheel is not equipped with ABS, the control for the service brake on that wheel is actuated with a force that is lower than the force that will cause the wheel to lock.

(f) Number of stops: until the vehicle meets the performance requirements, with a maximum of 6 stops.

(g) For each stop, accelerate the vehicle to the test speed and then actuate the brake control under the conditions specified in this paragraph.

S6.9.3.2 Performance requirements. When the brakes are tested in accordance with the test procedures referred to in S6.9.3.1:

(a) the stopping distance (S) shall be $\leq 0.0063V^2$ (where V is the specified test speed in km/h and S is the required stopping distance in meters); and

(b) there shall be no wheel lock beyond that allowed for in paragraph S6.9.1(d), and the vehicle wheels shall stay within the test lane.

S6.9.4 Stops on a low friction surface.

S6.9.4.1 Test conditions and procedure. As set out in S6.9.3.1, but using the low friction surface instead of the high friction one.

S6.9.4.2 Performance requirements. When the brakes are tested in accordance with the test procedures set out in S6.9.4.1:

(a) the stopping distance (S) shall be ≤ 0.0056 V^2/P (where V is the specified test speed in km/h, P is the peak braking coefficient and S is the required stopping distance in meters); and

(b) there shall be no wheel lock beyond that allowed for in paragraph S6.9.1(d), and the vehicle wheels shall stay within the test lane.

S6.9.5 Wheel lock checks on high and low friction surfaces.

S6.9.5.1 Test conditions and procedure.

(a) Test surfaces. High friction or low friction surface, as applicable.

(b) Initial brake temperature. Initial brake temperature is ≥ 55 °C and ≤ 100 °C.

(c) Test speed.

(1) On the high friction surface: 80 km/h or 0.8 Vmax, whichever is lower.

(2) On the low friction surface: 60 km/h or 0.8 Vmax, whichever is lower.

(d) Brake application.

(1) Each service brake system control actuated separately.

(2) Where ABS is fitted to both brake systems, simultaneous actuation of both brake controls in addition to (1).

(e) Brake actuation force. The force applied is that which is necessary to ensure that the ABS will cycle fully throughout each stop, down to 10 km/h.

(f) Brake application rate. The brake control actuation force is applied in 0.2 – 0.5 seconds.

(g) Number of stops: until the vehicle meets the performance requirements, with a maximum of 3 stops.

(h) For each stop, accelerate the vehicle to the test speed and then actuate the brake control under the conditions specified in this paragraph.

S6.9.5.2 Performance requirements. When the brakes are tested in accordance with the test procedures set out in S6.9.5.1, there shall be no wheel lock beyond that allowed for in paragraph S6.9.1(d), and the vehicle wheels shall stay within the test lane.

S6.9.6 Wheel lock check – high to low friction surface transition.

S6.9.6.1 Test conditions and procedure.

(a) Test surfaces. A high friction surface immediately followed by a low friction surface.

(b) Initial brake temperature. Initial brake temperature is ≥ 55 °C and ≤ 100 °C.

(c) Test speed. The speed that will result in 50 km/h or 0.5 Vmax, whichever is the lower, at the point where the vehicle passes from the high friction to the low friction surface.

(d) Brake application.

(1) Each service brake system control actuated separately.

(2) Where ABS is fitted to both brake systems, simultaneous actuation of both brake controls in addition to (1).

(e) Brake actuation force. The force applied is that which is necessary to ensure that the ABS will cycle fully throughout each stop, down to 10 km/h.

(f) Number of stops: until the vehicle meets the performance requirements, with a maximum of 3 stops.

(g) For each stop, accelerate the vehicle to the test speed and then actuate the brake control before the vehicle reaches the transition from one friction surface to the other.

S6.9.6.2 Performance requirements. When the brakes are tested in accordance with the test procedures set out in S6.9.6.1, there shall be no wheel lock beyond that allowed for in paragraph S6.9.1(d), and the vehicle wheels shall stay within the test lane.

S6.9.7 Wheel lock check – low to high friction surface transition.

S6.9.7.1 Test conditions and procedure.

(a) Test surfaces. A low friction surface immediately followed by a high friction surface with a PBC ≥ 0.8.

(b) Initial brake temperature. Initial brake temperature is ≥ 55 °C and ≤ 100 °C.

(c) Test speed. The speed that will result in 50 km/h or 0.5 Vmax, whichever is the lower, at the point where the vehicle passes from the low friction to the high friction surface.

(d) Brake application.

(1) Each service brake system control applied separately.

(2) Where ABS is fitted to both brake systems, simultaneous application of both brake controls in addition to (1).

(e) Brake actuation force. The force applied is that which is necessary to ensure that the ABS will cycle fully throughout each stop, down to 10 km/h.

(f) Number of stops: until the vehicle meets the performance requirements, with a maximum of 3 stops.

(g) For each stop, accelerate the vehicle to the test speed and then actuate the brake control before the vehicle reaches the transition from one friction surface to the other.

(h) Record the vehicle's continuous deceleration.

S6.9.7.2 Performance requirements. When the brakes are tested in accordance with the test procedures set out in S6.9.7.1:

(a) there shall be no wheel lock beyond that allowed for in paragraph S6.9.1(d), and the vehicle wheels shall stay within the test lane, and

(b) within 1 second of the rear wheel passing the transition point between the low and high friction surfaces, the vehicle deceleration shall increase.

S6.9.8 Stops with an ABS electrical failure.

S6.9.8.1 Test conditions and procedure. With the ABS electrical system disabled, carry out the test set out in S6.3 (dry stop test – single brake control actuated) applying the conditions relevant to the brake system and vehicle being tested.

S6.9.8.2 Performance requirements. When the brakes are tested in accordance with the test procedure set out in S6.9.8.1:

(a) the system shall comply with the failure warning requirements of S5.1.10.2; and

(b) the minimum requirements for stopping distance shall be as specified in column 2 under the heading “Single brake system, rear wheel(s) braking only” in Table 2.

S6.10 Partial failure test – for split service brake systems.

(Record Results on Data Sheet # 14)

S6.10.1 General information.

(a) The test is only applicable to vehicles that are equipped with split service brake systems.

(b) The test is to confirm the performance of the remaining subsystem in the event of a hydraulic system leakage failure.

S6.10.2 Vehicle condition.

(a) The test is applicable to motorcycle categories 3-3, 3-4 and 3-5.

(b) Lightly loaded.

(c) Engine disconnected.

S6.10.3 Test conditions and procedure.

(a) Initial brake temperature. Initial brake temperature is ≥ 55 °C and ≤ 100 °C.

(b) Test speed. Test speed is 50 km/h and 100 km/h or 0.8 Vmax, whichever is lower.

(c) Brake actuation force.

(1) Hand control:≤ 250 N.

(2) Foot control: ≤ 400 N.

(d) Number of stops: until the vehicle meets the performance requirements, with a maximum of 6 stops for each test speed.

(e) Alter the service brake system to induce a complete loss of braking in any one subsystem. Then, for each stop, accelerate the vehicle to the test speed and then actuate the brake control under the conditions specified in this paragraph.

(f) Repeat the test for each subsystem.

S6.10.4 Performance requirements. When the brakes are tested in accordance with the test procedure set out in S6.10.3:

(a) the system shall comply with the failure warning requirements set out in paragraph S5.1.10.1; and

(b) the stopping distance (S) shall be $\leq 0.1\ V + 0.0117\ V^2$ (where V is the specified test speed in km/h and S is the required stopping distance in meters).

S6.11 Power-assisted braking system failure test.

(Record Results on Data Sheet # 15)

S6.11.1 General information.

(a) The test is not conducted when the vehicle is equipped with another separate service brake system.

(b) The test is to confirm the performance of the service brake system in the event of failure of the power assistance.

S6.11.2 Test conditions and procedure. Carry out the test set out in S6.3.3 (dry stop test – single brake control actuated) for each service brake system with the power assistance disabled.

S6.11.3 Performance requirements. When the brakes are tested in accordance with the test procedure set out in S6.11.2, the stopping distance shall be as specified in column 2 of Table 4. Note that if the power assistance may be activated by more than one control, the above performance shall be achieved when each control is actuated separately.

TABLES AND FIGURES TO § 571.122

Table 1. Test Sequence

Test order	Paragraph
1. Dry stop - single brake control actuated	S6.3
2. Dry stop - all service brake controls actuated	S6.4
3. High speed	S6.5
4. Wet brake	S6.6
5. If fitted:	
6.1. Parking brake system	S6.8
6.2. ABS	S6.9
6.3. Partial failure, for split service brake systems	S6.10
6.4. Power-assisted braking system failure	S6.11
6. Heat fade	S6.7

Table 2. Performance requirements, Dry stop test – single brake control actuated.

Column 1	Column 2
Motorcycle Category	STOPPING DISTANCE (S) (Where V is the specified test speed in km/h and S is the required stopping distance in meters)
Single brake system, front wheel(s) braking only:	
3-1	$S \leq 0.1\ V + 0.0111\ V^2$
3-2	$S \leq 0.1\ V + 0.0143\ V^2$
3-3	$S \leq 0.1\ V + 0.0087\ V^2$
3-4	$S \leq 0.1\ V + 0.0105\ V^2$
3-5	Not applicable
Single brake system, rear wheel(s) braking only:	
3-1	$S \leq 0.1\ V + 0.0143\ V^2$
3-2	$S \leq 0.1\ V + 0.0143\ V^2$
3-3	$S \leq 0.1\ V + 0.0133\ V^2$
3-4	$S \leq 0.1\ V + 0.0105\ V^2$
3-5	Not applicable
Vehicles with CBS or split service brake systems: for laden and lightly loaded conditions.	
3-1 and 3-2	$S \leq 0.1\ V + 0.0087\ V^2$
3-3	$S \leq 0.1\ V + 0.0076\ V^2$
3-4	$S \leq 0.1\ V + 0.0071\ V^2$
3-5	$S \leq 0.1\ V + 0.0077\ V^2$
Vehicles with CBS – secondary service brake system:	
ALL	$S \leq 0.1\ V + 0.0154\ V^2$

Table 3. ABS tests.

ABS TESTS	PARAGRAPH
a. Stops on a high friction surface - as specified in S6.1.1.1.	S6.9.3
b. Stops on a low friction surface - as specified in S6.1.1.2.	S6.9.4
c. Wheel lock checks on high and low friction surfaces.	S6.9.5
d. Wheel lock check - high to low friction surface transition.	S6.9.6
e. Wheel lock check - low to high friction surface transition.	S6.9.7
f. Stops with an ABS electrical failure.	S6.9.8

Table 4. Performance requirements, Power-assisted braking system failure test.

Column 1	Column 2
Vehicle Category	STOPPING DISTANCE(S) (Where V is the specified test speed in km/h and S is the required stopping distance in metres)
Single brake system:	
3-1	$S \leq 0.1\ V + 0.0143\ V^2$
3-2	$S \leq 0.1\ V + 0.0143\ V^2$
3-3	$S \leq 0.1\ V + 0.0133\ V^2$
3-4	$S \leq 0.1\ V + 0.0105\ V^2$
Vehicles with CBS or split service brake systems:	
All	$S \leq 0.1\ V + 0.0154\ V^2$

Figure 1. Hand control lever force application points and direction.

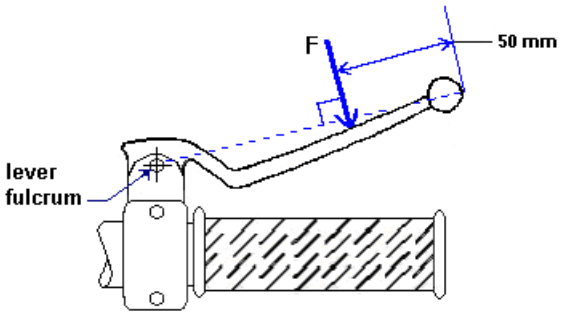


Figure 2. Typical Plug Type Thermocouple Installations

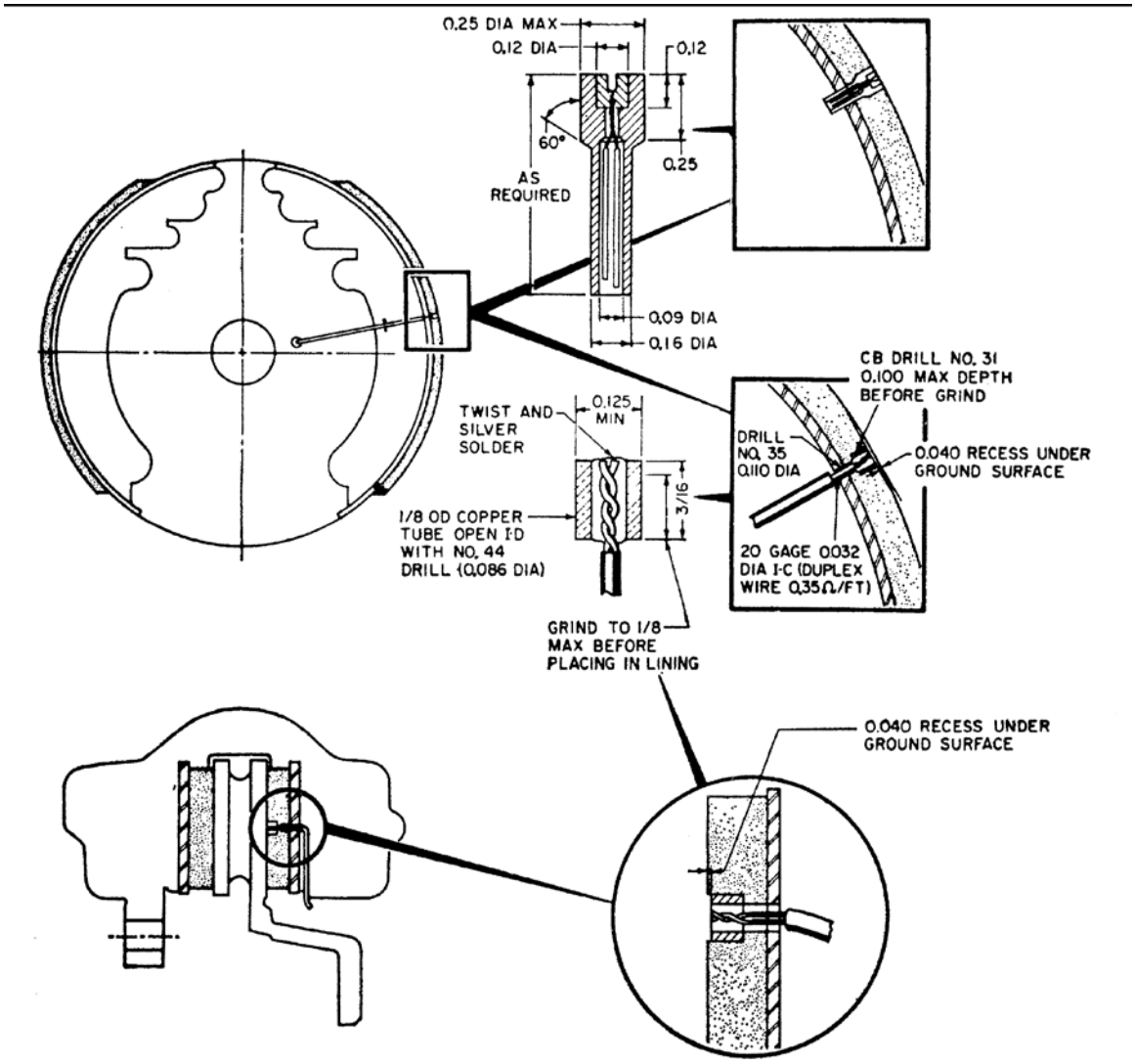
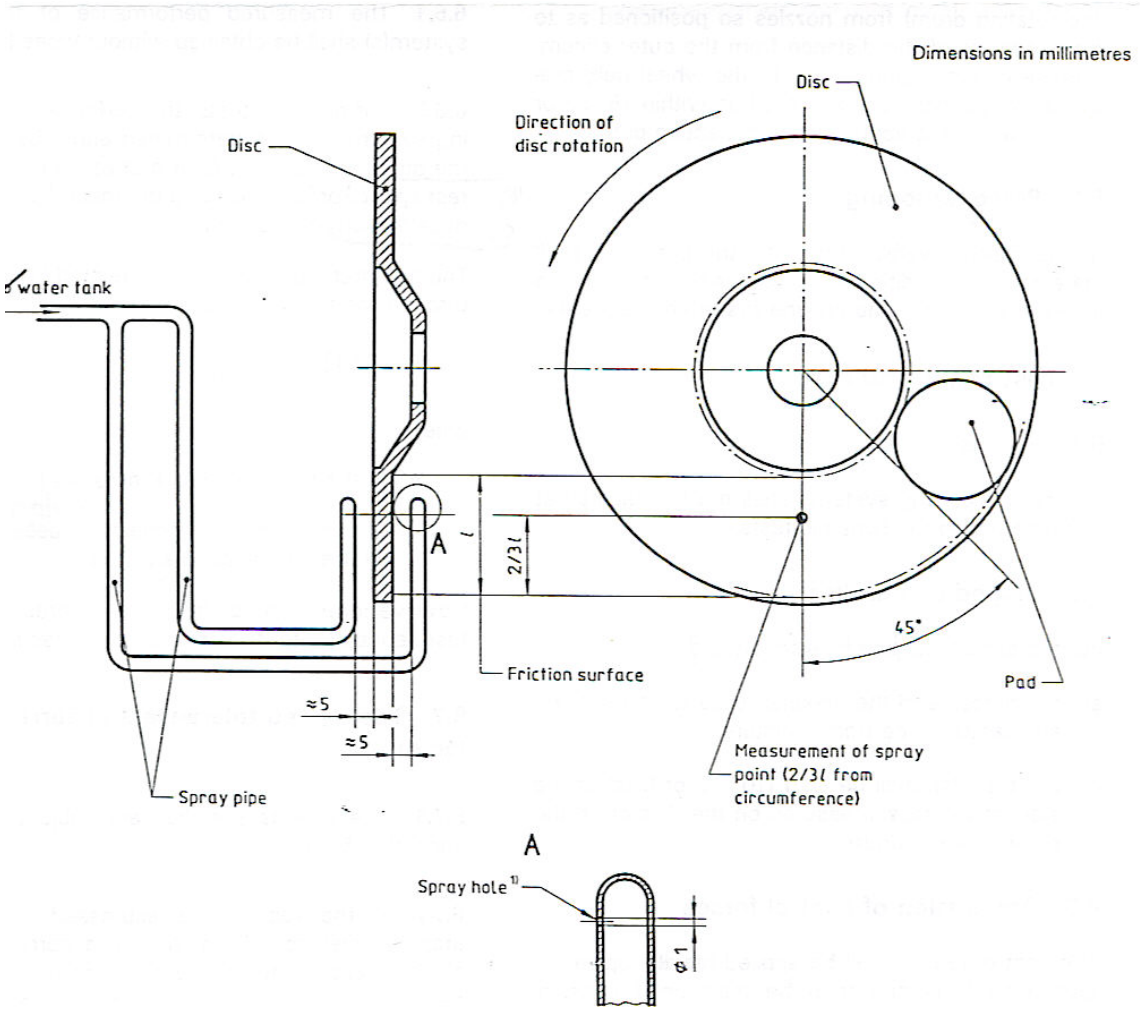


Figure 3. Wet brake test.



14. POST TEST REQUIREMENTS

After the required tests are completed, the contractor shall:

A. Verify all instrumentation, data sheets and photographs

B. Complete the Vehicle Condition report form including a word description of its post test condition

C. Copy applicable pages of the vehicle Owner's Manual for attachment to the final test report

D. Move the test vehicle to a secure area

E. Place all original records in a secure and organized file awaiting test data disposition.

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 or items of equipment are disposed of. Samples of the required Monthly Status Reports are contained in the Report Forms section.

15.2 APPARENT NONCOMPLIANCE

Any indication of a test failure shall be communicated by telephone to the COTR within 24 hours with written notification mailed within 48 hours (Saturdays and Sundays 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. In the event of a test failure, a post test calibration check of some critically sensitive test equipment and instrumentation is required for verification of accuracy. The calibration shall be performed without additional costs to the OVSC.

15.3 FINAL TEST REPORTS

15.3.1 COPIES

In the case of a test failure, 7 copies of the Final Test Report shall 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 "Report Section".

Where there has been no indication of a test failure, 3 copies of each Final Test Report shall 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. Do NOT submit invoices before the COTR is provided copies of the Final Test Report.

Contractors are required to submit the first Final Test Report in 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.

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 below for the purpose of 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 122-ABC-XX-001 where –

122 is the FMVSS tested
ABC are the initials for the laboratory
XX is the last two numbers of the Fiscal Year of the test program
001 is the Group Number (001 for the 1st test)

(2) Final Report Title and Subtitle such as

COMPLIANCE TESTING FOR FMVSS 122
Motorcycle Brake Systems
* *
World Motors Corporation
20XX XYZ Motor Cars
NHTSA No. CC2013X901

(3) Contractor's Name and Address such as

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

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
Enforcement
Office of Vehicle Safety Compliance
Mail Code: NVS-220
1200 New Jersey Ave., SE
Washington, DC 20590

B. FIRST PAGE AFTER COVER PAGE

When a contract test laboratory is reporting, a disclaimer statement and an acceptance signature block for the COTR shall be provided as follows:

This publication is distributed by the National Highway Traffic Safety Administration in the interest of information exchange. 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.

Prepared By:
_____

Approved By:
_____

Approval Date:
_____

FINAL REPORT ACCEPTANCE BY OVSC:

Accepted By:
_____

Acceptance Date:
_____

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

122-ABC-XX-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 122 Compliance Testing of 20XX World XYZ

Motor Cars, NHTSA No. CC2013X901

Block 5 — REPORT DATE

Month Day, 20XX

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

Block 10 — WORK UNIT NUMBER

Leave blank

Block 11 — CONTRACT OR GRANT NUMBER

DTNH22-XX-D-12345

Block 12 — SPONSORING AGENCY NAME AND ADDRESS

U.S. Department of Transportation
National Highway Traffic Safety Administration
Enforcement
Office of Vehicle Safety Compliance
Mail Code: NVS-220
1200 New Jersey Ave., SE
Washington, DC 20590

Block 13 — TYPE OF REPORT AND PERIOD COVERED

Final Test Report

Month Day to Month Day, 20XX

Block 14 — SPONSORING AGENCY CODE

NVS-220

Block 15 — SUPPLEMENTARY NOTES

Leave blank

Block 16 — ABSTRACT

Compliance tests were conducted on the subject 20XX World XYZ Motor Car in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-122-XX for the determination of FMVSS 122 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.

Block 17 — KEY WORDS

Compliance Testing
Safety Engineering
FMVSS 122

Block 18 — DISTRIBUTION STATEMENT

National Highway Traffic Safety Administration
Technical Information Services Division, NPO-411
1200 New Jersey Avenue SE (Room E12-100)
Washington DC 20590

e-mail: tis@nhtsa.dot.gov
FAX: 202-493-2833

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

15.3.4 TABLE OF CONTENTS

Final test report Table of Contents shall include the following:

Section 1 — Purpose of Compliance Test

Section 2 — Compliance Test Data Summary

Section 3 — Compliance Test Data

Section 4 — Noncompliance Data (if applicable)

Section 5 — Photographs

Section 6 — Notice of Test Failure (if applicable)

Section 7 — Applicable pages from vehicle owner’s manual

16. DATA SHEETS

DATA SHEET 1
VEHICLE INFORMATION

VEHICLE:		NHTSA NUMBER:		DATE:	
TIRE PRESSURE (FRONT):		TIRE PRESSURE (REAR):			
ODOMETER START:		ODOMETER FINISH:			

GENERAL DESCRIPTION:

VIN	
Date of Manufacture	
Engine Type	
Engine Displacement	
Fuel Delivery	
Transmission	
Final Drive	
Wheelbase	

TIRES:

	Front	Rear	3RD (IF EQUIPPED)
Manufacturer			
Type			
Size			
DOT Number			
Pressure (cold)			
Rim Label Information			

FMVSS 122 - DATA SHEET 1 (2 of 3)

WEIGHTS:

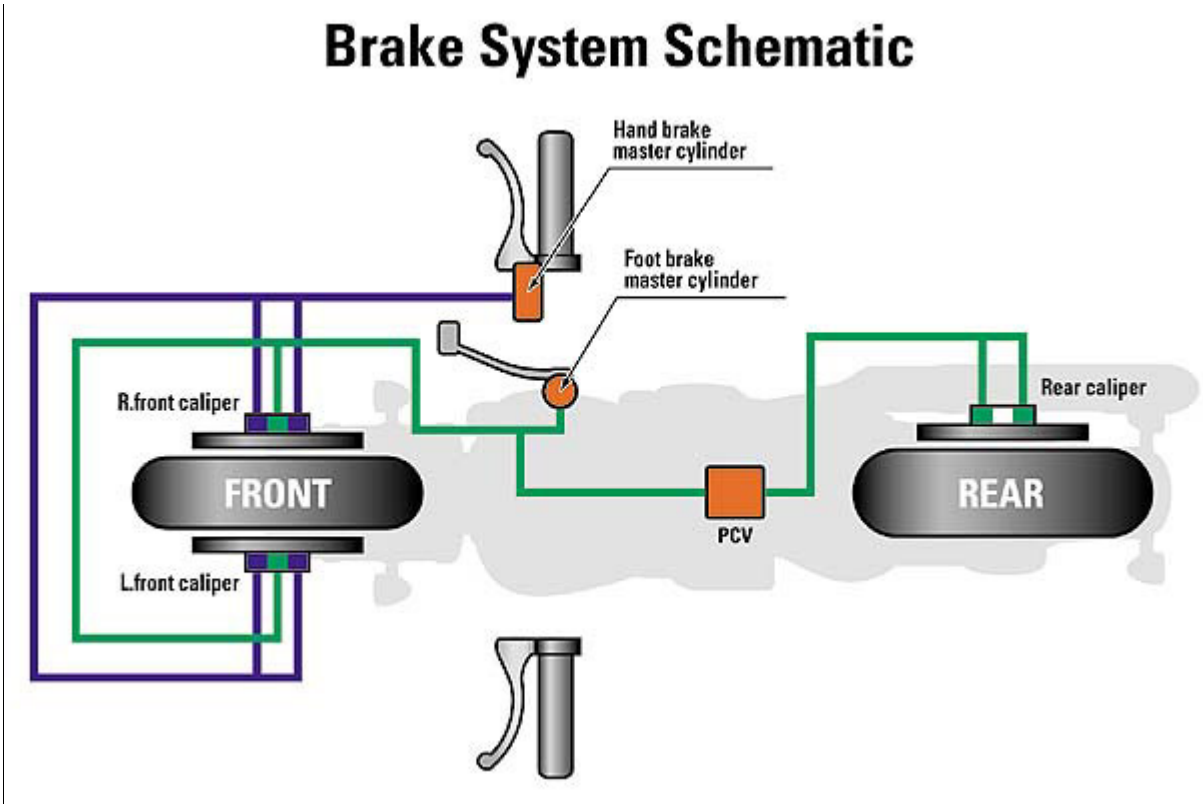
	Front		Rear		Total
	Weight (kg)	% of Total	Weight (kg)	% of Total	Weight (kg)
Test Rider					
Curb Weight (UVW)					
Test Weight Unladen					
Test Weight Laden					
GVWR (Certification label)					
GAWR (Certification label)					

BRAKES:

	Front	Rear
Actuation Method: mechanical, hydraulic, electric		
System Type: A. Individual Control B. Combined Brake System C. Split-Service		
Control Actuation (Foot/Hand)		
Shared brake i.e. 2 sets of pistons on front or rear caliper with each set actuated by separate control		
ABS		
Power Assist		
Caliper Type		
Number of Calipers		
No. of Caliper Pistons		
Caliper Piston Diameters		
Rotor –Type/Number		
Rotor Diameter		
Rotor Thickness/Min. Allowable Thickness		
Swept Area		
Brake Pad Identification Numbers		

FMVSS 122 - DATA SHEET 1 (3 of 3)

SKETCH OF BRAKE SYSTEM : ***(provide a sketch similar to the following)***



DATA SHEET 2
MOTORCYCLE BRAKE TEST SUMMARY

VEH. NHTSA NO.: _____ ; LABORATORY:_____

TEST SUMMARY (where applicable)	DATA SHEET #	SPEED (mph)	STOP. DIST. (m) Actual	STOP. DIST. (m) Corrected	MAX. BRAKE LEVER FORCE (kg)	MAX. BRAKE PEDAL FORCE (kg)	NUMBER OF STOPS	PASS/ FAIL
Brake System Requirements (S5.1.1 thru S5.1.8)	3							
Instrumentation Check	4							
Max Speed	5							
Burnish S6.2.5 (Lightly Loaded)	6							
Dry Stop single control actuation S6.3	7							
Dry Stop all controls actuated S6.4	8							
High speed Test S6.5	9							
Wet Brake Test S6.6	10							
Heat Fade Test (S6.7) [Last Dynamic Test]	11							
Parking Brake system Test (S6.8)	12							
ABS Tests (S6.9)	13							
Partial Failure Test – for split service brake system (S6.10)	14							
Power-assisted braking system failure test (S6.11)	15							
Durability (S5.2)	16							
Brake System Requirements (S5.1.9 and S5.1.10)	17							

DATA SHEET 3 (1 of 2)
BRAKE SYSTEM REQUIREMENTS (S5.1)

BRAKE SYSTEM INSPECTION REQUIREMENTS	RESULT	MEETS REQUIREMENT	
		YES	NO
S5.1.1 – Motorcycle has a configuration that enables a rider to actuate the service brake system control while seated in the normal driving position and with both hands on the steering control.			
S5.1.2 – If fitted, motorcycle has a configuration which enables a rider to actuate **the secondary** brake system control while seated in the normal driving position and with at least one hand on the steering control.			
S5.1.3 –If fitted with a parking brake system : 1. Control is separate from the service brake system controls, 2. Shall be held in the locked position by solely mechanical means, 3. Shall be configured to enable a rider to actuate the parking brake system while seated in the normal driving position.			
S5.1.4 – Each category **3-1 and 3-3** two-wheeled motorcycle shall be equipped with either two separate service brake systems, or a split service brake system, with at least one brake operating on the front wheel and at least one brake operating on the rear wheel.			
S5.1.5 -. Each category 3-4 motorcycle shall comply with the brake system requirements in S5.1.4. A brake on the asymmetric wheel (with respect to the longitudinal axis) is not required.			
S5.1.6 -. Each category 3-2 motorcycle shall be equipped with a parking brake system plus one of the following service brake systems: (a) two separate service brake systems, except CBS, which, when applied together, operate the brakes on all wheels; or (b) a split service brake system; or (c) a CBS that operates the brake on all wheels and a secondary brake system which may be the parking brake system.			

DATA SHEET 3 (2 of 2)
BRAKE SYSTEM REQUIREMENTS (S5.1)

BRAKE SYSTEM INSPECTION REQUIREMENTS	RESULT	MEETS REQUIREMENT	
		YES	NO
S5.1.7 -. Each category 3-5 motorcycle shall be equipped with: (a) a parking brake system; and (b) a foot actuated service brake system which operates the brakes on all wheels by way of either: (1) a split service brake system; or (2) a CBS and a secondary brake system, which may be the parking brake system.			
S5.1.8 - For motorcycles where two separate service brake systems are installed, the systems may share a common brake, if a failure in one system does not affect the performance of the other.			
S4 (Definition Complaince) - If Split Service Brake System Equipped -The brake system operates the brakes on **all** wheels, consisting of two or more subsystems actuated by a **single** control designed so that a single failure in any subsystem (such as a leakage type failure of a hydraulic subsystem) does not impair the operation of any other subsystem			

FMVSS 122 - DATA SHEET 4
INSTRUMENTATION CHECK

VEHICLE:		NHTSA NUMBER:		DATE:		ROAD PFC:	
AMBIENT TEMPERATURE		WIND VELOCITY:		TIRE PRESSURE (FRONT):		TIRE PRESSURE (REAR):	
TEST WEIGHT				ODOMETER START:		ODOMETER FINISH:	

REQUIREMENTS: Check instrumentation by making not more than 10 stops from 50 kph at a deceleration of not more than 3 **m/s^2**, record results, repeat if necessary.

Stop No.	Test Speed (Km/h)	Initial Brake Temp. (°C)		Actual Stopping Distance (m)	Corrected Stopping Distance (m)	Hand Lever Force (N)		Pedal Force (N)		Vehicle Deceleration (m/s^2)		Wheel Lockup	Stay In Lane
		Front	Rear			Max	Avg	Max	Avg	Max	Avg		
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													

REMARKS: _____

RECORDED BY:_____ **DATE:**_____

APPROVED BY:_____

FMVSS 122 - DATA SHEET 5
MAXIMUM SPEED

VEHICLE:		NHTSA NUMBER:		DATE:		ROAD PFC:	
AMBIENT TEMPERATURE		WIND VELOCITY:		TIRE PRESSURE (FRONT):		TIRE PRESSURE (REAR):	
TEST WEIGHT				ODOMETER START:		ODOMETER FINISH:	

MOTORCYCLE MAXIMUM SPEED DETERMINATION — Measure the speed that the motorcycle will attain in a distance of 1.6 km (1 mile) from a standing start, but do not exceed 200 kph.

TEST CONDITIONS:

Test Speed	Maximum speed attainable in 1.6 km (1 mile) from a standing start on a level surface.
Initial Brake Temperature (IBT)	N/A
Runs Required	Two runs shall be made in opposite directions.

	DIRECTION	**SPEED**
Run No. 1		
Run No. 2		

Average = _____ kph

REMARKS: _____

RECORDED BY:_____ **DATE:**_____

APPROVED BY:_____

NOTE:
The following **DATA SHEETS** are typical and representative of what would be required for a traditional motorcycle brake system consisting of a hand lever actuating a front wheel brake, and a foot lever actuating a separate rear brake. However, depending on the brake system configuration i.e. CBS, Split service system etc, motorcycle category, vehicle loading, and various test speeds, the data sheet content and number of data sheets will need to be adjusted accordingly.

Review of Section 13B of the Test Procedure is required to determine specific requirements and test conditions. Each Data Sheet template for Test Conditions is to be completed depending on the specific requirements of the applicable test.

The provided data sheets are for general reference, recommended format, and guidance.

FMVSS 122 - DATA SHEET 6 (1 of 2)

BURNISH PROCEDURE (S6.2.5)

VEHICLE:		NHTSA NUMBER:		DATE:		ROAD PFC:	
AMBIENT TEMPERATURE		WIND VELOCITY:		TIRE PRESSURE (FRONT):		TIRE PRESSURE (REAR):	
TEST WEIGHT				ODOMETER START:		ODOMETER FINISH:	

TEST CONDITIONS:

Vehicle Category	Specify
Vehicle Weight	Lightly Loaded
Transmission	Disconnected
Initial Brake temperature	≤100°C
Test Speed Initial	50 km/h or .8 Vmax whichever is lower
Final speed	5 to 10 km/h
Brake Application	Each service brake system **actuated separately**
Deceleration Rate – Single Front Brake System	3 to 3.5 m/s^2 for categories 3-3 and 3-4, 1.5 to 2 m/s^2 for categories 3-1 and 3-2
Deceleration Rate – Single Rear Brake System	1.5 to 2 m/s^2
Deceleration Rate –CBS or Spit service system and category 3-5	3.5 to 4 m/s^2
Number of Decelerations	100 **per brake system**
Actuation Forces	
First Stop	Accelerate to initial speed and actuate brake control until final speed is reached.
Stop Interval	Reaccelerate to the initial speed and maintain that speed until brake temperature falls to the specified initial value. Reapply the brake as specified. Repeat for specified number of decelerations..
Post Burnish Adjustments	After burnishing adjust the brakes in accordance with the manufacturer's recommendation.
Wheel Lockup	

FMVSS 122 - DATA SHEET 6 (2 of 2)
BURNISH PROCEDURE (S6.2.5)

Service Brake system #1 **Hand Actuated**

Stop No.	Test Speed (Km/h)	Initial Brake Temp. (°C)				Hand Lever Force (N)		Pedal Force (N)		Vehicle Deceleration ($m/s^{2)}$		Wheel Lockup	Stay In Lane
		Front	Rear			Max	Avg	Max	Avg	Max	Avg		
25													
50													
75													
100													

Service Brake system #2 **Foot Actuated**

Stop No.	Test Speed (Km/h)	Initial Brake Temp. (°C)				Hand Lever Force (N)		Pedal Force (N)		Vehicle Deceleration ($m/s^{2)}$		Wheel Lockup	Stay In Lane
		Front	Rear			Max	Avg	Max	Avg	Max	Avg		
25													
50													
75													
100													

REMARKS: _____

RECORDED BY:_____ **DATE:**_____

APPROVED BY:_____

FMVSS 122 - DATA SHEET 7 (1 of 2)
DRY STOP TEST – Single Brake Control Actuated (S6.3)

VEHICLE:		NHTSA NUMBER:		DATE:		ROAD PFC:	
AMBIENT TEMPERATURE		WIND VELOCITY:		TIRE PRESSURE (FRONT):		TIRE PRESSURE (REAR):	
TEST WEIGHT				ODOMETER START:		ODOMETER FINISH:	

Test Conditions-

Vehicle Category: (3-1, 3-2, 3-3, 3-4, or 3-5)	
Loading Condition: (Laden, Lightly loaded or both)	
Engine Drive: (disconnected or in gear)	
Initial Brake Temperature: (≥ ___ °C and ≤ ___ °C.)	
Test Speed **(Km/h)**	
Brake Application: (hand control applied, foot control applied, or both simultaneously applied)	
Maximum Brake Actuation force: Hand Control ≤ ____N, Foot Control ≤ _____N	
Maximum Number of Stops	

Service Brake system #1 **Hand Actuated**

Stop No.	Test Speed (Km/h)	Initial Brake Temp. (°C)		Actual Stopping Distance (m)	Corrected Stopping Distance (m)	Hand Lever Force (N)		Pedal Force (N)		Vehicle Deceleration ($m/s^{2)}$		Wheel Lockup	Stay In Lane
		Front	Rear			Max	Avg	Max	Avg	Max	Avg		
1													
2													
3													
4													
5													
6													

No Friction Material detachment and no leakage of brake fluid at test completion (S5.2.3) __

Required Performance	Test result	Pass/Fail

FMVSS 122 - DATA SHEET 7 (2 of 2)
DRY STOP TEST – Single Brake Control Actuated (S6.3)

Service Brake system #2 **Foot Actuated**

Stop No.	Test Speed (Km/h)	Initial Brake Temp. (°C)		Actual Stopping Distance (m)	Corrected Stopping Distance (m)	Hand Lever Force (N)		Pedal Force (N)		Vehicle Deceleration ($m/s^{2)}$		Wheel Lockup	Stay In Lane
		Front	Rear			Max	Avg	Max	Avg	Max	Avg		
1													
2													
3													
4													
5													
6													

No Friction Material detachment and no leakage of brake fluid at test completion (S5.2.3) _____

Required Performance	Test result	Pass/Fail

REMARKS: _____

RECORDED BY:_____ DATE:_____

APPROVED BY:_____

FMVSS 122 - DATA SHEET 8
DRY STOP TEST – ALL Service brake controls actuated (S6.4)

VEHICLE:		NHTSA NUMBER:		DATE:		ROAD PFC:	
AMBIENT TEMPERATURE		WIND VELOCITY:		TIRE PRESSURE (FRONT):		TIRE PRESSURE (REAR):	
TEST WEIGHT				ODOMETER START:		ODOMETER FINISH:	

Test Conditions-

Vehicle Category: (3-3, 3-4, or 3-5)	
Loading Condition: (Laden, Lightly loaded or both)	
Engine Drive: (disconnected or in gear)	
Initial Brake Temperature: (≥ ___ °C and ≤ ___ °C.)	
Test Speed **(Km/h)**	
Brake Application: (hand control applied, foot control applied, or both simultaneously applied)	
Maximum Brake Actuation force: Hand Control ≤ ____N, Foot Control ≤ _____N	
Maximum Number of Stops	

Hand Actuated AND Foot Actuated Simultaneously

Stop No.	Test Speed (Km/h)	Initial Brake Temp. (°C)		Actual Stopping Distance (m)	Corrected Stopping Distance (m)	Hand Lever Force (N)		Pedal Force (N)		Vehicle Deceleration ($m/s^{2)}$		Wheel Lockup	Stay In Lane
		Front	Rear			Max	Avg	Max	Avg	Max	Avg		
1													
2													
3													
4													
5													
6													

No Friction Material detachment and no leakage of brake fluid at test completion (S5.2.3) _____

Required Performance	Test result	Pass/Fail

REMARKS: _____
RECORDED BY:_____ DATE:_____
APPROVED BY:_____

FMVSS 122 - DATA SHEET 9
HIGH SPEED TEST – ALL Service brake controls actuated (S6.5)

VEHICLE:		NHTSA NUMBER:		DATE:		ROAD PFC:	
AMBIENT TEMPERATURE		WIND VELOCITY:		TIRE PRESSURE (FRONT):		TIRE PRESSURE (REAR):	
TEST WEIGHT				ODOMETER START:		ODOMETER FINISH:	

Test Conditions-

Vehicle Category: (3-3, 3-4, or 3-5)	
Loading Condition: (Laden, Lightly loaded or both)	
Engine Drive: (disconnected or in gear)	
Initial Brake Temperature: (≥ ___ °C and ≤ ___ °C.)	
Test Speed **(Km/h)**	
Brake Application: (hand control applied, foot control applied, or both simultaneously applied)	
Maximum Brake Actuation force: Hand Control ≤ ____N, Foot Control ≤ _____N	
Maximum Number of Stops	

Hand Actuated AND Foot Actuated Simultaneously

Stop No.	Test Speed (Km/h)	Initial Brake Temp. (°C)		Actual Stopping Distance (m)	Corrected Stopping Distance (m)	Hand Lever Force (N)		Pedal Force (N)		Vehicle Deceleration ($m/s^{2)}$)		Wheel Lockup	Stay In Lane
		Front	Rear			Max	Avg	Max	Avg	Max	Avg		
1													
2													
3													
4													
5													
6													

No Friction Material detachment and no leakage of brake fluid at test completion (S5.2.3) _____

Required Performance	Test result	Pass/Fail

REMARKS: _____
RECORDED BY:_____ DATE:_____
APPROVED BY:_____

FMVSS 122 - DATA SHEET 10 (1 of 4)
WET BRAKE TEST– Each Brake System (S6.6)

VEHICLE:		NHTSA NUMBER:		DATE:		ROAD PFC:	
AMBIENT TEMPERATURE		WIND VELOCITY:		TIRE PRESSURE (FRONT):		TIRE PRESSURE (REAR):	
TEST WEIGHT				ODOMETER START:		ODOMETER FINISH:	

Test Conditions-

Vehicle Category: (3-1, 3-2, 3-3, 3-4, or 3-5)	
Loading Condition: (Laden, Lightly loaded or both)	
Engine Drive: (disconnected or in gear)	
Initial Brake Temperature: (≥ ___ °C and ≤ ___ °C.)	
Test Speed **(Km/h)**	
Brake Application: (hand control applied, foot control applied, or both simultaneously applied)	
Maximum Brake Actuation force: Hand Control ≤ ____N, Foot Control ≤ _____N	
Maximum Number of Stops	

BASELINE TEST (S6.6.3): HAND control actuated (Maintain deceleration from 2.5 – 3 m/s$^{2)}$

Stop No.	Test Speed (Km/h)	Initial Brake Temp. (°C)		Actual Stopping Distance (m)	Corrected Stopping Distance (m)	Hand Lever Force (N)		Pedal Force (N)		Vehicle Deceleration (m/s$^{2)}$		Wheel Lockup	Stay In Lane
		Front	Rear			Max	Avg	Max	Avg	Max	Avg		
1													
2													
3													

Result within each of the three stops	
Average brake control force measured when vehicle is travelling between 80 and 10 % of specified test speed	Stop 1____, Stop 2_____, Stop 3_____, AVG. =_____**X**___
Average deceleration in the period 0.5 to 1.0 seconds after actuation of brake control	Stop 1____, Stop 2_____, Stop 3_____,: AVG. =____**Y**____
MAXIMUM vehicle deceleration for complete stop excluding the final .5 seconds.	Stop 1____, Stop 2_____, Stop 3_____, AVG. =____**Z**____

FMVSS 122 - DATA SHEET 10 (2 of 4)
WET BRAKE TEST– Each Brake System (S6.6)

Required Wet Brake Performance Calculation based on values X,Y, Z::

Average Brake Control Force maintained = **_____X_____**

Average Vehicle deceleration in the period .5 to 1.0 seconds after the point of actuation of the brake control: must be ≥ 60 percent (.60 times Y) = _____

MAXIMUM vehicle deceleration for complete stop excluding the final .5 seconds: must be ≤ 120 percent (1.2 times Z) = _____

WET Performance Test (S6.6.4): HAND control actuated (Maintain decel. from 2.5 – 3 m/s$^{2)}$

Stop No.	Test Speed (Km/h)	Initial Brake Temp. (°C)		Actual Stopping Distance (m)	Corrected Stopping Distance (m)	Hand Lever Force (N)		Pedal Force (N)		Vehicle Deceleration (m/s$^{2)}$		Wheel Lockup	Stay In Lane
		Front	Rear			Max	Avg	Max	Avg	Max	Avg		
1													
Result within the stop													
Average brake control force applied (based on baseline value).													
Average deceleration in the period 0.5 to 1.0 seconds after actuation of brake control													
MAXIMUM vehicle deceleration for complete stop excluding the final .5 seconds.													

Test Results:

a. **Wet Test Average deceleration in the period 0.5 to 1.0 seconds after actuation of brake control =_____ which is at least 60% of the Baseline value of _____.**
b. **Maximum Wet Test vehicle deceleration for the complete stop excluding the final .05 seconds _____ is not more than 120% of the Baseline Value.**

Pass/Fail_____

FMVSS 122 - DATA SHEET 10 (3 of 4)
WET BRAKE TEST– Each Brake System (S6.6)

BASELINE TEST (S6.6.3): FOOT control actuated (Maintain deceleration from 2.5 – 3 m/s$^{2)}$

Stop No.	Test Speed (Km/h)	Initial Brake Temp. (°C)		Actual Stopping Distance (m)	Corrected Stopping Distance (m)	Hand Lever Force (N)		Pedal Force (N)		Vehicle Deceleration (m/s$^{2)}$		Wheel Lockup	Stay In Lane
		Front	Rear			Max	Avg	Max	Avg	Max	Avg		
1													
2													
3													

Result within each of the three stops	
Average brake control force measured when vehicle is travelling between 80 and 10 % of specified test speed	Stop 1____, Stop 2_____, Stop 3_____, AVG. =_____**X**__
Average deceleration in the period 0.5 to 1.0 seconds after actuation of brake control	Stop 1____, Stop 2_____, Stop 3_____,: AVG. =____**Y**____
MAXIMUM vehicle deceleration for complete stop excluding the final .5 seconds.	Stop 1____, Stop 2_____, Stop 3_____, AVG. =____**Z**____

Required Wet Brake Performance Calculation based on values X,Y, Z::

Average Brake Control Force maintained = _____**X**_____

Average Vehicle deceleration in the period .5 to 1.0 seconds after the point of actuation of the brake control: must be ≥ 60 percent (.60 times Y) = _____

MAXIMUM vehicle deceleration for complete stop excluding the final .5 seconds: must be ≤ 120 percent (1.2 times Z) = _____

FMVSS 122 - DATA SHEET 10 (4 of 4)
WET BRAKE TEST– Each Brake System (S6.6)

WET Performance Test (S6.6.4): FOOT control actuated (Maintain decel. from 2.5 – 3 m/s$^{2)}$

Stop No.	Test Speed (Km/h)	Initial Brake Temp. (°C)		Actual Stopping Distance (m)	Corrected Stopping Distance (m)	Hand Lever Force (N)		Pedal Force (N)		Vehicle Deceleration (m/s$^{2)}$		Wheel Lockup	Stay In Lane
		Front	Rear			Max	Avg	Max	Avg	Max	Avg		
1													
Result within the stop													
Average brake control force applied (based on baseline value).													
Average deceleration in the period 0.5 to 1.0 seconds after actuation of brake control													
MAXIMUM vehicle deceleration for complete stop excluding the final .5 seconds.													

Test Results:

a. **Wet Test Average deceleration in the period 0.5 to 1.0 seconds after actuation of brake control =_____ which is at least 60% of the Baseline value of _____.**

b. **Maximum Wet Test vehicle deceleration for the complete stop excluding the final .05 seconds _____ is not more than 120% of the Baseline Value.**

Pass/Fail_____

REMARKS: _____

RECORDED BY:_____ DATE:_____

APPROVED BY:_____

FMVSS 122 - DATA SHEET 11 (1 of 4)
HEAT FADE TEST – Single Brake Control Actuated (S6.7)

(NOTE: Is the last performance test conducted.)

VEHICLE:		NHTSA NUMBER:		DATE:		ROAD PFC:	
AMBIENT TEMPERATURE		WIND VELOCITY:		TIRE PRESSURE (FRONT):		TIRE PRESSURE (REAR):	
TEST WEIGHT				ODOMETER START:		ODOMETER FINISH:	

Test Conditions-

Vehicle Category: (3-3, 3-4, or 3-5)	
Loading Condition: (Laden, Lightly loaded or both)	
Engine Drive: (disconnected or in gear)	
Initial Brake Temperature: (≥ ___ °C and ≤ ___ °C.)	
Test Speed **(Km/h)**	
Brake Application: (hand control applied, foot control applied, or both simultaneously applied)	
Maximum Brake Actuation force: Hand Control ≤ ____N, Foot Control ≤ _____N	
Maximum Number of Stops	

Service Brake system #1 **Hand Control**

BASELINE TEST (S6.7.2)

Stop No.	Test Speed (Km/h)	Initial Brake Temp. (°C)		Actual Stopping Distance (m)	Corrected Stopping Distance (m)	Hand Lever Force (N)		Pedal Force (N)		Vehicle Deceleration ($m/s^{2)}$)		Wheel Lockup	Stay In Lane
		Front	Rear			Max	Avg	Max	Avg	Max	Avg		
1													

No Friction Material detachment and no leakage of brake fluid at test completion (S5.2.3) _____

Brake control force required to achieve the required stopping distance_____. This force level cannot be exceeded in the Hot Stop Test that follows.

FMVSS 122 - DATA SHEET 11 (2 of 4)
HEAT FADE TEST – Single Brake Control Actuated (S6.7)

HEATING TEST (S6.7.3)
(Note: Engine connected then disconnected)

Stop No.	Test Speed (Km/h)	Initial Brake Temp. (°C)		Actual Stopping Distance (m)	Corrected Stopping Distance (m)	Hand Lever Force (N)		Pedal Force (N)		Vehicle Deceleration ($m/s^{2)}$		Wheel Lockup	Stay In Lane
		Front	Rear			Max	Avg	Max	Avg	Max	Avg		
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													

HOT BRAKE STOP (S6.7.4)
Brake control application force from Baseline test which cannot be exceeded in Hot Brake Stop _____

Stop No.	Test Speed (Km/h)	Initial Brake Temp. (°C)		Actual Stopping Distance (m)	Corrected Stopping Distance (m)	Hand Lever Force (N)		Pedal Force (N)		Vehicle Deceleration ($m/s^{2)}$		Wheel Lockup	Stay In Lane
		Front	Rear			Max	Avg	Max	Avg	Max	Avg		
1													

No Friction Material detachment and no leakage of brake fluid at test completion (S5.2.3) _____

Required Performance (Distance)	Test result	Pass/Fail

FMVSS 122 - DATA SHEET 11 (3 of 4)
HEAT FADE TEST – Single Brake Control Actuated (S6.7)

Service Brake system #1 **Foot Control**

BASELINE TEST (S6.7.2)

Stop No.	Test Speed (Km/h)	Initial Brake Temp. (°C)		Actual Stopping Distance (m)	Corrected Stopping Distance (m)	Hand Lever Force (N)		Pedal Force (N)		Vehicle Deceleration ($m/s^{2)}$		Wheel Lockup	Stay In Lane
		Front	Rear			Max	Avg	Max	Avg	Max	Avg		
1													

No Friction Material detachment and no leakage of brake fluid at test completion (S5.2.3) _____

Brake control force that was required to obtain required stopping distance_____.
This force level cannot be exceeded in the Hot Stop Test that follows.

HEATING TEST (S6.7.3)
(Note: Engine connected then disconnected)

Stop No.	Test Speed (Km/h)	Initial Brake Temp. (°C)		Actual Stopping Distance (m)	Corrected Stopping Distance (m)	Hand Lever Force (N)		Pedal Force (N)		Vehicle Deceleration ($m/s^{2)}$		Wheel Lockup	Stay In Lane
		Front	Rear			Max	Avg	Max	Avg	Max	Avg		
1													
2													
3													
4													
5													
6													
7													
8													
9													
10													

FMVSS 122 - DATA SHEET 11 (4 of 4)
HEAT FADE TEST – Single Brake Control Actuated (S6.7)

HOT BRAKE STOP (S6.7.4)

Brake control application force from Baseline test which cannot be exceeded in Hot Brake Stop _____

Stop No.	Test Speed (Km/h)	Initial Brake Temp. (°C)		Actual Stopping Distance (m)	Corrected Stopping Distance (m)	Hand Lever Force (N)		Pedal Force (N)		Vehicle Deceleration ($m/s^{2)}$		Wheel Lockup	Stay In Lane
		Front	Rear			Max	Avg	Max	Avg	Max	Avg		
1													

No Friction Material detachment and no leakage of brake fluid at test completion (S5.2.3) _____

Required Performance (Distance)	Test result	Pass/Fail

REMARKS: _____

RECORDED BY:_____ DATE:_____

APPROVED BY:_____

FMVSS 122 - DATA SHEET 12 (1 of 2)
PARKING BRAKE – for motorcycles with parking brake (S6.8)

VEHICLE:		NHTSA NUMBER:		DATE:		ROAD PFC:	
AMBIENT TEMPERATURE		WIND VELOCITY:		TIRE PRESSURE (FRONT):		TIRE PRESSURE (REAR):	
TEST WEIGHT				ODOMETER START:		ODOMETER FINISH:	

Test Conditions-

Vehicle Category: (3-2, 3-4, or 3-5)	
Loading Condition: (Laden, Lightly loaded or both)	
Engine Drive: (disconnected or in gear)	
Initial Brake Temperature: (≥ ___ °C and ≤ ___ °C.)	
Test Speed **(Km/h)**	
Brake Application: (hand control applied, foot control applied, or both simultaneously applied)	
Maximum Brake Actuation force: Hand Control ≤ ____N, Foot Control ≤ _____N	
Maximum Number of Stops	

VEHICLE FACING <u>UP</u> THE GRADIENT

Stop No.	Test Speed (Km/h)	Initial Brake Temp. (°C)		Actual Stopping Distance (m)	Corrected Stopping Distance (m)	Hand Lever Force (N)		Pedal Force (N)		Vehicle Deceleration ($m/s^{2)}$		Wheel Lockup	Stay In Lane
		Front	Rear			Max	Avg	Max	Avg	Max	Avg		
1													

No Friction Material detachment and no leakage of brake fluid at test completion (S5.2.3) _____

Performance Requirement: Vehicle Stationary for 5 minutes

Pass/Fail_____

FMVSS 122 - DATA SHEET 12 (2 of 2)
PARKING BRAKE – for motorcycles with parking brake (S6.8)

VEHICLE FACING <u>DOWN</u> THE GRADIENT

Stop No.	Test Speed (Km/h)	Initial Brake Temp. (°C)		Actual Stopping Distance (m)	Corrected Stopping Distance (m)	Hand Lever Force (N)		Pedal Force (N)		Vehicle Deceleration ($m/s^{2)}$		Wheel Lockup	Stay In Lane
		Front	Rear			Max	Avg	Max	Avg	Max	Avg		
1													

No Friction Material detachment and no leakage of brake fluid at test completion (S5.2.3) _____

Performance Requirement: Vehicle Stationary for 5 minutes

Pass/Fail_____

REMARKS: _____

RECORDED BY:_____ **DATE:**_____

APPROVED BY:_____

FMVSS 122 - DATA SHEET 13 (1 of 6)
ABS TEST– Stops on HIGH Friction surface (S6.9.3)

VEHICLE:		NHTSA NUMBER:		DATE:		ROAD PFC:	
AMBIENT TEMPERATURE		WIND VELOCITY:		TIRE PRESSURE (FRONT):		TIRE PRESSURE (REAR):	
TEST WEIGHT				ODOMETER START:		ODOMETER FINISH:	

Test Conditions-

Vehicle Category: (3-1 or 3-3)	
Loading Condition: (Laden, Lightly loaded or both)	
Engine Drive: (disconnected or in gear)	
Initial Brake Temperature: (≥ ___ °C and ≤ ___ °C.)	
Test Speed **(Km/h)**	
Brake Application: (hand control applied, foot control applied, or both simultaneously applied)	
Maximum Brake Actuation force: Hand Control ≤ ____N, Foot Control ≤ _____N	
Maximum Number of Stops	

Stop No.	Test Speed (Km/h)	Initial Brake Temp. (°C)		Actual Stopping Distance (m)	Corrected Stopping Distance (m)	Hand Lever Force (N)		Pedal Force (N)		Vehicle Deceleration ($m/s^{2)}$		Wheel Lockup	Stay In Lane
		Front	Rear			Max	Avg	Max	Avg	Max	Avg		
1													
2													
3													
4													
5													
6													

No Friction Material detachment and no leakage of brake fluid at test completion (S5.2.3) _____

Required Performance	Test result	Pass/Fail
Distance =		
No Lockup/ Stays in Lane =		

FMVSS 122 - DATA SHEET 13 (2 of 6)
ABS TEST– Stops on LOW Friction surface (S6.9.4)

VEHICLE:		NHTSA NUMBER:		DATE:		ROAD PFC:	
AMBIENT TEMPERATURE		WIND VELOCITY:		TIRE PRESSURE (FRONT):		TIRE PRESSURE (REAR):	
TEST WEIGHT				ODOMETER START:		ODOMETER FINISH:	

Test Conditions-

Vehicle Category: (3-1or 3-3)	
Loading Condition: (Laden, Lightly loaded or both)	
Engine Drive: (disconnected or in gear)	
Initial Brake Temperature: (≥ ___ °C and ≤ ___ °C.)	
Test Speed **(Km/h)**	
Brake Application: (hand control applied, foot control applied, or both simultaneously applied)	
Maximum Brake Actuation force: Hand Control ≤ ____N, Foot Control ≤ _____N	
Maximum Number of Stops	

Stop No.	Test Speed (Km/h)	Initial Brake Temp. (°C)		Actual Stopping Distance (m)	Corrected Stopping Distance (m)	Hand Lever Force (N)		Pedal Force (N)		Vehicle Deceleration ($m/s^{2)}$		Wheel Lockup	Stay In Lane
		Front	Rear			Max	Avg	Max	Avg	Max	Avg		
1													
2													
3													
4													
5													
6													

No Friction Material detachment and no leakage of brake fluid at test completion (S5.2.3) _____

Required Performance	Test result	Pass/Fail
Distance =		
No Lockup/Stays in Lane =		

FMVSS 122 - DATA SHEET 13 (3 of 6)
ABS TEST– Wheel Lock CHECKS on High and Low Friction Surfaces (S6.9.5)

HIGH FRICTION SURFACE Stability

VEHICLE:		NHTSA NUMBER:		DATE:		ROAD PFC:	
AMBIENT TEMPERATURE		WIND VELOCITY:		TIRE PRESSURE (FRONT):		TIRE PRESSURE (REAR):	
TEST WEIGHT				ODOMETER START:		ODOMETER FINISH:	

Test Conditions-

Vehicle Category: (3-1,or 3-3)	
Loading Condition: (Laden, Lightly loaded or both)	
Engine Drive: (disconnected or in gear)	
Initial Brake Temperature: (≥ ___ °C and ≤ ___ °C.)	
Test Speed **(Km/h)**	
Brake Application: (hand control applied, foot control applied, or both simultaneously applied)	
Maximum Brake Actuation force: Hand Control ≤ ____N, Foot Control ≤ _____N	
Maximum Number of Stops	

Stop No.	Test Speed (Km/h)	Initial Brake Temp. (°C)		Actual Stopping Distance (m)	Corrected Stopping Distance (m)	Hand Lever Force (N)		Pedal Force (N)		Vehicle Deceleration ($m/s^{2)}$		Wheel Lockup	Stay In Lane
		Front	Rear			Max	Avg	Max	Avg	Max	Avg		
1													
2													
3													

No Friction Material detachment and no leakage of brake fluid at test completion (S5.2.3) _____

Required Performance	Test result	Pass/Fail
No Lockup/Stays in Lane = Stability Check		

FMVSS 122 - DATA SHEET 13 (3 of 6)
ABS TEST– Wheel Lock CHECKS on High and Low Friction Surfaces (S6.9.5)

LOW FRICTION SURFACE Stability

VEHICLE:		NHTSA NUMBER:		DATE:		ROAD PFC:	
AMBIENT TEMPERATURE		WIND VELOCITY:		TIRE PRESSURE (FRONT):		TIRE PRESSURE (REAR):	
TEST WEIGHT				ODOMETER START:		ODOMETER FINISH:	

Test Conditions-

Vehicle Category: (3-1,or 3-3)	
Loading Condition: (Laden, Lightly loaded or both)	
Engine Drive: (disconnected or in gear)	
Initial Brake Temperature: (≥ ___ °C and ≤ ___ °C.)	
Test Speed **(Km/h)**	
Brake Application: (hand control applied, foot control applied, or both simultaneously applied)	
Maximum Brake Actuation force: Hand Control ≤ ____N, Foot Control ≤ _____N	
Maximum Number of Stops	

Stop No.	Test Speed (Km/h)	Initial Brake Temp. (°C)		Actual Stopping Distance (m)	Corrected Stopping Distance (m)	Hand Lever Force (N)		Pedal Force (N)		Vehicle Deceleration ($m/s^{2)}$		Wheel Lockup	Stay In Lane
		Front	Rear			Max	Avg	Max	Avg	Max	Avg		
1													
2													
3													

No Friction Material detachment and no leakage of brake fluid at test completion (S5.2.3) _____

Required Performance	Test result	Pass/Fail
No Lockup/Stays in Lane = Stability Check		

FMVSS 122 - DATA SHEET 13 (4 of 6)
ABS TEST– Wheel Lock Checks - HIGH TO LOW Friction Surface Transition Stabilitiy (S6.9.6)

VEHICLE:		NHTSA NUMBER:		DATE:		ROAD PFC:	
AMBIENT TEMPERATURE		WIND VELOCITY:		TIRE PRESSURE (FRONT):		TIRE PRESSURE (REAR):	
TEST WEIGHT				ODOMETER START:		ODOMETER FINISH:	

Test Conditions-

Vehicle Category: (3-1,or 3-3)	
Loading Condition: (Laden, Lightly loaded or both)	
Engine Drive: (disconnected or in gear)	
Initial Brake Temperature: (≥ ___ °C and ≤ ___ °C.)	
Test Speed **(Km/h)**	
Brake Application: (hand control applied, foot control applied, or both simultaneously applied)	
Maximum Brake Actuation force: Hand Control ≤ ____N, Foot Control ≤ _____N	
Maximum Number of Stops	

Stop No.	Test Speed (Km/h)	Initial Brake Temp. (°C)		Actual Stopping Distance (m)	Corrected Stopping Distance (m)	Hand Lever Force (N)		Pedal Force (N)		Vehicle Deceleration ($m/s^{2)}$		Wheel Lockup	Stay In Lane
		Front	Rear			Max	Avg	Max	Avg	Max	Avg		
1													
2													
3													

No Friction Material detachment and no leakage of brake fluid at test completion (S5.2.3) _____

Required Performance	Test result	Pass/Fail
No Lockup/Stays in Lane = Stability Check		

FMVSS 122 - DATA SHEET 13 (4 of 6)
ABS TEST– Wheel Lock Checks – LOW TO HIGH Friction Surface Transition Stability (S6.9.7)

VEHICLE:		NHTSA NUMBER:		DATE:		ROAD PFC:	
AMBIENT TEMPERATURE		WIND VELOCITY:		TIRE PRESSURE (FRONT):		TIRE PRESSURE (REAR):	
TEST WEIGHT				ODOMETER START:		ODOMETER FINISH:	

Test Conditions-

Vehicle Category: (3-1,or 3-3)	
Loading Condition: (Laden, Lightly loaded or both)	
Engine Drive: (disconnected or in gear)	
Initial Brake Temperature: (≥ ___ °C and ≤ ___ °C.)	
Test Speed **(Km/h)**	
Brake Application: (hand control applied, foot control applied, or both simultaneously applied)	
Maximum Brake Actuation force: Hand Control ≤ ____N, Foot Control ≤ _____N	
Maximum Number of Stops	

Stop No.	Test Speed (Km/h)	Initial Brake Temp. (°C)		Actual Stopping Distance (m)	Corrected Stopping Distance (m)	Hand Lever Force (N)		Pedal Force (N)		Vehicle Deceleration ($m/s^{2)}$		Wheel Lockup	Stay In Lane
		Front	Rear			Max	Avg	Max	Avg	Max	Avg		
1													
2													
3													

No Friction Material detachment and no leakage of brake fluid at test completion (S5.2.3) _____

Required Performance	Test result	Pass/Fail
No Lockup/Stays in Lane = Stability Check		
Within 1 second of rear wheel passing low to high friction surface, vehicle deceleration increases		

FMVSS 122 - DATA SHEET 13 (6 of 6)
ABS TEST– Electrical Failure (S6.9.8)

VEHICLE:		NHTSA NUMBER:		DATE:		ROAD PFC:	
AMBIENT TEMPERATURE		WIND VELOCITY:		TIRE PRESSURE (FRONT):		TIRE PRESSURE (REAR):	
TEST WEIGHT				ODOMETER START:		ODOMETER FINISH:	

Test Conditions-

Vehicle Category: (3-1, 3-2, 3-3, 3-4, or 3-5)	
Loading Condition: (Laden, Lightly loaded or both)	
Engine Drive: (disconnected or in gear)	
Initial Brake Temperature: (≥ ___ °C and ≤ ___ °C.)	
Test Speed **(Km/h)**	
Brake Application: (hand control applied, foot control applied, or both simultaneously applied)	
Maximum Brake Actuation force: Hand Control ≤ ____N, Foot Control ≤ _____N	
Maximum Number of Stops	

Stop No.	Test Speed (Km/h)	Initial Brake Temp. (°C)		Actual Stopping Distance (m)	Corrected Stopping Distance (m)	Hand Lever Force (N)		Pedal Force (N)		Vehicle Deceleration ($m/s^{2)}$		Wheel Lockup	Stay In Lane
		Front	Rear			Max	Avg	Max	Avg	Max	Avg		
1													
2													
3													
4													
5													
6													

No Friction Material detachment and no leakage of brake fluid at test completion (S5.2.3) _____

Required Performance	Test result	Pass/Fail
Distance =		
Warning Lamp Activated (S5.1.10.2) =		

REMARKS: _____
RECORDED BY:_____ DATE:_____
APPROVED BY:_____

FMVSS 122 - DATA SHEET 14 (1 of 2)
PARTIAL FAILURE TEST – for Split Service brake systems (S6.10)

VEHICLE:		NHTSA NUMBER:		DATE:		ROAD PFC:	
AMBIENT TEMPERATURE		WIND VELOCITY:		TIRE PRESSURE (FRONT):		TIRE PRESSURE (REAR):	
TEST WEIGHT				ODOMETER START:		ODOMETER FINISH:	

Test Conditions-

Vehicle Category: (3-3, 3-4, or 3-5)	
Loading Condition: (Laden, Lightly loaded or both)	
Engine Drive: (disconnected or in gear)	
Initial Brake Temperature: (≥ ___ °C and ≤ ___ °C.)	
Test Speed **(Km/h)**	
Brake Application: (hand control applied, foot control applied, or both simultaneously applied)	
Maximum Brake Actuation force: Hand Control ≤ ____N, Foot Control ≤ _____N	
Maximum Number of Stops	

SUBSYSTEM #1 FAILED

Describe System Failed and method used to fail _____

[Data sheet for foot pedal split service actuated system]

Stop No.	Test Speed (Km/h)	Initial Brake Temp. (°C)		Actual Stopping Distance (m)	Corrected Stopping Distance (m)	Hand Lever Force (N)		Pedal Force (N)		Vehicle Deceleration ($m/s^{2)}$		Wheel Lockup	Stay In Lane
		Front	Rear			Max	Avg	Max	Avg	Max	Avg		
1													
2													
3													
4													
5													
6													

No Friction Material detachment and no leakage of brake fluid at test completion (S5.2.3) _____

Failure Warning Light activated with Subsystem #1 Failed _____

Required Performance (Distance)	Test result	Pass/Fail

FMVSS 122 - DATA SHEET 14 (2 of 2)
PARTIAL FAILURE TEST – for Split Service brake systems (S6.10)

SUBSYSTEM #2 FAILED

Describe System Failed and method used to fail _____

[Data sheet for foot pedal split service actuated system]

Stop No.	Test Speed (Km/h)	Initial Brake Temp. (°C)		Actual Stopping Distance (m)	Corrected Stopping Distance (m)	Hand Lever Force (N)		Pedal Force (N)		Vehicle Deceleration ($m/s^{2)}$		Wheel Lockup	Stay In Lane
		Front	Rear			Max	Avg	Max	Avg	Max	Avg		
1													
2													
3													
4													
5													
6													

No Friction Material detachment and no leakage of brake fluid at test completion (S5.2.3) _____

Failure Warning Light activated with Subsystem #2 Failed _____

Required Performance (Distance)	Test result	Pass/Fail

REMARKS: _____

RECORDED BY:_____ **DATE:**_____

APPROVED BY:_____

FMVSS 122 - DATA SHEET 15
POWER-ASSISTED BRAKING SYSTEM FAILURE TEST – (S6.11)

VEHICLE:		NHTSA NUMBER:		DATE:		ROAD PFC:	
AMBIENT TEMPERATURE		WIND VELOCITY:		TIRE PRESSURE (FRONT):		TIRE PRESSURE (REAR):	
TEST WEIGHT				ODOMETER START:		ODOMETER FINISH:	

Test Conditions- (not conducted if equipped with 2nd separate service brake system)

Vehicle Category: (3-1, 3-2, 3-3, 3-4, or 3-5)	
Loading Condition: (Laden, Lightly loaded or both)	
Engine Drive: (disconnected or in gear)	
Initial Brake Temperature: (≥ ___ °C and ≤ ___ °C.)	
Test Speed **(Km/h)**	
Brake Application: (hand control applied, foot control applied, or both simultaneously applied)	
Maximum Brake Actuation force: Hand Control ≤ ____N, Foot Control ≤ _____N	
Maximum Number of Stops	

Describe method used to disable power assist_____

[Shown for vehicle equipped with power assist acting with foot lever only]

Stop No.	Test Speed (Km/h)	Initial Brake Temp. (°C)		Actual Stopping Distance (m)	Corrected Stopping Distance (m)	Hand Lever Force (N)		Pedal Force (N)		Vehicle Deceleration ($m/s^{2)}$		Wheel Lockup	Stay In Lane
		Front	Rear			Max	Avg	Max	Avg	Max	Avg		
1													
2													
3													
4													
5													
6													

No Friction Material detachment and no leakage of brake fluid at test completion (S5.2.3) _____

Required Performance (Distance)	Test result	Pass/Fail

REMARKS: _____

RECORDED BY:_____ **DATE:**_____

APPROVED BY:_____

FMVSS 122 - DATA SHEET 16
DURABILITY - (S5.2)

VEHICLE:		NHTSA NUMBER:		DATE:		ROAD PFC:	
AMBIENT TEMPERATURE		WIND VELOCITY:		TIRE PRESSURE (FRONT):		TIRE PRESSURE (REAR):	
TEST WEIGHT				ODOMETER START:		ODOMETER FINISH:	

Upon completion of performance tests:

REQUIREMENT	RESULT	PASS/FAIL
Wear of the brakes shall be compensated for by means of a system of automatic or manual adjustment. (S5.2.1)	Means utilized for brake wear adjustment_____	
The friction material thickness shall either be visible without disassembly, or where the friction material is not visible, wear shall be assessed by means of a device designed for that purpose. (S5.2.2)	Method to determine brake wear front/rear _____	
During all the tests in this standard and on their completion, there shall be no friction material detachment and no leakage of brake fluid. (S5.2.3)	No detachment or leakage during or following any of the performance tests..	

REMARKS: _____

RECORDED BY:_____ **DATE:**_____

APPROVED BY:_____

DATA SHEET 17 (1 of 3)
BRAKE SYSTEM REQUIREMENTS (S5.1.9 and S5.1.10)

BRAKE SYSTEM INSPECTION REQUIREMENTS	TEST VEHICLE COMPLIANCE	DATA	
		YES	NO
5.1.9 - For motorcycles that use hydraulic fluid for brake force transmission, the master cylinder shall:	Meets sealed, covered and separate reservoir___		
(a) have a sealed, covered, separate reservoir for each brake system; and	Master cylinder reservoir capacity?___		
(b) have a minimum reservoir capacity equivalent to 1.5 times the total fluid displacement required to satisfy the new to fully worn lining condition with the worst case brake adjustment conditions; and	Attach annotated calculations for each reservoir capacity. (Data Sheet 18)		
(c) have a reservoir where the fluid level is visible for checking without removal of the cover.	Vehicle meets master cylinder reservoir requirements?		
(d) have a brake fluid warning statement that reads as follows, in letters at least 3/32 of an inch high:	Visible fluid level____		
Warning: Clean filler cap before removing. Use only _____ fluid from a sealed container (inserting the recommended type of brake fluid as specified in accordance with 49 CFR 571.116, e.g., "DOT 3"). The lettering shall be:	Statement present, correct and 3/32 high_____		
	Permanently affixed by what means_____		
(1) Permanently affixed, engraved, or embossed;	Located where and what distance from plug or cap_____		
(2) Located so as to be visible by direct view, either on or within 4 inches of the brake-fluid reservoir filler plug or cap; and			
(3) Of a color that contrasts with its background, if it is not engraved or embossed.	Colour if not engraved or embossed		

DATA SHEET 17 (2 of 3)
BRAKE SYSTEM REQUIREMENTS (S5.1.9 and S5.1.10)

BRAKE SYSTEM INSPECTION REQUIREMENTS	TEST VEHICLE COMPLIANCE	DATA	
		YES	NO
S5.1.10 Warning lamps. All warning lamps shall be mounted in the rider's view. **S5.1.10.1 Split service brake system warning lamps**. (a) Each motorcycle that is equipped with a split service brake system shall be fitted with a red warning lamp, which shall be activated: (1) when there is a hydraulic failure on the application of a force of ≤ 90 N on the control; or (2) without actuation of the brake control, when the brake fluid level in the master cylinder reservoir falls below the greater of: (i) that which is specified by the manufacturer; or (ii) that which is less than or equal to half of the fluid reservoir capacity. (b) To permit function checking, the warning lamp shall be illuminated by the activation of the ignition switch and shall be extinguished when the check has been completed. The warning lamp shall remain on while a failure condition exists whenever the ignition switch is in the “on” position. (c) Each indicator lamp shall have the legend “Brake Failure” on or adjacent to it in letters not less than 3/32 of an inch high that shall be legible to the driver in daylight when lighted.	Warning lights visible_____ Warning light location_____ Split service brake system?___ Red warning light?__ Master cylinder Reservoir Volume_____ Force lamp activated___ or Fluid level removed for activation_____ Does failure indicator lamp conform to operational and physical requirement? _____ Wording_____ Height_____		

DATA SHEET 17 (3 of 3)
BRAKE SYSTEM REQUIREMENTS (S5.1.9 and S5.1.10)

BRAKE SYSTEM INSPECTION REQUIREMENTS	TEST VEHICLE COMPLIANCE	DATA	
		YES	NO
S5.1.10.2 <u>Antilock brake system warning lamps</u>.			
(a) Each motorcycle equipped with an ABS system shall be fitted with a yellow warning lamp. The lamp shall be activated whenever there is a malfunction that affects the generation or transmission of signals in the motorcycle's ABS system.	Yellow warning light present_____ Activates with malfunction_____		
(b) To permit function checking, the warning lamp shall be illuminated by the activation of the ignition switch and extinguished when the check has been completed. The warning lamp shall remain on while a failure condition exists whenever the ignition switch is in the "on" position.	Activates and extinguishes as a check_____ Remains activated with malfunction_____		
(c) The indicator shall be labeled in letters at least 3/32 of an inch high with the words "Antilock" or "Anti-lock" or "ABS" in accordance with Table 1 of Standard No. 101 (49 CFR 571.101).	Letter Height_____ Wording_____		

REMARKS: _____

RECORDED BY:_____ **DATE:**_____

APPROVED BY:_____

DATA SHEET 18
CALCULATION OF MINIMUM RESERVOIR VOLUME REQUIREMENTS

BRAKE		LINING		
LOCATION	**TYPE**	**DESCRIPTION**	**MINIMUM THICKNESS**	**THICKNESS TO FULLY WORN (1) in.**
Front Brake	Drum	Leading	Pretest	
		Primary	Post Test	
		Inboard	☐	
	Disc	Trailing	Pretest	
		Secondary	Post Test	
		Outboard	☐	
LINING CLEARANCE:	Diametral (2) -	Inboard -	Outboard -	
WHEEL CYLINDER DIAMETER (3)		CALIPER PISTON DIAMETER (3)		
SHOE CAGE DIAMETER (4) _____ ; CENTER POINT OF BRAKE ASSY TO CENTER POINT OF W.C.				
Rear Brake	Drum	Leading	Pretest	
		Primary	Post Test	
		Inboard	☐	
	Disc	Trailing	Pretest	
		Secondary	Post Test	
		Outboard	☐	
LINING CLEARANCE:	Diametral (2)	Inboard	Outboard	
WHEEL CYLINDER DIAMETER (3)		CALIPER PISTON DIAMETER (3)		
SHOE CAGE DIAMETER (4)		CENTER POINT OF BRAKE ASSY TO CENTER POINT OF W.C.		
SUBSYSTEM 1 CONSISTS OF:	LF	LR	RF	RR
SUBSYSTEM 2 CONSISTS OF:	LF	LR	RF	RR

(1) MFRS RECOMMENDATIONS -
REAR - TOP OF RIVET HEADS -
FRONT - 1/32 INCH -

(2) DRUM BRAKES, MEASURED AT HORIZONTAL CENTERLINE

(3) MFRS DATA

(4) RESET POSITION

17. FORMS

INSTRUMENT CALIBRATION (12 MONTH MAXIMUM INTERVAL) (EXAMPLE)

INSTRUMENT	SERIAL NUMBER	CALIBRATION DATE	NEXT CALIBRATION
Data Acquisition System			
Computer			
GPS			
Software			
Front Torque Wheel			
Rear Torque Wheel			
Front Slip Ring			
Rear Slip Ring			
Hand Lever Force Transducer			
Pedal Force Transducer			
Park Brake Force Transducer			
Front Hydraulic Pressure Transducer			
Rear Hydraulic Pressure Transducer			
Accelerometer			
Fifth Wheel			
Wind Velocity Gauge			
Ambient Temperature Gauge			
Front Brake Thermocouple			
Rear Brake Thermocouple			
Fifth Wheel Velocity			
Lock-up Detection System			

QUALITY ASSURANCE_____

DAILY INSTRUMENT CALIBRATION
(EXAMPLE)

NOTE: A daily Pre and Post Test instrumentation calibration is required per section 8.

INSTRUMENT	(EXAMPLES) CALIBRATION PROCEDURE	DESIRED VALUE	INDICATED VALUE MORNING	INDICATED VALUE EVENING	ALLOWED DEVIATION
Velocity Meter	2.568 kHz Input				
5th Wheel Distance Meter	Drive Measured Distance				
5th Wheel Velocity Meter	Drive Measured Distance vs. Time				
Hand Lever Force Transducer	Dead Weight/Shunt				
Pedal Force Transducer	Dead Weight/Shunt				
Accelerometer	Known Accel. Or to Known Angles				
Brake Thermocouple	Known Temp.				
Lock-up Detector	Hand Spin Wheel - Vehicle Stopped				

Comments:

TECHNICIAN:_____ QUALITY ASSURANCE:_____

DATE: _____

LABORATORY NOTICE OF TEST FAILURE TO OVSC

FMVSS NO.: 122_____ TEST DATE: _____

LABORATORY: _____

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

LABORATORY PROJECT ENGINEER'S NAME: _____

TEST VEH. MAKE/MODEL: _____

VEHICLE NHTSA NO.: _____; VIN: _____

VEHICLE MODEL YEAR: _____; BUILD DATE: _____

TEST FAILURE DESCRIPTION:

S122 REQUIREMENT, PARAGRAPH ____ :

NOTIFICATION TO NHTSA (COTR):

DATE: _____ BY: _____

REMARKS:

18. APPENDIX

APPENDIX 1

Procedure for Determining Master Cylinder Volume Requirement

NOTE: The following equations may need to be modified depending on the specific brake system present on the vehicle e.g. calipers equipped with multiple pistons, fixed versus sliding caliper etc..

The procedure followed for determining the minimum volume requirements is outlined below and used in conjunction with Data sheet 17.

DETERMINATION OF MASTER CYLINDER MINIMUM VOLUME REQUIREMENTS

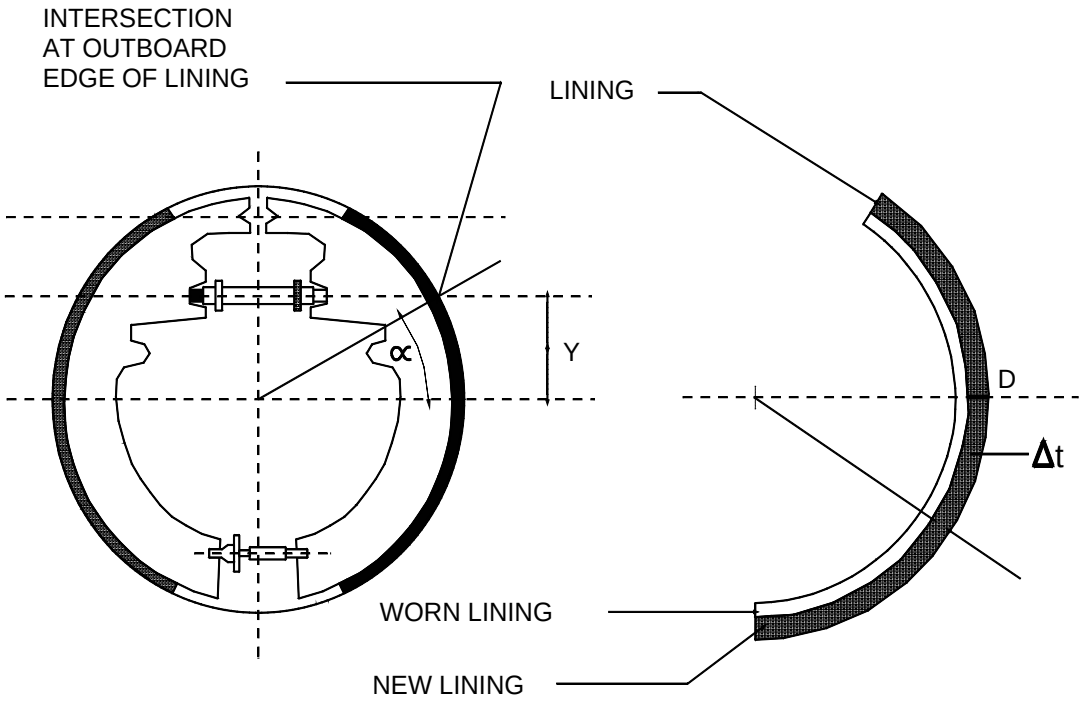


FIGURE 1A

DRUM BRAKES:

Volume Required, $V_r = [(2C + \Delta t_s + \Delta t_p)/\cos\propto] \times A \times NWC$, where –

:	V_r =	Volume required per wheel
	C =	Manufacturer's recommended drum-to-lining clearance
	Δt_p =	Change in thickness of primary lining
	Δt_s =	Change in thickness of secondary lining
	Y =	Center point of wheel cylinder to center point of brake assembly
	A =	Cross sectional area of the wheel cylinder bore
	NWC =	Number of wheel cylinders serviced by the reservoir in question
	$\propto$ =	$Sin^{-1}(2Y/D)$
	D =	Cage diameter

DISC BRAKES:

Volume Required, $V_v = (\Delta t_i + \Delta t_{ic} + \Delta t_o + t_{oc}) \times [\Pi(D^2)]/4$, where –

:	V_v =	Volume required per wheel
	Δt =	Change in thickness (average)
	i =	inboard
	o =	Outboard
	D =	Caliper cylinder diameter
	c =	Average clearance