

**Draft gtr Development
Presented by Canada**

Title	Recommended by IMMA	Recommended by Canada	Comments	Unresolved issues
Scope	<p>ECE REG 78 :- Applies to the braking of 2 and 3 wheeled vehicles. Excludes those with V max < 25 km/h and fitted for invalid drivers. Summary of vehicle categories : L1 = 2 wheels, engine < 50cc and max speed < 50 km/h L2 = 3 wheels, engine < 50cc and max speed < 50 km/h L3 = 2 wheels, engine > 50 cc or max speed > 50 km/h L4 = 3 wheels – asymmetric, engine > 50 cc or max speed > 50 km/h (motorcycle + sidecar) L5 = 3 wheels – symmetrical, max weight <1000kg., engine > 50 cc or max speed >50 km/h .</p>	<p>The purpose of this standard is to ensure safe motorcycle braking performance under normal and emergency situations for the motorcycles falling within the following categories.</p> <p>L1: Two wheels, engine < 50 cc, and max. speed < 50 km/h L2: Three wheels, engine < 50 cc, and max. speed < 50 km/h L3: Two wheels, engine > 50 cc, or max. speed > 50 km/h L4: Three wheels - Asymmetric, engine > 50 cc, or max. speed > 50 km/h L5: Three wheels - Symmetric, engine > 50 cc, or max. speed > 50 km/h</p>	<p>(IMMA) In Europe and Japan, there are separate Moped requirements</p> <p>(CAN) Includes necessary aspects of all standards.</p> <p>Should forward vehicles classification suggestions to GRSG for consideration.</p>	Wait for the outcome of GRSG vehicles classification
Definitions	To be determined	To be determined		Review at the end
Requirements	<p>ECE REG 78 philosophy :- - Test brakes separately Brake performance based on Mean Fully Developed Deceleration – MFDD If vehicle cannot meet test speed, generally use v max or % of v max Specify for each test</p>	<p>Performance is based on the corrected stopping distance, taken from measured data, or alternately the MFDD.</p> <p>Test brakes separately</p>		Need to agree on text.

Type of Service Brake System	In principle :- - 2 separate braking systems 1 or 2 brake controls – subject to future discussion	Combined Braking System, for L1 and L3 vehicles, means braking wheels actuated in combination by a single control. L1 and L3 vehicles must be equipped with two [independent] service brake systems , which may or may not include a combined braking system. All L2 & L5 vehicles must have sufficient service brakes (either a split service brake system or two independently actuated service brake systems) to act on all three wheels and be equipped with a parking brake device.	(IMMA) FMVSS allows 1 or 2 controls but meaning must be clarified – see also definitions. Controls issue requires further discussion. (CAN) proposed text is very similar to ECE but includes the reference to split service brake system.	Need to agree on text.
Mechanical Service Brake System	ECE REG 78 :- 5.2.1.1 – Parts such as the brake, cylinder, pistons, etc., shall not be regarded as liable to breakage if they are amply dimensioned, readily accessible for maintenance and exhibit sufficient safety features. The 2 service braking devices may have a common brake so long as a failure in 1 does not affect the performance of the other.	Failure of any component in a mechanical brake system shall not result in a loss of braking ability in any other brake system.	(CAN) Agree with IMMA intent,	Need to review text for enforcement purposes
Hydraulic Service Brake System		Failure of any component in a hydraulic brake system shall not result in a loss of braking ability in any other brake system.		
Master Cylinder Reservoirs	FMVSS 122 :- S5.1.2.1. – Each m/cylinder shall have a separate reservoir for each brake circuit and openings having their own cover etc Each reservoir shall have a min. capacity based on 1.5 times volume required to cover difference between new and fully worn linings – brakes applied.	Use text from FMVSS 122 (S5.1.2.1)	Agreed with IMMA	
Reservoir	FMVSS 122 :-	S5.1.2.2 <i>Reservoir labeling.</i> Each	(IMMA) Language	Language

Labeling	S5.1.2.2. – Brake fluid warning statement that specifies : Text and size of letters Method of application Location	motorcycle shall have a brake fluid warning statement that reads as follows, in letters at least three thirty-seconds 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 49 CFR 571.116, e.g., DOT 3.) The lettering shall be:— (a) Permanently affixed, engraved, or embossed; (b) Located so as to be visible by direct view, either on or within 4 inches of the brake-fluid reservoir filler plug or cap; (c) Of a color that contrasts with its background, if it is not engraved or embossed.	requirements to be discussed. (CAN) Not included in other standards.	requirements need to be discussed.
Split Service Brake System & Failure Indicator Lamp	FMVSS 122 :- S5.1.3 – Additional requirement for vehicles with split service brake systems S5.1.3.1 – Details of the lamp function: Position When it functions eg. pressure failure, low reservoir level. Ignition switch activation etc. Colour and marking of lens	Use text from FMVSS (S5.1.3, S5.1.3.1)	(CAN) Not included in other standards Agreed with IMMA	Need to define split service brake
Parking Brake	ECE REG 78 :- For 3 wheelers only. 5.1.2.3 – must hold the vehicle stationary on a slope in the absence of the driver. Working parts locked in position by a mechanical device, actuated from the driving seat. 5.2.3 – L ₂ and L ₅ shall be equipped with : a secondary (emergency) braking device	Only applicable to three-wheeled motorcycles.	(CAN) Agreed with the intent suggested by IMMA.	Text needs to be review for enforcement purposes.

	which may be the parking brake. 5.2.4.1. and 5.2.4.2 for L5 vehicles.			
Visual Inspections	FMVSS 122 :- S5.1.5 – Lining thickness of drum brakes shall be visually inspected without removing drums and pad thickness visible without removal	Use text from FMVSS.	(CAN) Not included in other standards.	IMMA and Canada already agreed to use FMVSS wording
Preburnish Effectiveness Test	Burnishing procedure should be manufacturers responsibility.	Use text from FMVSS	(IMMA) Modern friction materials require less burnishing. (CAN) In the past 7 years TC had 4 non-compliances out of 38 motorcycles tested due to failure to meet the requirements of 2nd and/or final effectiveness	Need to agree on text and tests.
Burnishing	Not required	Use text from FMVSS	(CAN) In the past 7 year TC had 4 non-compliances out of 38 motorcycles tested due to failure to meet the requirements of 2nd and/or final effectiveness	Need to agree on text and tests
Dry Stop Tests (second effectiveness)	ECE REG 78 :- Annex 3 – 2.1.1 – 2.2.2.2 Single braking device or CBS tests with the vehicle generally laden from 60 km/h. ($L_1 + L_2$ at 40 km/h) If single brake cannot reach prescribed decel ($L_3 = 4.4 \text{ m/s}^2$ Front , 2.9 m/s^2 Rear) , use vehicle laden with both braking devices together to meet ($L^3 = 5.8 \text{ m/s}^2$) JAPAN SS 12 – 61 with higher speed: -	Use test procedure from Japanese standard.	(IMMA) 60 km/h test speed is adequate because: the motorcycle is laden brakes tested separately high speed test covers up to 192 km/h, fade test is at 100 km/h Thus, performance is covered over a range of speeds. An increase in test speed to 192 km/h	Need to agree on fixed number of stops

	<p>Applies to L₃, L₄, & L₅ vehicles. Unladen test using both brakes with engine connected from a speed of 192 km/h or 0.8 v max whichever is less. Decel – 5.8 m/s² and vehicle behaviour recorded.</p>		<p>results in the Japan test being more stringent in all aspects. (CAN) Japanese standard most stringent</p> <p>Canada agreed with IMMA test procedure but for compliance purposes we would like to require 6 consecutive stops with at least one stop meeting the requirements</p>	
Fade and Recovery	<p>ECE REG 78 :- Annex 3 – 1.6.1.1 L₃, L₄, and L₅ in laden condition. If CBS, only CBS to be fade tested Annex 3 – 1.6.1.2 1 Dry stop test (Service braking) – as in item 13 above. Annex 3 – 1.6.1.2.2 10 stops with vehicle laden. Test each brake separately (if CBS, then only CBS) Speeds – Front + CBS = 100 km/h Rear = 80 km/h Braking interval = 1000 m Suitable gear for 50% stop, engine disconnected for remainder. Decel = 3 m/s² with constant force.</p> <p>Annex 3 – 1.6.1.2.3 Repeat Fade Baseline Check ASAP or at least within 1 minute after completion of fade test. 1.6.3 – Residual performance = > 60% of baseline test</p>	<p>For categories L3, L4 and L5, repeated tests with laden vehicle. If combined braking system exists, testing brakes separately is not required. Single dry stop test for each brake. With vehicle laden, 10 stops are made and each brake is tested separately. For front brake or CBS, stop from lower of 70% maximum speed or 100 km/h. For rear brake, stop from 70% maximum speed or 80 km/h. Braking interval is 1000m and deceleration is 3 m/s². Repeat baseline test within one minute of completing fade tests. Residual performance must not be less than 60% of deceleration achieved in baseline test or equivalent stopping distance.</p>	<p>(IMMA) Mopeds not included in ECE or FMVSS.</p> <p>(CAN) ECE/Japanese is more stringent than FMVSS</p> <p>We agreed with IMMA on the wording</p> <p>Canada is including moped.</p>	<p>Do we include mopeds?</p>

Reburnish & Final Effectiveness Test	Not required	Use text and test from FMVSS	(CAN) Effectiveness Test Results indicated little change in performance through duration of testing. In some cases, performance improved but in the past 7 years TC had 4 non-compliances out of 38 motorcycles tested due to failure to meet the requirements of 2nd and/or final effectiveness	Need to agree on text and tests
Partial Failure Test	Relevant for hydraulic leakage failure in “Split service brake system” – see FMVSS 122 S4.	In the event of a hydraulic leakage failure, the remaining portion of the brake system must operate. Six stops from 30mph and six stops from 60 mph, within specified stopping distances. Repeat for each subsystem. Only applicable to three-wheeled motorcycles.	(IMMA) Test procedure to be developed as necessary. FMVSS partial failure tests are with single brake therefore same principle as ECE. See 13 – dry test comparison. Severity of partial failure tests need checking because ECE is laden and FMVSS unladen. Further investigation on the exact application of FMVSS under way by USSMA (CAN) Not included in other standards. As it is only applicable to three-	Need to agree on text and tests

			wheeled vehicles, test results are not available to evaluate margin of compliance.	
Parking Brake System	<p>ECE REG 78 :- Annex 3 – 2.3 Laden vehicle 18% slope up and down.</p> <p>Brake forces: hand < 400N; foot < 500 N</p>	<p>Applicable to 3 wheeled motorcycles. After applying the parking brake and releasing the service brakes, vehicle must remain at rest for 5 minutes for both forward and reverse orientation on a 30% grade. The application of the parking brake must not exceed 400 N for a foot operated system and 245 N for a hand operated system. Also, the braking action must be achievable from the driving seat.</p>	<p>(IMMA) IMMA has no strong view but prefers ECE.</p> <p>(CAN) Includes the most stringent components of each standard.</p>	Need to agree on text and tests
Wet Braking	<p>ECE REG 78 :- Annex 3 – 1.4.4 - Same vehicle/test conditions as Dry brake test (Item 13) - For vehicle categories L₁,L₂,L₃,L₄. - Exemption for conventional drum and fully enclosed disc brakes - New test proposal for CBS under discussion in IMMA.</p> <p>Annex 3 – 2.5.2 - Carry out a Dry Brake test and measure the control force at 2.5 m/s²</p> <p>Annex 3 – 2.5 - With equipment continuously wetting the brakes at a flow rate of 15 l/h., Mfdd attained between 0.5 and 1 sec after brake application to be > 60% and <120% of mfdd for dry brakes performance ie. Base line check.</p>	<p>Water recovery test conducted under the same conditions as the dry test with the exception of the water device. The MFDD (or stopping distance) of the wet test is to be compared to the results from the dry brake test. Equipment required to continuously wet brakes at a flow rate of 15 l/h. The mean fully developed deceleration attained 0.5-1.0 seconds after brake application must be between 60 and 120% of baseline test. A similar requirement must be developed for stopping distance, if required.</p> <p>The immersion test(FMVSS) should be required for conventional drum brakes</p>	<p>(IMMA) There are different FMVSS v ECE philosophies – FMVSS is a static immersion test to simulate passing through deep water. ECE is a dynamic spray test to simulate very heavy rain on a normal road. Disc and drum brakes will behave differently for each test.</p> <p>(CAN) ECE/Japanese is more stringent than FMVSS test.</p>	<p>IMMA and Canada agreed that ECE/Japan is more stringent than FMVSS test but do we want to simulate passing through deep water or driving in heavy rain?</p> <p>Do fully enclosed disk brakes still exist?</p> <p>Select immersion test for drum brakes.</p>
Design Durability	<p>No experience of such failures. If necessary, FMVSS text could be used.</p>	Each motorcycle must be capable of completing all braking requirements	(CAN) FMVSS is more specific than the ECE,	IMMA and Canada already agreed to use

		without damage to the brake system including detachment of brake linings or leakage of brake fluid. Includes disassembly of all brake system components.	which is very generic. In order to evaluate this criterion, we need a set number of stop.	FMVSS wording
Vehicle Weight Test	ECE REG 78 :- In general, vehicle is fully laden except : High speed test(1.4.3) unladen. CBS tests laden and unladen ABS tests unladen Notes: Fully laden = manufacturers max mass. unladen = rider and test equipment Test with rider alone not required if calcs show that $>2.5 \text{ m/s}^2$ is possible Loading conditions to be specified for each test.	Unladen state shall be the unloaded vehicle mass plus 90 kg, including driver and instrumentation. Laden state shall be such that the total weight of the vehicle, driver, instrumentation and ballast will be greater than (GVW) but less than (GVW+65kg).	(IMMA) General definitions of mass will be decided by GRSG. (CAN) Covers all standards but more specific for consistency. Includes the more stringent test with the Japanese fully laden condition.	Wait for the definition of mass from GRSG Final decision will depend on agreed test procedure
Tire Pressure	ECE REG 78 :- Annex 3 – 1.3.1.1 Prescribed by manufacturer.	The tire pressure should be set according to the recommendation by the manufacturer. The tires must be cold.	(CAN) Covers all standards and includes the more specific tire requirement provided by ECE.	IMMA and Canada already agreed wording
Transmission	Specified for each test	Unless otherwise specified, all stops are to be made with the clutch disengaged.	(CAN) Covers all standards.	Need to agree on text
Engine	Not necessary	Engine idle speed and ignition timing are set according to manufacturer's recommendations.	(CAN) Not included in other standards.	Need to agree on text
Ambient Temperature	4° - 38° C	Ambient temperature between 4 and 38 C.	(IMMA) To avoid ice on road.	
Wind Velocity	JAPAN SS 12 – 61 :- Not more than 5 m/s	Agreed with IMMA intent	.	
Road Surface	ECE REG 78 :- Annex 3 – 1.3.1.5 Test area must be level, dry and have a surface affording good adhesion.	Test area to be clean, dry and level road surface. Test surface to have a skid number of 81. Lane width of 2.5 m for two-wheeled motorcycles; 4 m for two-	(CAN) Reasonably covers all standards	Need to agree on text

	Include a note stating that the surface should be consistent for each test. Note also Annex 4 ABS test surfaces	wheeled motorcycles with sidecar or three wheeled motorcycles. Test surface shall be Portland cement concrete.		
Vehicle Position and Wheel Lock	JAPAN SS 12 – 61 :- No lock up more than 15km/h, no deviation from course and no abnormal vibration. For 2 wheelers, no out of lines having 2.5 m width. For 3 wheelers, width increased.	All stops to be made without deviation from the vehicle course and without wheel lockup (not applicable to ABS equipped vehicles).	(CAN) Agreed with intent of IMMA proposal	
Thermocouples	ECE REG 13H :- 1.4.1.1 – the temperature measured inside the brake linings or on the braking path of the disc or drum, is ...	Brake temperature to be measured on the disc or shoe with thermocouples..	(IMMA) Pyrometer or a surface thermometer proposed.	Need to agree on text
Brake Actuation Forces	ECE REG 78 :- Annex 3 – 1.2.4.2.4 Hand control: < 200N Foot control: < 350 N (L ₁ ,L ₂ ,L ₃ ,L ₄) <500 N (L ₅) Point of application 5 cm from end of lever.	Hand Lever: For all categories, force < 200 N where the point of application is 50 mm from the end of the lever. Foot Pedal: For L1, L2, L3, L4, force < 350 N. For L5, force < 500 N.	(IMMA) Front control application point needs harmonization – see ISO. Does not think minimum values are necessary (CAN) ECE/Japanese more stringent	We need to decide the application point
Anti-Lock Systems	ECE REG 78 :- Annex 4 L ₁ + L ₃ vehicles only	Use text from ECE.	(IMMA) ABS optional fitment. If fitted, must meet ECE Annex 4. (CAN) Only procedure available. May be altered following future tests with ABS systems.	Need to wait for the results of the abs testing