

GLOBAL HARMONIZATION OF PTW, AND 3W BRAKING

DEVELOPMENT OF DRAFT GTR PROPOSAL

PROPOSED GTR OUTLINE FOR DISCUSSION AT 2ND INFORMAL MEETING

Document revision date : 04/04/02

LAYOUT	PROPOSED CONTENT IN SUMMARISED FORM – TEXT LATER	NOTES/ACTIONS FROM PREVIOUS MEETING <i>IMMA = blue Others = red yyy = outstanding</i>
1. SCOPE	<p>Intended to apply to 2 and 3 wheeled motorcycles including mopeds and electric power.</p> <p>For reference, extracts from 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>Wait for the outcome of GRSG vehicle classification. <i>T.Canada to consider how to separate out 3 wheelers which are not considered motorcycles.</i></p>
2. DEFINITIONS	<p>Review after tests have been agreed. Include: brake, transmission, control, CBS, split service, ABS, laden</p>	<p>Add during GTR development</p>
3. REQUIREMENTS		
3.1 Performance	<ul style="list-style-type: none"> - Based on MFDD [or the corrected stopping distance, taken from measured data] - Test brakes separately unless otherwise specified. - Specify laden or unladen for each test. - Clarify requirements for split brake systems where necessary. 	<p><i>T.Canada and USA to review whether or not to include stopping and to define conversion formula.</i></p>

LAYOUT		PROPOSED CONTENT IN SUMMARISED FORM – TEXT LATER	NOTES/ACTIONS FROM PREVIOUS MEETING <i>IMMA = blue Others = red yyy = outstanding</i>
3.2 General - Equipment - Function	Durability	For reference, FMVSS states : - During tests, there shall be no lining detachment, no component fracture, and no leakage of fluid.	Needs to be specific and in principle, testable. <i>IMMA to propose a text based on FMVSS and ECE 13H</i>
	Parking brake characteristics	For reference, ECE REG 78 states:- 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 which may be the parking brake. 5.2.4.1. and 5.2.4.2 for L5 vehicles.	At 1 st GTR meeting, agreed to use ECE or FMVSS test. <i>USA to review current test procedures</i>
3.3 Design and Operational Characteristics			
3.3.1 Design	Type of service brake system	In principle :- - 2 separate braking systems - 1 or 2 brake controls – subject to future discussion	Include in “Definitions”. <i>Controls issue requires further discussion.</i>
	Mechanical service brake system	For reference, ECE REG 78 states :- 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.	A general requirement for component integrity would be appropriate. Need to define general test procedures (so that the requirement can be enforced) or delete the item.
	Hydraulic service brake system	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.	
	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.	At 1 st GTR meeting, agreed to use FMVSS text.
	Reservoir labelling	FMVSS 122 :- S5.1.2.2. – Brake fluid warning statement that specifies : - Text and size of letters - Method of application - Location	Make a requirement to have a warning statement and not specify the language (if not done by symbols) based on FMVSS. <i>IMMA to research how this would be treated by the EU eg. Symbols and explanation in owners manual.</i>

LAYOUT		PROPOSED CONTENT IN SUMMARISED FORM – TEXT LATER	NOTES/ACTIONS FROM PREVIOUS MEETING <i>IMMA = blue Others = red yyy = outstanding</i>
3.3.2 Operation	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	Agreed to use FMVSS text
	Inspection of pad/lining	FMVSS 122 :- S5.1.5 – Lining thickness of drum brakes shall be visually inspected without removing drums and pad thickness visible without removal.	Agreed to use FMVSS text. Need to agree when this should be done.
4. TESTS			
4.1 General	Test sequence	Not necessary but to simplify testing, the heat fade test could be done last.	To agree any sequence requirement.
	Transmission	Unless otherwise specified, all stops to be made with the clutch disengaged. (Not applicable to auto gearbox)	← Proposed Content agreed at 1 st GTR meeting.
	Ambient temperature	4° - 38° C	To avoid frozen surface.
	Wind velocity	JAPAN SS 12 – 61 :- Not more than 5 m/s	
	Vehicle position and wheel lock	All stops to be made without deviation from the test lane and without wheel lockup (not applicable to ABS equipped vehicles < 10 km/h). Vehicles shall start in the middle of the lane.	← Proposed Content agreed at 1 st GTR meeting.
	Brake actuation force	For reference, ECE REG 78 states :- 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.	T.Canada does not think minimum values are necessary. <i>USA to review need for minimum values and clarify current requirements.</i> IMMA will provide a clear specification of the application point at the 2 nd GTR meeting.
	Thermocouples	For reference, ECE REG 13H states :- 1.4.1.1 – the temperature measured inside the brake linings or on the braking path of the disc or drum , is between 65 and 100 °C.	Agreed that brake temperatures are measured on the disc or shoe with thermocouples.

LAYOUT		PROPOSED CONTENT IN SUMMARISED FORM – TEXT LATER	NOTES/ACTIONS FROM PREVIOUS MEETING <i>IMMA = blue Others = red yyy = outstanding</i>
4.2 Preparation			
4.2.1 Track	Road surface	<p>Test area to be clean, dry and level road surface. Test surface to have a skid number of 81. Maximum lane width of 2.5 m for 2 wheeled motorcycles; vehicle width plus 2.5 m for 2 wheeled motorcycles with sidecar or 3 wheeled motorcycles.</p> <p>[For ABS, see ECE 78 Annex 4]</p> <p>For parking brake test, surface shall be Portland cement concrete.</p>	← Proposed Content agreed at 1 st GTR meeting.
4.2.2 Vehicle	Vehicle weight	<p>For reference, ECE REG 78 :- In general, vehicle is fully laden except :</p> <ul style="list-style-type: none"> - High speed test unladen. - CBS tests laden and unladen - ABS tests unladen <p>Note: Fully laden = manufacturers max mass. Unladen = rider and test equipment</p> <p>Final decision will depend on agreed test procedures</p>	<p>Wait for the definition of mass from GRSG (if time allows) <i>USA to consider any consequences from Phase 2 testing.</i></p>
	Tyre pressure	Manufacturer recommendation	← Proposed Content agreed at 1 st GTR meeting.
	Brake burnishing	Include a requirement that the manufacture will carry out the burnishing and show records to the test house on request.	← Agreed at 1 st GTR meeting. <i>IMMA will present a draft proposal with justification at the 2nd GTR meeting.</i>
4.3 Dry Stop Tests		<p>For reference, ECE REG 78 summary:-</p> <ul style="list-style-type: none"> - Laden vehicle only (but CBS where fitted also tested unladen) - Initial speed = 40 km/h for L1, L2 and 60 km/h for L3, L4, L5 vehicles - All stops with engine disconnected - Separate test for front brake, rear brake, and CBS (if fitted) <p>Requirements :</p> <p>Minimum deceleration :</p> <p>Front : L1 = 3.4 m/s² L2 = 2.7 m/s² L3 = 4.4 m/s² L4 = 3.6 m/s² L5 = 2.9 m/s²</p> <p>Rear : L1 = 2.7 m/s² L2 = 2.7 m/s² L3 = 2.9 m/s² L4 = 3.6 m/s² L5 = 2.9 m/s²</p> <p>CBS : L1,L2 = 4.4 m/s² L3 = 5.1 m/s² L4 = 5.4 m/s² L5 = 5 m/s²</p> <p>CBS secondary brake = 2.5 m/s² for all vehicle types.</p>	<p>To agree on the number of stops needed. <i>IMMA will make a proposal of 6 stops maximum at the 2nd GTR meeting.</i></p>

LAYOUT	PROPOSED CONTENT IN SUMMARISED FORM – TEXT LATER	NOTES/ACTIONS FROM PREVIOUS MEETING <i>IMMA = blue Others = red yyy = outstanding</i>
<p>4.4 Wet Brake</p> <p>- Base line</p> <p>- Wet brake</p>	<p>For reference, ECE REG 78 summary:-</p> <ul style="list-style-type: none"> - For vehicle categories L1,L2,L3,L4 (not L5) - Exemption for conventional drum and fully enclosed disc brakes - Laden vehicle only (CBS where fitted also tested unladen) - Initial speed = 40 km/h for L1, L2 and 60 km/h for L3, L4 vehicles - Stops with engine disconnected - Separate tests for front brake, rear brake, and CBS (where fitted) <p>- Perform a Dry Stop test (as 4.3) but measure the control force to achieve 2.5 m/s²</p> <p>- Repeat Baseline test after the brake has been continuously wetted at a flow rate of 15 l/h for > 500 m.</p> <p>Requirement:</p> <ul style="list-style-type: none"> - Deceleration recorded between 0.5 and 1 sec after brake application => 60% to <120% of Base line test using same control force. 	<p>← The ECE test is for disc brakes.</p> <p><i>USA and T.Canada to consider need for a drum brake test.</i></p> <p><i>IMMA to consider a revised immersion test for drum brakes, particularly for scooters.</i></p>
<p>4.5 Heat Fade</p> <p>- Base line</p> <p>- Fade</p> <p>- Recovery</p>	<p>ECE REG 78 :-</p> <ul style="list-style-type: none"> - L3,L4, and L5 vehicles only - All with laden vehicle - Separate test for front brake, rear brake, and CBS (where fitted) - If CBS fitted, test only CBS - Perform 1 Dry stop test as in 4.3 above <p>- Perform 10 repeated stops as quickly as possible</p> <p>- Speeds – Front + CBS = 100 km/h or 70% v max whichever is lower - Rear = 80 km/h or 70 % v max whichever is lower</p> <p>- Braking interval = 1000 m</p> <p>- Engine connected with suitable gear for 50% stop, disconnected for remainder.</p> <p>- For the first stop, deceleration = 3 m/s² with constant control force. Same force for remainder</p> <p>- Repeat Baseline test ASAP or at least within 1 minute after completion of Fade test.</p> <p>Requirement :</p> <p>Recovery test performance => 60% of Baseline test performance</p>	<p>Mopeds (L1 and L2) would be excluded.</p> <p>← Provisionally, the ECE method would be used.</p> <p><i>T.Canada to review low speed motorcycles (not mopeds).</i></p> <p><i>USA to review requirements.</i></p>

LAYOUT	PROPOSED CONTENT IN SUMMARISED FORM – TEXT LATER	NOTES/ACTIONS FROM PREVIOUS MEETING <i>IMMA = blue Others = red yyy = outstanding</i>
4.6 High Speed	JAPAN SS 12 – 61 (with higher speed) :- - L3, L4, & L5 vehicles only - Unladen vehicle only - Stops with engine connected - Test front brake + rear brake together OR CBS (where fitted) - Initial speed = 192 km/h or 0.8 v max whichever is less Requirement: - Deceleration > 5.8 m/s ² Note : Record vehicle behaviour	← Use test procedure from Japanese standard. <i>USA to review high speed test.</i>
OPTIONAL / IF FITTED		
4.7 Parking Brake	For reference, ECE REG 78 summary :- - Static test - Laden vehicle - 18% slope - up and down. Requirement : - Vehicle holds on slope with control forces: hand < 400N; foot < 500 N	FMVSS test is more severe for slope, applied forces, and also includes a dynamic test but vehicle is unladen. However, FMVSS tests apply to 3 wheelers only. No conclusion. <i>USA to review relative severity.</i>
4.8 ABS	For reference, ECE REG 78 summary :- - L1 + L3 vehicles only - Tests on 2 road surfaces : > 0.8, and < 0.45 - Unladen vehicle only - Initial speed = 60 km/h - Separate test for front brake and rear brake. - Stability tests for low-high surface, high-low surface and both brakes together Requirements: - $\epsilon = > 0.7$ for L3 vehicles only. No requirement for L1. - Electrical supply failure shall be signalled to the rider - If ABS failure, Dry Stop test performance (4.3) shall be maintained - Wheel must not lock on test surface (but acceptable if low speed and	← ECE is the only procedure available. May be altered following future tests with ABS systems. Need to wait for the results of the USA testing.

LAYOUT	PROPOSED CONTENT IN SUMMARISED FORM – TEXT LATER	NOTES/ACTIONS FROM PREVIOUS MEETING <i>IMMA = blue Others = red yyy = outstanding</i>
	vehicle stable) - For low-high surface test, vehicle decel “must rise to the appropriate high value within a reasonable time” Note : - Additional requirements may be required for vehicles fitted with CBS	
4.9 Partial Failure	FMVSS requirement and only applicable to hydraulic leakage failure in “Split service brake system” – see FMVSS 122 S4.	IMMA will propose that the failed sub system must meet the Dry Stop requirement at the 2 nd GTR meeting.
ITEMS PROVISIONALLY DELETED		
Pre burnish	Provisionally not necessary	<i>USA to review the need for a pre burnishing test</i>
Final effectiveness test	Not necessary because no sequence of testing specified.	<i>USA and T.Canada to review need for test.</i>
Engine	Not applicable to motorcycles.	<i>USA to review need</i>
Pretest instrumentation check	Test house responsibility	
Final inspection	Not necessary because no sequence of testing specified.	