22 February 2017

# Agreement

## Concerning the Adoption of Uniform Technical Prescriptions for Wheeled Vehicles, Equipment and Parts which can be Fitted and/or be Used on Wheeled Vehicles and the Conditions for Reciprocal Recognition of Approvals Granted on the Basis of these Prescriptions*

(Revision 2, including the amendments which entered into force on 16 October 1995)

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## Addendum 77 – Regulation No. 78

## Revision 1 - Amendment 3

Supplement 3 to the 03 series of amendments – Date of entry into force: 9 February 2017

## Uniform provisions concerning the approval of vehicles of categories $L_1$, $L_2$, $L_3$, $L_4$ and $L_5$ with regard to braking

This document is meant purely as documentation tool. The authentic and legal binding text is: ECE/TRANS/WP.29/2016/56 as amended by paragraph 59 of the report ECE/TRANS/WP.29/1123.

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**UNITED NATIONS**

* Former title of the Agreement: Agreement Concerning the Adoption of Uniform Conditions of Approval and Reciprocal Recognition of Approval for Motor Vehicle Equipment and Parts, done at Geneva on 20 March 1958.

GE.17-01969(E)
*1701969*

*Paragraph 1.*, amend to read:

"1 …

This Regulation applies to vehicles of category L.[1]

…"

*Paragraph 2.6.*, amend to read:

"2.6. "*Combined brake system (CBS)*" means:

For vehicle categories $L_1$ and $L_3$: a service brake system where at least two brakes on different wheels are operated by the actuation of a single control.

For vehicle categories $L_2$, $L_5$, $L_6$ and $L_7$: a service brake system where the brakes on all wheels are operated by the actuation of a single control.

…"

*Insert a new paragraph 2.30.*, to read:

"2.30. "*Emergency braking signal*" means logic signal indicating emergency braking specified in paragraphs 5.1.15 to 5.1.15.2. of this Regulation."

*Paragraph 5.1.4.*, amend to read:

"5.1.4. Parking brake system

If a parking brake system is fitted, it shall hold the vehicle stationary on the slope prescribed in paragraph 1.1.4. of Annex 3.

The parking brake system shall:

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

(b) Be held in the locked position by solely mechanical means.

Vehicles shall have configurations that enable a rider to be able to actuate the parking brake system while seated in the normal driving position.

For $L_2$, $L_4$, $L_5$, $L_6$ and $L_7$, the parking brake system shall be tested in accordance with paragraph 8. of Annex 3."

*Paragraph 5.1.7.*, amend to read:

"5.1.7. Three-wheeled vehicles of category $L_2$ and four-wheeled vehicles of category $L_6$ shall be equipped with a parking brake system plus one of the following service brake systems:

…"

*Paragraph 5.1.8.*, amend to read:

"5.1.8. Category $L_5$ vehicles and category $L_7$ vehicles shall be equipped with:"

*Insert a new paragraph 5.1.14.*, to read:

"5.1.14. The effectiveness of the braking systems, including the anti-lock system, shall not be adversely affected by magnetic or electrical fields. This shall be demonstrated by fulfilling the technical requirements and respecting the transitional provisions of Regulation No. 10 (EMC) by applying:

(a) The 03 series of amendments for vehicles without a coupling system for charging the Rechargeable Electric Energy Storage System (traction batteries);

(b) The 04 series of amendments for vehicles with a coupling system for charging the Rechargeable Electric Energy Storage System (traction batteries)."

*Insert paragraphs 5.1.15. to 5.1.15.2. and footnote*, to read:

"5.1.15. When a vehicle is equipped with the means to indicate emergency braking, activation and de-activation of the emergency braking signal shall only be generated by the application of the service braking system when the following conditions are fulfilled:*

5.1.15.1. The signal shall not be activated when the vehicle deceleration is below 6 $m/s^2$ but it may be generated at any deceleration at or above this value, the actual value being defined by the vehicle manufacturer.

The signal shall be de-activated at the latest when the deceleration has fallen below 2.5 $m/s^2$.

5.1.15.2. The following conditions may also be used:

(a) The signal may be generated from a prediction of the vehicle deceleration resulting from the braking demand respecting the activation and de-activation thresholds defined in paragraph 5.1.15.1. above;

or

(b) The signal may be activated at a speed above 50 km/h when the antilock system is fully cycling (as defined in paragraph 9.1. of Annex 3) and deceleration is at least 2.5$m/s^2$. The deceleration may be generated from the prediction described in point (a). The signal shall be deactivated when the antilock system is no longer fully cycling.

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* At the time of type approval, compliance with this requirement shall be confirmed by the vehicle manufacturer."

*Annex 3,*

*Paragraph 1.1.5.*, amend to read:

"1.1.5. Test lane width:

For two-wheeled vehicles (vehicle categories $L_1$ and $L_3$) the test lane width is 2.5 m.

For three-wheeled and four-wheeled vehicles (vehicle categories $L_2$, $L_4$, $L_5$, $L_6$ and $L_7$) the test lane width is 2.5 m plus the vehicle width."

*Paragraph 3.2.*, amend to read:

"3.2. Test conditions and procedure:

(a) Initial brake temperature: $\geq$ 55 °C and $\leq$ 100 °C;

(b) Test speed:

(i) Vehicle categories $L_1$, $L_2$ and $L_6$ : 40 km/h or 0.9 Vmax, whichever is lower;

(ii) Vehicle categories $L_3$, $L_4$, $L_5$ and $L_7$: 60 km/h or 0.9 Vmax, whichever is lower;

(c) Brake application:

(i) Each service brake system control actuated separately;

(d) Brake actuation force:

(i) Hand control: ≤ 200 N;

(ii) Foot control: ≤ 350 N for vehicle categories $L_1$, $L_2$, $L_3$, $L_4$ and $L_6$;

≤ 500 N for vehicle category $L_5$ and $L_7$;

…"

*Paragraph 3.3.*, amend to read:

"3.3. Performance requirements

When the brakes are tested in accordance with the test procedure set out in paragraph 3.2., the stopping distance shall be as specified in column 2 or the MFDD shall be as specified in column 3 of the following table:

| *Column 1* | *Column 2* | | *Column 3* |
|---|---|---|---|
| *Vehicle Category* | *STOPPING DISTANCE (S) (Where V is the specified test speed in km/h and S is the required stopping distance in metres)* | | *MFDD* |
| Single brake system, front wheel(s) braking only: | | | |
| $L_1$ | $S \leq 0.1\ V + 0.0111\ V^2$ | | $\geq$ 3.4 m/s$^2$ |
| $L_2$ and $L_6$ | $S \leq 0.1\ V + 0.0143\ V^2$ | | $\geq$ 2.7 m/s$^2$ |
| $L_3$ | $S \leq 0.1\ V + 0.0087\ V^2$ | | $\geq$ 4.4 m/s$^2$ |
| $L_5$ and $L_7$ | Not applicable | | Not applicable |
| $L_4$ | $S \leq 0.1\ V + 0.0105\ V^2$ | | $\geq$ 3.6 m/s$^2$ |
| Single brake system, rear wheel(s) braking only: | | | |
| $L_1$ | $S \leq 0.1\ V + 0.0143\ V^2$ | | $\geq$ 2.7 m/s$^2$ |
| $L_2$ and $L_6$ | $S \leq 0.1\ V + 0.0143\ V^2$ | | $\geq$ 2.7 m/s$^2$ |
| $L_3$ | $S \leq 0.1\ V + 0.0133\ V^2$ | | $\geq$ 2.9 m/s$^2$ |
| $L_5$ and $L_7$ | Not applicable | | Not applicable |
| $L_4$ | $S \leq 0.1\ V + 0.0105\ V^2$ | | $\geq$ 3.6 m/s$^2$ |
| Vehicles with CBS or split service brake systems: for laden and lightly loaded conditions: | | | |
| $L_1$ $L_2$ and $L_6$ | $S \leq 0.1\ V + 0.0087\ V^2$ | | $\geq$ 4.4 m/s$^2$ |
| $L_3$ | $S \leq 0.1\ V + 0.0076\ V^2$ | | $\geq$ 5.1 m/s$^2$ |
| $L_5$ and $L_7$ | $S \leq 0.1\ V + 0.0077\ V^2$ | | $\geq$ 5.0 m/s$^2$ |
| $L_4$ | $S \leq 0.1\ V + 0.0071\ V^2$ | | $\geq$ 5.4 m/s$^2$ |
| Vehicles with CBS – secondary service brake systems: | | | |
| ALL | $S \leq 0.1\ V + 0.0154\ V^2$ | | $\geq$ 2.5 m/s$^2$ |

"

*Paragraph 4.1.*, amend to read:

"4.1. Vehicle condition:

(a) The test is applicable to vehicle categories $L_3$, $L_4$, $L_5$ and $L_7$;

…"

*Paragraph 4.2.*, amend to read:

"4.2. Test conditions and procedure:

…

(d) Brake actuation force:

Hand control: ≤ 250 N;

Foot control: ≤ 400 N for vehicle categories L3 and L4;

≤ 500 N for vehicle category L5 and L7;

…"

*Paragraph 5.1.*, amend to read:

"5.1. Vehicle condition:

(a) The test is applicable to vehicle categories $L_3$, $L_4$, $L_5$ and $L_7$;

…"

*Paragraph 5.2.*, amend to read:

"5.2. Test conditions and procedure:

…

(d) Brake actuation force:

Hand control: ≤ 200 N;

Foot control: ≤ 350 N for vehicle categories L3 and L4;

≤ 500 N for vehicle category $L_5$ and $L_7$ ;

…"

*Paragraph 7.1.*, amend to read:

"7.1. General:

…

(b) The test is applicable to vehicle categories $L_3$, $L_4$, $L_5$ and $L_7$;

…"

*Paragraph 7.2.2.*, amend to read:

"7.2.2. Test conditions and procedure:

…

(d) Brake actuation force:

Hand control: ≤ 200 N;

Foot control: ≤ 350 N for vehicle categories L3 and L4;

≤ 500 N for vehicle category L5 and L7 ;

…"

*Paragraph 8.1.*, amend to read:

"8.1. Vehicle condition:

(a) The test is applicable to vehicle categories $L_2$, $L_4$, $L_5$ and $L_7$;

…"

*Paragraph 9.1.*, amend to read:

"9.1. General:

(a) The tests are only applicable to the ABS if fitted.

…"

*Paragraph 10.2.*, amend to read:

"10.2. Vehicle condition:

(a) The test is applicable to vehicle categories $L_3$, $L_4$, $L_5$ and $L_7$;

…"

*Paragraph 11.3.*, amend to read:

"11.3. Performance requirements

…

| *Column 1* | *Column 2* | | *Column 3* |
|---|---|---|---|
| *Vehicle* | *STOPPING DISTANCE(S)*<br>*(Where V is the specified test speed in km/h and S is the required stopping distance in metres)* | | *MFDD* |
| Single brake system | | | |
| $L_1$ | $S \leq 0.1\ V + 0.0143\ V^2$ | | $\geq 2.7\ m/s^2$ |
| $L_2$ and $L_6$ | $S \leq 0.1\ V + 0.0143\ V^2$ | | $\geq 2.7\ m/s^2$ |
| $L_3$ | $S \leq 0.1\ V + 0.0133\ V^2$ | | $\geq 2.9\ m/s^2$ |
| $L_4$ | $S \leq 0.1\ V + 0.0105\ V^2$ | | $\geq 3.6\ m/s^2$ |
| Vehicles with CBS or SSBS | | | |
| ALL | $S \leq 0.1\ V + 0.0154\ V^2$ | | $\geq 2.5\ m/s^2$ |

…"

*Paragraph 12.3.*, amend to read:

"12.3. Performance requirements

…

| *Column 1* | *Column 2* | *Column 3* |
|---|---|---|
| *Vehicle Category* | *STOPPING DISTANCE (S) (Where V is the specified test speed in km/h and S is the required stopping distance in metres)* | *MFDD* |
| Front wheel(s) braking only | | |
| $L_1$ | $S \leq 0.1\ V + 0.0111\ V^2$ | $\geq 3.4\ m/s^2$ |
| $L_2$ and $L_6$ | $S \leq 0.1\ V + 0.0143\ V^2$ | $\geq 2.7\ m/s^2$ |
| $L_3$ | $S \leq 0.1\ V + 0.0087\ V^2$ | $\geq 4.4\ m/s^2$ |
| $L_4$ | $S \leq 0.1\ V + 0.0105\ V^2$ | $\geq 3.6\ m/s^2$ |
| $L_5$ and $L_7$ | $S \leq 0.1\ V + 0.0117\ V^2$ | $\geq 3.3\ m/s^2$ |
| Rear wheel(s) braking only | | |
| $L_1$ | $S \leq 0.1\ V + 0.0143\ V^2$ | $\geq 2.7\ m/s^2$ |
| $L_2$ and $L_6$ | $S \leq 0.1\ V + 0.0143\ V^2$ | $\geq 2.7\ m/s^2$ |
| $L_3$ | $S \leq 0.1\ V + 0.0133\ V^2$ | $\geq 2.9\ m/s^2$ |
| $L_4$ | $S \leq 0.1\ V + 0.0105\ V^2$ | $\geq 3.6\ m/s^2$ |
| $L_5$ and $L_7$ | $S \leq 0.1\ V + 0.0117\ V^2$ | $\geq 3.3\ m/s^2$ |

"

*Appendix 1,*

*Paragraph 1.2.*, amend to read:

"1.2. Vehicle condition:

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

…"