

**Proposal
to introduce Grouping Criteria
for the approval
of replacement brake lining assemblies
for L-category vehicles
in UN Regulation No. 90**

submitted by ITALY

**82° GRRF
22 September 2016**

Preamble

At the last 81° GRRF session (doc **ECE/TRANS/WP.29/GRRF/2016/18**) ITALY presented a proposal aimed at including in UN-R 90 a criteria of Grouping for the approval of replacement brake lining assemblies **only for L-category vehicles.**

During the discussion some experts expressed reservations suggesting a more strategic and coordinated approach to develop the Regulation.

81° GRRF agreed that this proposal may be reviewed by a SIG (Special Interested Group) dealing with such proposal, under the leadership of Italy.

As a result, ITALY sent a proposal on 23 February 2016 to all potential interested parties, inviting them to attend a meeting scheduled in Milano one month later (22 March 2016) or sending written contributions by 11th March 2016.

No contribution of interest to attend were received.

Preamble

Notwithstanding the negative feedback, ITALY sent a new request of written comments or request of amendments by the 20 April 2016, in order to consider these feedbacks and present a revised proposal by 22 June 2016 to GRRF Secretariat, to be submitted for approval at the next GRRF session.

No feedbacks were again received to this second attempt.

As result, ITALY present ECE/TRANS/WP.29/GRRF/2016/18 also to 82° GRRF

Rationale

The proposal presented at 81° GRRF session (doc **ECE/TRANS/WP.29/GRRF/2016/18**) was aimed at including in UN-R 90 a criteria of Grouping for the approval of replacement brake lining assemblies **only for L-category vehicles**:

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1. **Scope**
 - 1.1. This Regulation applies to the basic braking function of the following replacement parts¹:
 - 1.1.1. **Replacement brake lining assemblies intended for use in friction brakes forming part of a braking system of vehicles of category M, N, L and O which have a type approval in accordance with Regulations Nos. 13, 13-H or 78.**
 - 1.1.2. Replacement drum brake linings designed to be riveted to a brake shoe for fitment to and use on vehicles of category M₃, N₂, N₃, O₃ or O₄ having a type approval in accordance with Regulation No. 13.
 - 1.1.3. The replacement brake lining assemblies used for separate parking brake systems being independent of the vehicle service brake system will be subject only to the technical prescriptions defined in Annex 8 of this Regulation.
 - 1.1.4. Replacement brake drums and discs intended for use in friction brakes forming part of a braking system of vehicles of category M, N and O which have a type approval in accordance with Regulation No. 13 or Regulation No. 13-H.
 - 1.2. Original brake discs and brake drums, fitted at time of manufacturing of the vehicle and original replacement discs and drums intended for the servicing of the vehicle are not subject to this Regulation.
 - 1.3. This Regulation does not apply to "Special parts", as defined in paragraph 2.3.4.

Rationale

Basically: it is a matter of making UN R 90 really applicable (from an economic sustainability viewpoint) for the type approval of replacement brake lining assemblies !!!

For vehicles belonging to L-categories, there is a great number of different types of replacement brake lining assemblies in the market.

For each type, the quantity of parts marketed is very low.

As an average, a medium size manufacturer:

- producing around **600** types of brake lining assemblies
- referring to **12.000** different applications with **4** different materials,
- needs to proceed with **2.400** requests of type approval (as a minimum)
- with an overall sales of around **3 Million** of sets, it means an average of **1.250** sets/for each homologation.

The Grouping is therefore needed to steadily reduce the burden for approval sustained by the manufacturer.

The average manufacturer would carry out only **12** type approval tests, making the application of Reg. 90 really sustainable and feasible (**250.000** sets/each homologation)

3. Application for approval

- 3.3. In the case of an application regarding the approval of a replacement brake lining assembly type, a replacement drum brake lining type or a replacement drum brake lining:
 - 3.3.1. An application for approval shall be accompanied, in triplicate, by a description of the replacement brake lining assembly or replacement drum brake lining with regard to the items specified in Annex 1 to this Regulation.
 - 3.3.1.1. Diagrams showing functional dimensions of the replacement brake lining assembly or replacement drum brake lining;
 - 3.3.1.2. An indication of the positions of the replacement brake lining assembly or replacement drum brake lining on the vehicles for which approval to fit is sought.

“3.3.1.3. In the case of brake lining assemblies for vehicles of category L, the list of brake lining assemblies belonging to the same group defined according to Annex 7a. This list shall indicate for each brake lining assembly: name of brake lining assembly manufacturer, the brake lining assembly manufacturer’s code, the friction material area (cm²). ”

Add new paragraph 3.3.1.3

4. Approval

4.2. To each replacement part approved there shall be assigned an approval number comprising four groups of digits:

4.2.1. The first two digits (at present 02 for the Regulation in its 02 series of amendments) shall indicate the series of amendments incorporating the most recent major technical amendments made to the Regulation at the time of issue of the approval.

4.2.2. The following single digit shall indicate the category of the replacement part as follows:

- A Replacement brake lining assembly
- B Replacement drum brake lining
- C Replacement brake disc
- D Replacement brake drum

4.2.3. The next four digits shall indicate the manufacture and the type of the brake lining, the type of disc or the type of drum.

A suffix of four digits shall indicate:

- (a) The shoe or back plate or specific dimension in the case of drum brake linings;
- (b) The variant in the case of a replacement disc or replacement drum.

Add new
paragraph 4.2.4

4.2.4. In the case of brake lining assemblies for vehicles of category L, brake lining assemblies belonging to the same group defined according to the criteria of Annex 7a, shall be assigned the same approval number of the one assigned to the representative brake lining assembly.

5. Specifications and tests

- 5.2. Requirements regarding the approval of a replacement brake lining assembly type, a replacement drum brake lining type or a replacement drum brake lining

Amend
paragraph 5.2.1.5

5.2.1.5. Replacement brake lining assemblies for vehicles of category L

It is allowed the verification of a brake lining assembly deemed to be representative of a group of brake lining assemblies, grouped according to the criteria defined in Annex 7a.

The representative brake lining assembly is deemed to identify the most severe application.

Results obtained with that representative brake lining assembly are considered valid for all the brake lining assemblies belonging to the same group defined according to the grouping criteria as from Annex 7a.

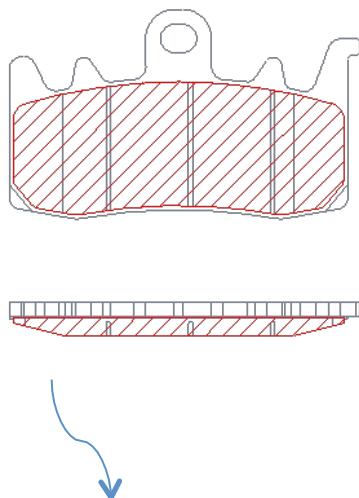
At least one set **of the chosen** replacement brake lining assemblies, representing the type of lining to be approved, shall be installed and tested in at least one vehicle which is representative of the vehicle type for which approval is sought, according to the prescriptions of Annex 7 and shall satisfy the requirements stated in this annex. The representative vehicle(s) shall be selected from among the application range using a worst case analysis⁴.

Add a new ANNEX 7a:

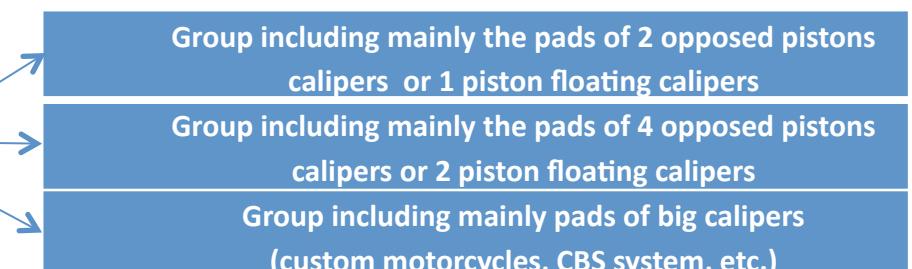
Criteria to define groups of brake lining assembly for vehicles of category L

The Grouping is made according to the following approach:

- a. According to the individual **friction material** of the brake lining (i.e. Organic, Sintered)
- b. Depending on the **area** of the friction material area of the brake lining assembly operated by the piston/pistons of only one side of the brake caliper



Group	Brake lining area [cm ²]
A	≤ 15
B	$> 15 \leq 22$
C	> 22



Slots and chamfers are not taken into account: their presence is provisional due to wear.

The total area is used to simplify the calculation, inevitable with so many different applications and initial shapes.

Add a new ANNEX 7a:

The brake lining assembly to be approved is defined, according to the following criteria:

- a. Choice of friction material to be approved
- b. Verification of the applications where the chosen friction material is applied
- c. Definition of the area of the selected brake lining assemblies according to Table 1, and classification into groups A – B – C ;
- d. For each group, selection of the most severe application, according to the highest value of the index **Ep** (kinetic energy by brake lining area), as follows:

$$E_p = \frac{1}{2} * M * p * (V * c)^2 / (S * q_p)$$

Add a new ANNEX 7a:

Ep (kinetic energy index) is proposed as criteria to select the most severe application, because it is the most relevant data to evaluate the stress applied to the brake lining assembly.

$$E_p = \frac{1}{2} * M * p * (V * c)^2 / (S * q_p)$$

Where:

Ep = kinetic energy index [kJ/cm²]

M = gross vehicle weight of the vehicle [kg]

p = allocation percentage of the vehicle weight:

- for front braking system:

- 75% in case of 1 brake disc
- 37.5% in case of 2 brake discs

- for rear braking system:

- 50%



«p» corresponds to the % of vehicle total mass which is braked by the lining.
Conventional values obtained through real testing on OEM brake discs

V = vehicle maximum speed [m/s]

c = correction coefficient of speed:

- for front braking system = 0.8

- for rear braking system: variable according to the brake disc diameter:

- 0.5 for $\emptyset \leq 245$ [mm]
- 0.6 per $\emptyset > 245 < 280$ [mm]
- 0.75 per $\emptyset \geq 280$ [mm]



«c» is a max speed reduction factor, used as easier alternative to the vehicle initial and final speed..
Conventional values obtained through real testing on OEM brake discs

S = brake lining area as defined in Table 1 [cm²].

qp = number of pads in 1 caliper