

**TESTEK, s.r.o., technical service for technical vehicle inspections
P.O.Box 84, Plachého 14, SK – 840 02 Bratislava, Slovak Republic**

<http://www.testek.sk>, e-mail: testek@testek.sk, tel.:+421254651311



Brake Testing of Vehicles with GVW Exceeding 3,5 t in the Slovak Republic According the Directive 2010/48/EU

Peter Ondrejka, e-mail: peter.ondrejka@testek.sk

Changes in the Slovak national regulations



Directive 2010/48/EU



ANNEX

Act No. 725/2004 and connected MoT Decrees and other Regulations



355

VYHLÁŠKA

Ministerstva dopravy, výstavby a regionálneho rozvoja Slovenskej republiky

Čl. I

1. V § 34 sa odsek 2 dopĺňa písmenom t), ktoré „t) meradlom spomalenia vozidla.“.
2. V § 34 sa odsek 5 dopĺňa písmenom y), ktoré „y) meradlom spomalenia vozidla.“.



Annex II to Directive 2009/40/EC is replaced by the following:

‘ANNEX II

1.2.2. Efficiency



Method	reasons for failure
<p>Test with a static brake testing machine or, if one cannot be used for technical reasons, by a road test using a recording decelerometer. Vehicles or a trailer with a maximum permissible mass exceeding 3 500 kg has to be inspected following the standards given by ISO 21069 or equivalent methods.</p> <p>Road tests should be carried out under dry conditions on a flat, straight road.</p>	<p>Does not give at least the minimum figure as follows</p> <p>Vehicles registered first time after entry into force of this Directive:</p> <ul style="list-style-type: none"> — Category N1: 50 %, — Category M1: 58 %, — Category M2 and M3: 50 %, — Category N2 and N3: 50 %, — Category O2 (XX) (c), O3 and O4:

„Príloha č. 4a k vyhláške č. 578/2006 Z. z.

Kontrola na statickom zariadení na skúšanie brzd. Ak sa z technických dôvodov neda použít výkonaf jazdní skúšky pomocou zánamového decelerometra.	prípado jazdní skúšky vozidla.
Vozidla alebo prípoje vozidla s najvyššou prípustnou celkovou hmotnosťou presahujúcou 3 500 kg musia byť preverené podľa požiadaviek stanovených v norme alebo rovnocennými metódami. Jazdné skúšky by sa mali vykonať za suchých podmienok na rovnej asfaltovanej ceste.	<p>Nedostihu sa aspoň nasledujúce minimálne hodnoty:</p> <p>Vozidla priradené do evidencie projekt č. 26. 6. 2009:</p> <ul style="list-style-type: none"> — kategória N₁: 58 %, — kategória M₂ a M₃: 50 %, — kategória N₂ a N₃: 50 %, — kategória O₂ (XX), O₃ a O₄: — pre návesy: 45 %, — pre ťahové prívesy: 50 %. <p>Vozidla priradené do evidencie pred 26. 6. 2009:</p> <ul style="list-style-type: none"> — kategória N₁: 45 %, — kategória M₂, M₃ a M₄: 50 %,¹⁾ — kategória N₂ a N₃: 45 %,¹⁾ — kategória O₂ (XX), O₃ a O₄: 40 %.¹⁾

New inspecting methods, procedures and reasons for failure

Brake Testing in the Slovak Republic according the 2010/48/EU

Possible solutions



1.

Calculation of brake rate using one point extrapolation method from brake forces measured after reaching the minimum brake actuator pressure.



Necessary changes in the Slovak legislation and possibilities how to keep to the terms of ISO 21069



2. Load simulation

3. Method equivalent to ISO 21069

4. Measuring fully laden vehicles

~~...vehicle must be inspected empty...
(a condition in the Slovak Law)~~

- prescription of a minimum load for vehicles exceeding 3,5 t during PTI

- obligation to reach at least 30 % of the design brake actuator pressure when measuring brake forces to be used for calculation of brake rate.



Brake Testing in the Slovak Republic according to the 2010/48/EU

Basis for the fulfillment of the ISO 21069

1. Calculation of brake rate using one point extrapolation method from brake forces measured after reaching minimum brake actuator pressure.

Problems with loading of some vehicles
(e.g. some buses, ADR vehicles, vehicles transporting of fowl, dead animals etc.)

Problems with reaching the minimum brake actuator pressure:

- friction between tyre-rollers of RBT in wet condition
- vehicles equipped with EBS 5 system

2. Load simulation

Not used in Slovakia

Problems:

- not allowed by some vehicle producers
- inspection demands more time

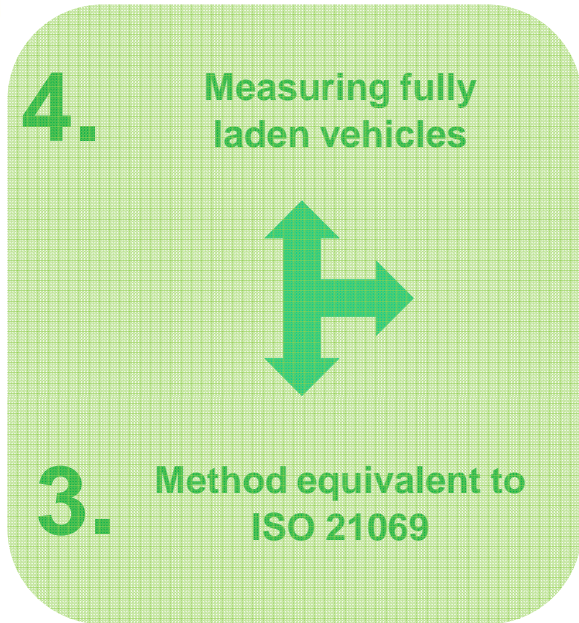


How to reach minimum brake actuator pressure more easily?

High friction TYRE – ROLLERS of RBT + low friction DISC/DRUM – BRAKE LININGS/PADS

= Early wear of RBT

Basis for the fulfillment of the ISO 21069



3+4
In preparation

If the inspected vehicle in actual load condition is able to reach such high brake forces that the brake rate for fully laden state meets the requirements given in directive 2010/48/EC, it is proven that it meets the requirements when fully loaded.

$$Z = 10,2 \cdot \Sigma B_{vi} / mc$$

$$Z \geq Z_{min}$$



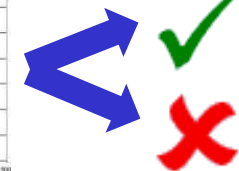
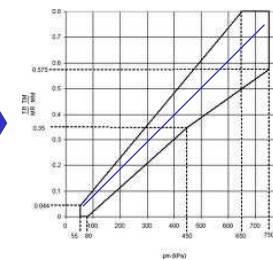
Legend:

- B_{vi} – brake force on wheel i
- mc – gross vehicle weight
- Z – braking rate of vehicle
- Z_{min} – minimum braking rate

In progress



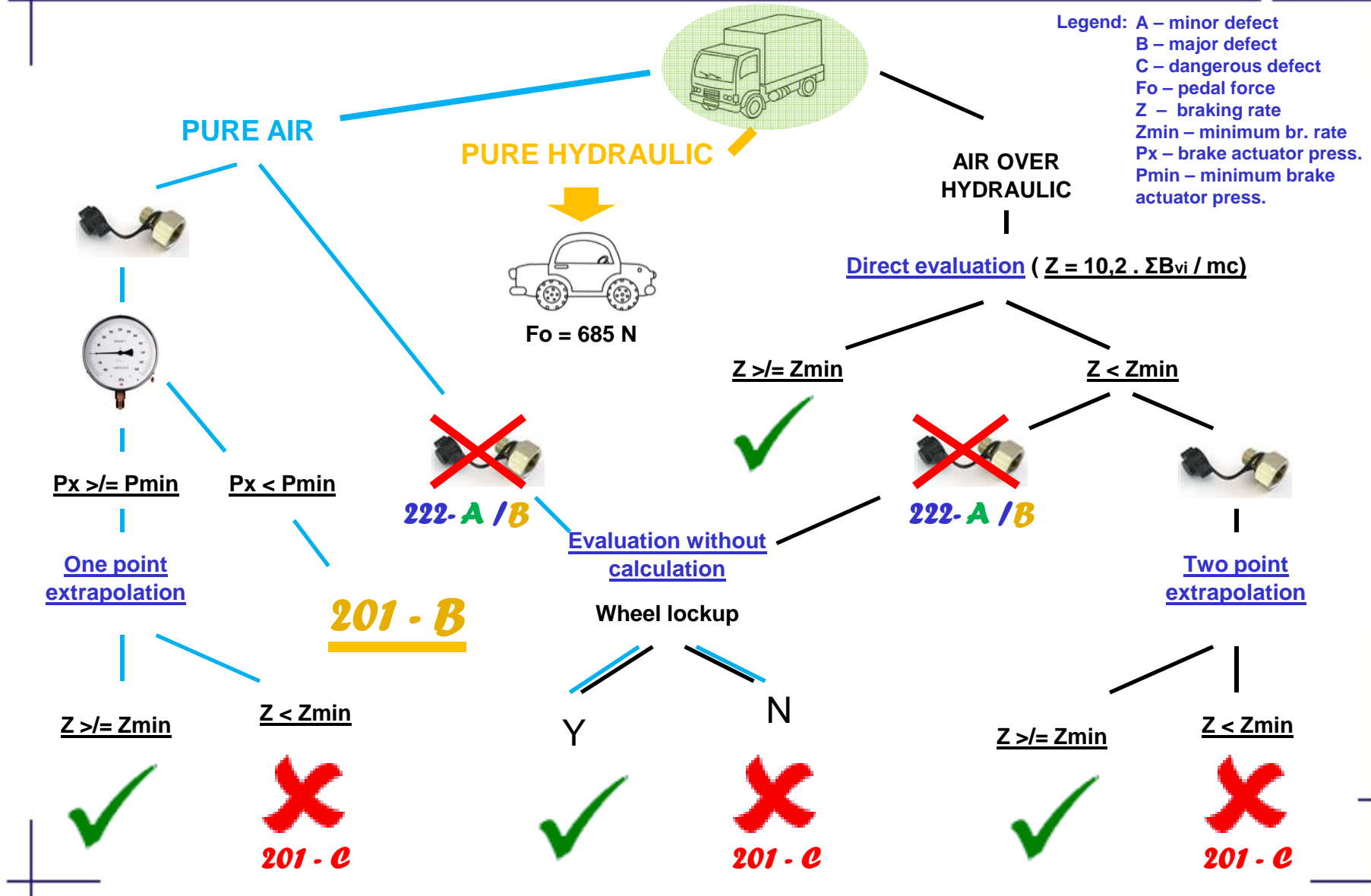
Comparing map curve of actual braking with type-specified for measured vehicle



Overview of Slovak procedures for braking rate evaluation



Legend: A – minor defect
 B – major defect
 C – dangerous defect
 Fo – pedal force
 Z – braking rate
 Zmin – minimum br. rate
 Px – brake actuator press.
 Pmin – minimum brake actuator press.



Brake Testing in the Slovak Republic according to the 2010/48/EU