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Economic Commission for Europe**Inland Transport Committee****World Forum for Harmonization of Vehicle Regulations****Working Party on Brakes and Running Gear****Seventy-second session**

Geneva, 20–24 February 2012

Item 3(b) of the provisional agenda

Regulation Nos. 13 and 13-H (Braking) – Trailer braking**Proposal for Supplement 10 to the 11 series of amendments
to Regulation No. 13 (Heavy vehicle braking)****Submitted by the expert from Denmark, coordinated and supported by
the International Road Transport Union, International Commission of
Technical Affairs (IRU CIT) and the Nordic Road Association, Vehicles
and Transport Committee (NVF). ***

The text reproduced below was prepared by the expert from Denmark, coordinated and supported by the International Road Transport Union, International Commission of Technical Affairs (IRU CIT) and the Nordic Road Association, Vehicles and Transport Committee (NVF). The text aims at improving brake distribution between the truck and the trailer of heavy vehicle combinations doing at everyday low decelerations, to enhance uniform use of all wheel brakes and thereby to counteract loss of full brake performance. The text is based on informal documents GRRF-71-18 and GRRF-71-19 distributed during the seventy-first session of the Working Party on Brakes and Running Gear and is based on ISO 20918 International Standard "Road vehicles - Braking threshold pressures for heavy commercial vehicle combinations with fully pneumatic braking systems". The modifications to the existing text of the Regulation are marked in bold characters for new or strikethrough for deleted characters.

* In accordance with the programme of work of the Inland Transport Committee for 2010–2014 (ECE/TRANS/208, para. 106 and ECE/TRANS/2010/8, programme activity 02.4), the World Forum will develop, harmonize and update Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate

I. Proposal

Insert a new paragraph 5.1.4.2.4., to read:

"5.1.4.2.4.: In the control line between the coupling head and the trailer relay emergency valve."

Existing paragraphs 5.1.4.2.4. and 5.1.4.2.5. to be renumbered as paragraphs 5.1.4.2.5. and 5.1.4.2.6.

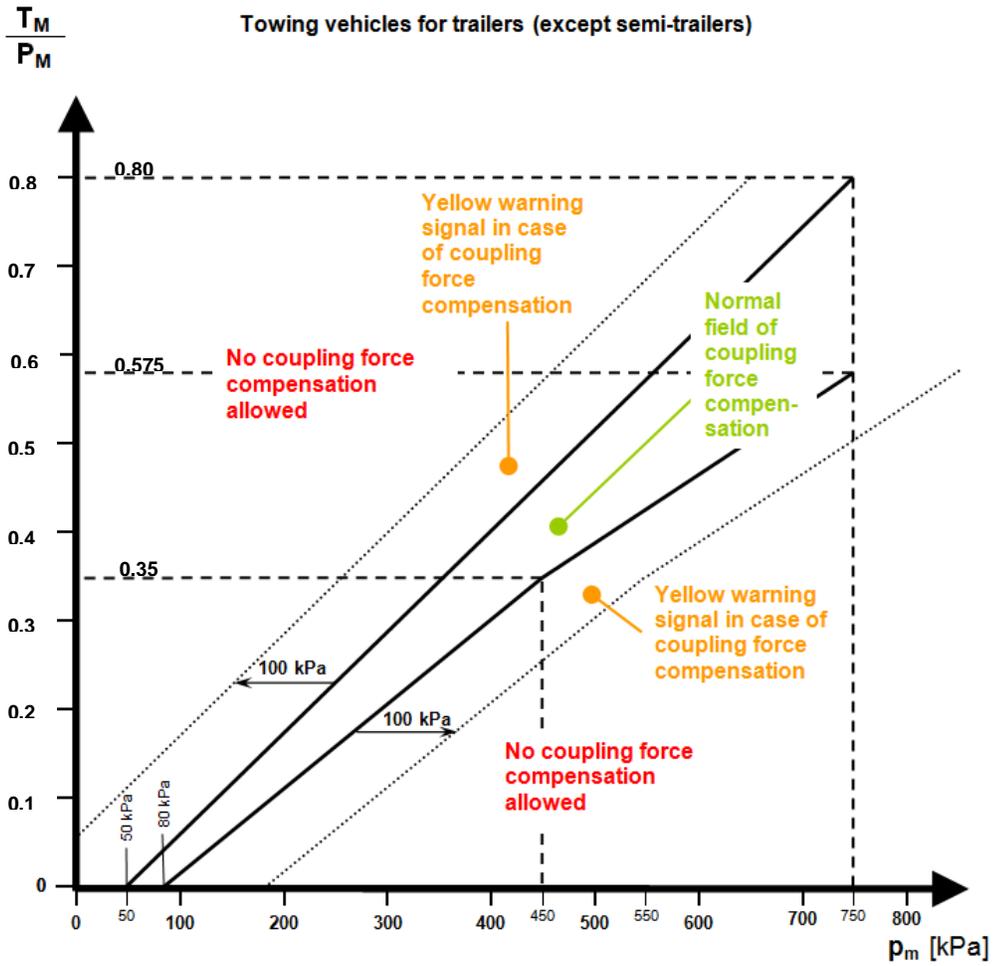
Paragraph 5.2.1.28.5., amend to read:

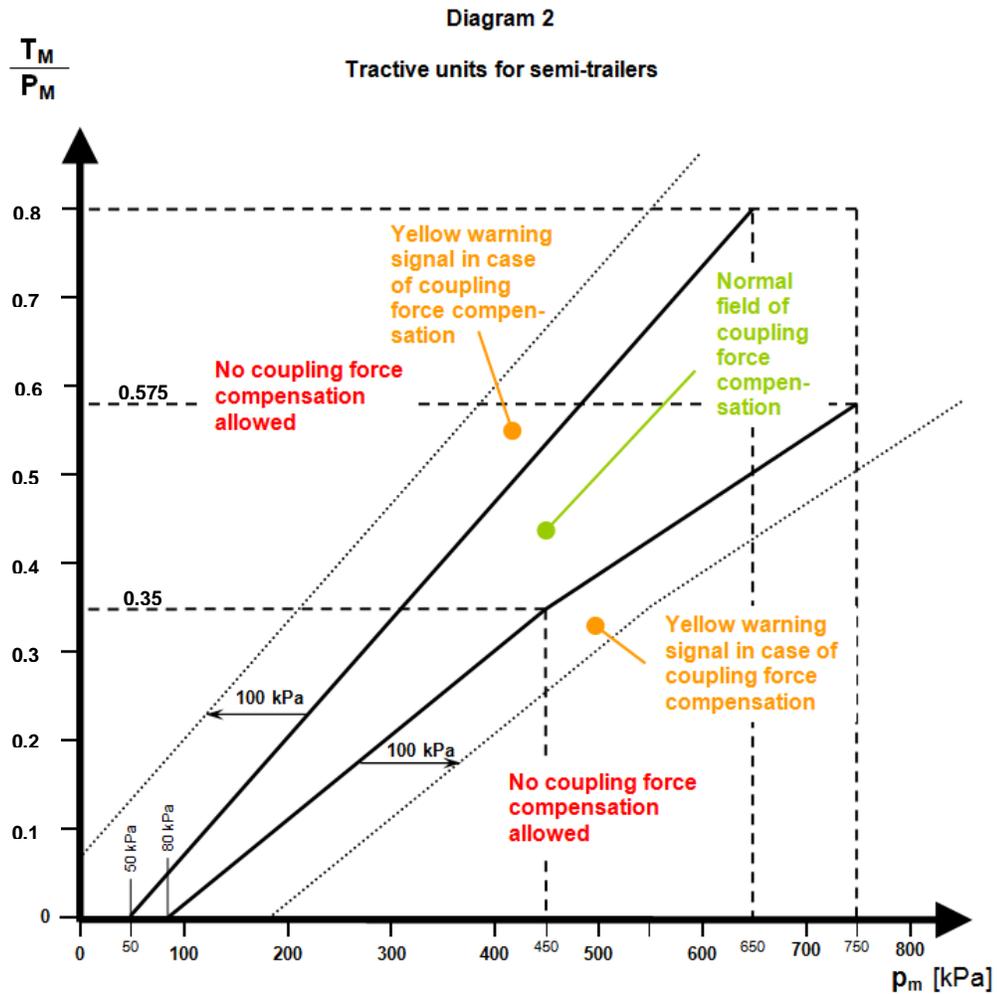
"5.2.1.28.5. The coupling force control system shall tend to minimise the coupling force. Maximum allowed compensation by the coupling force control system is 100 kPa below the lower limit of the compatibility band and 100 kPa above the upper limit of the compatibility band as specified in Annex 10. If this compensation causes the operating point to lie outside the compatibility band as specified in Annex 10 for the motor vehicle the yellow warning signal specified in paragraph 5.2.1.29.2. shall be activated. After recoupling, no compensation is allowed before the coupling force control system has registered a difference between the braking rates of the vehicles in the combination. "

Diagrams 1 and 2, amend to read:

"

Diagram 1





Annex 10, paragraph 1.3.1., amend to read:

"1.3.1. At the time of type approval it shall be checked that the development of braking ~~on an axle of each independent axle group 2/~~ shall be within the following pressure ranges:

a) ~~Laden~~ vehicles:

~~At least one axle shall commence to develop a braking force when the pressure at the coupling head is within the pressure range 20 to 100 kPa.~~

~~At least one axle of every other axle group shall commence to develop a braking pressure at the coupling head is at a pressure ≤ 120 kPa.~~

(b) ~~Unladen~~ vehicles:

~~All axels At least one axle shall commence to develop a braking force when the pressure at the coupling head is within the pressure range 20 to 100~~ **50 to 80 kPa.**"

Annex 10, diagrams 2, 3 and 4A, amend to read:

"

DIAGRAM 2

TOWING VEHICLES AND TRAILERS
 (except tractors for semi-trailers and semi-trailers)
 (see paragraph 3.1.5.1 of this annex)

$$\frac{T_R}{P_R} \quad \frac{T_M}{P_M}$$

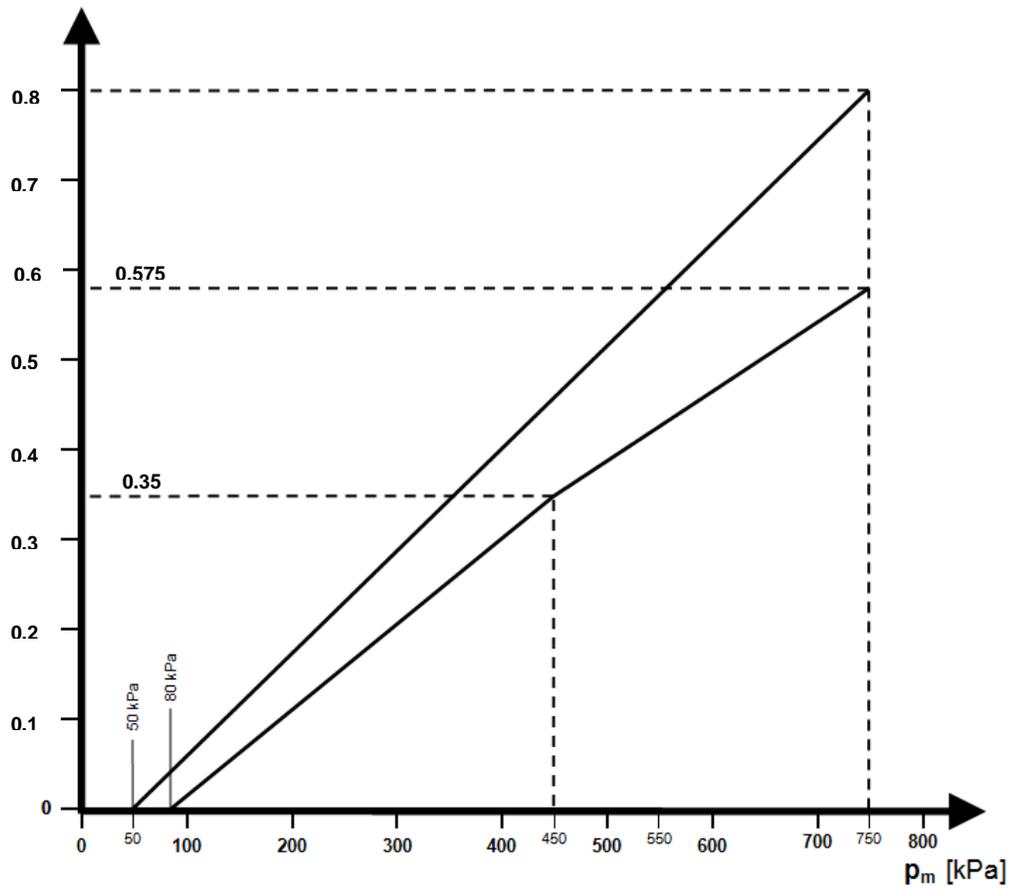


DIAGRAM 3

TRACTORS FOR SEMI-TRAILERS
(see paragraph 3.1.6.3 of this annex)

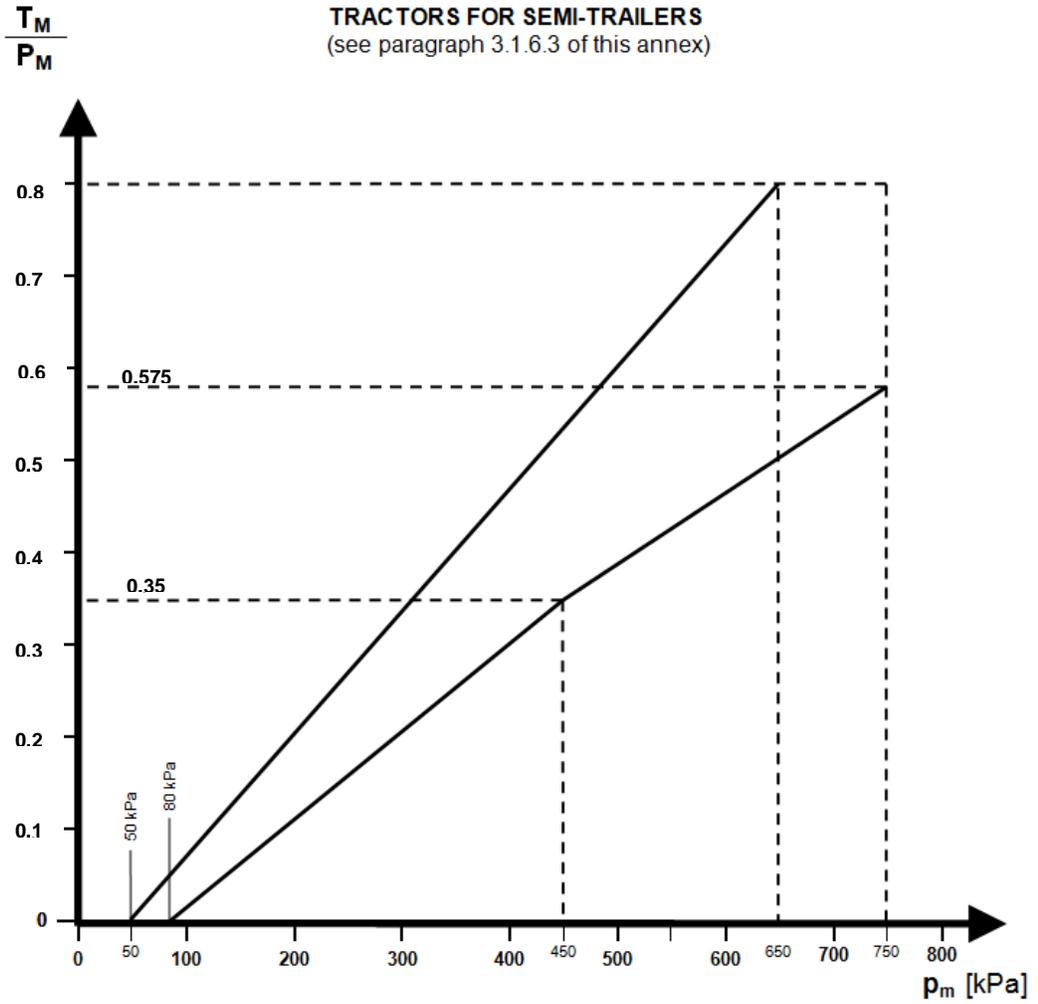
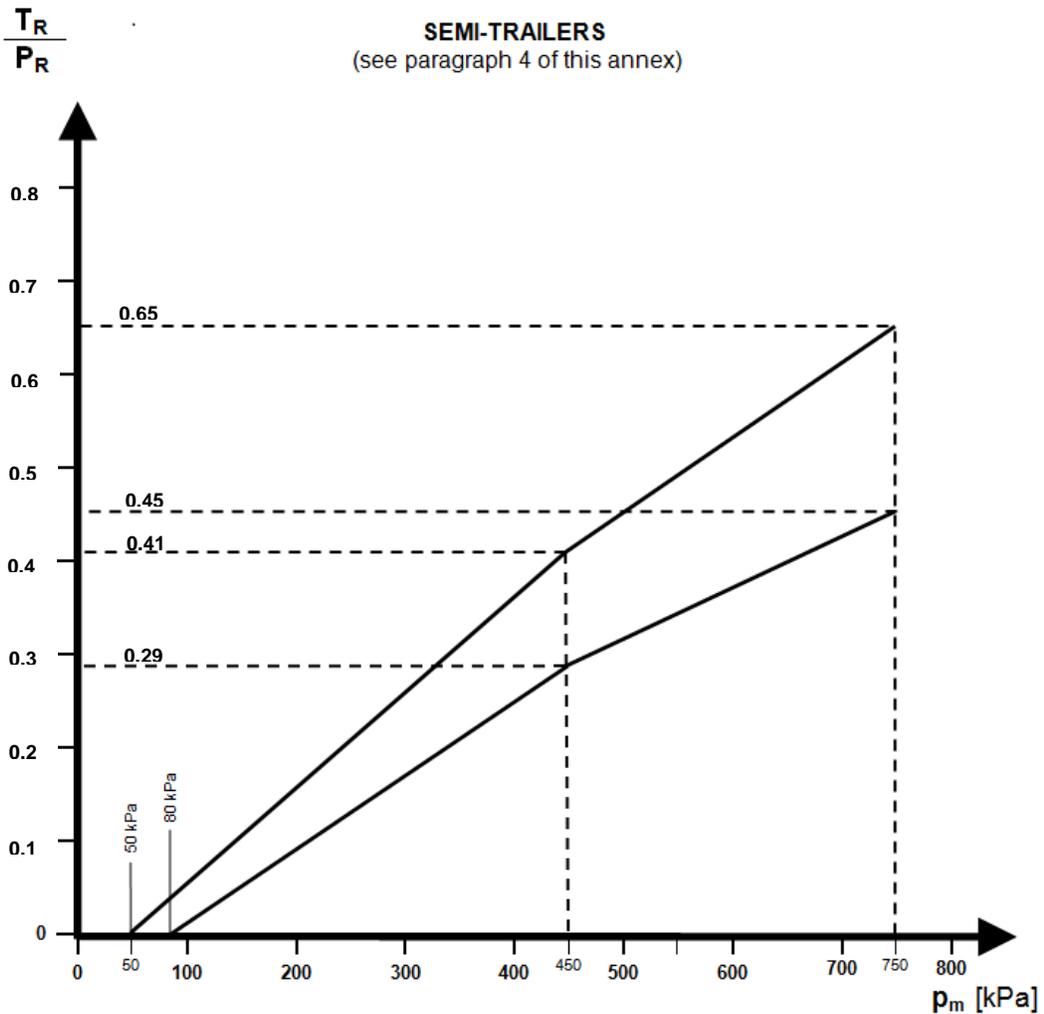


DIAGRAM 4
SEMI-TRAILERS
 (see paragraph 4 of this annex)



Annex 13,

Paragraph 1.1., amend to read:

"1.1. This annex defines the required braking performance for road vehicles fitted with antilock systems. In addition, power-driven vehicles which are authorized to tow a trailer, and trailers equipped with compressed-air braking systems, shall, when the vehicles are laden, meet the requirements for compatibility set out in Annex 10 to this Regulation. However, for all load conditions, **the requirements for compatibility set out in Annex 10 to this Regulation shall be fulfilled for a pressure (p_m) below 200 kPa or the equivalent digital demand value at the coupling head of the control line(s).**"

II. Justification

1. Various studies and results from annual periodical technical inspections as well as experiences reported by the International Road Transport Union (IRU) call for focus on reduced maintenance costs for heavy goods vehicle combinations and enhanced and more consistent brake performance of trailers in particular.
 - (a) [The European Truck Accident Causation Study \(2007\)](#) – although human factors were dominant – found technical failures in 5.3 per cent of all main causes for traffic accident with trucks, and that queue accidents accounted for 20.6 per cent of all accidents. Brakes can play a role in these accidents.
 - (b) [A Danish study \(2005\)](#) of brake performance of heavy goods vehicle combinations found that most heavy trucks performed well as only 4 per cent were under-performing. However major problems were identified regarding brake performance of trailers as 38 per cent did not meet legal requirements.
 - (c) [The European Union \(EU\) General Safety Regulation 661/2009](#) requires Automatic Emergency Brake System (AEBS) for trucks type approved from 01.11.2013. Well performing wheel brakes are a prerequisite for obtaining the safety benefit.
 - (d) [The ISO 20918 International Standard](#) "Road vehicles - Braking threshold pressures for heavy commercial vehicle combinations with fully pneumatic braking systems - Test with roller brake tester" describes a method to evaluate the braking threshold of heavy commercial vehicle combinations with pneumatic braking systems by means of a roller brake tester. This International Standard describes procedures for workshops and garages and provides a recommended pressure range of the system threshold pressure for motor vehicles and trailers, and a recommended practice for determining the system threshold pressure. The standard says that optimization and low adhesion utilization requires good braking balance between axles in the pressure range up to 200 kPa. This improvement in balance is achieved by minimizing the variation in pressure when all brakes start to develop a braking force and recommends an interval of 50-80 kPa.
 - (e) Likewise inspiration has been found in the former Swedish voluntary [XTB \(Extra Tested Brakes\) maintenance prescription](#). The XTB maintenance prescription recommended a brake activation pressure of 50 to 80 kPa for each individual wheel brake. A similar demand were planned to be introduced in Swedish national demands at Periodical Technical Inspection (PTI), but it was not implemented due to the less stringent EU/ECE demands: The UN Regulation No. 13 allows for a brake activation pressure spread between 20 and 100 kPa for each vehicle in the combination, which is a too wide tolerance by today's standards.
2. Indications show that the limits for coupling force control system are too lenient which results in the possibility for overcompensation. This proposal also limits a strategy by some manufactures to start compensation before an actual need has been discovered. This compensation is a challenge for the brake compatibility and can result in overloading of the trailer brakes.
3. Denmark, IRU and NVF are aware that
 - (a) the braking performance measured at PTI differs in various countries depending on different braking calculations ([NVF report 2004](#));
 - (b) the precision of the measuring equipment – the roller brake tester – should be taken into account when evaluating measurement results ([NVF report 2009](#));

- (c) in the future, reference braking forces will be available for all vehicles due to UN Regulation No. 13 PTI requirements for new type approved vehicles and can be used as common method of determining brake performance resulting in a harmonized evaluation at PTI;
- (d) the ISO 20918 standard sets out a method to determine braking balance of vehicle combinations which means that the whole transport unit starts braking at the same time resulting in truck and trailer braking their own proportion of the total unit weight;
- (e) the ISO 20918 standard limits the starting pressure span to 50 kPa – 80 kPa;
- (f) Swedish experiences has shown that the ISO 20918 pressure span of 50 kPa – 80 kPa can be fulfilled even with conventional non-EBS vehicles ([Better brakes on heavy vehicles, 2005](#));
- (g) demands for improvement of brake balance between truck and trailer resulting in enhancement of durability in brake performance should be implemented for new vehicles and thereafter implemented for those vehicles in use as outlined in the ISO standard;
- (h) the yellow warning lamp regarding the coupling force control - in line with other MIL-lights - indicates a possible problem with the trailer brakes and should be taken care of. A supplementary text message in the dashboard could explain the reason for the signal, for instance "trailer 1.5 kPa outside compatibility band, check trailer brakes". A good practical method for the driver to check if brakes are active is to check brake temperature;
- (i) glazed brake linings are a common problem and can be a result of bad low pressure compatibility resulting in lowered full brake performance;
- (j) maintenance of the heavy vehicle brakes is one of the most significant maintenance cost for the vehicle owner ([Better brakes on heavy vehicles, 2005](#)).

This proposal for an amendment of ECE R13 is presented as based on the above points.

The following diagrams show the difference between the existing diagrams and the new proposed diagrams:

[Annex 10, diagram 2, 3 and 4A \(compatibility\)](#):

DIAGRAM 2

Revised

TOWING VEHICLES AND TRAILERS
 (except tractors for semi-trailers and semi-trailers)
 (see paragraph 3.1.5.1 of this annex)

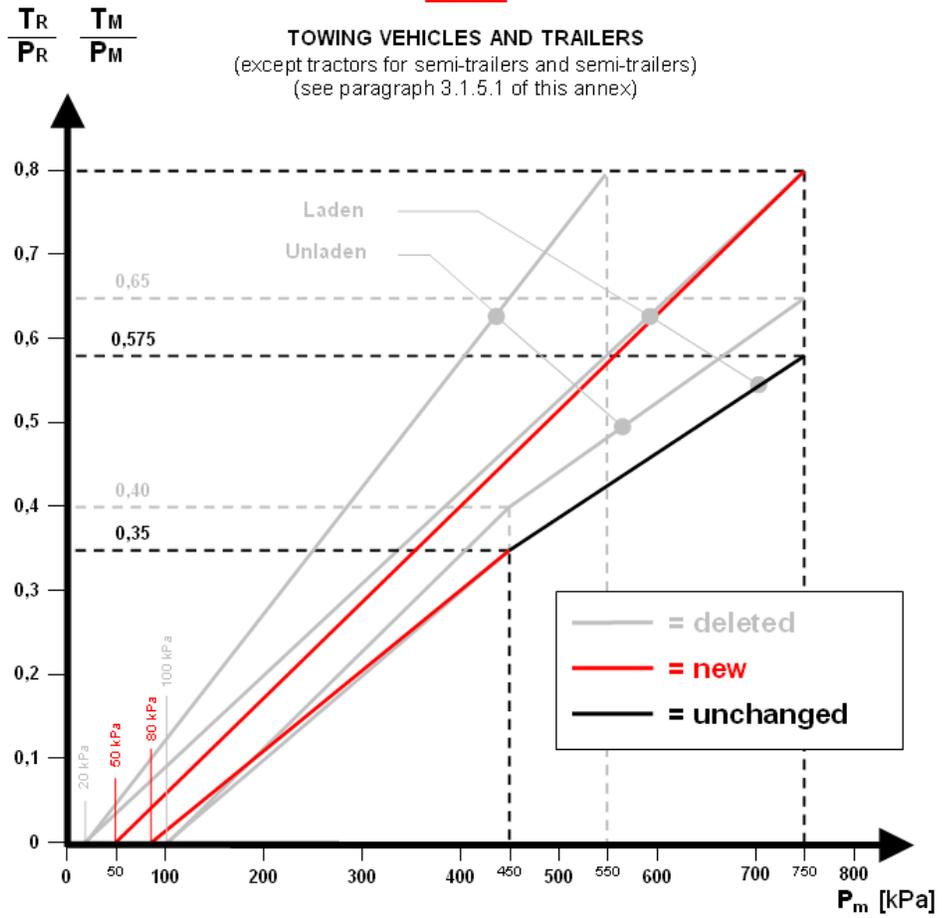


DIAGRAM 3

Revised

TRACTORS FOR SEMI-TRAILERS
 (see paragraph 3.1.6.3 of this annex)

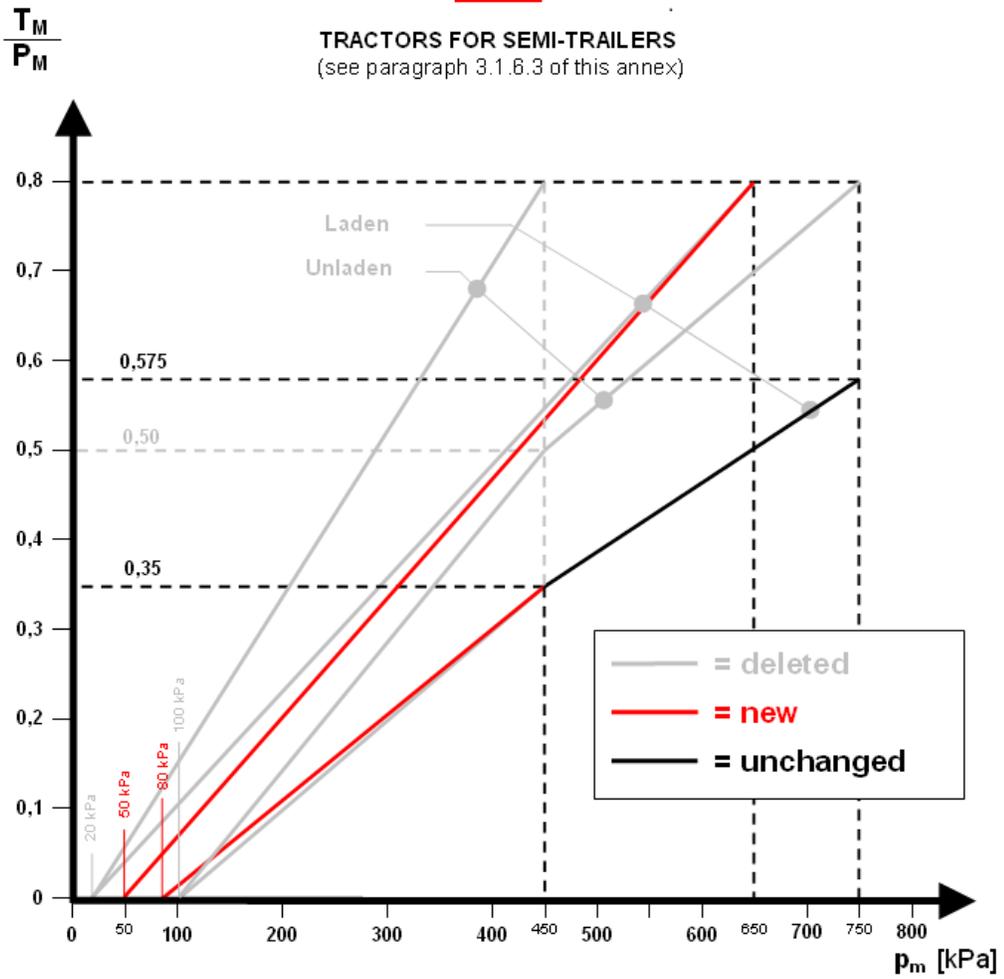
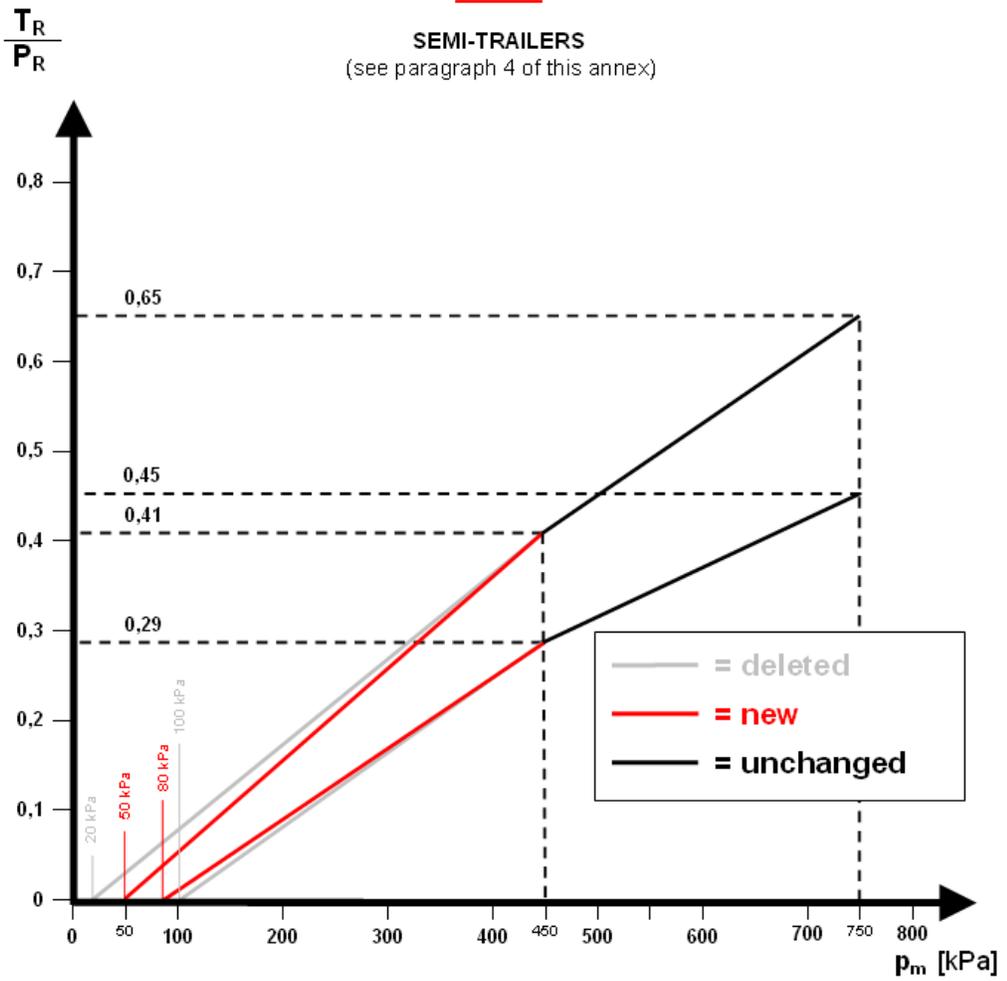


DIAGRAM 4

Revised

SEMI-TRAILERS

(see paragraph 4 of this annex)



Existing diagrams in paragraph 5.2.1.28.5. (coupling force control) for reference:

