

Comments on Changes to the Requirements Associated with Braking Compatibility of Semi-Trailers and Centre Axle Trailers as Proposed by Denmark in GRRF-72-7

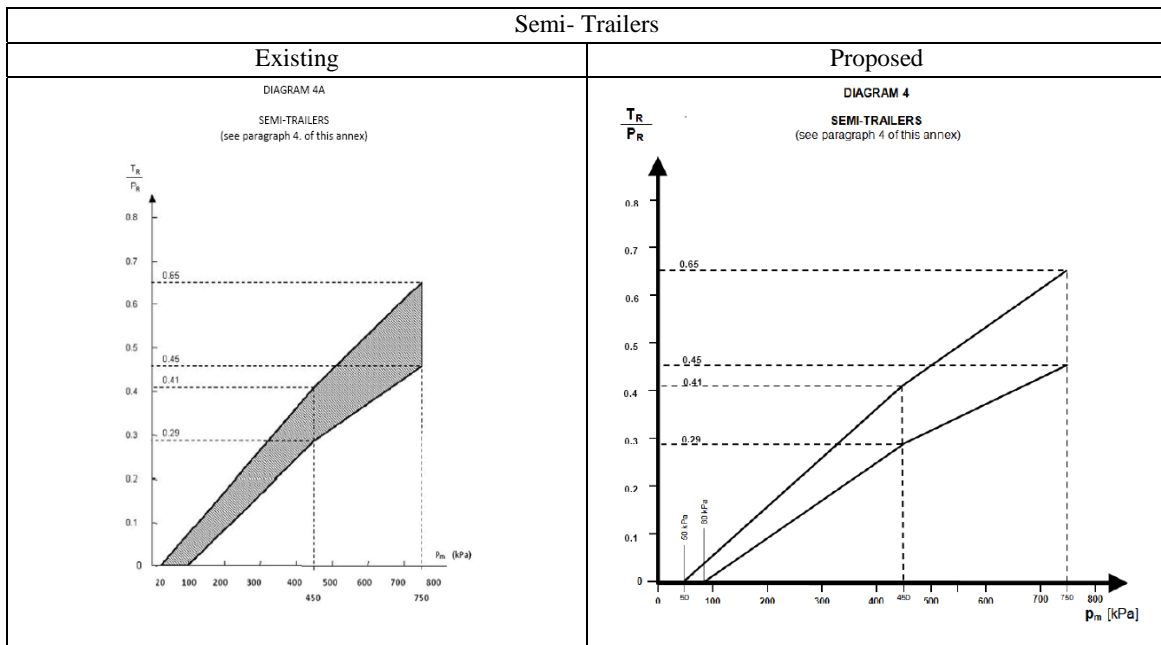
Introduction:

At the 71st GRRF Denmark submitted Documents GRRF-71-18 & 19 the content of which has been consolidated into ECE/TRANS/WP29/GRRF/2012/12. This document proposes fundamental changes to the compatibility requirements for towing vehicles, trailers and tractors for semi-trailers. However semi-trailers were omitted from the proposal. Document GRRF-72-7 appears to consolidate the content of ECE/TRANS/WP29/GRRF/2012/12 as well as including new proposals for semi-trailers which automatically apply to centre axle trailers.

Discussion:

Justifications against the proposed changes are outlined in document GRRF-72-XX and are not repeated in this document as they remain unchanged. The objective of this document is to address the ramifications of introducing the proposals outlined in GRRF-72-7 specifically associated with semi-trailers.

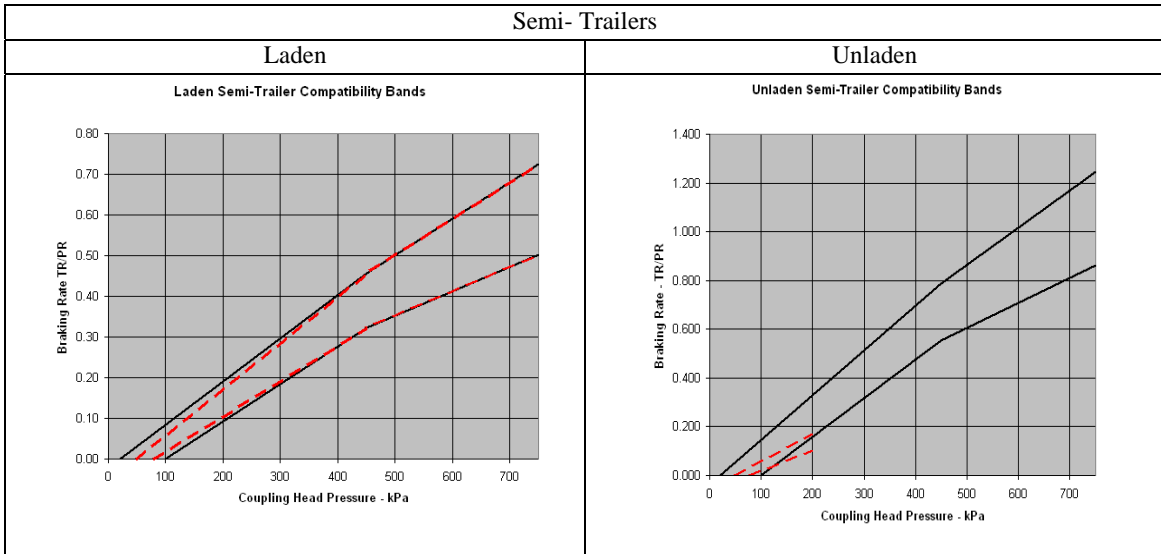
The following diagrams illustrate the current requirements and those proposed by Denmark relating to the Annex 10 compatibility bands for the respective vehicles:



In the case of semi-trailers no unladen bands are specified however both laden and unladen bands are determined by means of using factors K_c (laden) and K_v (unladen). These factors are calculated by means of a formula defined with Annex 10 and utilise the physical characteristics associated with the actual trailer to which the bands will apply. It is proposed in GRRF-72-7 that it is only necessary to determine the co-ordinates for the laden vehicle and as a result the formula used to determine the laden factor (K_v) is simplified as only one factor is calculated (K).

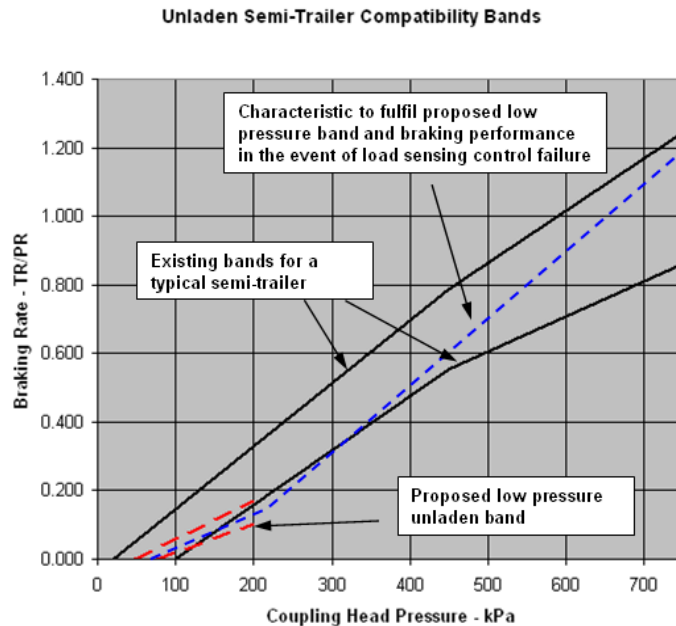
For the laden vehicle the same principle is proposed which is defined for other vehicles in that the laden co-ordinates remain unchanged except that the coupling head pressure range where braking commences is reduced

from 20 to 100kPa to 50 to 80kPa. For unladen semi-trailers it is proposed that braking performance should fall within the revised laden band up to a coupling head pressure of 200kPa. The diagrams below compare the current bands with those proposed for a typical high volume semi-trailer:



The broken red line represents the range of the bands proposed while the solid lines represent the bands determined using the methodology currently prescribed within Annex 10 to Regulation 13.

While compliance with the unladen compatibility bands is optional it is common practice for the unladen braking performance to lie within the unladen corridor. The reason for this is that there is a requirement specified with paragraph 6 of Annex 10 that in the event of a failure of the load sensing control the residual braking performance shall be at least 30% of the prescribed laden performance. For the trailer used to determine the bands in the above diagrams the minimum unladen braking rate (T_R/P_R) at a coupling head pressure of 650kPa is 1.01. The following diagram illustrates the characteristic required to fulfil both the proposed low pressure unladen band and load sensing control failure performance:



It can be seen that the relationship of coupling head pressure to generated braking rate is no longer the typical linear relationship. Such a characteristic can only be produced by the brake control system by modifying the

input output relationship of the load sensing control. With electronic brake control this is may be possible but not for a convention pneumatic braking system utilising a conventional load sensing valve.

Conclusion:

The proposal outlined in Informal Document GRRF-72-7 applies the principle of requiring the unladen semi-trailer or centre axle trailer to fulfil the laden compatibility band up to a coupling head pressure of 200kPa (as defined in ECE/TRANS/WP29/GRRF/2012/12 for towing vehicles and trailers). The issues associated with this proposal are outlined in GRRF-72-19 and are equally valid for semi-trailers and centre axle trailers.

If it was possible for all braking systems to fulfil the proposed unladen low pressure requirement there remains the current requirement to ensure the residual laden braking performance in the event of load sensing control failure is at least 30% of the prescribed Type O performance. Combining these two requirements would necessitate a change to the braking system characteristics as the input / output relationship is no longer linear and cannot be fulfilled by all braking systems.