Response to the NTC Mass Limits for Three-Axle Buses Discussion Paper

Bus Industry Confederation

July 2018

Contents

1. Background

The BIC supports a national approach for two axle bus mass limits and also supports the current review by the National Transport Commission to apply similar logic to the 3 axle bus mass limits.

As such BIC has included below, for contextual purposes, the introduction from the BIC submission in response to the NTC discussion paper for 2 axle buses, as the same principles and premise apply to 3 axle bus mass limits.

The *National Transport Commission (NTC)* released a detailed discussion paper called *"Mass Limits for 2-Axle Buses Discussion Paper February 2014"* (referred to in the following as the *NTC Two Axle Paper*). The NTC Two Axle Paper reviewed the issue of both 16t and 18t mass limits for two axle buses operating in Australia.

The paper reviewed a range of issues including:

- The National Heavy Vehicle (Mass, Dimension and Loading) Regulation (MDL Regulation).
- The level of increase in Tare Mass for two axle buses and coaches over time.
- The causes behind these increases in Tare Mass such as the DDA requirements, progression from Euro 3 to 5 and other issues such as air-conditioning.
- The increasing passenger loadings due to increases in per passenger mass (that is the ADR is 65 kg per person where the current Australian Bureau of Statistics figures for the average male and female are 86 kg and 71 kg respectively[1]).
- The on-bus testing commissioned by VicRoads and conducted by Advantia Transport Consulting (Advantia)[2] which determined that two axle buses were operating up to or near the 18-tonne limit for short periods of time.
- The European mass limits for these types of buses.

The NTC Two Axle Paper presented five options to address the mass issues with two axle buses and these options were:

Option 1: Maintain the status quo.

Option 2: Increase the mass limits from 16t to 18t via an amendment to the MDL Regulation.

Option 3: Issue of a mass limit exemption for route buses through the gazettal of a national notice issued by the NHVR.

Option 4: The encouragement of innovation and industry best practice models to address mass overloading.

Option 5: Develop methods to allow bus operators to monitor and manage the bus mass.

[1] NTC Mass Limits for 2-Axle Buses February 2014.

[2] Ibid page 3.

Since the NTC February 2014 Two Axle Paper, the following has occurred:

- A Bus Mass Exemption Notice has been gazetted for 18t, 2 axle complying buses in NSW, Queensland and Victoria, that includes braking and stability conditions for vehicles to operate at the higher mass via the Multi-State Class 3 Bus Mass Exemption Notice 2014.
- The West Australian and NT Governments introduced their own exemption for 2 axle buses to operate at 18t
- The NHVR introduced a legislative amendment such that from 1 July 2018, the Heavy Vehicle (Mass, Dimension and Loading) National Regulation will incorporate an amendment to increase the Gross Vehicle Mass (GVM) of certain types of 2 axle buses ("eligible 2-axle buses") from 16t to 18t
- This mass increase will be applicable to "eligible 2-axle buses" operating in QLD, NSW, ACT, VIC, SA, TAS and the ACT for all roads unless signposted. In Victoria, 2 axle buses will continue to be able to operate at 18t GVM under a notice.

2. Introduction to BIC's Responses to the NTC Three Axle Paper

The following is the BIC response to the National Transport Commission (NTC) review of the mass limits for three axle buses, specifically the NTC paper titled "Mass limits for three-axle buses Discussion paper June 2018" (referred to in the following as the ***NTC Three Axle Paper***).

The BIC supports the current review undertaken by the NTC. This review will assist in the development of a national regulation that addresses the current issue where three axle buses can, during peak loading periods, exceed the regulated mass limits when operating at legal passenger capacity.

The bus and coach industry are concerned about the legal liability issues as they relate to operating over the regulated 3 axle mass limits. This is especially concerning in the context of the Adventia two axle bus work see **attachment A** , which confirmed that overloading was occurring on two axle buses whilst operating within existing passenger capacity limits. As three axle buses and coaches carry the same number of passengers as two axle buses and the method used to calculate the licenced passenger capacity is the same for both vehicle types, 3 axle buses when fully loaded, are likely to operate over the prescribed legal mass limit at times.

The contention that 3 axle buses are operating over mass is supported by the action taken by NSW to increase the allowable operating mass for three axle buses in March 2018. This increase was a result of discussions and reviews by both RMS and the bus industry following a high number of fines being issued to 3 axle buses for being over mass at both the Marulan and Mt White RMS inspection stations.

In all of the instances, the buses were operating within their legal passenger carrying capacities, yet they were still over the legal operating mass limit.

The BIC's position on bus mass limits is:

- Bus mass regulations need to be national, uniform and consistent across all States and Territories in Australia and a new national mass regulation for three axle buses.
- The impact of the actual increased average passenger weight over time needs to be compared with the current ADR that states that 65kg per person is the basis upon which passenger capacity is calculated.

- The increase in bus tare mass over time is a result of new regulations, such as ADR emission standards, access requirements (DDA) and introduced operational requirements such as air-conditioning.
- Any increase in the existing passenger capacity of buses should be minimised. The intent is to ensure that what is currently occurring on the road network is legal and operating within the regulated mass limits.
- Realistic mass operating limits need to be set which include guidance on the method by which passenger carrying capacity on the specific vehicle is calculated.
- There needs to be a national approach to calculating passenger capacity as a key step in achieving national consistency and improved compliance.
- The increase in average passenger weight over time, the current passenger capacity calculation as determined by the ADR and the increasing bus tare mass over time are all a result of factors outside the control of the bus manufacturer and operator.
- An agreed passenger calculation methodology for all 3 axle bus and coach axle group types needs to be applied which takes into account a full consideration of vehicle configuration and axle splits.
- The reality on the road is that three axle buses and coaches provide the majority of longer tour, charter and interstate services and are more likely to be subject to an inspection at road authority vehicle weigh stations.
- The fact that buses and coaches operate over the regulated mass limit does not mean that the bus or coach is overloaded in accordance with the Manufacturer's Gross Vehicle Mass (as determined by the ADR compliance process).

3. Change of UNECE Regulation from 18 to 19.5 tonne for Two Axle Buses

A review of the UNECE regulations for the mass limits for two axle buses has shown that the European mass limit was approved for an increase from 18 to 19.5 tonnes for two axle buses on the 29 April 2015. This increase is detailed in the *COUNCIL DIRECTIVE 96/53/EC of 25 July 1996 laying down for certain road vehicles circulating within the Community the maximum authorized dimensions in national and international traffic and the maximum authorized weights in international traffic as amended by Directive (EU) 2015/719 of the European Parliament and of the Council of 29 April 2015,* a copy of which is provided in **Appendix B**.

The agreement from the European Parliament is detailed in the following extract from the Journal:

> *"On 13 May 2013 the Council, and on 18 April 2013 the European Parliament decided to consult the European Economic and Social Committee, under Article 91 of the Treaty on the Functioning of the European Union, on the Proposal for a Directive of the European Parliament and of the Council amending Directive 96/53/EC of 25 July 1996 laying down for certain road vehicles circulating within the Community the maximum authorised dimensions in national and international traffic and the maximum authorised weights in international traffic.*
>
> *Given the urgent nature of the work, the European Economic and Social Committee appointed Mr Ranocchiari as rapporteur-general at its 491st plenary session, held on 10 and 11 July 2013 (meeting of 11 July), and adopted the following opinion by 87 votes with 1 abstention."* [3]

[3] Official Journal of the European Union C 327/133 *COM(2013) 195 final/2 — 2013/0105 (COD)* (2013/C327/22) Rapporteur-General: **Mr RANOCCHIARI** , see Annexure A.

The specific approval for the two axle buses was based on the following:

> *"3.2 To grant a weight increase of one tonne for:*
>
> *— Two axle vehicles with electric or hybrid propulsion in order to provide allowances for battery weights and dual propulsion, without prejudice to the load capacity of those vehicles;*
>
> *— The same weight increase will be granted to the buses to take account of the increase of the average weight of passengers and their baggage, but also of the weight of the new on board safety devices. This will avoid reducing the number of passengers per coach."*[4]

As outlined in the passage above, the one tonne increase proposed in the EU was based on the increase in the average passenger weight and the increased tare mass for new buses. The final result was that **ALL** two axle buses were in fact provided with a 1.5t GVM increase to operate at 19.5t to take into account electric and hybrid propulsion vehicles as per clause 2.3.2 in the COUNCIL DIRECTIVE 96/53/EC of 25 July 1996 as amened 29 April 2015, **see attached at Appendix B**.

Whilst the EU regulation above applies to 2 axle buses, all of the same principles apply to 3 axle buses and coaches as outlined below.

Increased mass for hybrid propulsion and electric vehicles is an important issue that should be considered by the NTC as part of this review.

The BIC supports hybrid and electric vehicles being considered in their own separate category for GVM purposes.

4. NTC Questions

The NTC 3 axle discussion paper posed the following three questions:

- Question 1. Do you believe the suggested limits allow three-axle buses to run at full capacity, for both route services and charter services?
- Question 2. What would the increased cost of road wear be in your jurisdiction if the mass limits for three-axle buses were increased to the suggested limits?
- Question 3. Are you aware of any other issues (not raised in this paper) that you believe would have a negative impact on industry, government or the community, should the mass limits be raised as per the suggested options?

The BIC responses to each of these questions is provided in the following.

[4] Official Journal of the European Union C 327/133 *COM(2013) 195 final/2 — 2013/0105 (COD)* (2013/C327/22) Rapporteur-General: **Mr RANOCCHIARI**

4.1 The BIC Response to Question 1

BIC believes that the suggested higher limits are not appropriate and that the final agreed approach should be a National position used by all States and Territories as outlined below.

Furthermore, the BIC provides the following:

NTC Three Axle Paper Option of front 7 tonne, tandem (drive and tag with tyre above 375 mm) 16 tonnes:

- **BIC Response:** The BIC believes that the NTC proposal of *front axle: 7 tonnes, tandem, drive and tag 16 tonnes and a gross operating mass of 23 tonnes* is appropriate to allow three axle rigid single buses to run at full capacity, for both route services and charter services when carrying adult passengers with an average per passenger weight of 80 kg.

The assumed passenger mass of 80 kg is supported by the figures provided in Section 1.3.4 of the NTC report that states that the average weight of an adult male is 85.9 kg and the average adult female is 71.1 kg. The BIC notes that the proposed increase in luggage from 15 to 23 kg per person could have a minor adverse effect on passenger capacity.

The assumed passenger and luggage carrying capacity for the existing regulations of 65 kg and 15 kg for a gross of 20.5t compared to 80 kg and 23 kg for a gross of 23 tonne is detailed in Table 1. As is seen, there is a slight increase in passenger capacity, but the calculations used assume that the individual axle limits will not be reached prior to the gross limit being reached, however, this may not be the case.

Therefore, the BIC proposes that a 23-tonne limit, with 7 tonne front and 16 tonne rear axle set, when using 80 kg per passenger, is a realistic assessment of in-service bus weights of single deck 3 axle rigid buses.

Table 1 - Three Axle Bus 23 t Mass Analysis (Single Deck Buses)

Three Axle Buses	***Current ADR Processes***			***Proposed Gazette Change to 80 kg per person***		
	Based on Typical Current Tare Masses in kg			***Based on Typical Tare Mass Euro 6 (see note 1 and 2)***		
	Three Axle Low Floor Bus	High Floor No Luggage	High Floor with Luggage	Three Axle Low Floor Bus	High Floor No Luggage	High Floor with Seatbelts and Luggage
Typical Tare Mass Euro 5	14,300	14,500	14,500	14,650	14,850	15,350
Gross Limits	20,500	20,500	20,500	23,000	23,000	23,000
Effective Carrying Capacity	6,200	6,000	6,000	8,350	8,150	7,650
Passenger Mass	65	65	65	80	80	80
Luggage Allowance per Passenger Mass	0	0	15	0	0	23
Theoretical Gross Number of Passengers, *(see note 3).*	95	92	75	104	102	74
Potential Change in Number of Passengers based on similar mass distribution.				9	10	-1
Potential Change in Tare of the bus based on similar Mass distribution.				764	813	-62

Notes for Two Axle Buses
Note 1: Add 350 kg to the tare mass of each bus to account for Euro 6.
Note 2: Add 500 kg for seatbelts or if seat belts fitted, 500 kg for DDA wheelchair lift).
Note 3: To determine maximum increases, it is assumed that the passenger masses are able to be distributed throughout the bus such that the full gross limit of 23 tonne can be fully utilised with the available axle masses of 7 Tonne front and 16 tonne rear axle set. Plus, the per passenger standing area requirement of 6.25 persons per square metre has not been exceeded.

- **BIC Comment on 375 mm Wide Tyres:** The NTC paper is not clear that the wider 375 mm tyres are intended for the tag axle only, but the BIC has since confirmed with the NTC that the proposal is to specify 375 mm tyres on the tag axle for the higher operating mass option of 16 tonne on the rear axle set.

The feedback the BIC has received is that buses can be fitted with 375 mm minimum width tyres on the tag (these would typically be 385/65R22.5 type tyres), but consideration should be given that if the tag is a steerable tag, then the wider section tyre is not needed as the steerable tag system already reduces pavement wear when compared to a non-steerable tag.

Therefore, the BIC recommends that the NTC agree that the wider 375 mm wider tag tyres are not needed for a steerable tag and axle set to operate at the 16 tonne rear axle limit and the associated 23t GVM limit.

NTC Three Axle Paper Option of front 7 tonnes and tandem 14 tonnes:

- **BIC Response:** The BIC considers that the *limit of 7 tonne front and 14 tonne rear, with an assumed gross of 21 tonne* will dramatically reduce passenger carrying capacity if the 80 kg per person and 23 kg per person for luggage is taken into account.

Table 2 shows that, in a comparison between three different bus types, using 20.5 and 21 tonne with the higher per passenger mases would result in a loss in passenger capacity that varied from 15 to 20. This scenario is unacceptable.

The only way that the limit *of 7 tonne front and 14 tonne rear, with an assumed gross of 21 tonne* would be viable is if the average per passenger mass remained at 65 kg. However, buses are likely to carry passengers with an average mass of 80 kg and hence the 21t gross is likely to be exceeded.

Table 2 - Three Axle Bus 21 t Mass Analysis (Single Deck Buses)

Three Axle Buses	***Current ADR Processes***			***Proposed Gazette Change to 80 kg per person***		
	Based on Typical Current Tare Masses in kg			***Based on Typical Tare Mass Euro 6 (see note 1 and 2)***		
	Three Axle Low Floor Bus	High Floor No Luggage	High Floor with Luggage	Three Axle Low Floor Bus	High Floor No Luggage	High Floor with Seatbelts and Luggage
Typical Tare Mass Euro 5	14,300	14,500	14,500	14,650	14,850	15,350
Gross Limits	20,500	20,500	20,500	21,000	21,000	21,000
Effective Carrying Capacity	6,200	6,000	6,000	6,350	6,150	5,650
Passenger Mass	65	65	65	80	80	80
Luggage Allowance per Passenger Mass	0	0	15	0	0	23
Theoretical Gross Number of Passengers, *(see note 3).*	95	92	75	79	77	55
Potential Change in Number of Passengers based on similar mass distribution.				**-16**	**-15**	**-20**
Potential Change in Tare of the bus based on similar Mass distribution.				**-1361**	**-1312**	**-1712**

Notes for Two Axle Buses
Note 1: Add 350 kg to the tare mass of each bus to account for Euro 6.
Note 2: Add 500 kg for seatbelts or if seat belts fitted, 500 kg for DDA wheelchair lift).
Note 3: To determine maximum increases, it is assumed that the passenger masses are able to be distributed throughout the bus such that the full gross limit of 23 tonne can be fully utilised with the available axle masses of 7 Tonne front and 16 tonne rear axle set. Plus the per passenger standing area requirement of 6.25 persons per square metre has not been exceeded.

- **Further BIC Response:** The BIC considers that the limit of 7 tonne front and 14 tonne rear, with an assumed gross of 21 tonne, does not reflect current practice and is not practical. As outlined below NSW increased mass limits for these 3 axle buses to 22t in March 2018. This has not been considered in the NTC discussion paper but indicates a recognition in NSW of the real world problems of operating legally at 21 tonne. Having said that BIC believes that 22t in itself is still inadequate and support a 23t GVM limit.

- On 6 March 2018 NSW Minister for Roads, Maritime and Freight Melinda Pavey announced that the gross mass limit for three-axle buses (with dual tyred drive axle and a single tyred steerable or non-steerable tag axle with 295mm wide tyre) would increase from 20.5 to 22 tonnes. The technical requirements associated with this increase are **(See Appendix C for full details):**

The 15.5 tonnes six-tyred tandem axle group mass limit must be distributed across the two axles (comprised of a dual tyred axle and a single tyred tag axle) with a weight distribution ration of 60:40 i.e. 60% of the mass on the dual tyred axle and 40% of mass on the single tyred tag axle.

The single tyred tag axle must be fitted with minimum width 295/80R22.5 tyres or equivalent.

The drive axle must be fitted with 295/80R22.5 tyres or equivalent.

Comply with the following braking and stability control requirements. If a bus is fitted with an Identification Plate which indicates that the vehicle was manufactured:

a. before 1 January 2015, it must be fitted with a properly functioning:

   i. Anti-lock braking system; or

   ii. Electronic stability control

b. If a bus is fitted with an Identification Plate which indicates that the vehicle was manufactured on after 1 January 2015, it must be fitted with properly functioning:

   i. Anti-lock braking system and Electronic braking system; or

   ii. Electronic stability control

c. Compliance with the requirements of subclauses (a) and (b) must be verified by either:

   i. an Identification Plate issued by a person authorised by an Australian Road Authority to affix an Identification Plate; or

   ii. a Certificate verifying modifications issued by a person authorised by an Australian Road Authority to certify heavy vehicle modifications

The BIC believes that the NTC proposal should recognise the existing practices in regard to three axle buses, or we will in effect go backwards in terms of allowable operating masses.

- **BIC Question to the NTC:** The BIC asks the NTC to consider that any proposed changes have to meet, as a minimum, the current industry practices for three axle mass limits or industry will go backwards in terms of allowable operating masses.

  This will avoid the current situation where a bus that has a fully seated load and is operating at the NSW legal limit passes into say Victoria and due to the differing State based mass limits, this bus then becomes over mass once it has crossed the Victorian border.

4.2 The BIC Response to Question 2

In response to the question of road wear, the BIC provides the following:

- **BIC Response:** The BIC believes that there would be no significant effect on pavement wear for two reasons;
    - Firstly, it is already happening. Buses and coaches are already carrying passengers with an average mass of 80 kg per person, therefore the real world operating mass for three axle buses is 22t to 23t (depending on configuration).
    - Secondly, the paper in **Appendix A** lists pavement wear for a range of bus types and, as can be seen, the 22t 3 axle bus listed has a lower ESA per tonne then the currently legal two axle buses operating at 18t.
    - In regard to the use of wider tyres, the BIC reiterates that buses with steerable tag axles have much less pavement wear then a fixed tag type axle.

4.3 The BIC Response to Question 3

In response to the question of any other issues the BIC provides the following:

- **BIC Response:** The BIC notes that the NTC is not proposing to change the ADR limit of 65 kg per person. The BIC supports this position as the 65 kg figure is used in a range of ADR's that determine items such as seat strength, rollover compliance and double decker stability requirements.

  The BIC has released a guide to calculate passenger capacity for the 18t two axle bus configuration with an average mass of 80 kg per passenger, and we would suggest that similar methods could be used for the *7 tonnes, tandem 16 tonnes and a gross operating mass of 23 tonnes* option. But for the *limit of 7 tonne front and 14 tonne rear, with an assumed gross of 21 tonne* option, only the ADR per passenger mass of 65 kg could be used.

- **BIC Response Double Deckers:** The NTC paper is not clear as to which bus types are included, but the BIC assumption for the previous commentary is that the NTC are only intending this for single deck buses.

  If the NTC proposes to use the same axle limits for double decker buses, then there are two significant issues that have not been considered, firstly the existing NSW notice, Part 5 – Three axle double decker buses – New South Wales, of the Heavy Vehicle National Law New South Wales and Victoria Class 3 Bus Mass Limit Exemption (Notice) 2014 (No.1) Amendment Notice (No.1) 2016, allows for double decker buses the following:

    - for a steer axle – 6.5t
    - for a tandem axle group – 15.5t
    - Gross of 22 t.

  Note: The above increased mass limits apply to the B-Line double decker buses that are operating on the narrower 275 mm section tyres with a non-steering tag.

  As discussed in the NTC report, the above allows the B-Line double deckers in NSW to operate at a maximum passenger capacity of 100 people. Without an accurate tare mass and axle loading for the B-line buses the BIC cannot determine the actual effect of increasing the per passenger mass to

80 kg for these specific buses, but in simple terms, the NTC proposal adds 1 tonne to the gross as it goes from 22 tonne to 23 tonne, but for 100 passengers the added 15 kg per person would add 1.5 tonne, so there would likely be a reduction in capacity of at least 7 passengers.

If the NTC intends to recommend a limit for single steer double decker buses, when using an average per passenger mass of 80 kg, such a bus would need a gross in excess of 23 tonne.

The other issue is that the NTC paper does not consider the other double decker configuration of twin steer and single drive, as supplied to the Australian market. For these twin steer buses, an 80 kg per person loading would need the following axle loading allowances:

- 12 t front twin steer
- 12 t rear axle
- 23 t gross.

This is shown in table 3.

Table 3 - Double Decker Bus Mass Analysis, Twin Steer with Single Drive Axles

Double Decker Buses	***Current ADR Processes***	***Proposed Gazette Change to 85 kg per person***
	Based on Typical Current Tare Masses in kg	***Based on Typical Tare Mass Euro 6 (see note 2)***
	Double Decker Low Floor Bus	Double Decker Low Floor Bus
Typical Tare Mass Euro 5 *(see note 1)*	13000	13350
Gross Limits	21000	23000
Effective Carrying Capacity	7475	9475
Passenger Mass	65	80
Theoretical Gross Number of Passengers, *(see note 3).*	115	118
Potential Change in Number of Passengers based on similar mass distribution.		3
Potential Change in Tare of the bus based on similar mass distribution.		292

Notes for Double Decker Bus Twin Steer
Note 1: Tare and gross capacity from Bustech web page
Note 2: Add 350 kg to the tare mass of each bus to account for Euro 6 plus general tare increases due to EBS, ESC etc.
Note 3: For double decker buses the proposed axle limits are 12 Tonne front dual steer with load sharing suspension and 12 tonne rear axle combination with a gross of 23 tonne.

- **BIC Response Distribution of Weight Across the Tandem Axle:** The BIC believes that the weight distribution across the rear axle set should be in accordance with the manufacturer's recommendation as opposed to a set ratio. The reason for this is that:

- Manufacturers must comply with their respective axle limits and tyre load limit combinations, so they will have set distribution ratios.

- These ratios also effect other issues with the chassis such as braking and stability programming.

- **BIC Response Braking Technology:** The BIC has reviewed the issue of advanced braking and stability control systems as they apply to both older and newer buses and high or low floor buses.

The BIC agrees with the current agreed position of the NHVR and NSW regarding advanced braking and stability systems, as per the following:

> *(1) An eligible vehicle manufactured before 1 January 2015 must be fitted with either—*
>
> *(a) an ABS that complies with ADR 35/04 or later; or*
>
> *(b) an ESC system that complies with UN ECE R13.*
>
> *(2) An eligible vehicle manufactured on or after 1 January 2015 must be fitted with either—*
>
> *(a) an ABS that complies with ADR 35/04 or later and an EBS that complies with UN ECE R13; or*
>
> *(b) an ESC system that complies with –*
>
> *(i) for a vehicle to which ADR 35/06 applies – ADR 35/06; or*
>
> *(ii) for another vehicle – UN ECE R13.*
>
> *(3) The manufacture date of an eligible vehicle is the date shown on its identification plate.*

5 Summary and Recommendations

Overall the BIC supports the NTC review of 3 axle bus mass limits. When the real world per passenger mass limit of 80 kg per person is applied, the following axle and gross limits are recommended by the BIC:

Bus Type	Front Axle – Description and Limit	Centre Axle	Rear Axle – Description and Limit	Total Operating Mass
Two Axle Bus	7 tonne		12 tonne	18 tonne
Two Axle Hybrid or Electric Powered	7 tonne		13 tonne	19 tonne
Three axle Bus	7 tonne		Tag and dual with steer tag - 16 tonne	23 tonne
Double Decker Twin Steer Bus	11 tonne twin steer		12 tonne	23 tonne
Double Decker Single Steer axle Bus	7 tonne		Tag and dual with steer tag – greater than 16 tonne	Greater than 23 tonne
Articulated Single Deck Bus	7 tonne	11 tonne	12 tonne	26 tonne

Appendix A Bus Pavement Wear Analysis

ADVANTIA
TRANSPORT CONSULTING

Advantia Transport Consulting Pty Ltd

30/240 Plenty Road
Bundoora VIC 3083
Australia

PO Box 145
Diamond Creek VIC 3089
Australia

T +61 3 9438 6790

contact@advantia.com.au
www.advantia.com.au

Our ref: ATC0115-01-01

24 June 2016

To: Bus Industry Confederation Technical Committee

Pavement wear analysis for various bus axle/tyre configurations

This letter outlines a pavement wear analysis prepared for the Bus Industry Confederation Technical Committee to demonstrate the difference in pavement wear attributed to buses with various axle and tyre configurations, taking into account the number of axles, the load on each axle, the number of tyres on each axle, and tyre section width.

Technical background

The amount of wear that develops in a pavement due to the passing of a heavy vehicle can be estimated using the Standard Axle Repetition (SAR) approach. The SAR approach considers that one unit of pavement wear is the amount of wear caused by one pass of a standard axle, being a single axle with dual tyres that is laden to 80 kN (8.16 tonnes). According to Austroads[1] the amount of wear caused by one pass of a vehicle with various axle group types laden to various axle group loads is equal to the wear caused by an equivalent number of passes of a standard axle (i.e. standard axle repetitions, or SAR) using the formula:

$$\mathrm{SAR} = \sum_{i=1}^{m} (\mathrm{L}_i / SL_i)^n$$

where:

Li = load carried by axle group *i* in tonnes

SLi = standard load for axle group *i* in tonnes (see Table 1) – if the axle group happens to be at this load it produces one unit of pavement wear

n = pavement wear exponent, which may vary from 4 to 12 depending on the pavement distress type (typically 4 for overall wear of unbound granular pavements by rutting, for which the calculation is termed 'Equivalent Standard Axles' or ESA)

m = number of axle groups on the vehicle.

Table 1 lists the standard load applicable to various axle and tyre configurations.

Table 1: Standard load by axle group type

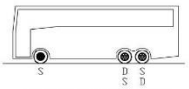
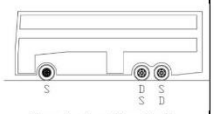
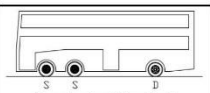
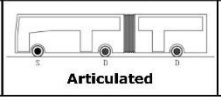
Axle group type	Tyre width 'W' (mm)	Standard load (tonnes)
Single axle with single tyres	W < 375 375 ≤ W < 450	5.40 5.92
Tandem axle with single tyres	W < 375 375 ≤ W < 450	9.18 9.96
Single axle with dual tyres	W < 375	8.16
Tandem axle with dual tyres	W < 375	13.77

[1] Austroads 2011, *Pavement Wear Assessment Method for PBS Vehicles*, AP-R372/11, Austroads, Sydney.

1

Calculations for typical bus configurations are shown in Table 2. They consider various axle configurations, axle loads and tyre configurations. The Total ESA and ESA per tonne may be used to compare the pavement wear effects of the vehicles.

Table 2: ESA calculations

	Configuration	Axle loads	Tyre specification	Standard loads	Total ESA	ESA per tonne
A	 **2-axle**	**18.0 tonnes GVM** 1. 7.00 + 11.00 2. 6.00 + 12.00	FA 275 or 295 DA 275 or 295	5.40 + 8.16	1. 6.13 2. 6.20	1. 0.34 2. 0.34
B	 **3-axle single deck**	**20.5 tonnes GVM** 6.50 + (9.33 + 4.67)* (Current mass limits)	FA 275 or 295 DA 275 or 295 TA 275 or 295	5.40 + (8.16 + 5.40)*	4.37	0.21
C	 **3-axle double deck**	**22.0 tonnes GVM** 6.50 + (10.33 + 5.17)*	FA 275 or 295 DA 275 or 295 TA 275 or 295	5.40 + (8.16 + 5.40)*	5.51	0.25
			FA 275 or 295 DA 275 or 295 TA 305	5.40 + (8.16 + 5.40)*	5.51	0.25
			FA 275 or 295 DA 275 or 295 TA 385 (Wide Tyre)	5.40 + (8.16 + 5.92)*	5.25	0.24
D	 **3-axle double deck (twin steer)**	**22.0 tonnes GVM** 11.00 + 11.00	FA 275 or 295 FA2 275 or 295 DA 275 or 295	9.18 + 8.16	5.36	0.24
E	 **Articulated**	**26.0 tonnes GVM** 6.50 + 7.50 + 12.00	FA 275 or 295 CA 275 or 295 DA 275 or 295	5.40 + 8.16 + 8.16	7.49	0.29

Notes:

FA = Front Axle
FA2 = Second Front Axle
DA = Drive Axle
CA = Centre Axle
TA = Tag or Pusher Axle
S = Single Tyres
D = Dual Tyres

*Austroads recommends treating a six-tyred-tandem as the summation of a single axle with dual tyres and a single axle with single tyres.

If you have any questions about this analysis, please feel free to contact me.

Yours sincerely

Rob Di Cristoforo
Managing Director

Appendix B COUNCIL DIRECTIVE 96/53/EC of 25 July 1996 as Amended

1996L0053 — EN — 26.05.2015 — 002.001 — 1

►B

COUNCIL DIRECTIVE 96/53/EC

of 25 July 1996

laying down for certain road vehicles circulating within the Community the maximum authorized dimensions in national and international traffic and the maximum authorized weights in international traffic

(OJ L 235, 17.9.1996, p. 59)

Amended by:

		Official Journal		
		No	page	date
►M1	Directive 2002/7/EC of the European Parliament and of the Council of 18 February 2002	L 67	47	9.3.2002
►M2	Directive (EU) 2015/719 of the European Parliament and of the Council of 29 April 2015	L 115	1	6.5.2015

▼B

COUNCIL DIRECTIVE 96/53/EC

of 25 July 1996

laying down for certain road vehicles circulating within the Community the maximum authorized dimensions in national and international traffic and the maximum authorized weights in international traffic

THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty establishing the European Community, and in particular Article 75 thereof,

Having regard to the proposal from the Commission (1),

Having regard to the opinion of the Economic and Social Committee (2),

Acting in accordance with the procedure laid down in Article 189c of the Treaty (3),

(1) Whereas Council Directive 85/3/EEC of 19 December 1984 on the weights, dimensions and certain other technical characteristics of certain road vehicles (4) established, in the framework of the common transport policy, common standards permitting improved use of road vehicles in traffic between Member States;

(2) Whereas Directive 85/3/EEC has been significantly amended on many occasions; whereas on the occasion of its further amendment it should for reasons of clarity and rationality be recast in a single text together with Council Directive 86/364/EEC of 24 July 1986 relating to proof of compliance of vehicles with Directive 85/3/EEC (5);

(3) Whereas differences between standards in force in the Member States with regard to the weights and dimensions of commercial road vehicles could have an adverse effect on the conditions of competition and constitute an obstacle to traffic between Member States;

(4) Whereas, under the principle of subsidiarity, action should be taken at Community level in order to remove this obstacle;

(5) Whereas the abovementioned standards reflect a balance between the rational and economical use of commercial road vehicles and the requirements of infrastructure maintenance, road safety and the protection of the environment and the fabric of live;

(1) OJ No C 38, 8. 2. 1994, p. 3 and OJ NO C 247, 23. 9. 1995, p. 1.
(2) OJ No C 295, 22. 10. 1994, p. 72.
(3) Opinion of the European Parliament delivered on 15 November 1994 (OJ No C 341, 5. 12. 1994, p. 39), Council common position of 8 December 1995 (OJ No C 356, 30. 12. 1995, p. 13), and Decision of the European Parliament of 14 March 1996 (OJ No C 96, 4. 4. 1996, p. 233).
(4) OJ No L 2, 3. 1. 1985, p. 14. Directive as last amended by Directive 92/7/EEC (OJ No L 57, 2. 3. 1992, p. 29).
(5) OJ No L 221, 7. 8. 1986, p. 48).

▼B

(6) Whereas common standards on the dimensions of vehicles intended for the carriage of goods should remain stable in the long term;

(7) Whereas additional technical requirements related to the weights and dimensions of vehicles may apply to commercial vehicles registered or put into circulation in a Member State; whereas these requirements must not constitute an obstacle to the circulation of commercial vehicles between Member States;

(8) Whereas the definition of 'thick-walled refrigerated vehicle' in Article 2 of Directive 85/3/EEC, as amended by Directive 89/388/EEC (1), should be broadened in order to permit Member States to allow refrigerated vehicles no longer meeting the insulation requirements defined in that Article to circulate in their territory;

(9) Whereas it is necessary to clarify the concept of 'indivisible load' in order to ensure uniform application of this Directive in respect of permits for vehicles or vehicle combinations carrying such loads;

(10) Whereas the tonne is universally used and understood as the unit of measurement for vehicle weight and is, therefore, applied in this Directive whilst recognizing that the formal unit of weight is the newton;

(11) Whereas, in implementation of the internal market, the scope of this Directive should be extended to national transport insofar as it concerns characteristics that significantly affect the conditions of competition in the transport sector and in particular the values relating to the maximum authorized length and width of vehicles and vehicle combinations intended for the carriage of goods;

(12) Whereas, for the other vehicle characteristics, Member States are authorized to apply in their territory different values from those laid down in this Directive only to vehicles used in national traffic;

(13) Whereas road trains using extensible coupling systems in practice attain a maximum length of 18,75 m when fully extended; whereas the same maximum length should be authorized for road trains using fixed coupling systems;

(14) Whereas the maximum authorized width of 2,50 m for vehicles intended for the carriage of goods can leave insufficient internal space for the efficient loading of pallets, which has given rise to the application of different tolerances beyond that level in the legislation of the Member States concerning domestic traffic; whereas a general adaptation to the current situation is therefore necessary in order to provide for clarity in technical requirements, bearing in mind the road safety aspects of these characteristics;

(1) OJ No L 142, 25. 5. 1989, p. 3.

▼B

(15) Whereas if the maximum width of vehicles intended for the carriage of goods is increased to 2,55 m, that standard should also be applied to buses; whereas, in respect of buses, it is however necessary to provide for a transitional period to allow the manufacturers concerned to adapt industrial plant;

(16) Whereas, to prevent excessive road damage and to ensure manoeuvrability, when authorizing and using vehicles preference should be given to pneumatic or equivalent suspension rather than mechanical suspension; whereas certain maximum axle loads should not be exceeded, and the vehicle must be capable of turning through 360° within certain limit values for the path followed;

(17) Whereas Member States should be permitted, in national goods transport, to allow vehicles or vehicle combinations with dimensions deviating from those laid down in this Directive to circulate in their territory if the transport operations carried out by such vehicles are defined by this Directive as not significantly affecting international competition in the transport sector, i.e. operations carried out by specialized vehicles and operations carried out according to a modular concept;

(18) Whereas, in the case of modular concept operations, there should be provision for a transitional period to enable a Member State to adapt its road infrastructure;

(19) Whereas vehicles or vehicle combinations constructed applying new technologies or new concepts, according to standards which deviate from those laid down by this Directive, should be allowed to carry out local transport operations for a trial period to enable profit to be drawn from technical progress;

(20) Whereas vehicles which entered into service before the date of implementation of this Directive and which do not comply with the dimension characteristics laid down in this Directive, owing to previously differing national provisions or methods of measurement, should be allowed for a transitional period to continue to provide transport services within the Member State in which the vehicle is registered or put into circulation;

(21) Whereas progress has been made towards adopting Type-Approval Directives for vehicle combinations with five or six axles; whereas, the requirements regarding conformity with characteristics other than weights and dimensions as laid down in Annex II of Directive 85/3/EEC should therefore be deleted;

(22) Whereas such a modification is also necessary in order to avoid rules conflicting with international conventions on road traffic and circulation;

(23) Whereas in order to facilitate the monitoring of compliance with this Directive, it is necessary to ensure that vehicles carry proof of such compliance;

▼B

(24) Whereas this Directive does not affect the obligations of the Member States concerning the deadlines for transposition into national law and for application of the Directives which this Directive replaces,

HAS ADOPTED THIS DIRECTIVE:

Article 1

1. This Directive applies to:

▼M2

(a) the dimensions of motor vehicles in categories M2 and M3 and their trailers in category 0 and motor vehicles in categories N2 and N3 and their trailers in categories 03 and 04, as defined in Annex II to Directive 2007/46/EC of the European Parliament and of the Council (1);

▼B

(b) the weights and certain other characteristics of the vehicles defined in (a) and specified in Annex I (2) to this Directive.

2. All the values of weights indicated in Annex I are valid as circulation standards and thus refer to loading conditions, not production standards, which will be defined in a later Directive.

▼M1

3. This Directive shall not apply to articulated buses comprising more than one articulated section.

▼B

Article 2

For the purposes of this Directive:

— 'motor vehicle' shall mean any power-driven vehicle which travels on the road by its own means,

— 'trailer' shall mean any vehicle intended to be coupled to a motor vehicle excluding semi-trailers, and constructed and equipped for the carriage of goods,

— 'semi-trailer' shall mean any vehicle intended to be coupled to a motor vehicle in such a way that part of it rests on the motor vehicle with a substantial part of its weight and of the weight of its load being borne by the motor vehicle, and constructed and equipped for the carriage of goods,

— 'vehicle combination' shall mean either:

  — a road train consisting of a motor vehicle coupled to a trailer; or

  — an articulated vehicle consisting of a motor vehicle coupled to a semi-trailer,

(1) Directive 2007/46/EC of the European Parliament and of the Council of 5 September 2007 establishing a framework for the approval of motor vehicles and their trailers, and of systems, components and separate technical units intended for such vehicles (Framework Directive) (OJ L 263, 9.10.2007, p. 1).

▼B

— 'conditoned vehicle' shall mean any vehicle whose fixed or movable superstructures are specially equipped for the carriage of goods at controlled temperatures and whose side walls, inclusive of insulation, are each at least 45 mm thick,

— 'bus' shall mean a vehicle with more than nine seats including the driver's seat, constructed and equipped to carry passengers and their luggage. It may have one or two decks and may also draw a luggage trailer,

— 'articulated bus' shall mean a bus consisting of two rigid sections connected to each other by an articulated section. On this type of vehicle the passenger compartments in each of the two rigid sections shall be intercommunicating. The articulated section shall permit the free movement of travellers between the rigid sections. Connection and disconnection of the two sections shall be possible only in a workshop,

— 'maximum authorized dimensions' shall mean the maximum dimensions for use of a vehicle, as laid down in Annex I to this Directive,

— 'maximum authorized weight' shall mean the maximum weight for use of a laden vehicle in international traffic,

— 'maximum authorized axle weight' shall mean the maximum weight for use in international traffic of a laden axle or group of axles,

— 'indivisible load' shall mean a load that cannot, for the purpose of carriage by road, be divided into two or more loads without undue expense or risk of damage and which owing to its dimensions or mass cannot be carried by a motor vehicle, trailer, road train or articulated vehicle complying with this Directive in all respects,

— 'tonne' shall mean the weight executed by the mass of a tonne and shall correspond to 9,8 kilonewtons (kN),

▼M2

— 'alternative fuels' shall mean fuels or power sources which serve, at least partly, as a substitute for fossil oil sources in the energy supply to transport and which have the potential to contribute to its decarbonisation and enhance the environmental performance of the transport sector, consisting of:

(a) electricity consumed in all types of electric vehicles;

(b) hydrogen;

(c) natural gas, including biomethane, in gaseous form (Compressed Natural Gas — CNG) and liquefied form (Liquefied Natural Gas — LNG);

(d) Liquefied Petroleum Gas (LPG);

(e) mechanical energy from on-board storage/on-board sources, including waste heat,

▼M2

— 'alternatively fuelled vehicle' shall mean a motor vehicle powered wholly or in part by an alternative fuel and which has been approved under the framework of Directive 2007/46/EC,

— 'intermodal transport operation' shall mean:

(a) the combined transport operations defined in Article 1 of Council Directive 92/106/EEC (1) engaged in the transport of one or more containers or swap bodies, up to a total maximum length of 45 feet; or

(b) transport operations engaged in the transport of one or more containers or swap bodies, up to a total maximum length of 45 feet, using waterborne transport, provided that the length of the initial or the final road leg does not exceed 150 km in the territory of the Union. The distance of 150 km referred to above may be exceeded in order to reach the nearest suitable transport terminal for the envisaged service in the case of:

(i) vehicles complying with point 2.2.2(a) or (b) of Annex I; or

(ii) vehicles complying with point 2.2.2(c) or (d) of Annex I, in cases where such distances are permitted in the relevant Member State.

For intermodal transport operations, the nearest suitable transport terminal providing a service may be located in a Member State other than the Member State in which the shipment was loaded or unloaded,

— 'shipper' shall mean a legal entity or a natural or legal person who is named on the bill of lading or on an equivalent transport document, such as a 'through' bill of lading, as the shipper and/or in whose name or on whose behalf a contract of carriage has been concluded with the transport company.

▼B

All maximum authorized dimensions specified in Annex I shall be measured in accordance with Annex I to ►M2 Directive 2007/46/EC ◄, with no positive tolerances.

Article 3

1. A Member State may not reject or prohibit the use in its territory:

— in international traffic, of vehicles registered or put into circulation in any other Member State for reasons relating to their weights and dimensions,

▼M1

— in national traffic, of vehicles registered or put into circulation in any other Member State for reasons relating to their dimensions,

▼B

provided that such vehicles comply with the limit values specified in Annex I.

(1) Council Directive 92/106/EEC of 7 December 1992 on the establishment of common rules for certain types of combined transport of goods between Member States (OJ L 368, 17.12.1992, p. 38).

▼B

This provision shall apply notwithstanding the fact that:

(a) the said vehicles are not in conformity with the requirements of that Member State with regard to certain weight and dimension characteristics not covered by Annex I;

(b) the competent authority of the Member State in which the vehicles are registered or put into circulation has authorized limits not referred to in Article 4 (1) exceeding those laid down in Annex I.

2. However, paragraph 1 (a) shall not affect the right of Member States, with due regard to Community law, to require vehicles registered or put into circulation in their own territory to be in conformity with their national requirements on weight and dimension characteristics not covered by Annex I.

3. Member States may require conditioned vehicles to carry an ATP certificate or ATP certification plate provided for in the Agreement of 1 September 1970 on the international carriage of perishable foodstuffs and on the special equipment to be used for such carriage.

Article 4

▼M1

1. Member States shall not authorise the normal circulation within their territories:

(a) of vehicles or vehicle combinations for the national transport of goods which are not in conformity with the characteristics set out in points 1.1, 1.2, 1.4, 1.5, 1.6, 1.7, 1.8, 4.2 and 4.4 of Annex I;

(b) of vehicles for national passenger transport, which are not in conformity with the characteristics set out in points 1.1, 1.2, 1.4a, 1.5 and 1.5a of Annex I.

2. Member States may nonetheless authorise the circulation within their territories:

(a) of vehicles or vehicle combinations for the national transport of goods which are not in conformity with the characteristics set out in points 1.3, 2, 3, 4.1 and 4.3 of Annex I;

(b) of vehicles for national passenger transport, which are not in conformity with the characteristics set out in points 1.3, 2, 3, 4.1 and 4.3 of Annex I.

▼B

3. Vehicles or vehicle combinations which exceed the maximum dimensions may only be allowed to circulate on the basis of special permits issued without discrimination by the competent authorities, or on the basis of similar non-discriminatory arrangements agreed on a case-by-case basis with those authorities, where these vehicles or vehicle combinations carry or are intended to carry indivisible loads.

▼B

4. Member States may allow ►M1 vehicles or vehicle combinations used for transport which ◄ carry out certain national transport operations that do not significantly affect international competition in the transport sector to circulate in their territory with dimensions deviating from those laid down in points 1.1, 1.2, 1.4 to 1.8, 4.2 and 4.4 of Annex I.

Transport operations shall be considered not significantly to affect international competition in the transport sector if one of the conditions under (a) and (b) is fulfilled:

(a) the transport operations are carried out in a Member State's territory by specialized vehicles or specialized vehicle combinations in circumstances in which they are not normally carried out by vehicles from other Member States, e.g. operations linked to logging and the forestry industry;

(b) the Member State which permits transport operations to be carried out in its territory by vehicles or vehicle combinations with dimensions deviating from those laid down in Annex I also permits motor vehicles, trailers and semi-trailers which comply with the dimensions laid down in Annex I to be used in such combinations as to achieve at least the loading length authorized in that Member State, so that every operator may benefit from equal conditions of competition (modular concept).

▼M2 _____

▼B

5. Member States may allow vehicles or vehicle combinations incorporating new technologies or new concepts which cannot comply with one or more requirements of this Directive to carry out certain local transport operations for a trial period. Member States shall inform the Commission thereof.

▼M2 _____

▼M1

7. Until 31 December 2020 Member States may authorise buses that were registered or put into circulation before the implementation of this Directive but the dimensions of which exceed those laid down in points 1.1, 1.2, 1.5 and 1.5a of Annex I to circulate within their territories.

▼M2

Article 5

Articulated vehicles put into circulation before 1 January 1991 which do not comply with the specifications contained in points 1.6 and 4.4 of Annex I shall be deemed to comply with such specifications for the purposes of Article 3 if they do not exceed a total length of 15,50 m.

▼B

Article 6

1. Member States shall take the necessary measures to ensure that Article 1 vehicles referred to in Article 1 and complying with this Directive carry one of the proofs referred to in (a), (b) and (c):

▼B

(a) a combination of the following two plates:

— the 'manufacturer's plate' established and attached in accordance with Directive 76/114/EEC (1),

— the plate relating to dimensions, in accordance with Annex III, established and attached in accordance with Directive 76/114/EEC;

(b) a single plate established and attached in accordance with Directive 76/114/EEC and containing the information on the two plates referred to in (a);

(c) a single document issued by the competent authorities of the Member State in which the vehicle is registered or put into circulation. Such document shall bear the same headings and information as the plates referred to in (a). It shall be kept in a place easily accessible to inspection and shall be adequately protected.

2. If the characteristics of the vehicle no longer correspond to those indicated on the proof of compliance, the Member State in which the vehicle is registered shall take the necessary steps to ensure that the proof of compliance is altered.

3. The plates and documents referred to in paragraph 1 shall be recognized by the Member States as the proof of vehicle compliance provided for in this Directive.

4. Vehicles carrying proof of compliance may be subject:

— as regards common standards on weights, to random checks,

— as regards common standards on dimensions, only to checks where there is a suspicion of non-compliance with this Directive.

5. The middle column of the proof of compliance relating to weights shall contain, where appropriate, the Community weight standards applicable to the vehicle in question. As regards vehicles referred to in point 2.2.2 (c) of Annex I, the entry '44 tonnes' shall be included in brackets under the maximum authorized weight of the vehicle combination.

6. Each Member State may decide, in respect of any vehicle registered or put into circulation in its territory, that the maximum weights authorized by its national legislation shall be indicated in the proof of compliance in the left-hand column and the technically permissible weights in the right-hand column.

▼M1

Article 7

This Directive shall not preclude the application of road traffic provisions in force in each Member State which permit the weight and/or dimensions of vehicles on certain roads or civil engineering structures to be limited, irrespective of the State of registration of such vehicles or the State where such vehicles were put into circulation.

(1) OJ No L 24, 30. 1. 1976, p. 1. Directive as amended by Commission Directive 78/507/EEC (OJ No L 155, 13. 6. 1978, p. 31).

▼M1

This includes the possibility to impose local restrictions on maximum authorised dimensions and/or weights of vehicles that may be used in specified areas or on specified roads, where the infrastructure is not suitable for long and heavy vehicles, such as city centres, small villages or places of special natural interest.

▼M2

Article 8b

1. With the aim of improving their energy efficiency, vehicles or vehicle combinations which are equipped with aerodynamic devices meeting the requirements laid down in paragraphs 2 and 3, and which comply with Directive 2007/46/EC, may exceed the maximum lengths provided for in point 1.1 of Annex I to this Directive, to allow the addition of such devices to the rear of vehicles or vehicle combinations. Vehicles or vehicle combinations equipped with such devices shall comply with point 1.5 of Annex I to this Directive, and any exceeding of the maximum lengths shall not result in an increase in the loading length of those vehicles or vehicle combinations.

2. Before being placed on the market, the aerodynamic devices referred to in paragraph 1 exceeding 500 mm in length shall be type-approved in accordance with the rules on type-approval within the framework of Directive 2007/46/EC.

By 27 May 2017, the Commission shall assess the need to adopt or amend any technical requirements for type-approval of aerodynamic devices laid down within that framework taking into account the need to ensure road safety and the safety of intermodal transport operations, and in particular:

(a) the secure attachment of the devices in such a way as to reduce the risk of their becoming detached over time, including during an intermodal transport operation;

(b) the safety of other road users, especially vulnerable road users, by ensuring, inter alia, the visibility of contour markings when aerodynamic devices are fitted, by adapting the indirect vision requirements and, in the event of a collision with the rear of a vehicle or a vehicle combination, by not compromising rear underrun protection.

To that end, the Commission shall submit, as appropriate, a legislative proposal to amend the relevant rules on type-approval within the framework of Directive 2007/46/EC.

3. The aerodynamic devices referred to in paragraph 1 shall fulfil the following operational conditions:

(a) in circumstances where the safety of other road users or of the driver is at risk, they shall be folded, retracted or removed by the driver;

(b) their use on urban and inter urban road infrastructures shall take into account the special characteristics of areas where the speed limit is less than or equal to 50 km/h and where vulnerable road users are more likely to be present; and

▼M2

(c) their use shall be compatible with intermodal transport operations and, in particular, when retracted/folded, they shall not exceed the maximum authorised length by more than 20 cm.

4. The Commission shall adopt implementing acts laying down detailed provisions ensuring uniform conditions for the implementation of paragraph 3. Those implementing acts shall be adopted in accordance with the examination procedure referred to in Article 10i(2).

5. Paragraph 1 shall apply from the date of transposition or application of the necessary amendments to the instruments referred to in paragraph 2, and after the adoption of the implementing acts referred to in paragraph 4, as appropriate.

Article 9a

1. With the aim of improving energy efficiency, in particular as regards the aerodynamic performance of cabs, as well as road safety, vehicles or vehicle combinations which fulfil the requirements laid down in paragraph 2 and which comply with Directive 2007/46/EC may exceed the maximum lengths laid down in point 1.1 of Annex I to this Directive provided that their cabs deliver improved aerodynamic performance, energy efficiency and safety performance. Vehicles or vehicle combinations equipped with such cabs shall comply with point 1.5 of Annex I to this Directive and any exceeding of the maximum lengths shall not result in an increase in the load capacity of those vehicles.

2. Before being placed on the market, the vehicles referred to in paragraph 1 shall be approved in accordance with the rules on type-approval within the framework of Directive 2007/46/EC. By 27 May 2017, the Commission shall assess the need to develop the technical requirements for type-approval of vehicles equipped with such cabs as laid down within that framework, taking into account the following:

(a) the improved aerodynamic performance of vehicles or vehicle combinations;

(b) vulnerable road users, and improvement of their visibility to drivers, in particular by reducing drivers' blind spots;

(c) the reduction in damage or injury caused to other road users in the event of a collision;

(d) the safety and comfort of drivers.

To that end, the Commission shall submit, as appropriate, a legislative proposal to amend the relevant rules on type-approval within the framework of Directive 2007/46/EC.

3. Paragraph 1 shall apply from 3 years after the date of transposition or application of the necessary amendments to the instruments referred to in paragraph 2, as appropriate.

▼B

Article 10

The Directive listed in Annex IV, Part A, shall be repealed with effect from the date in Article 11, without prejudice to the obligations of the Member States concerning the deadlines for transposition set out in Annex IV, Part B.

References to the repealed Directives shall be construed as references to this Directive and shall be read in accordance with the correlation table set out in Annex V.

▼M2

Article 10b

The maximum authorised weights of alternatively fuelled vehicles shall be those set out in points 2.3.1, 2.3.2 and 2.4 of Annex I.

Alternatively fuelled vehicles shall also comply with the maximum authorised axle weight limits set out in point 3 of Annex I.

The additional weight required by alternatively fuelled vehicles shall be defined on the basis of the documentation provided by the manufacturer when the vehicle in question is approved. That additional weight shall be indicated in the official proof required in accordance with Article 6.

The Commission shall be empowered to adopt delegated acts in accordance with Article 10h to update, for the purposes of this Directive, the list of alternative fuels referred to in Article 2 that require additional weight. It is of particular importance that the Commission follow its usual practice and carry out consultations with experts, including Member States' experts, before adopting those delegated acts.

Article 10c

The maximum lengths laid down in point 1.1 of Annex I, subject where applicable to Article 9a(1), and the maximum distance laid down in point 1.6 of Annex I, may be exceeded by 15 cm for vehicles or vehicle combinations engaged in the transport of 45-foot containers or 45-foot swap bodies, empty or loaded, provided that the road transport of the container or swap body in question is part of an intermodal transport operation.

Article 10d

1. By 27 May 2021, Member States shall take specific measures to identify vehicles or vehicle combinations in circulation that are likely to have exceeded the maximum authorised weight and that should therefore be checked by their competent authorities in order to ensure compliance with the requirements of this Directive. Those measures may be taken with the aid of automatic systems set up on the road infrastructure, or by means of on-board weighing equipment installed in vehicles in accordance with paragraph 4.

A Member State shall not require on-board weighing equipment to be installed on vehicles or vehicle combinations which are registered in another Member State.

▼M2

Without prejudice to Union and national law, where automatic systems are used to establish infringements of this Directive and to impose penalties, such automatic systems shall be certified. Where automatic systems are used only for identification purposes, they need not be certified.

2. Each Member State shall carry out each calendar year an appropriate number of checks on the weight of vehicles or vehicle combinations in circulation, proportionate to the total number of vehicles inspected each year in its territory.

3. Member States shall, in accordance with Article 18 of Regulation (EC) No 1071/2009 of the European Parliament and of the Council (1)*, ensure that their competent authorities exchange information about infringements and penalties relating to this Article.

4. The on-board weighing equipment referred to in paragraph 1 shall be accurate and reliable, fully interoperable and compatible with all vehicle types.

5. By 27 May 2016, the Commission shall adopt implementing acts, laying down detailed provisions ensuring uniform conditions for the implementation of the rules on interoperability and compatibility set out in paragraph 4.

In order to ensure interoperability, those detailed provisions shall enable the weight data to be communicated at any time from a moving vehicle to the competent authorities, as well as to its driver. That communication shall be done through the interface defined by the CEN DSRC standards EN 12253, EN 12795, EN 12834, EN 13372 and ISO 14906. In addition, such communication shall ensure that the competent authorities of the Member States can communicate and exchange information in the same way with vehicles and vehicle combinations registered in any Member State and using on-board weighing equipment.

In order to ensure compatibility with all vehicle types, on-board systems of motor vehicles shall have the capability to receive and process any data coming from any type of trailer or semi-trailer attached to the motor vehicle.

Those implementing acts shall be adopted in accordance with the examination procedure referred to in Article 10i(2).

Article 10e

Member States shall lay down rules on penalties applicable to infringements of this Directive and shall take all measures necessary to ensure that they are implemented. Those penalties shall be effective, non-discriminatory, proportionate and dissuasive. Member States shall notify those rules to the Commission.

(1)* Regulation (EC) No 1071/2009 of the European Parliament and of the Council of 21 October 2009 establishing common rules concerning the conditions to be complied with to pursue the occupation of road transport operator and repealing Council Directive 96/26/EC (OJ L 300, 14.11.2009, p. 51).

▼M2

Article 10f

1. For the transport of containers and swap bodies, Member States shall lay down rules that require:

(a) the shipper to give to the haulier to whom it entrusts the transport of a container or swap body a statement indicating the weight of the container or swap body transported; and

(b) the haulier to provide access to all relevant documentation provided by the shipper.

2. Member States shall lay down rules on the liability of both the shipper and the haulier as appropriate in cases where the information referred to in paragraph 1 is missing or is incorrect and the vehicle or vehicle combination is overloaded.

Article 10g

Every 2 years, and at the latest by 30 September of the year following the end of the 2-year period concerned, Member States shall send to the Commission the necessary information concerning:

(a) the number of checks carried out in the previous 2 calendar years; and

(b) the number of overloaded vehicles or vehicle combinations detected.

This information may be part of the information submitted under Article 17 of Regulation (EC) No 561/2006 of the European Parliament and of the Council (2)*.

The Commission shall analyse the information received pursuant to this Article, and shall include such analysis in the report to be forwarded to the European Parliament and to the Council pursuant to Regulation (EC) No 561/2006.

Article 10h

1. The power to adopt delegated acts is conferred on the Commission subject to the conditions laid down in this Article.

2. The power to adopt delegated acts referred to in Article 10b shall be conferred on the Commission for a period of 5 years from 26 May 2015. The Commission shall draw up a report in respect of the delegation of power not later than 9 months before the end of the 5-year period. The delegation of power shall be tacitly extended for periods of an identical duration, unless the European Parliament or the Council opposes such extension not later than 3 months before the end of each period.

(2)* Regulation (EC) No 561/2006 of the European Parliament and of the Council of 15 March 2006 on the harmonisation of certain social legislation relating to road transport and amending Council Regulations (EEC) No 3821/85 and (EC) No 2135/98 and repealing Council Regulation (EEC) No 3820/85 (OJ L 102, 11.4.2006, p. 1).

▼M2

3. The delegation of power referred to in Article 10b may be revoked at any time by the European Parliament or by the Council. A decision to revoke shall put an end to the delegation of the power specified in that decision. It shall take effect the day following the publication of the decision in the *Official Journal of the European Union* or at a later date specified therein. It shall not affect the validity of any delegated acts already in force.

4. As soon as it adopts a delegated act, the Commission shall notify it simultaneously to the European Parliament and to the Council.

5. A delegated act adopted pursuant to Article 10b shall enter into force only if no objection has been expressed either by the European Parliament or the Council within a period of 2 months of notification of that act to the European Parliament and the Council or if, before the expiry of that period, the European Parliament and the Council have both informed the Commission that they will not object. That period shall be extended by 2 months at the initiative of the European Parliament or of the Council.

Article 10i

1. The Commission shall be assisted by the Road Transport Committee referred to in Article 42 of Regulation (EU) No 165/2014 of the European Parliament and of the Council ([3])*. That committee shall be a committee within the meaning of Regulation (EU) No 182/2011 of the European Parliament and of the Council ([4])*.

2. Where reference is made to this paragraph, Article 5 of Regulation (EU) No 182/2011 shall apply.

3. Where the committee delivers no opinion, the Commission shall not adopt the draft implementing act and the third subparagraph of Article 5(4) of Regulation (EU) No 182/2011 shall apply.

Article 10j

By 8 May 2020, the Commission shall submit, as appropriate, a report to the European Parliament and the Council on the implementation of the amendments to this Directive introduced by Directive (EU) 2015/719 of the European Parliament and of the Council ([5])*, including taking into consideration specific characteristics of certain market segments. On the basis of that report, the Commission shall, if appropriate, make a legislative proposal duly accompanied by an impact assessment. The report shall be made available at least 6 months prior to the submission of any legislative proposal.

([3])* Regulation (EU) No 165/2014 of the European Parliament and of the Council of 4 February 2014 on tachographs in road transport, repealing Council Regulation (EEC) No 3821/85 on recording equipment in road transport and amending Regulation (EC) No 561/2006 of the European Parliament and of the Council on the harmonisation of certain social legislation relating to road transport (OJ L 60, 28.2.2014, p. 1).

([4])* Regulation (EU) No 182/2011 of the European Parliament and of the Council of 16 February 2011 laying down the rules and general principles concerning mechanisms for control by Member States of the Commission's exercise of implementing powers (OJ L 55, 28.2.2011, p. 13).

([5])* Directive (EU) 2015/719 of the European Parliament and of The Council of 29 April 2015 amending Council Directive 96/53/EC laying down for certain road vehicles circulating within the Community the maximum authorised dimensions in national and international traffic and the maximum authorised weights in international traffic (OJ L 115, 6.5.2015, p. 1).

▼B

Article 11

1. Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive by 17 September 1997. They shall forthwith inform the Commission thereof.

When Member States adopt these measures, they shall contain a reference to this Directive or shall be accompanied by such reference on the occasion of their official publication. The methods of making such reference shall be laid down by Member States.

2. Member States shall communicate to the Commission the text of the main provisions of domestic law which they adopt in the field covered by this Directive.

Article 12

This Directive shall enter into force on the day of its publication in the *Official Journal of the European Communities*

Article 13

This Directive is addressed to the Member States.

▼B

ANNEX I

MAXIMUM WEIGHTS AND DIMENSIONS AND RELATED CHARACTERISTICS OF VEHICLES

	1.	**Maximum authorized dimensions for the vehicles referred to in Article 1 (1) (a)**	
▼M1			
	1.1	*maximum length:*	
		— motor vehicle other than a bus 12,00 m	12,00 m
		— trailer	12,00 m
		— articulated vehicle	16,50 m
		— road train	18,75 m
		— articulated bus	18,75 m
		— bus with two axles	13,50 m
		— bus with more than two axles	15,00 m
		— bus + trailer	18,75 m
	1.2	*Maximum width:*	
▼M2			
		(a) all vehicles except the vehicles referred to in point (b)	2,55 m
		(b) superstructures of conditioned vehicles or conditioned containers or swap bodies transported by vehicles	2,60 m
▼B			
	1.3	*Maximum height (any vehicle)*	4,00 m
	1.4	Removable superstructures and standardized freight items such as containers are included in the dimensions specified in points 1.1, 1.2, 1.3, 1.6, 1.7, 1.8 and 4.4	
▼M1			
	1.4a	If any removable attachments such as ski-boxes are fitted to a bus, its length, including the attachments, must not exceed the maximum length laid down in point 1.1	
▼B			
	1.5	Any motor vehicle or vehicle combination which is in motion must be able to turn within a swept circle having an outer radius of 12,50 m and an inner radius of 5,30 m	
▼M1			
	1.5a	*Additional requirements for buses*	
		With the vehicle stationary, a vertical plane tangential to the side of the vehicle and facing outwards from the circle shall be established by marking a line on the ground. In the case of an articulated vehicle, the two rigid portions shall be aligned with the plane	
		When the vehicle moves from a straight line approach into the circular area described in point 1.5, no part of it shall move outside of that vertical plane by more than 0,60 m	

▼B

	1.6	Maximum distance between the axis of the fifth-wheel king pin and the rear of a semi-trailer	12,00 m
	1.7	Maximum distance measured parallel to the longitudinal axis of the road train from the foremost external point of the loading area behind the cabin to the rearmost external point of the trailer of the combination, minus the distance between the rear of the drawing vehicle and the front of the trailer	15,65 m
	1.8	Maximum distance measured parallel to the longitudinal axis of the road train from the foremost external point of the loading area behind the cabin to the rearmost external point of the trailer of the combination	16,40 m
	2.	**Maximum authorized vehicle weight (in tonnes)**	
	2.1	*Vehicles forming part of a vehicle combination*	
	2.1.1	Two-axle trailer	18 tonnes
	2.1.2	Three-axle trailer	24 tonnes
	2.2	*Vehicle combinations*	
	2.2.1	Road trains with five or six axles	
		(a) two-axle motor vehicle with three-axle trailer	40 tonnes
		(b) three-axle motor vehicle with two or three-axle trailer	40 tonnes
	2.2.2	Articulated vehicles with five or six axles	
		(a) two-axle motor vehicle with three-axle semi-trailer	40 tonnes
		(b) three-axle motor vehicle with two or three-axle semi-trailer	40 tonnes
▼M2			
		(c) two-axle motor vehicle with three-axle semi-trailer carrying, in intermodal transport operations, one or more containers or swap bodies, up to a total maximum length of 45 feet	42 tonnes
		(d) three-axle motor vehicle with two- or three-axle semi-trailer carrying, in intermodal transport operations, one or more containers or swap bodies, up to a total maximum length of 45 feet	44 tonnes
▼B			
	2.2.3	**Road trains with four axles consisting of a two-axle motor vehicle and a two-axle trailer**	36 tonnes

▼B

2.2.4	Articulated vehicles with four axles consisting of a two-axle motor vehicle and a two-axle semi-trailer, if the distance between the axles of the semi-trailer:	
2.2.4.1	is 1,3 m or greater but not more than 1,8 m	36 tonnes
2.2.4.2	is greater than 1,8 m	36 tonnes + 2 tonnes margin when the maximum authorized weight (MAW) of the motor vehicle (18 tonnes) and the MAW of the tandem axle of the semi-trailer (20 tonnes) are respected and the driving axle is fitted with twin tyres and air suspension or suspension recognized as being equivalent within the Community as defined in Annex II
2.3	*Motor vehicles*	

▼M2

2.3.1	Two-axle motor vehicles other than buses: 18 tonnes Two-axle alternatively fuelled motor vehicles other than buses: the maximum authorised weight of 18 tonnes is increased by the additional weight required for the alternative fuel technology with a maximum of 1 tonne	Two-axle buses: 19,5 tonnes
2.3.2	Three-axle motor vehicles	25 tonnes, or 26 tonnes where the driving axle is fitted with twin tyres and air suspension or suspension recognised as being equivalent within the Union as defined in Annex II, or where each driving axle is fitted with twin tyres and the maximum weight of each axle does not exceed 9,5 tonnes. Three-axle alternatively fuelled motor vehicles: the maximum authorised weight of 25 tonnes, or 26 tonnes where the driving axle is fitted with twin tyres and air suspension or suspension recognised as being equivalent within the Union as defined in Annex II, or where each driving axle is fitted with twin tyres and the maximum weight of each axle does not exceed 9,5 tonnes, is increased by the additional weight required for the alternative fuel technology with a maximum of 1 tonne

▼B

2.3.3	Four-axle motor vehicles with two steering axles	—32 tonnes where the driving axle is fitted with twin tyres and air suspension or suspension recognized as being equivalent within the Community as defined in Annex II, or where each driving axle is fitted with twin tyres and the maximum weight of each axle does not exceed 9,5 tonnes

▼M2

	2.4	*Three-axle articulated buses*	28 tonnes
			Three-axle articulated buses alternatively fuelled: the maximum authorised weight of 28 tonnes is increased by the additional weight required for the alternative fuel technology, with a maximum of 1 tonne
▼B			
	3.	**Maximum authorized axle weight of the vehicles referred to in Article 1 (1) (b) (in tonnes)**	
	3.1	*Single axles*	
		Single non-driving axle	10 tonnes
	3.2	*Tandem axles of trailers and semi-trailers*	
		The sum of the axle weights per tandem axle must not exceed, if the distance (d) between the axles is:	
	3.2.1	less than 1 m (d < 1,0)	11 tonnes
	3.2.2	between 1,0 m and less than 1,3 m (1,0 ≤ d < 1,3)	16 tonnes
	3.2.3	between 1,3 m and less than 1,8 m (1,3 ≤ d < 1,8)	18 tonnes
	3.2.4	1,8 m or more (1,8 ≤ d)	20 tonnes
	3.3	*Tri-axles of trailers and semi-trailers*	
		The sum of the axle weights per tri-axle must not exceed, if the distance (d) between the axles is:	
	3.3.1	1,3 m or less (d ≤ 1,3)	21 tonnes
	3.3.2	over 1,3 m and up to 1,4 m (1,3 <d ≤ 1,4)	24 tonnes
	3.4	*Driving axle*	
	3.4.1	Driving axle of the vehicles referred to in 2.2.1 and 2.2.2	11,5 tonnes
	3.4.2	Driving axle of the vehicles referred to in points 2.2.3, 2.2.4, 2.3 and 2.4	11,5 tonnes
	3.5	*Tandem axles of motor vehicles*	
		The sum of the axle weights per tandem axle must not exceed, if the distance (d) between the axles is:	
	3.5.1	less than 1 m (d < 1,0)	11,5 tonnes
	3.5.2	1,0 m or greater but less than 1,3 m	
		(1,0 ≤ d < 1,3)	16 tonnes

▼B

3.5.3	1,3 m or greater but less than 1,8 m (1,3 ≤ d < 1,8)	—18 tonnes —19 tonnes where the driving axle is fitted with twin tyres and air suspension or suspension recognized as being equivalent within the Community as defined in Annex II, or where each driving axle is fitted with twin tyres and where the maximum weight for each axle does not exceed 9,5 tonnes

4. Related characteristics of the vehicles referred to in Article 1 (1) (b)

4.1 *All vehicles*

The weight borne by the driving axle or driving axles of a vehicle or vehicle combination must not be less than 25 % of the total laden weight of the vehicle or vehicle combination, when used in international traffic

4.2 *Road trains*

The distance between the rear axle of a motor vehicle and the front axle of a trailer must not be less than 3,00 m.

4.3 *Maximum authorized weight depending on the wheelbase*

The maximum authorized weight in tonnes of a four-axle motor vehicle may not exceed five times the distance in metres between the axes of the foremost and rearmost axles of the vehicle

4.4 *Semi-trailers*

The distance measured horizontally between the axis of the fifth-wheel king pin and any point at the front of the semi-trailer must not exceed 2,04 m

▼B

ANNEX II

CONDITIONS RELATING TO EQUIVALENCE BETWEEN CERTAIN NON-AIR SUSPENSION SYSTEMS AND AIR SUSPENSION FOR VEHICLE DRIVING AXLE(S)

1. DEFINITION DER LUFTFEDERUNG

A suspension system is considered to be air suspended if at least 75 % of the spring effect is caused by the air spring.

2. EQUIVALENCE TO AIR SUSPENSION

A suspension recognized as being equivalent to air suspension must conform to the following:

2.1. during free transient low frequency vertical oscillation of the sprung mass above a driving axle or bogie, the measured frequency and damping with the suspension carrying its maximum load must fall within the limits defined in points 2.2 to 2.5;

2.2. each axle must be fitted with hydraulic dampers. On tandem axle bogies, the dampers must be positioned to minimize the oscillation of the bogies;

2.3. the mean damping ratio D must be more than 20 % of critical damping for the suspension in its normal conditions with hydraulic dampers in place and operating;

2.4. the damping ratio D of the suspension with all hydraulic dampers removed or incapacitated must be not more than 50 % of D;

2.5. the frequency of the sprung mass above the driving axle or bogie in a free transient vertical oscillation must not be higher than 2,0 Hz;

2.6. the frequency and damping of the suspension are given in paragraph 3. The test procedures for measuring the frequency and damping are laid down in paragraph 4.

3. DEFINITION OF FREQUENCY AND DAMPING

In this definition a sprung mass M (kg) above a driving axle or bogie is considered. The axle or bogie has a total vertical stiffness between the road surface and the sprung mass of K Newtons/metre (N/m) and a total damping coefficient of C Newtons per metre per second (N.s/m). The vertical displacement of the sprung mass is Z. The equation of motion for free oscillation of the sprung mass is:

$$M\frac{d^2Z}{dt^2} + C\frac{dZ}{dt} + kZ = 0$$

The frequency of oscillation of the sprung mass F (rad/sec) is:

$$= \sqrt{\frac{K}{M} - \frac{A}{4M^2}}$$

The damping is critical when $C = C_c$,

where

$$C_c = 2\sqrt{KM}$$

The damping ratio as a fraction of critical damping is C/C_c.

▼B

During free transient oscillation of the sprung mass the vertical motion of the mass will follow a damped sinusoidal path (Figure 2). The frequency can be estimated by measuring the time for as many cycles of oscillation as can be observed. The damping can be estimated by measuring theheights of successive peaks of the oscillation in the same direction. If the peak amplitudes of the first and second cycles of the oscillation are A_1 and A_2, then the damping ratio D is;

$$D = \frac{C}{C_c} = \frac{1}{2\pi} \ln \frac{A_1}{A_2}$$

'ln' being the natural logarithm of the amplitude ratio.

4. TEST PROCEDURE

To establish by test the damping ratio D, the damping ratio with hydraulic dampers removed, and the frequency F of the suspension, the loaded vehicle should either:

(a) be driven at low speed (5 km/hr + 1 km/hr) over an 80 mm step with the profile shown in Figure 1. The transient oscillation to be analyzed for frequency and damping occurs after the wheels on the driving axle have left the step;

or

(b) be pulled down by its chassis so that the driving axle load is 1,5 times its maximum static value. The vehicle held down is suddenly released and the subsequent oscillation analyzed;

or

(c) be pulled up by its chassis so that the sprung mass is lifted by 80 mm above the driving axle. The vehicle held up is suddenly dropped and the subsequent oscillation analyzed;

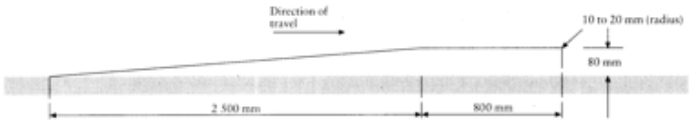
or

(d) be subjected to other procedures insofar as it has been proved by the manufacturer, to the satisfaction of the technical department, that they are equivalent.

The vehicle should be instrumented with a vertical displacement transducer between driving axle and chassis, directly above the driving axle. From the trace, the time interval between the first and second compression peaks can be measured to obtain the frequency F and the amplitude ratio to obtain the damping. For twin-drive bogies, vertical displacement transducers should be fitted between each driving axle and the chassis directly above it.

Figure 1

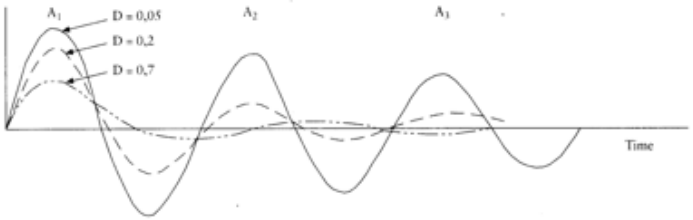
Step for suspension tests



▼B

Figure 2

A damped transient response



▼B

ANNEX IV

PLATE RELATING TO DIMENSIONS REFERRED TO IN ARTICLE 6 (1) (a)

I. The plate relating to dimensions, as far as possible affixed next to the plate referred to in Directive 76/114/EEC, must contain the following data:

1. name of the manufacturer (1);
2. vehicle identification number (1);
3. length of the motor vehicle, trailer or semi-trailer (L);
4. width of the motor vehicle, trailer or semi-trailer (W);
5. data for the measurement of the length of vehicle combinations:
   - the distance (a) between the front of the motor vehicle and the centre of the coupling device (coupling hook or fifth wheel); in the case of a fifth wheel with several coupling points, the minimum and maximum values must be given (a_{min} and a_{max}),
   - the distance (b) between the centre of the coupling device of the trailer (fifth wheel ring) or of the semi-trailer (kingpin) and the rear of the trailer or of the semi-trailer; in the case of a device with several coupling points, the minimum and maximum values must be given (b_{min} and b_{max}).

   The length of vehicle combinations is the length of the motor vehicle and trailer or semi-trailer placed in a straight line behind each other.

II. The values given on the proof of compliance shall reproduce exactly the measurements carried out directly on the vehicle.

(1) This information need not be repeated where the vehicle carries a single plate containing data on both weights and dimensions.

▼B

ANNEX IV

PART A

REPEALED DIRECTIVES

(referred to in Article 10)

— Directive 83/3/EEC on the weights, dimensions and certain other technical characteristics of certain road vehicles and its successive amendments:

  — Directive 86/360/EEC

  — Directive 88/218/EEC

  — Directive 89/338/EEC

  — Directive 89/460/EEC

  — Directive 89/461/EEC

  — Directive 91/60/EEC

  — Directive 92/7/EEC

— Directive 86/364/EEC relating to proof of compliance of vehicles with Directive 85/3/EEC on the weights, dimensions and certain other technical characteristics of certain road vehicles.

PART B

Directive	*Deadline for transposition*
85/3/EEC (OJ No L 2, 3. 1. 1985, p. 14)	1 July 1986
	1 January 1990
86/360/EEC (OJ No L 217, 5. 8. 1986, p. 19)	1 January 1992
86/364/EEC (OJ No L 221, 7. 8. 1986, p. 48)	29 July 1987
88/218/EEC (OJ No L 98, 15. 4. 1988, p. 48)	1 January 1989
89/338/EEC (OJ No L 142, 25. 5. 1989, p. 3)	1 July 1991
89/460/EEC (OJ No L 226, 3. 8. 1989, p. 5)	1 January 1993
89/461/EEC (OJ No L 226, 3. 8. 1989, p. 7)	1 January 1991
91/60/EEC (OJ No L 37, 9. 2. 1991, p. 37)	30 September 1991
92/7/EEC (OJ No L 57, 2. 3. 1992, p. 29)	31 December 1992

▼B

ANNEX V

CORRELATION TABLE

This Directive	85/3/EEC	86/360/EEC	86/364/EEC	88/218/EEC	89/338/EEC	89/460/EEC	89/461/EEC	91/60/EEC	92/7/EEC
Article 1 (1)	Article 1 (1)								
Article 1 (1) (a)	—								
Article 1 (1) (b)	Article 1 (1) (b)								
Article 1 (2)	Article 1 (2)								
Article 2 1st to 4th and 6th to 10th indents					Article 1 (2)				
Article 2 5th, 11th and 12th indents	—								
Article 2 last paragraph	—								
Article 3 (1)	—								
Article 3 (1) (a) (b)	Article 3 (1) (a) (b)								
Article 3 (2)	Article 3 (2)								
Article 3 (3)	—								

▼B

This Directive	85/3/EEC	86/360/EEC	86/364/EEC	88/218/EEC	89/338/EEC	89/460/EEC	89/461/EEC	91/60/EEC	92/7/EEC
Article 4	—								
Article 5 (a)							Article 1 (1)		
Article 5 (b)								Article 1 (1)	
Article 6 (1 to 4)			Article 1 (1 to 4)						
Article 6 (5 to 6)			Article 2 (1 to 2)						
Article 7	Article 6								
Article 8						Article 1			
Articles 9 to 12	—								
Article 13	Article 9								
Annex I	Annex I								
Point 1	Point 1								
Point 1.1 1st to 3rd and 5th indent								Article 1 (2)	
Point 1.1 4th indent	—								
Point 1.2 (a)	—								
Point 1.2 (b)	—								

▼B

This Directive	85/3/EEC	86/360/EEC	86/364/EEC	88/218/EEC	89/338/EEC	89/460/EEC	89/461/EEC	91/60/EEC	92/7/EEC
Point 1.3 to 1.5	Point 1.3 to 1.5								
Point 1.6							Article 1 (3)		
Point 1.7								Article 1 (3)	
Point 1.8	—								
Point 2 to 2.2.1 (b)	Point 2 to 2.2.1 (b)								
Point 2.2.2 (a to c)	Point 2.2.2 (a to c)								
Point 2.2.3 Point 2.2.4.1					Article 1 (5) (b)				
Point 2.2.4.2								Article 1 (1) (a)	
Point 2.3 to 2.3.1					Article 1 (5) (c)				
Point 2.3.2 to 2.3.3								Article 1 (1) (b to c)	
Point 2.4					Article 1 (5) (c)				
Point 3 to 3.3.2	Point 3 to 3.3.2								

▼B

This Directive	85/3/EEC	86/360/EEC	86/364/EEC	88/218/EEC	89/338/EEC	89/460/EEC	89/461/EEC	91/60/EEC	92/7/EEC
Point 3.4 to 3.4.1		Article 1 (3)							
Point 3.4.2 to 3.5.2					Article 1 (5) (d)				Article 1 (1) (d)
Point 3.5.3									
Point 4 to 4.2	Point 4 to 4.2								
Point 4.3					Article 1 (5) (e)				
Point 4.4							Article 1 (4)		
Annex II									Annex III
Annex III			Annex						

Appendix C BusNSW Explanation of NSW Regulations

busnsw
Bus & Coach Association NSW

Member Information

THREE AXLE-BUS MASS LIMITS

3 April 2018

Introduction

On 6 March 2018 Minister for Roads, Maritime and Freight Melinda Pavey announced that the gross mass limit for three-axle buses (with dual tyred drive axle and a single tyred tag axle) would increase from 20.5 to 22 tonnes. The increase is based on bus operators applying for a permit via the National Heavy Vehicle Regulator for specified vehicles to operate up to a 22 tonne mass limit on nominated NSW roads. The road managers in NSW will assess permit applications based on the conditions set out below.

Axle Limits and Conditions

The axle mass limits for a three-axle bus operating at 22.0 tonnes is 6.5 tonnes on the steer axle and 15.5 tonnes on the six-tyred tandem axle group, with the following conditions:

1. The 15.5 tonnes six-tyred tandem axle group mass limit must be distributed across the two axles (comprised of a dual tyred axle and a single tyred tag axle) with a weight distribution ration of 60:40 i.e. 60% of the mass on the dual tyred axle and 40% of mass on the single tyred tag axle.
2. The single tyred tag axle must be fitted with minimum width 295/80R22.5 tyres or equivalent.
3. The drive axle must be fitted with 295/80R22.5 tyres or equivalent.
4. Comply with the following braking and stability control requirements. If a bus is fitted with an Identification Plate which indicates that the vehicle was manufactured:
   a. before 1 January 2015, it must be fitted with a properly functioning:
      i. Anti-lock braking system; or
      ii. Electronic stability control
   b. If a bus is fitted with an Identification Plate which indicates that the vehicle was manufactured on after 1 January 2015, it must be fitted with properly functioning:
      i. Anti-lock braking system and Electronic braking system; or
      ii. Electronic stability control
   c. Compliance with the requirements of subclauses (a) and (b) must be verified by either:
      i. an *Identification Plate* issued by a person authorised by an Australian Road Authority to affix an Identification Plate; or
      ii. a *Certificate* verifying modifications issued by a person authorised by an Australian Road Authority to certify heavy vehicle modifications

This Members Information sheet has been prepared by BusNSW for Bus Operators to assist with understanding of relevant issues. BusNSW shall not be liable for any matter contained herein or any loss suffered by an Operator due to reliance on this information. Contact ***BusNSW*** *on* ***(02) 8839 9500*** *for assistance.*

1

busnsw
Bus & Coach Association NSW

Member Information

Process to Apply for a Permit

The National Heavy Vehicle Regulator (NHVR) manages the access of heavy vehicles to ensure a safe, efficient and sustainable road network for industry. The NHVR coordinates a range of access applications from start to finish, liaising directly with road managers (both RMS and local government in NSW) to manage applications and issue permits.

Operators can apply for a Higher Mass Limits (HML) permit via the NHVR PORTAL at:

https://www.service.nhvr.gov.au/

No Increase to Authorised Passenger Numbers

A vehicle operating under a Higher Mass Limits permit may not carry more seated and standing passengers than the number determined by the manufacturer in accordance with ADR 58 on the basis that the mass limits in **Heavy Vehicle (Mass, Dimension and Loading) National Regulation (NSW)** apply to the vehicle, rather than the higher mass limits in the permit. For a three-axle bus with a rear tandem axle group fitted with dual tyres on the drive axle and single tyres on the tag axle – the mass limit to be used for the calculation of authorised passenger numbers is 20 tonnes.

Further Information

For further information please contact BusNSW on 02 8839 9500.

First Published: 3 April 2018

*This Members Information sheet has been prepared by BusNSW for Bus Operators to assist with understanding of relevant issues. BusNSW shall not be liable for any matter contained herein or any loss suffered by an Operator due to reliance on this information. Contact **BusNSW** on **(02) 8839 9500** for assistance.*

2