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Item 6 of the provisional agenda

Regulation No. 58 (Rear underrun protection)**Proposal for the 03 series of amendments to Regulation No. 58
(Rear underrun protection)****Submitted by the expert from the Organization of Motor Vehicle
Manufacturers ***

The text reproduced below was prepared by the expert from the Organization of Motor Vehicle Manufacturers (OICA) as an alternative to document ECE/TRANS/WP.29/GRSG/2014/18 proposed by the expert from Germany, to include more stringent requirements for rear underrun protection devices. It is based on informal document GRSG-105-20 (see report ECE/TRANS/WP.29/GRSG/84, para. 34). The modifications to the current text of UN Regulation No. 58 are marked in bold for new or strikethrough for deleted characters.

* In accordance with the programme of work of the Inland Transport Committee for 2012–2016 (ECE/TRANS/224, para. 94 and ECE/TRANS/2012/12, programme activity 02.4), the World Forum will develop, harmonize and update Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.

I. Proposal

Paragraphs 1.2. to 1.2.3., shall be deleted.

Paragraph 2.3., amend to read:

- "2.3. Any vehicle in one of the categories ~~M₁, M₂, M₃, N₁, O₁~~ **M, N, or O** will be deemed to satisfy the condition set out above:
- (a) If it satisfies the same conditions ...
.....
 - (c) If, in case of vehicles of categories O₁ and O₂ where the tyres project for more than half of their width outside the bodywork (excluding the wheel guards) or outside the chassis in the absence of bodywork, the ground clearance of the rear part of the unladen vehicle does not exceed 550 mm over a width which is not less than 100 mm deducted from the distance measured between the innermost points of the tyres (excluding any tyre bulging close to the ground), on either side;
 - (d) **In case of tractive units for articulated vehicles;**
 - (e) **In case of trailers specially designed and constructed for the carriage of very long loads of indivisible length, such as timber, steel bars, etc.;**
 - (f) **In case of vehicles where any RUPD is incompatible with their use. In this case, the manufacturer shall demonstrate to the [Type Approval Authority / Technical Service] that the RUPD is incompatible with their use."**

Insert new paragraphs 3.1.4. to 3.1.6., to read:

- 3.1.4. "Vehicle with tipping bodies" are vehicles whose structure is connected via a tilting mechanism to the chassis of the vehicle and can be tilted by an operating mechanism, causing an intentional slip off of the cargo from the cargo area.**
- 3.1.5. "Off-road vehicles" means off-road vehicles as defined in the Consolidated Resolution on the Construction of Vehicles (R.E.3).**
- 3.1.6. "Tractive units for articulated vehicles" are units which are able to tow vehicles of category O."**

Paragraph 7.1., amend to read:

- "7.1. The section height of the cross-member shall not be less than ~~100 mm~~ **the values in Annex 6 of this Regulation**. The lateral extremities of the cross-member shall not bend to the rear or have a sharp outer edge; this condition is fulfilled when the lateral extremities of the cross-member are rounded on the outside and have a radius of curvature of not less than 2.5 mm."

Paragraph 7.4.2., amend to read:

- "7.4.2. The individual elements of the underrun protection, including those outboard of the lift mechanism, where provided, shall have an effective surface area **in line with the values in Annex 6 of this Regulation, in each case, of at least 350 cm²**.

The effective surface area may be reduced when it is impossible to meet the values. In this case the manufacturer shall demonstrate this impossibility to the [Type Approval Authority / Technical Service].

However, in the case of vehicles having a width of less than 2,000 mm and where it is impossible to achieve the above requirement, the effective surface may be reduced on the condition that the resistance criteria are met."

Paragraphs 16.1. and 16.2., amend to read:

- "16.1. The ground clearance with respect to the underside of the protective device, even when the vehicle is unladen, shall not exceed ~~550 mm~~ **the values in Annex 6 of this Regulation** over its entire width and shall be such that the height above the ground of the points of application of the test forces applied to the device according to Part I of this Regulation and recorded in the type approval communication form (Annex 1, item 7) does not exceed ~~600 mm~~ **the values in Annex 6 of this Regulation.**
- 16.2. The width of the rear protective device shall at no point exceed the width of the rear axle measured at the outermost points of the wheels, excluding the bulging of the tyres close to the ground, nor shall RUPD be more than 100 mm shorter on either side. Where the device is contained in or comprises the vehicle bodywork **or the platform lift** which itself extends beyond the width of the rear axle, the requirement, that the width of the RUPD shall not exceed that of the rear axle, shall not apply. However,"

Paragraph 16.3., amend to read:

- "16.3. The device shall be so fitted that the horizontal distance between the rear of the device and the rear extremity of the vehicle, including any platform lift mechanism, does not exceed ~~400 mm~~ **the values in Annex 6 of this Regulation** diminished by the recorded deformation (paragraph 7.3 of Part I) measured at any of the points where the test forces have been applied (Annex 1, item 8) during the type approval of the rear underrun protective device in conformity with the provisions of Part I of this Regulation and recorded in the type approval communication form. In measuring this distance:
- (a) any part of the vehicle which is more than 2 m above the ground when the vehicle is unladen shall be excluded;
 - (b) **nonstructural protrusions such as tail lights, [rubber bumpers/resilient buffers], hinges and latches shall be excluded from the determination of the rear extremity.**"

Paragraph 25.1., amend to read:

- "25.1. The ground clearance with respect to the underside of the RUP, even when the vehicle is unladen, shall not exceed ~~550 mm~~ **the values in Annex 6 of this Regulation** over its entire width."

Paragraph 25.3., amend to read:

- "25.3. The width of the RUP shall at no point exceed the width of the rear axle measured at the outermost points of the wheels, excluding the bulging of the tyres close to the ground, nor shall RUP be more than 100 mm shorter on either side. Where the device is contained in or comprises the vehicle bodywork **or the platform lift** which itself extends beyond the width of the rear axle, the requirement, that the width of the RUP shall not exceed that of the rear axle, shall not apply. However,"

Paragraph 25.4., amend to read:

"25.4. The section height of the RUP shall not be less than ~~100 mm~~ **the values in Annex 6 of this Regulation**. The lateral extremities of the RUP shall not bend to the rear or have a sharp outer edge, this condition is fulfilled when the lateral extremities of the RUP are rounded on the outside and have a radius of curvature of not less than 2.5 mm."

Paragraph 25.6., amend to read:

"25.6. The RUP shall offer adequate resistance to forces applied parallel to the longitudinal axis of the vehicle and be connected, when in the service position, with the chassis side-members or whatever replaces them. This requirement will be satisfied if it is shown that both during and after the application of the forces described in Annex 5 the horizontal distance between the rear of the RUP and the rear extremity of the vehicle, including any platform lift mechanism, does not exceed ~~400 mm~~ **the values in Annex 6 of this Regulation** at any of the points where the test forces are applied. In measuring this distance:

- (a) any part of the vehicle which is more than 2 m above the ground when the vehicle is unladen shall be excluded;
- (b) **non-structural protrusions such as tail lights, [rubber bumpers / resilient buffers], hinges and latches shall be excluded from the determination of the rear extremity.**"

Paragraph 25.8.2., amend to read:

"25.8.2. The individual elements of the underrun protection, including those outboard of the lift mechanism, where provided, shall have an effective surface area **in line with the values in Annex 6 of this Regulation**, ~~in each case, of at least 350 cm².~~

The effective surface area may be reduced when it is impossible to meet the values. In this case the manufacturer shall demonstrate this impossibility to the [Type Approval Authority / Technical Service].

However, in the case of vehicles having a width of less than 2,000 mm and where it is impossible to achieve the above requirement, the effective surface may be reduced on the condition that the resistance criteria are met."

Paragraphs 31.1. to 31.5., amend to read:

"31.1. As from the official date of entry into force of the ~~02~~ **03** series of amendments, no Contracting Party applying this Regulation shall:

- (a) refuse to grant approval under Parts I, II and III of this Regulation as amended by the ~~02~~ **03** series of amendments;
- (b) refuse a type of component or separate technical unit approved under Part I of this Regulation as amended by the ~~02~~ **03** series of amendments;
- (c) prohibit the fitting on a vehicle of a component or separate technical unit approved under Parts I and II of this Regulation as amended by the ~~02~~ **03** series of amendments.

31.2. Until **[24]** months after the date of entry into force of this Regulation as amended by the ~~02~~ **03** series of amendments, Contracting Parties applying this Regulation shall:

-
- (a) not refuse a type of component or separate technical unit approved under Part I of this Regulation as amended by the ~~01~~ **02** series of amendments;
- (b) not refuse to grant approvals to those types of component or separate technical unit which comply with the requirements of Part I of this Regulation as amended by the ~~01~~ **02** series of amendments;
- (c) not refuse to grant extensions of approval for components or separate technical units which comply with Part I of this Regulation as amended by the ~~01~~ **02** series of amendments;
- (d) continue to allow the fitting on a vehicle of a component or separate technical unit approved under Parts I and II of this Regulation as amended by the ~~01~~ **02** series of amendments.
- 31.3. Starting **[24]** months after the date of entry into force of this Regulation as amended by the ~~02~~ **03** series of amendments, Contracting Parties applying this Regulation:
- (a) May refuse a type of component or separate technical unit which does not meet the requirements of Part I of this Regulation as amended by the ~~02~~ **03** series of amendments;
- (b) Shall grant approvals only if the type of component or separate technical unit to be approved meets the requirements of Part I of this Regulation as amended by the ~~02~~ **03** series of amendments;
- (c) May prohibit the fitting of a component or separate technical unit which does not meet the requirements of Parts I and II of this Regulation as amended by the ~~02~~ **03** series of amendments;
- 31.4. Until **[84]** months following the date of entry into force of this Regulation as amended by the ~~02~~ **03** series of amendments Contracting Parties applying this Regulation shall:
- (a) continue to grant approvals to those types of vehicles which comply with the requirements of Part III of this Regulation as amended by the ~~01~~ **02** series of amendments;
- (b) continue to accept national or regional type-approval of a vehicle type approved under Part III of this Regulation as amended by the ~~01~~ **02** series of amendments.
- 31.5. As from **[84]** months after the date of entry into force of this Regulation as amended by the ~~02~~ **03** series of amendments, Contracting Parties applying this Regulation:
- (a) Shall grant approvals only if the vehicle type to be approved meets the requirements of paragraph 2.3.(b) or paragraph 2.3.(c) or Part III of this Regulation as amended by the ~~02~~ **03** series of amendments;
- (b) May refuse national or regional type-approval and may refuse first national or regional registration (first entry into service) of a vehicle which does not meet the requirements of paragraph 2.3.(b) or paragraph 2.3.(c) or Part III of this Regulation as amended by the ~~02~~ **03** series of amendments;"

Annex 1, insert new item 9.1., to read:

"9.1. Vehicles with tipping bodies / off road vehicles / vehicles with lift mechanism / M₁ / M₂ / M₃ / N₁ / N₂ / N₃ / O₃ / O₄ (2/)"

Annex 2, item 5., amend to read:

"5. Brief description of the vehicle type ~~as regards its dimensions and lines:~~

5.1. as regards its dimensions and lines:

5.2. Vehicles with tipping bodies / off road vehicles / vehicles with lift mechanism / M₁ / M₂ / M₃ / N₁ / N₂ / N₃ / O₃ / O₄ (2/)"

Annex 3, item 5., amend to read:

"5. Brief description of the vehicle type as regards its structure, dimensions, lines and any fixing elements:

5.1. Fulfilled provisions of item 2.3: 2.3 b / 2.3 c / 2.3 d / 2.3 e/ 2.3 f (2/)

5.2. Brief description of the reasons why the provisions of 2.3 f are fulfilled:"

Annex 5, paragraphs 3.1.1. to 3.1.3., amend to read:

"3.1.1. A horizontal force ~~of 100 kN or 50 per cent of the force generated by the maximum mass of the vehicle, whichever is the lesser~~ **according to Annex 6**, shall be applied consecutively to two points situated symmetrically about the centre line of the device or of the vehicle whichever is applicable at a minimum distance apart of 700 mm and a maximum of 1 m. The exact location of the points of application shall be specified by the manufacturer.

3.1.2. In the cases defined in paragraphs 1.1.1. and 1.1.2. of this annex a horizontal force ~~of 50 kN or 25 per cent of the force generated by the maximum mass of the vehicle, whichever is the lesser~~ **according to Annex 6**, shall be applied consecutively to two points located 300 ± 25 mm from the longitudinal planes tangential to the outer edges of the wheels on the rear axle or of the RUPD, if it exceeds the width of the rear axle, and to a third point located on the line joining these two points, in the median vertical plane of the vehicle.

3.1.3. In the cases defined in paragraph 1.1.3 of this annex a horizontal force of ~~50 kN or 25 per cent of the force generated by the maximum mass of the vehicle for which the device is intended, whichever is the lesser~~ **according to Annex 6**, shall be applied consecutively to two points located at the discretion of the manufacturer of the rear underrun protective device and to a third point located on the line joining these two points, in the median vertical plane of the device."

Insert a new Annex 6, to read:

"Annex 6

RUPD requirements – pass/fail values

Ref. paragraphs of this Regulation		Vehicle Categories	
		N ₁ , N ₂ , N ₃ , O ₁ , O ₂	O ₃ , O ₄ ¹⁾
7.1. / 25.4.	Height of cross member	≥ 100 mm	≥ 120 mm
7.4.2. / 25.8.2.	Effective Surface	≥ 350 cm ²	≥ 420 cm ² ⁶⁾
16.3. / 25.6.	horizontal distance	≤ 400 mm	≤ 400 mm
16.1. / 25.1.	ground clearance	≤ 550 mm	≤ 450 mm ²⁾ ≤ 500 mm ³⁾ ≤ 550 mm ⁵⁾
16.1. / Annex 5, 3.1.	Test force application	≤ 600 mm	≤ 510 mm ²⁾ ≤ 560 mm ³⁾ ≤ 620 mm ⁵⁾
Annex 5, 3.1.1.	Test force	100 kN or 50 % max. gross weight ⁴⁾	180 kN or 85 % max. gross weight ⁴⁾
Annex 5, 3.1.2.	Test force	50 kN or 25 % max. gross weight ⁴⁾	100 kN or 50 % max. gross weight ⁴⁾
Annex 5, 3.1.3.	Test force	50 kN or 25 % max. gross weight ⁴⁾	100 kN or 50 % max. gross weight ⁴⁾

¹⁾ Vehicles with rearward tipping bodies or vehicles with folding rear underrun protection device used in intermodal traffic are considered the same values as for N₁, N₂ and N₃ vehicles.

²⁾ Vehicles with hydropneumatic, hydraulic or pneumatic spring.

³⁾ Vehicles with other than hydropneumatic, hydraulic or pneumatic spring at the rear axle.

⁴⁾ whichever is the lower value.

⁵⁾ on vehicles with a departure angle more than 8° according ISO 612:1978.

⁶⁾ According items 7.4.2 or 25.8.2, it is possible to reduce the effective surface to not less than 350 cm²."

II. Justification

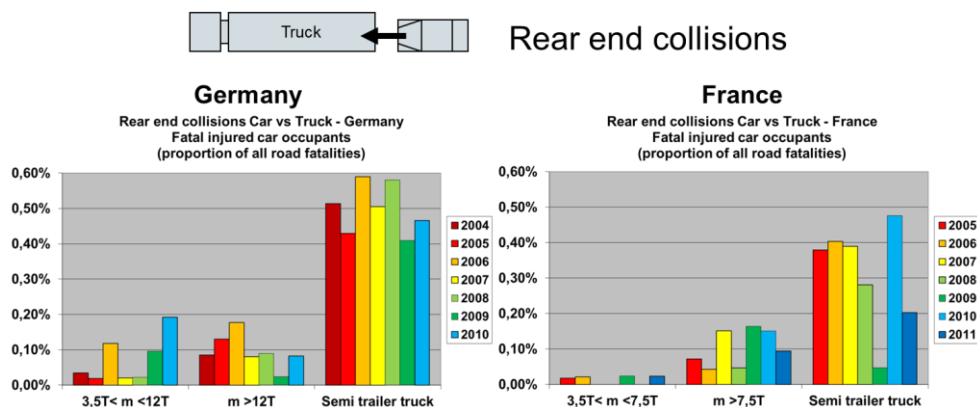
A. General

1. The target of the original proposal by the expert from German (ECE/TRANS/WP.29/GRSG/2013/27) is to ensure a high level of safety for passenger car occupants, who have a high risk of severe or fatal injury in case of hitting the rear of a semi-trailer truck. While OICA still believes it necessary to assess the consequences of the 02 series of amendments to UN Regulation No. 58 before undertaking important changes to the requirements, OICA proposes a significant improvement in situations of rear underrun accidents by suggesting the introduction of more demanding requirements for rear underrun protection devices.

2. The proposed changes are based on the outcome of current accident statistics and the Federal Highway Research Institute (BAST) impact assessment. Germany had presented at the 104th session of the Working Party on General Safety Provisions (GRSG) a short summary of an impact assessment performed by BAST taking into account the current accident situation and the proposals to improve rear underrun protection devices (see GRSG-105-23). The complete BAST report of the study was sent to the delegations after the 104th session of GRSG.

3. The German and French accident statistics show that most of these accidents occur outside built-up areas on motorways/freeways. In most cases a semi-trailer truck was involved.

Figure 1
Statistics on rear end collisions between cars and trucks in Germany and France



4. A detailed analysis of all rear end collisions between trucks/trailers and cars based on German accident data show that in more than 85 per cent of accidents resulting in fatality or injury for car occupants a semi-trailer truck was involved (see following table).

Table 1
German Accident Statistics

Accident statistic in Germany [Source: destatis]	2006				2007				2008				
	Accidents	Fatal injured car occupant	Severe injured car occupant	Slightly injured car occupant	Accidents	Fatal injured car occupant	Severe injured car occupant	Slightly injured car occupant	Accidents	Fatal injured car occupant	Severe injured car occupant	Slightly injured car occupant	
Inside Built-Up Areas	Trucks <3.5 t	337	0	13	134	392	2	10	146	349	0	9	137
	Trucks 3.5 t - 12 t	49	0	3	52	54	0	4	50	46	0	6	37
	Trucks >12t	27	0	5	25	39	0	7	32	27	0	2	29
	Semi-trailer truck	30	1	2	29	25	0	3	26	29	0	6	27
	Others or foreign trucks	21	1	2	12	12	0	1	6	14	0	2	11
	Total	464	2	25	252	522	2	25	260	465	0	25	241
Outside Built-Up Areas (Rural roads)	Trucks <3.5 t	157	0	10	84	181	0	12	93	178	0	15	97
	Trucks 3.5 t - 12 t	38	0	6	33	35	0	3	34	39	0	9	33
	Trucks >12t	44	2	14	36	31	0	6	26	56	1	15	51
	Semi-trailer truck	52	2	14	51	39	1	15	34	50	0	10	48
	Others or foreign trucks	23	0	5	25	26	0	6	21	24	0	3	20
	Total	314	4	49	229	312	1	42	208	347	1	52	249
Outside Built-Up Areas (Motorways)	Trucks <3.5 t	128	0	18	76	152	0	18	84	109	1	17	63
	Trucks 3.5 t - 12 t	74	6	26	56	70	1	32	57	58	1	23	53
	Trucks >12t	98	7	50	84	91	4	47	66	87	3	45	63
	Semi-trailer truck	283	27	130	241	280	24	112	255	290	26	128	243
	Others or foreign trucks	86	4	39	76	99	5	42	80	50	3	18	43
	Total	669	44	263	533	692	34	251	542	594	34	231	465
Total	Trucks <3.5 t	622	0	41	294	725	2	40	323	636	1	41	297
	Trucks 3.5 t - 12 t	161	6	35	141	159	1	39	141	143	1	38	123
	Trucks >12t	169	9	69	145	161	4	60	124	170	4	62	143
	Semi-trailer truck	365	30	146	321	344	25	130	315	369	26	144	318
	Others or foreign trucks	130	5	46	113	137	5	49	107	88	3	23	74
	Total	1447	50	337	1014	1526	37	318	1010	1406	35	308	955

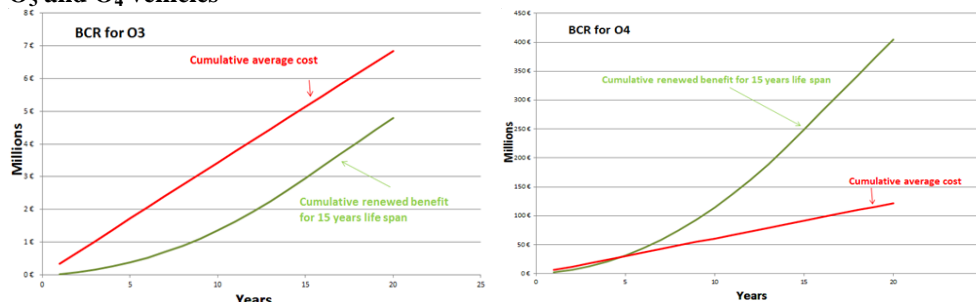
5. The BASt report gives an overview of the relevant German accident statistics over the last ten years. A slight decrease in the number of fatalities can be noticed (see Table 1 of BASt report). This effect corresponds to the general trend of accidents in Germany over the last decade.

6. In detail, the BASt report illustrates the involvement in rear end collisions between commercial vehicles of categories O₃, O₄, N₂, N₃ and passenger cars. The effect of increasing test forces and the reduction of ground clearance of a rear underrun protection device (RUPD) in a best case and a worst case scenario for the different types of commercial vehicles was assessed. In summary, a favourable real cost/benefit ratio can be

seen for the vehicles of category O₃ and O₄. This result corresponds to the detailed accident statistics (see table and diagrams above).

7. Figure 2 shows the effect of the successive market penetration in relation to the best case and worst case scenario defined by BAST, taking into account the implementing time of any measure and a fifteen years life span for the concerned categories.

Figure 2
Cumulative average costs and cumulative renewed benefit over a 15 year life span for O₃ and O₄ vehicles



8. Having a detailed look on the general traffic volume especially on German roads it can be noticed that cars (M₁) represent the biggest group of traffic participants followed by semi-trailer trucks. The number of buses, motorcycles and single trucks without a trailer (N₂ and N₃) is very low.

9. An excerpt of more than 1600 automatic counting stations in Germany can be seen in the following table:

Table 2
Excerpt of 1600 automatic counting stations

Germany Year 2010 (Excerpt)		Number of cars per day (M1)	Number of trucks/buses per day (M2, M3, N, O)	Percentage of vehicles in % per day						
Number of Motorway	Name of counting station			Car (M1) and Motorcycle (L)	Car with trailer	Truck without trailer (N2, N3)	Truck with trailer (N3+O4 /N2+O3)		Bus (M2/M3)	Others
						Semi-trailer truck	Others			
A2	Lehnhin	53582	13027	72.7	1.8	3.8	15.4	4.6	0.5	1.2
A9	Niemegk	46415	7963	81.2	1.3	3.2	9.8	3.7	0.4	0.4
A8	Augsburg West	61486	8613	82.2	1.5	3.3	7.8	2.4	0.5	2.3
A8	Munich-West	39901	2405	90.4	0.4	3.3	1.3	1.1	0.3	3.2
A3	Regensburg East	68910	12741	79.2	1.4	3.7	10.7	3.7	0.4	0.9
A6	Neckarsulm 1	89036	16354	80.9	0.8	3.0	11.1	4.0	0.2	0.0
A5	Karlsruhe 1	140069	19996	84.4	1.4	2.8	8.2	2.9	0.3	0.0
A5	Nimburg	67098	8252	86.1	1.4	2.6	6.6	2.8	0.4	0.1
A3	Rohrbrunn	51819	11052	76.3	1.5	3.4	13.0	4.4	0.5	0.9
A6	Amberg East	17950	5869	64.7	1.4	6.4	20.1	5.5	0.7	1.2
A9	Bayreuth/Kulmbach	62997	10507	81.2	1.1	3.5	9.4	3.4	0.4	1.0
A10	Oranienburg	51073	6953	83.8	1.5	3.5	7.4	2.3	0.4	1.1
A1	Bremen - Weserbrücke	99869	16968	81.2	1.5	2.9	10.6	3.3	0.2	0.3
A66	Wiesbaden	116457	6779	92.9	0.4	2.6	2.0	0.9	0.3	0.9
A20	Tessin	17067	1353	89.9	1.4	2.7	3.8	1.1	0.3	0.8
A2	Peine	81717	19441	74.4	1.6	3.9	14.4	5.1	0.4	0.2
A1	Leverkusen	101598	13011	85.9	0.9	3.2	7.2	2.3	0.1	0.4
A3	Siegburg	76735	10675	84.7	1.4	2.5	8.4	2.7	0.3	0.0

10. In conclusion the main result of the BAST report and real traffic data demand an improvement of the situation of rear underrun accidents by more effective and efficient measures at vehicles of category O₃ and O₄.

Justification N₂ category

11. The BAST study on 2011 accidents does not take into account the fact that a massive percentage of vehicles compliant with the 01 series of amendments (including the exemptions thereto) are part of the traffic. Indeed, compliance with the 02 series of amendments is mandatory in the EU for all registered vehicles only from March 2010.

12. The figures provided by the BAST do not discriminate between N₂ and N₂+O₃ categories. Yet, as can be seen on the diagrams above, the O₃ and O₄ categories are far above the average in terms of benefit/cost ratio (BCR). As a consequence, the BCR of the N₂ category is polluted by the poor results of the O₃ category, and the lack of accident data on only N₂.

13. The above table (automatic counting stations in Germany) provides an excerpt of road statistics since 2010 given via counting stations covering the German highway network. These figures show that only N₂ make about 1 per cent of the traffic in Germany, only N₃ about 2 per cent, while trucks with trailer or semi-trailer make about 13 per cent of the traffic. This means that of 3,648 road fatalities for the complete year 2010 in Germany, the case of rear underrun on only N₂ would represent about four road fatalities.

14. Most vehicles of N₂ under 7.5 t have architecture close to that of the N₁ vehicles. They share a lot of platform components and their RUPD is integrated versus standard RUP. Doubling the effort levels, changing ground clearance and deformation performance directly impacts the whole platform, leading to high investments (stamped parts, process, etc.) and long development lead times.

Justification paragraph 2.3. (f)

15. The current text of the scope of UN Regulation No. 58 excludes vehicles where any RUPD is incompatible with their use. This results in different kinds of practices during the type approval process, especially in Europe. Through the deletion of the sentence in paragraph 1.2.3. and a re-writing of paragraph 2.3.(f), including the approach that the manufacturer shall demonstrate the incompatibility, OICA expects a better common practice. This means that the manufacturer shall provide data to the type approval authority or technical service which describes the technical aspects of incompatibility.

Justification paragraph 3.1.4. and footnote 1 in Annex 6

16. Vehicles (O₃/O₄) with rearward tipping bodies will be used typically for the transport of bulk goods (sand, bitumen, broken stones, etc.). Most of these vehicles will be used under rough working conditions (off-road, road works, etc.). The rear overhang of these vehicles compared with a classical full or semi-trailer is shorter. Vehicles with tipping bodies are normally designed with folding RUPD to avoid an interaction with the tipping mechanism during unloading. The change of geometrical requirements and the increase of the test forces for RUPD results automatically in a complete re-design of the complete tipping mechanism and the trailer itself. Furthermore the practical use of these vehicles in the field (e.g. interaction with road finisher machines) does not permit any change of geometry. Compared with conventional trailers the percentage of these vehicles is very low and will seldom be used for the long-distance transport on motorways.

Justification paragraphs 7.4.2. and 25.8.2.

17. The increase of the height of the RUPD for vehicles of category O₃ and O₄ from 100 mm to 120 mm results in some design restrictions for the individual elements of the underrun protection in combination with a lift mechanism. The separate outboard elements

of the RUPD may not meet the required effective surface of 420 cm² due to the effective height over ground of the RUPD, the design of the platform lift mechanism, the effective surface of rear lamps and the geometry of the longitudinal main beams of the trailers. In this case the manufacturer shall demonstrate this impossibility to the type approval authority or technical service.

Justification paragraphs 16.3. and 25.6.

18. The horizontal distance between the rear of the RUP and the rear extremity of the vehicle, including any platform lift mechanism, does not exceed 400 mm. This value cannot be changed due to the geometrical interaction of RUPDs with their infrastructure. Ramps and platforms of logistic centres are designed to match the geometry of the rear end of the trailer perfectly. The lowering of the RUPD (see paras. 16.1. and 25.1.) in combination with a possible reduction of the horizontal distance may result in relevant incompatibilities between vehicles and infrastructure.

19. Tail lights, [rubber bumpers/resilient buffers], hinges and latches which are projecting over the rear end have very little influence in a rear end collision, thus they should be excluded from the rearward points of vehicle.

20. Considering the highest level of safety to passenger cars occupants, RUPD manufacturers give preference to a large deformation in order to achieve best energy absorption. However, if non-structural protrusions were included in the calculation of the rearward points of the vehicle, the deformation amount of RUPD would logically be limited since these protrusions also need certain space for structure deformation.

