Submitted by the IWG on MVC

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Agenda item 8(b)

Draft Proposal for amendments to UN Regulation No. 13

Requirements for vehicles used in a Modular Vehicle Combination (MVC)

I. PROPOSAL

Add new paragraph 2.42., to read:

2.42 "A towing trailer" is a trailer which is equipped to tow another trailer.

2.42.1 A "Dolly" means a towing trailer designed for the sole purpose to tow a semi-trailer. A dolly may have a rigid or a hinged drawbar.

2.42.2 A "Link-trailer" is a semi-trailer equipped with a fifth wheel in its rear end enabling a second semi-trailer to be towed.

5.1. General

Paragraph 5.1.3., amend to read:

5.1.3. Connections, for compressed-air braking systems, between ~~power-driven vehicles and trailers~~ **vehicles within a combination**.

Paragraph 5.1.3.1., amend to read:

5.1.3.1. The connections of the compressed-air braking systems between ~~power-driven~~ **vehicles** ~~and trailers~~ shall be provided according to paragraphs 5.1.3.1.1., 5.1.3.1.2. or 5.1.3.1.3.:

Paragraph 5.1.3.2., amend to read:

5.1.3.2. The electric control line of the power-driven vehicle **or towing trailer** shall provide information as to whether the requirements of paragraph 5.2.1.18.2. can be satisfied by the electric control line, without assistance from the pneumatic control line. It shall also provide information as to whether it is equipped according to paragraph 5.1.3.1.2. with two control lines or according to paragraph 5.1.3.1.3. with only an electric control line.

Paragraph 5.1.3.4., amend to read:

5.1.3.4. In the case of a power-driven vehicle **or towing trailer** equipped with two control lines as defined in Paragraph 5.1.3.1.2., when electrically connected to a trailer which is also equipped with two control lines, the following provisions shall be fulfilled:

Paragraph 5.1.3.4.1., amend to read:

5.1.3.4.1. both signals shall be present at the coupling head and the **succeeding** trailer shall use the electric control signal unless this signal is deemed to have failed. In this case, the trailer shall automatically switch to the pneumatic control line;

Paragraph 5.1.3.5., amend to read:

5.1.3.5. A trailer may be equipped as defined in paragraph 5.1.3.1.3., provided that it can only be operated in conjunction with a power-driven vehicle with an electric control line which satisfies the requirements of paragraph 5.2.1.18.2.
Whether these requirements can be satisfied by the electric control line of the towing trailer, without assistance from the pneumatic control line, shall be verified by the evaluation of message EBS12, Byte 3. In any other case, the trailer, when electrically connected, shall automatically apply the brakes or remain braked. The driver shall be warned by the separate yellow warning signal specified in paragraph 5.2.1.29.2.

Paragraph 5.1.3.6.3., amend to read:

5.1.3.6.3. When a power-driven vehicle is equipped with an electric control line and electrically connected to a trailer equipped with an electric control line, a continuous failure (> 40 ms) within the electric control line shall be detected in the power-driven vehicle and shall be signalled to the driver by the yellow warning signal specified in paragraph 5.2.1.29.1.2. ~~when such vehicles are connected via the electric control line.~~
When a towing trailer equipped with an electric control line and electrically connected to a trailer equipped with an electric control line, a continuous failure (> 40 ms) within the electric control line at the rear of the towing trailer shall be detected in the towing trailer and shall be signalled to the driver by the yellow warning signal specified in paragraph 5.2.1.29.2.

Add a new paragraph 5.1.3.6.4. to read:

5.1.3.6.4. A trailer shall utilise the control line signalling defined in paragraphs 5.1.3.2. above and 4.3.2.1. or 4.3.2.2. of Annex 17 below that is generated from the vehicle (power-driven vehicle or towing trailer) ~~that~~ first generates the signal. In the case of the signal being generated from a towing trailer this would be recognised as having the highest source address.?? Alt. "signal should have the highest priority"

Paragraph 5.1.3.9., amend to read:

5.1.3.9. ~~In the case of tractor and semi-trailer combinations, the flexible hoses and cables shall be a part of the power-driven vehicle. In all other cases, the flexible hoses and cables shall be a part of the trailer.~~ **The flexible hoses and cables used for the connection between a towing vehicle for semi-trailer [(e.g. a tractor, a link-trailer, a dolly…)] and its following semi-trailer shall be part of the towing vehicle.**

The flexible hoses and cables used for the connection between a towing vehicle for trailer other than a semi-trailer [(e.g. a rigid truck, a centre-axle towing trailer)] and its following trailer [(e.g. a dolly, a centre-axle trailer)] shall be part of the following trailer."

In the case of an automated connector, this requirement regarding the allocation of flexible hoses and cables is not applicable.

5.2.1. Vehicles of categories M2, M3 and N

Paragraph 5.2.1.15., amend to read:

5.2.1.15. In the case of a power-driven vehicle to which the coupling of a trailer equipped with a brake controlled by the driver of the ~~towing~~ **power-driven** vehicle is authorized, the service braking system of the ~~towing~~ **power-driven** vehicle shall be equipped with a device so

designed that in the event of failure of the trailer's braking system, or in the event of an interruption in the air supply pipe (or of such other type of connection as may be adopted) between the ~~towing~~ **power-driven** vehicle and its trailer, it shall still be possible to brake the ~~towing~~ **power-driven** vehicle with the effectiveness prescribed for secondary braking; it is accordingly prescribed, in particular, that this device shall be situated on the ~~towing~~ **power-driven** vehicle.

Paragraph 5.2.1.18., amend to read:

5.2.1.18. In the case of a **power-driven** vehicle authorized to tow a trailer of category O_3 or O_4, its braking systems shall satisfy the following conditions:

5.2.1.18.1 when the ~~towing~~ **power-driven** vehicle's secondary braking system comes into action, there shall also be a graduated braking action in the trailer;

5.2.1.18.2 in the event of failure of the ~~towing~~ **power-driven** vehicle's service braking system, where that system consists of at least two independent parts, the part or parts not affected by the failure shall be capable of partially or fully actuating the brakes of the trailer. It shall be possible to graduate this braking action. If this operation is achieved by a valve which is normally at rest, then such a valve may only be incorporated if its correct functioning can easily be checked by the driver, either from within the cab or from outside the vehicle, without the use of tools;

Paragraph 5.2.1.19., amend to read:

5.2.1.19.2. In the event of a failure in the ~~towing~~ **power-driven** vehicle's service braking system, where that system consists of at least two independent parts, the part or parts not affected by the failure should be capable of partially or fully actuating the brakes of the trailer;

Paragraph 5.2.1.21., amend to read:

5.2.1.21. In the case of a power-driven vehicle authorized to tow a trailer of categories O3 or O4, the service braking system of the trailer may only be operated in conjunction with the service, secondary or parking braking system of the ~~towing~~ **power-driven** vehicle. However, automatic application of the trailer brakes alone is permitted where the operation of the trailer brakes is initiated automatically by the ~~towing~~ **power-driven** vehicle for the sole purpose of vehicle stabilization.

Paragraph 5.2.1.27.9., amend to read:

5.2.1.27.9. In the case of a failure in the electric control transmission of the service braking system of a ~~towing~~ **power-driven** vehicle equipped with an electric control line according to paragraph 5.1.3.1.2. or 5.1.3.1.3., the full actuation of the brakes of the trailer shall remain ensured.

Paragraph 5.2.1.28., amend to read:

5.2.1.28.1. Coupling force control shall only be permitted on the ~~towing~~ **power-driven** vehicle.

5.2.1.28.2. The action of the coupling force control shall be to reduce the difference between the dynamic braking rates of ~~towing~~ **power-driven** and towed vehicles. The operation of the coupling force control shall be checked at the time of type approval. The method by which this check is carried out shall be agreed between the vehicle manufacturer and the technical

service with the method of assessment and results being appended to the type approval report.

5.2.1.28.2.1. The coupling force control may control the braking rate TM/PM and/or the brake demand value(s) for the trailer. In the case of a ~~towing~~ **power-driven** vehicle equipped with two control lines according to paragraph 5.1.3.1.2. above, both signals shall be subject to similar control adjustments.

Paragraph 5.2.1.29.2., amend to read:

5.2.1.29.2. Power-driven vehicles equipped with an electric control line and/or authorized to tow a trailer equipped with an electric control transmission, shall be capable of providing a separate yellow warning signal to indicate a defect within the electric control transmission of the braking equipment of the trailer. The signal shall be activated from the trailer **as follows:**

(a) via pin 5 of the electric connector conforming to ISO 7638:2003[9] ~~**or,**~~ **as relevant, via the equivalent pin of an automated connector meeting the requirements of Annex 22.**

and

b) by the amber warning signal request whenever the trailer provides corresponding failure information via the data communications part of the electric control line.

In all cases the signal transmitted by the trailer shall be displayed without significant delay or modification by the **power-driven** ~~towing~~ vehicle. This warning signal shall not light up when coupled to a trailer without an electric control line and/or electric control transmission or when no trailer is coupled. This function shall be automatic.

The amber warning request referred to above may only be used to transmit equivalent information as defined for pin 5 of the ISO 7638:2003 connector or, as relevant, via the equivalent pin of an automated connector meeting the requirements of Annex 22.

Paragraph 5.2.1.29.2.1., amend to read:

5.2.1.29.2.1. In the case of a power-driven vehicle equipped with an electric control line, when electrically connected to a trailer with an electric control line, the red warning signal specified in paragraph 5.2.1.29.1.1. above shall also be used to indicate certain specified failures within the braking equipment of the trailer, whenever the trailer provides corresponding failure information via the data communication part of the electric control line. **The above requirement shall also apply when a towing trailer connected to the power-driven vehicle transmits the red warning signal request from any succeeding towed trailer as defined within part 2 of ISO 11992-2003 including its Amd. 1:2007.** This indication shall be in addition to the yellow warning signal specified in paragraph 5.2.1.29.2. above. Alternatively, instead of utilizing the red warning signal specified in paragraph 5.2.1.29.1.1. and the accompanying yellow warning signal above, a separate red warning signal may be provided in the **power-driven** ~~towing~~ vehicle to indicate such a failure within the braking equipment of **a** ~~the~~ trailer.

Add a new paragraph 5.2.1.34., to read:

5.2.1.34. [Additional / Special] requirements applicable to power-driven vehicles authorised to tow more than one trailer of category O_3 or O_4.

5.2.1.34.1. The power-driven vehicle shall be equipped with a pneumatic and an electric control line, as per 5.1.3.1.2.

5.2.2. Vehicles of category O

Paragraph 5.2.2.12.1., amend to read:

5.2.2.12.1 In the case of trailers equipped with an electric control line and electrically connected to a towing vehicle with an electric control line the automatic braking action specified in paragraph 5.2.1.18.4.2. may be suppressed as long as the pressure in the compressed air reservoirs of the trailer is sufficient to ensure the braking performance specified in paragraph 3.3. of Annex 4 to this Regulation.

[This function suppressing the automatic braking action shall be inhibited when a [towing] trailer is operated within a combination with multiple trailers.]

Paragraph 5.2.2.15.2.1., amend to read:

5.2.2.15.2.1. A failure within the electric control transmission of the trailer that affects the function and performance of systems addressed by this Regulation and failures of energy supply available from the ISO 7638:1997 [15] connector shall be indicated to the driver by the separate warning signal specified in paragraph 5.2.1.29.2. via pin 5 of the electrical connector conforming to ISO 7638:2003 [15]. In addition, trailers equipped with an electric control line, when electrically connected to a ~~towing vehicle~~ **power-driven vehicle or towing trailer** with an electric control line, shall provide the failure information for activation of the red warning signal specified in paragraph 5.2.1.29.2.1. **and the yellow warning signal specified in paragraph 5.2.1.29.2.** via the data communication part of the electric control line, when the prescribed service braking performance of the trailer can no longer be ensured.

Paragraph 5.2.2.17., amend to read:

5.2.2.17. Trailers equipped with an electric control line and O_3 and O_4 category trailers equipped with an anti-lock system, shall be fitted with either one or both of the following for the electric control transmission:

(a) a special electrical connector for the braking system and/or anti-lock system, conforming to ISO 7638:2003 [15] [16].

(b) an automated connector meeting the requirements specified in Annex 22

Failure warning signals required from the trailer by this Regulation shall be activated via the above connector. The requirement to be applied to trailers with respect to the transmission of failure warning signals shall be those, as appropriate, which are prescribed for power-driven vehicles in paragraphs 5.2.1.29.4., 5.2.1.29.5. and 5.2.1.29.6.

Trailers equipped with an ISO 7638:2003 connector as defined above shall be marked in indelible form to indicate the functionality of the braking system when the ISO 7638:2003 connector is connected and disconnected.*

The marking ~~is to~~ **shall** be positioned so that it is visible when connecting the pneumatic and electrical interface connections.

Add a new paragraph 5.2.2.17.3., to read:

5.2.2.17.3. Repeater

In case the length of an electric control line installed in a trailer exceeds the maximum permissible length(s) according to ISO 11992-1:2003, a device to amplify and repeat the transmitted messages shall be installed within the electric control line, in order to ensure the electric signals fulfil the relevant requirements of ISO 11992-1:2003. The capabilities of the device to extend the length of the electric control line shall be declared by the manufacturer. [~~In all cases repeating of messages shall not delay the transmission of messages.~~] The requirements of ISO 11992 and the relevant requirements of this Regulation shall continue to be fulfilled.

Add a new paragraph 5.2.2.24., to read:

5.2.2.24. [Additional / special] requirements applicable to towing trailers of category O_3 or O_4 able to tow another trailer of category O_3 or O_4

5.2.2.24.1. Towing trailers shall be equipped with pneumatic control/supply lines and electric control line as specified in paragraph 5.1.3.1.2 of this Regulation, for the purpose of being connected to the towing and to the towed vehicles[, respectively via the "front" and the "rear" coupling heads & electric connector].

5.2.2.24.2. Message routing function

Towing trailers shall be equipped with a message routing function as defined in paragraph 6.3 of ISO 11992-2:2003 including its amendment 1:2007 for the purpose of connecting multiple electronic control units to the electric control line. This function is deemed to fulfil the point to point requirement specified in paragraph 5.1.3.6. for the electric control line between electronic control units.

Additionally, the "VDC active" information transmitted by the towed trailer via the data communications part of the electric control line shall be combined with the "VDC active" message generated by the towing trailer and forwarded to the preceding vehicle.

5.2.2.24.3. The "pin 5" signal transmitted from the towed trailer via pin 5 of the ISO 7638:2003 electric connector (or as relevant via the equivalent pin of an automated connector meeting the requirements of Annex 22) shall be combined with the "pin 5" signal generated by the towing trailer, and transmitted to the towing vehicle. The pin 5 of the rear electric connector shall be electrically isolated from the pin 5 of the front electric connector.

5.2.2.24.4. The "Relative brake demand" information, as defined within byte 7 & 8 of EBS 11 message of the data communications part of the electric control line shall not be supported by towing trailers. This status shall be indicated to the power-driven vehicle by transmitting the "support of the axle wise or side wise brake force distribution" information (see byte 2, bit 3 & 4 of EBS21) with a value of 00_b (disabled) or 11_b (not supported).

5.2.2.24.5. In the case of a towing trailer to which the coupling of a trailer equipped with a brake controlled by the towing trailer, the service braking system of the towing trailer shall be equipped with a device so designed that in the event of failure of the towed trailer's braking system, or in the event of an interruption in the air supply pipe (or of such other type of connection as may be adopted) between the towing and towed trailer, it shall still be possible to brake the towing trailer with a performance of at least 50% of the prescribed service brake performance for the relevant trailer. This device shall be situated on the towing trailer.

5.2.2.24.6. **In the case of a towing trailer authorized to tow a trailer of category O_3 or O_4, its braking system shall satisfy the following conditions:**

5.2.2.24.6.1. **In the event of a failure (e.g. breakage or leak) in one of the pneumatic connecting lines, interruption or defect in the electric control line between the towing trailer and its trailer it shall nevertheless be possible to fully actuate the brakes of the towed trailer by means of the service braking system of the towing trailer, unless the failure automatically causes the towed trailer to be braked with the performance prescribed in paragraph 3.3. of Annex 4 to this Regulation.**

5.2.2.24.6.2. **The automatic braking in paragraph 5.2.2.24.5.1. above shall be considered to be met when the following conditions are fulfilled:**

5.2.2.24.6.2.1. **when the service braking system of the towing trailer is fully actuated the pressure in the supply line at the rear coupling head shall fall to 150 kPa within the following two seconds; in addition, when the service braking system is released, the supply line shall be re-pressurized;**

5.2.2.24.6.2.2. **when the supply line between the towing trailer and towed trailer is evacuated at the rate of at least 100 kPa per second the automatic braking of the towed trailer shall start to operate before the pressure in the supply line falls to 200 kPa.**

5.2.2.24.6.3. **A towing trailer may only be operated in conjunction with a power-driven vehicle which is equipped with at least a pneumatic and an electric control line, as per 5.1.3.1.2. In the event of such a trailer being connected to a power-driven vehicle equipped with only an electric control line according to paragraph 5.1.3.1.3. it is considered that this combination is not compatible. In this case the towing trailer, when electrically connected to the power-driven vehicle, shall automatically apply the brakes of the trailer or remain braked. The driver shall be warned by the separate yellow warning signal in paragraph 5.2.1.29.2.**

5.2.2.24.6.4. **When a towing trailer is automatically braked by evacuation of the supply line to the preceding vehicle the succeeding trailer shall also be braked by providing a control signal of at least 650kPa at the rear pneumatic coupling head.**

5.2.2.24.7. **For the purpose of carrying out plausibility checks between the pneumatic and electric control line signals when towing trailers and trailers are used in combination the following shall apply:**

When the electric control signal has exceeded the equivalent of 100 kPa the towed trailer shall verify that a pneumatic signal is present. Depending on the position of the trailer within the vehicle combination the time delay between the electric and pneumatic control line signals defined in the table below shall apply; should no pneumatic signal be present, the driver shall be warned from the trailer by the separate yellow warning signal specified in paragraph 5.2.1.29.2. above:

Trailer number 2:	**2 seconds**
Trailer number 3:	**3 seconds**
Trailer number 4:	**4 seconds**
Trailer number 5:	**5 seconds**

5.2.2.24.8. **The brake demand at the rear control line of the towing trailer compared to the front control line of the towing trailer may not deviate, under static conditions, from the following:**

- **Pneumatic control lines:** **0 to +20kPa at front coupling head demand of 100kPa and 0 to +50kPa at 650kPa.**
- **Electric control line:** **no deviation permitted**

The requirements applicable to the pneumatic control line specified in this paragraph shall be fulfilled even when no electrical power supply to the trailer is available.

5.2.2.24.9. Parking Braking System

5.2.2.24.9.1. The parking brake performance of a towing trailer shall be fulfilled by the application of spring brakes fulfilling the relevant requirements of Annex 4 and Annex 8.

5.2.2.24.9.2 Application of the parking braking system of the towing trailer shall result in the towed trailer being braked.

5.2.2.24.10. For the purpose of checking the response time of the braking system of the towing trailer as defined in paragraph 3.5.2 of Annex 6 the towing trailer may be temporarily configured as a non towing trailer.

5.2.2.24.11. [Additional / Special] requirements for dollies

5.2.2.24.11.1. Rigid drawbar dolly

A rigid drawbar dolly as defined in paragraph 2.42.1. of this Regulation shall be considered to be a centre axle trailer with respect to the requirements of paragraph 3 of Annex 4 and paragraph 5 of Annex 10.

5.2.2.24.11.2. Hinged drawbar dolly

Reserved

5.2.2.24.12. [Additional / Special] requirements for link-trailers

A link-trailer as defined in paragraph 2.42.2. of this Regulation shall be considered to be a semi-trailer with respect to the requirements of paragraph 3 of Annex 4 and paragraph 5 of Annex 10.

5.2.2.25. [Additional / Special] requirements applicable to non-towing trailers of category O_3 or O_4 authorized to be coupled to a towing trailer

5.2.2.25.1. The trailer shall be equipped with a pneumatic and an electric control line, as per 5.1.3.1.2.

5.2.2.25.2. The parking brake performance of the trailer shall be fulfilled by the application of spring brakes fulfilling the relevant requirements of Annex 4 and Annex 8.

Annex 1,
Add a new paragraph 2., to read:

2. Hinged drawbar dolly as defined in paragraph 2.42.1.

Annex 2,
Add a new paragraph 9.4.6., to read:

9.4.6. The power-driven vehicle is / is not[2] authorised to tow more than one trailer of category O_3 or O_4.

Paragraph 14.7.3., amend to read:

14.7.3. Flexible pipes of tractors / **towing trailers[2]** for semi-trailers:
length (m): …….....
internal diameter (mm): .....

Add a new paragraph 14.16., to read:

14.16 The towing trailer is / is not[2] authorised to tow a trailer of category O_3 or O_4

Add a new paragraph 14.17 to read:

14.17 The trailer is / is not[2] authorised to be towed by a towing trailer (of category O_3 or O_4)

Annex 4,
Paragraph 2.3.2., amend to read:

2.3.2. On **power-driven** vehicles to which the coupling of a trailer **/ multiple trailers** is authorized, the parking braking system of the ~~towing vehicle~~ **power-driven vehicle** ~~must~~ **shall** be capable of holding the **laden** combination of vehicles stationary on a 12 per cent up or down-gradient.

Annex 6,
Add a new paragraph 4., to read:

4 Towing trailers

4.1 In addition to the requirements defined in paragraph 3 above towing trailers shall also fulfil the following requirements:

4.1.1. The towing trailers control line response time shall be measured without the power-driven vehicle. To replace the power-driven vehicle it is necessary to provide a simulator to which the forward coupling heads of the supply line, the pneumatic control line and electric control line are connected. For the purposes of the test the simulator defined in paragraphs 3.3 and 3.4 above shall be used.

4.1.2. Requirements for Towing trailers; in addition to the requirements of paragraph 1.1. of this annex, the response time shall be measured at the extremity of a pipe 2.5 m long with an internal diameter of 13 mm which shall be joined to the rearmost coupling head of the control line of the service braking system. During this test, a volume of 385 $\pm$ 5 cm^3 (which is deemed to be equivalent to the volume of a pipe 2.5 m long with an internal diameter of 13 mm and under a pressure of 650 kPa) shall be connected to the coupling head of the supply line. Towing trailers for semi-trailers shall be equipped with flexible pipes for making the connection to semi-trailers. The coupling heads will, therefore, be at the extremity of those flexible pipes. The length and internal diameter of the pipes shall be entered at item 14.7.3. of the form conforming to the model in Annex 2 to this Regulation.

4.1.3. The pressure in the supply line at the front of the towed trailer shall be 650 kPa.

4.1.4. Performance requirements

4.1.4.1. The time elapsing between the moment when the pressure produced in the front control line by the simulator reaches 65 kPa and the moment when the pressure at the rear coupling head of the towing trailer reaches 75 per cent of its asymptotic value shall not exceed 0.4 seconds.

4.1.4.2. Towing trailers shall be checked with the electrical power supplied to the trailer via the ISO 7638:2003 connector (7 pin).

4.1.4.3. It is not necessary to check the reaction time difference of the electric control line between the front and rear coupling heads of the towing trailer as this is defined within part 2 of ISO 11992-2003 including its Amd. 1:2007 and is therefore part of the Annex 17 assessment.

4.1.4.4.. Towing trailers equipped with a pneumatic and an electric control line, the response time measurement for each control line shall be determined independently according to the relevant procedure defined above.

Annex 7,

A. Compressed air braking systems

Add a new paragraph 1.3.3., to read:

1.3.3. In the case of towing trailers the test defined in paragraph 1.3.2. above shall be carried out with rear supply line stopped and a compressed air reservoir of 0.5 litre capacity shall be connected directly to the rear coupling head of the pneumatic control line. Before each braking operation, the pressure in this compressed-air reservoir shall be completely eliminated. After the test referred to in paragraph 1.3.1. above, the energy level supplied to the rear pneumatic control line shall not fall below a level equivalent to one-half the figure obtained at the first brake application.

Annex 17,

Add a new paragraph 4.3., to read:

4.3 Additional Requirements for Towing Trailers

4.3.1. Simulators as defined in paragraph 4.1 above shall be used to connect to both the front and rear ISO 7638 interfaces. Alternatively a single simulator may be used provided it is capable of the combined functionality of generating and receiving ISO 11992 messages at both front and rear ISO 7638 connections.

4.3.2 Control line signalling:

4.3.2.1. The parameters defined in EBS 12 byte 3 of ISO 11992-2:2003 shall be checked at the rear ISO 7638 connector of the towing trailer against the specification of the power-driven vehicle as follows:

Control Line Signalling	EBS 12 Byte 3	
	Bits 1 - 2	Bits 5 - 6
Service braking demand generated from one electrical circuit	00_b	
Service braking demand generated from two electrical circuits	01_b	
Vehicle is not equipped with a pneumatic control line [1/]		00_b
Vehicle is equipped with a pneumatic control line		01_b

4.3.2.2. The parameters defined in EBS 12 byte 3 of ISO 11992-2:2003 shall be checked at the rear ISO 7638 connector of the towing trailer against the specification of the towing trailer as follows:

Control Line Signalling	EBS 12 Byte 3	
	Bits 1 - 2	Bits 5 - 6
Service braking demand generated from one electrical circuit	00_b	
Service braking demand generated from two electrical circuits	01_b	

[1/] **This specification of vehicle is prohibited by footnote 4/ to paragraph 5.1.3.1.3. and paragraph 5.2.2.24.1 of this Regulation.**

Vehicle is not equipped with a pneumatic control line [1/]		**00_b**
Vehicle is equipped with a pneumatic control line		**01_b**

4.3.3. Service braking system function:

4.3.3.1 The trailer response at the rear coupling head to the parameters defined in EBS 11 of ISO 11992-2:2003 and its Amd 1:2007 shall be checked as follows:

The pressure in the supply line at the start of each test shall be $\geq$ 700 kPa and the vehicle shall be laden (the loading condition may be simulated for the purpose of this check).

For trailers equipped with pneumatic and electric control lines:
- **both control lines shall be connected;**
- **both control lines shall be signalled simultaneously;**
- **the simulator shall transmit message byte 3, bits 5 – 6 of EBS 12 set to 01_b to indicate to the trailer that a pneumatic control line should be connected.**

Parameters to be checked:

Message transmitted by the simulator		**Signal at rear ISO 7638 electric control line**
Byte reference	**Digital demand value**	**Digital demand value**
3 - 4	**0**	**0**
3 - 4	**33280_d (650 kPa)**	**33280_d (650 kPa)**

4.3.3.2. Trailers equipped with pneumatic and electric control lines:

- **Only the electric control line shall be connected**
- **The simulator shall transmit the following messages:**
- **Byte 3, bits 5 - 6 of EBS 12 set to 00b to indicate to the trailer that a pneumatic control line is not available, and byte 3, bits 1 - 2 of EBS 12 set to 01b to indicate to the trailer that the electric control line signal is generated from two electric circuits.**

Parameters to be checked:

Message transmitted by the simulator		**Pressure at the brake chambers**
Byte reference	**Digital demand value**	
3 - 4	**0**	**At least that defined in the vehicle manufacturer's brake calculation for a demand of 33280_d (650 kPa)**

4.2.2.3. Information signals

4.2.2.3.1. Check that the appropriate warning message or signal is transmitted from the rear electric control line connection to the front electric control line connection under the following conditions:

4.2.2.3.1.1. Red warning signal request:

Simulate byte 2, bits 3 - 4 of EBS 22 is set to 01b (red warning signal request) and 00b (no red warning signal request) at the rear electric control line connection.

4.2.2.3.1.2. Yellow (Amber) warning signal request:

Simulate byte 2, bits 5 - 6 of EBS 22 is set to 01b (yellow warning signal request) and 00b (no yellow warning signal request) at the rear electric control line connection.

4.2.2.3.1.3. Vehicle electrical supply sufficient / insufficient

Simulate byte 2, bits 1 - 2 of EBS 22 is set to 01b (supply sufficient) and 00b (supply insufficient) at the rear electric control line connection.

4.2.2.3.1.4. Vehicle pneumatic supply sufficient / insufficient:

Simulate byte 1, bits 7 - 8 of EBS 23 is set to 01b (supply sufficient) and 00b (supply insufficient) at the rear electric control line connection.

4.2.2.3.1.5 Illumination of stop lamps

Simulate message EBS 22 byte 4 bits 5 to 6 set to 00 (stop lamps are not illuminated) and 01 (stop lamps illuminated) at the rear electric control line connection.

4.2.2.3.1.6 Intervention of Trailer Stability Function

Simulate message EBS 21 byte 2 bits 1 to 2 set to 00 (VDC not active) and 01 (VDC active) at the rear electric control line connection – see also paragraph 5.2.2.24.9 of the Regulation

4.2.2.4. Additional Checks

Additional checks may be made to ensure messages defined within Annex 16 are transmitted from the rear electric control line connection to the front electric control line connection.

II. JUSTIFICATION

Regulation No. 13 only defines requirements for vehicle combinations which include a single trailer. However, in many countries, vehicle combinations, which include more than one trailer or a combination of a dolly and semi-trailer, are used and no uniform provisions with respect to braking are applied. The above proposal is a draft which would amend Regulation No. 13 to specify uniform requirements for trailers and motor vehicles which may be used in a combination with multiple trailers.

The content of this document is based on Informal Document GRRF 66-08 and amended to take into consideration subsequent amendments to UN Regulation 13 up to and including the Supplement 15 to the 11 Series of Amendments.

Below are the vehicle combinations which have been considered by the informal group. Black spots have been added on the drawings to indicate to which vehicle the flexible hoses and cables shall be attached (as specified in paragraph 5.1.3.9.).

Vehicle combination 1

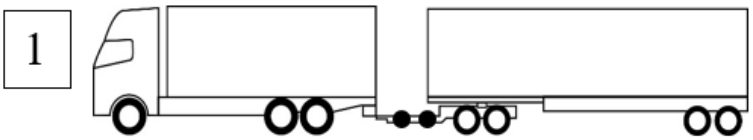

Figure 2 — truck + rigid drawbar dolly + A-semi

Vehicle combination 2

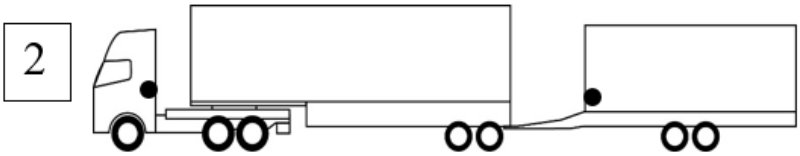

Figure 3 — tractor + A-semi + centre axle trailer

Vehicle combination 3

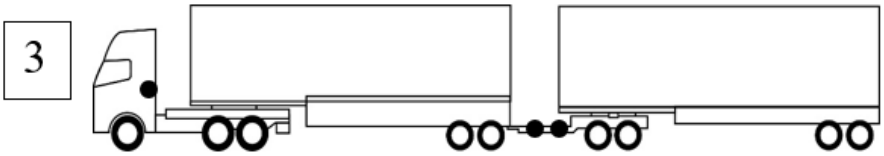

Figure 4 — tractor + A-semi + rigid drawbar dolly + A-semi

Vehicle combination 4

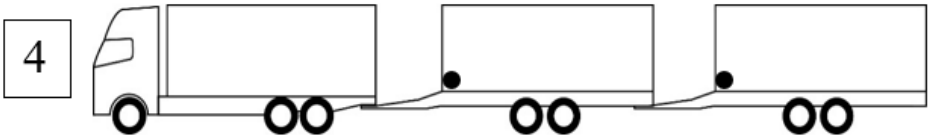

Figure 5 — truck + centre axle trailer+ centre axle trailer

Vehicle combination 5

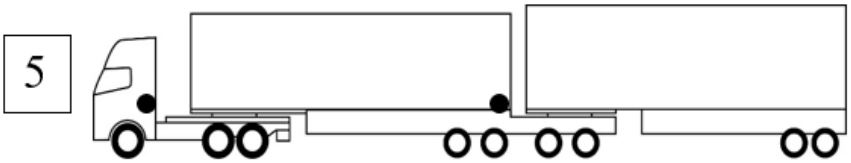

Figure 6 — tractor + link-trailer + A-semi (B-train)

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