

Submitted by the experts from the IWG on MVC

Informal document **GRVA-05-43**
5th GRVA, 10-14 February 2020
Agenda item 8(b)

Modular Vehicle Combinations Informal Working Group (MVC IWG)

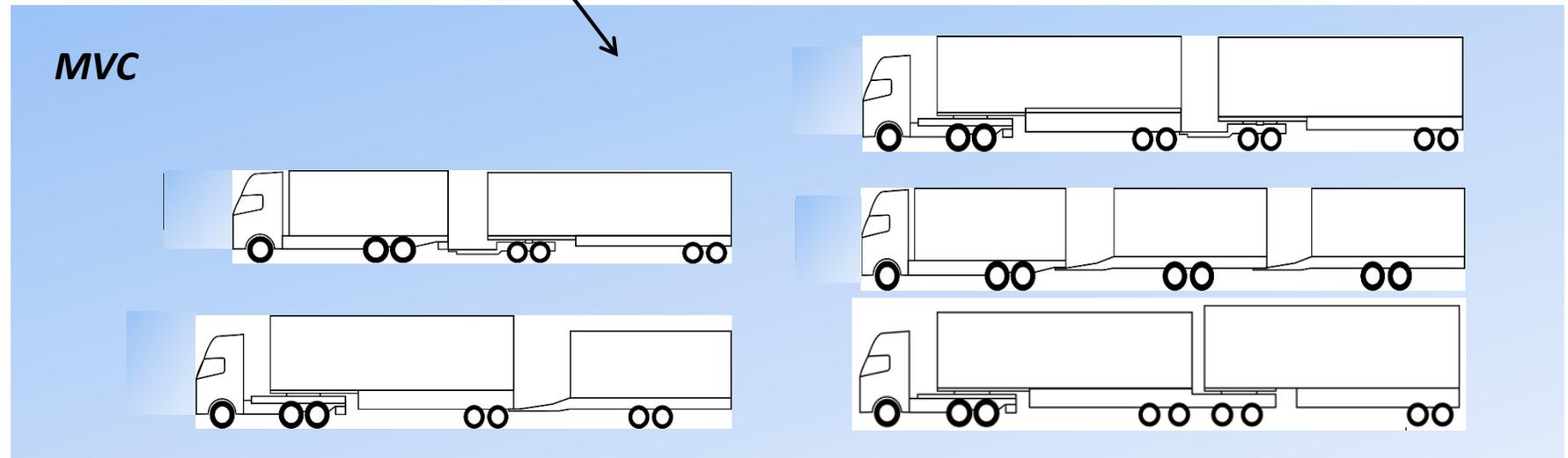
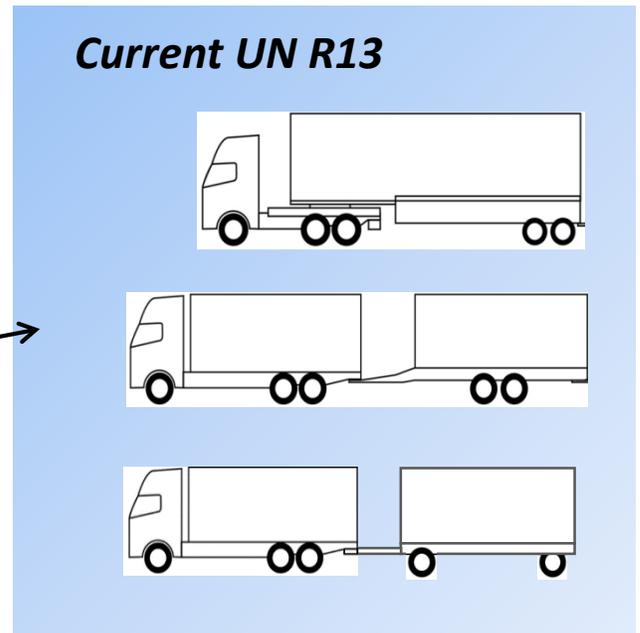
Presentation of draft amendment to UN R13
as per informal document GRVA-05-03r1

Content

- Introduction
- History of the MVC IWG
- Executive summary
- Expectations from GRVA

Introduction

- Current UN R13 mainly addresses the approval of single vehicles involved in single-trailers combinations.
- The objective of the MVC IWG is to add missing definitions and requirements in UN R13 for **approving single vehicles** involved in Modular Vehicle Combinations, e.g. towing trailers.



History of the MVC IWG

- In 2014, GRRF started a new Informal Group on Modular Vehicle Combinations (MVC).
- Objectives:
 - Enable the approval of vehicles, with regards to braking, steering, stability and mechanical couplings, which are a part of a modular vehicle combination.
 - Avoid individual approval according to non harmonized national requirements (which is limiting market competition and operation of these vehicles)
- Around 20 to 25 experts were involved in the group: Sweden, NL, Denmark, Finland, Norway, Spain, motor vehicle, trailer and system manufacturers
- The work was put on hold in 2016 after 6 meetings, due to resource issues (same experts involved in several groups like e.g. ACSF).
- The informal group on mechanical coupling **delivered** 2 years ago a supplement to UN R55 series 01 to cover MVCs.
- Decision at WP29 of March 2019 to prolong the mandate by one year **until February 2020**.
- **GRVA-04 supported IWG's proposal to concentrate on the delivery of the MVC step 1.**

Executive summary

A. The IWG has developed a draft proposal amending UN R13 (GRVA-05-03r1).

The proposal covers the same (five) combinations as in R55-01 supplement 7 (ISO 18868).

Only dollies with rigid drawbars are covered (hinged drawbars should be dealt in a second step).

The proposal is built on version 2014 of ISO 11992 standard (digital link between vehicles).

B. The objective of the IWG is to get the amendment **adopted at GRVA session of September 2020**.

C. Relevance, content and prioritization of a **2nd step** should be decided at GRVA of September 2020.

D. The mandate of the IWG is coming to an end, GRVA is expected to advise on the way forward.

Expectations from GRVA

- A. **Principle agreement** on the main concept of the proposal.
- B. Detailed comments to the draft text **by March 31st, 2020.**
- C. Make GRVA-05-03r1e a formal document, for **possible adoption in September 2020**
- D. **Endorse** ISO 11992-2:2014 (or comment by March 31st, 2020)
- E. Get guidance on **how to proceed** to finalize the work:
 - Option 1: finalize MVC-step 1 for September GRVA in an ad-hoc group led by industry
 - Option 2: prolong mandate by [1 year] to complete MVC-step 1
(we then need a new chairman)
 - Decide at GRVA of September 2020 (or February 2021) about the step 2
(relevance, content, level of urgency, deadline)

Work program and Scope

Work program

MVC IWG - Work Program until GRVA-05

2019				2020						
Week 49	50	51	52	1	2	3	4	5	6	7
		GEVA 17-19/12				VMAD (Japan)	ACSF-25 (Japan)			GRVA-05 10-14/2
Skype 6/12	Skype 13/12	Skype 20/12			IWG Paris 8-9/1	Skype 17/01		Skype 29/1 new date !!	Skype 5/2	
			Finalize a draft for the live meeting							
						All decisions made, concepts defined				
							Send a preliminary document to GRVA			
										Send an update to GRVA

Scope

Step 1 – Feb 2020

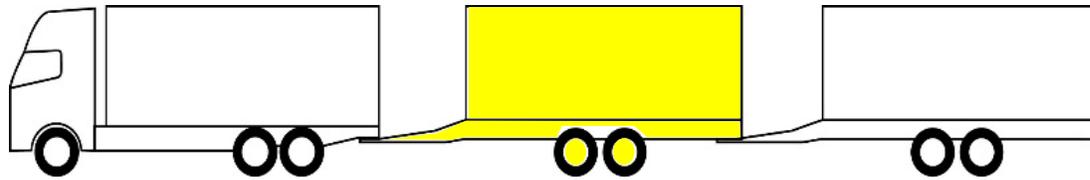
- Deliver amendments to UN R13, to cover:
 - The same combinations as the five covered in R55-01 supplement 7 (ISO 18868)
 - Dollies with rigid drawbars

Step 2 – Content & lead-time tbd

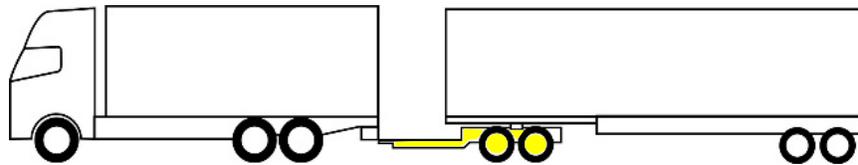
- UN R13
 - Dollies with hinged drawbar
 - Other combinations and/or other vehicle type
- UN R79: e.g. to cover steered dollies
- UN R55: Coordinate further steps with GRSG

Technical principles

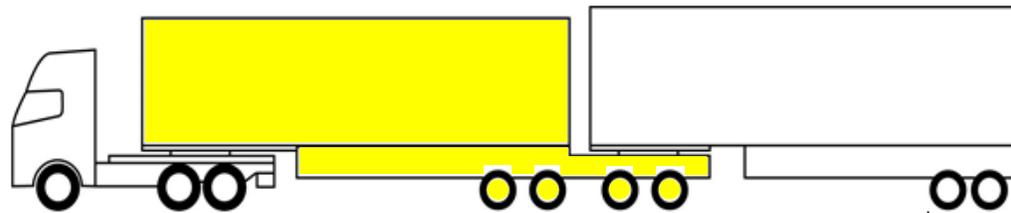
Definitions



A “**towing trailer**” is a trailer which is equipped to tow another trailer.



A “**Dolly**” is a towing trailer designed for the sole purpose to tow a semi-trailer. A dolly may have a rigid or a hinged drawbar.



A “**Link-trailer**” is a semitrailer equipped with a fifth wheel in its rear end enabling a second semitrailer to be towed. (Definition from R55-01 supplement 7).

Structure of the proposal

5.1. General

5.2.1. Motor vehicle

- 5.2.1.1. Applicable to all motor vehicles
- ...
- 5.2.1.33.

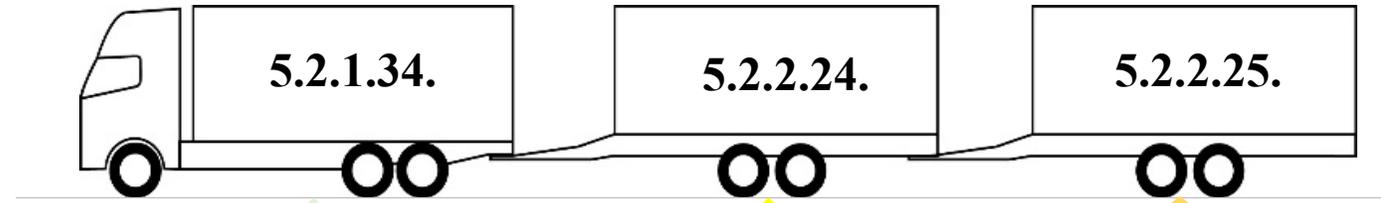
5.2.1.34. Motor vehicles authorized to tow more than one trailer

5.2.2. Trailers

- 5.2.1.1. Applicable to all Trailers
- ...
- 5.2.1.23.

5.2.2.24. Towing trailers

5.2.2.25. Non towing trailers authorized to be coupled to a towing trailer



General

- Same braking reference for all vehicles of the combination (Same pressure in the pneumatic control line and in the equivalent electronic message for all vehicles of the combination)
- Electric control line mandatory on all vehicles of the combination
 - ISO 7638 7-pins connector or automated connector
 - ISO 11992 digital link between vehicles
- In-use and construction requirements
 - The motor vehicles are authorized to tow multiple trailers only when fulfilling the requirements in 5.2.1.34.
 - The trailers -other than towing trailers- are authorized to be coupled to a towing trailer only when fulfilling the requirements in 5.2.2.25.
 - It is an in-use requirement for the user to ensure the motor vehicle and the last non-towing trailer are compatible with the use in a multiple-trailer combination.

Communication between vehicles

- Use of ISO 11992 standard for the communication between vehicles.
- Update of the ISO 11992 standard: use version 2014
- Requirement for a point-to-point connection between vehicles is kept
- The use of repeaters and message routing function is regulated. See further information in the backup slides at the end of this presentation.
- Each towing trailer shall gateways the hard-wired warning signal (pin 5 of ISO 7638) from following trailers, while electrically isolating the signal. See further information in the backup slides at the end of this presentation.

Braking of motor vehicles

- The parking brake of the motor vehicle shall be able to maintain the combination stationary in a 12% slope (same requirement as for a motor vehicle for a single trailer).
- Air supply: Current formula in R13 Annex 7 paragraph 2.3.3 considers the towable mass for the dimensioning of the energy source. This formula is valid for multiple trailer combinations. No need for change. Same conclusion for the electric supply.
- Warning and information to driver
 - From a safety standpoint, the driver only needs to know when one of the trailer EVSC is intervening, no need to know which trailer(s) is intervening
 - Same conclusion when a trailer fails

Braking of trailers

- Spring brakes mandatory on all trailers
- Type-0 and compatibility bands
 - A rigid drawbar dolly shall be considered to be a centre axle trailer with respect to the requirements of Annex 4 (Type-0) and Annex 10 (compatibility bands).
 - A link-trailer shall be considered to be a semi-trailer with respect to the requirements of Annex 4 (Type-0) and Annex 10 (compatibility bands).
 - This is the state-of-the-art on multiple trailer combinations for more the past 10-20 years. Experience shows it works.
 - Simulations done by the Technical university of Eindhoven shows the load transfer during braking are very similar on a dolly vs centre axle trailer and on a link-trailer vs semi-trailer.

Vehicle Stability Control

- Vehicle Stability Control mandatory on all vehicles of the combination, **including dollies**.
 - EVSC on the motor vehicle
 - Roll Stability Control on the trailers
- Every trailer of the combination can generate automatically commanded braking.
- Automatically commanded braking shall be transmitted to the towed trailers via the pneumatic and the electric control lines (the towed trailers cannot differentiate braking generated by the driver and braking generated by Stability control)
- A towing trailer may brake towed trailer(s) for the purpose of stretching the rear of the combination.

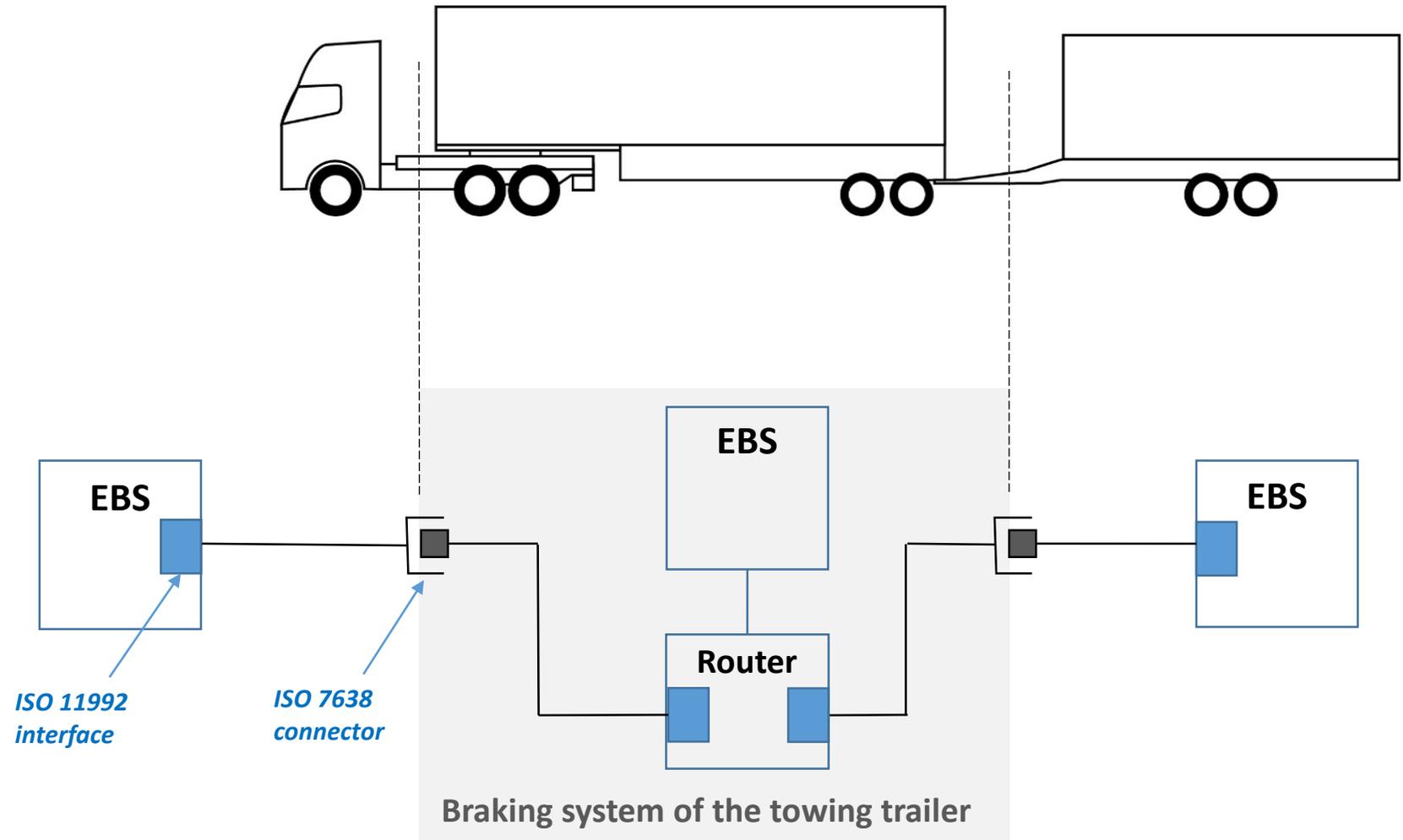
Thanks for your attention

Communication between vehicles

Message Routing function

Routing Function

The message routing function shall transmit forward and backward all relevant messages defined in the ISO 11992 standard, e.g. the brake demand is transmitted by the towing vehicles to the towed ones; the failure information of towed trailers is transmitted to the motor vehicle.

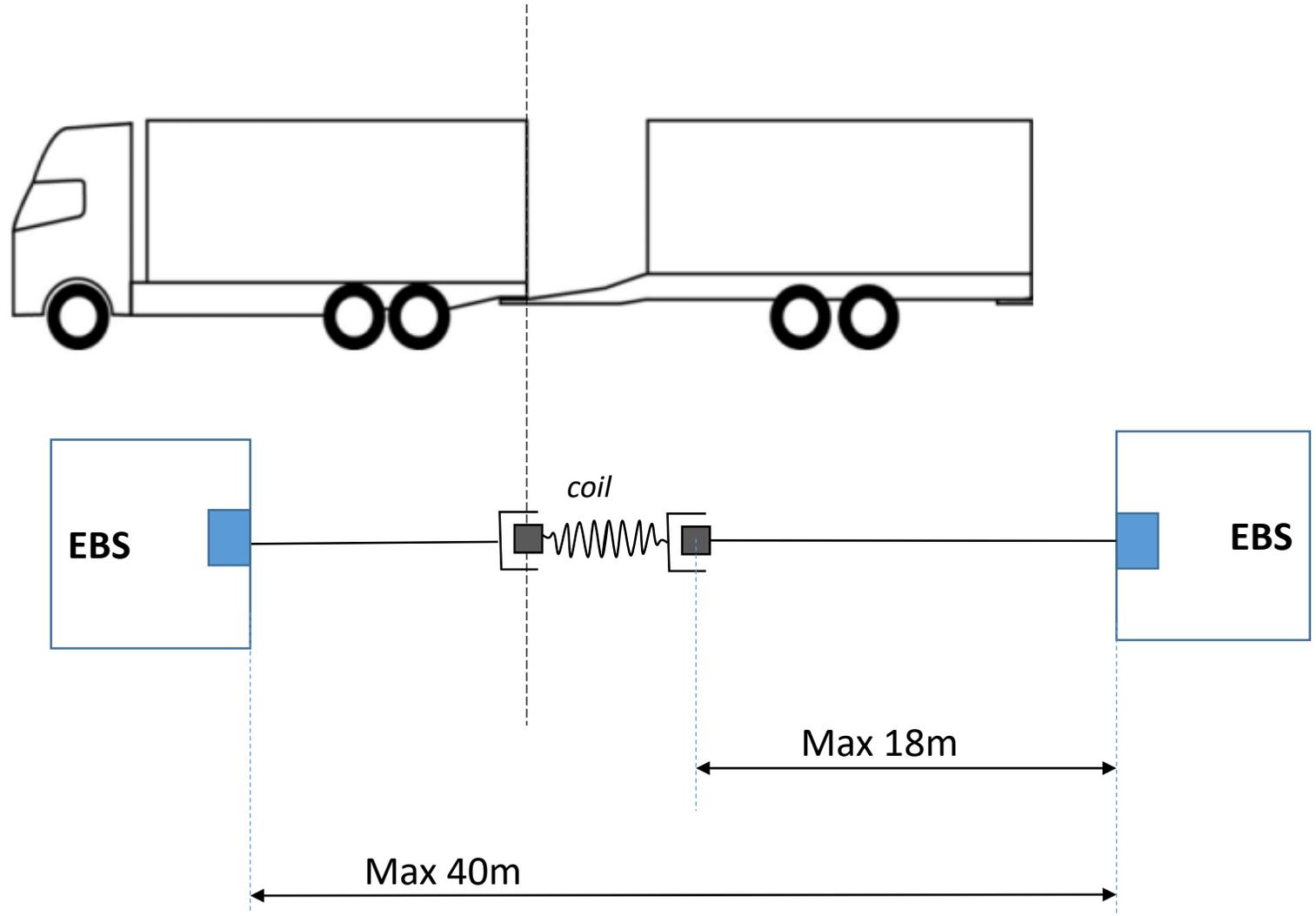


Communication between vehicles

Repeater

Function of the repeater

If more than the 18m allowed by the ISO 11992-1 standard are needed on the trailer, a repeater device can be added on the electric control line.



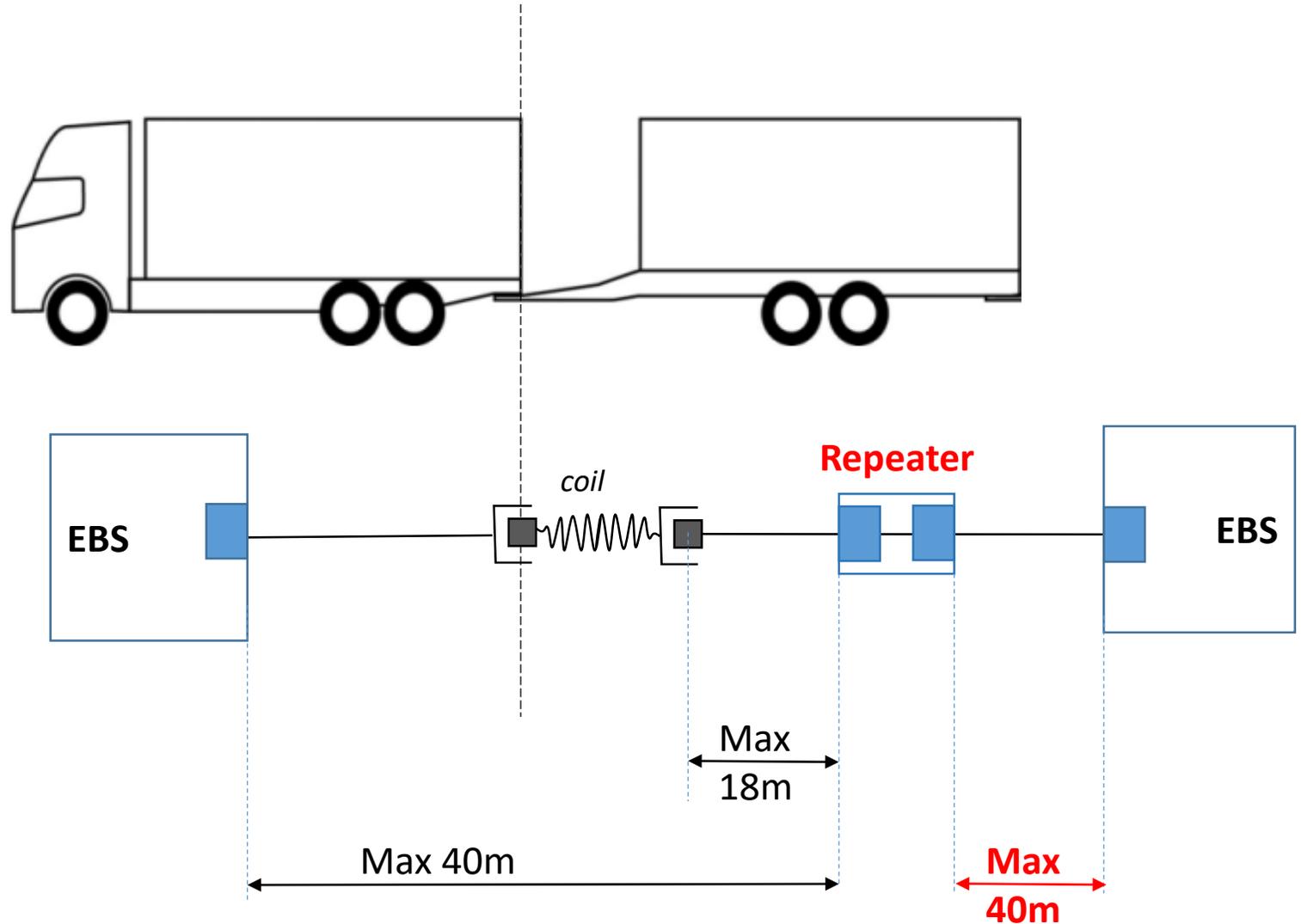
Communication between vehicles

Repeater

Function of the repeater

If more than the 18m allowed by the ISO 11992-1 standard are needed on the trailer, a repeater device can be added on the electric control line.

The repeater then provides an extra 40m for the wiring.



Communication between vehicles

Transmission of “pin 5” warning signal

Principles

Every towing trailer shall read the “pin 5” input from the following trailer and gateway it on its own “pin 5” information to the towing vehicle, and on the ISO 11992 relevant message.

The pin 5 of the rear electric connector shall be electrically isolated from the pin 5 of the front electric connector.

