

25 November 2022

Agreement

Concerning the Adoption of Harmonized Technical United Nations Regulations for Wheeled Vehicles, Equipment and Parts which can be Fitted and/or be Used on Wheeled Vehicles and the Conditions for Reciprocal Recognition of Approvals Granted on the Basis of these United Nations Regulations*

(Revision 3, including the amendments which entered into force on 14 September 2017)

Addendum 140 – UN Regulation No. 141

Revision 1 – Amendment 1

Supplement 1 to the 01 series of amendments – Date of entry into force: 8 October 2022

Uniform provisions concerning the approval of vehicles with regard to their Tyre Pressure Monitoring Systems (TPMS)

This document is meant purely as documentation tool. The authentic and legal binding text is: ECE/TRANS/WP.29/2022/9.



UNITED NATIONS

* Former titles of the Agreement:

Agreement concerning the Adoption of Uniform Conditions of Approval and Reciprocal Recognition of Approval for Motor Vehicle Equipment and Parts, done at Geneva on 20 March 1958 (original version); Agreement concerning the Adoption of Uniform Technical Prescriptions for Wheeled Vehicles, Equipment and Parts which can be Fitted and/or be Used on Wheeled Vehicles and the Conditions for Reciprocal Recognition of Approvals Granted on the Basis of these Prescriptions, done at Geneva on 5 October 1995 (Revision 2).



*Table of contents, Annexes, add references to new Annexes 7 and 8 to read:***

"...

7Performance testing of Tyre Pressure Monitoring System/Tyre Pressure Refill System/
Central Tyre Inflation System

8Alternative procedure for type approval of subject trailer(s)....."

Paragraph 12, amend to read:

- "12. Transitional provisions
- 12.1. As from the official date of entry into force of the 01 series of amendments, no Contracting Party applying this Regulation shall refuse to grant or refuse to accept type approvals under this Regulation as amended by the 01 series of amendments.
- 12.2. As from 6 July 2022, for vehicle types of category N₁ without twin wheels fitted on an axle, Contracting Parties applying this Regulation shall not be obliged to accept type approvals to the preceding series of amendments, first issued after 6 July 2022.
- 12.3. Until 6 July 2022, for vehicle types of category M₁ up to a maximum mass of 3,500 kg and without twin wheels fitted on an axle and until 6 July 2024 for vehicle types of category N₁ without twin wheels fitted on an axle, Contracting Parties applying this Regulation shall accept type approvals to the preceding series of amendments, first issued before 6 July 2022.
- 12.4. As from 6 July 2022, for vehicle types of category M₁ up to a maximum mass of 3,500 kg and without twin wheels fitted on an axle and as from 6 July 2024 for vehicle types of category N₁ without twin wheels fitted on an axle, Contracting Parties applying this Regulation shall not be obliged to accept type approvals issued to the preceding series of amendments to this Regulation.
- 12.5. Notwithstanding the transitional provisions above, Contracting Parties who start to apply this Regulation after the date of entry into force of the most recent series of amendments are not obliged to accept type approvals which were granted in accordance with any of the preceding series of amendments to this Regulation/are only obliged to accept type approval granted in accordance with the 01 series of amendments.
- 12.6. Notwithstanding paragraph 12.4., Contracting Parties applying this Regulation shall continue to accept type approvals issued according to the preceding series of amendments to this Regulation, for the vehicles/vehicle systems which are not affected by the changes introduced by the 01 series of amendments.
- 12.7. Contracting Parties applying this Regulation may grant type approvals according to any preceding series of amendments to this Regulation.
- 12.8. Contracting Parties applying this Regulation shall continue to grant extensions of existing approvals to any preceding series of amendments to this Regulation."

** Page numbers will be indicated at a later stage (*note by the secretariat*).

Insert new Annexes 7 and 8 to read:

"Annex 7

Performance testing of Tyre Pressure Monitoring System / Tyre Pressure Refill System / Central Tyre Inflation System

1. General
 - 1.1. This Annex defines the procedure to determine the performance of a Tyre Pressure Monitoring System (TPMS), Tyre Pressure Refill System (TPRS) or Central Tyre Inflation System (CTIS) intend to be fitted to vehicles of category O₃ and O₄.
 - 1.2. Tests carried out on trailers of category O₄ will be deemed to cover the requirements for trailers of O₃ category.
2. Information document
 - 2.1. The manufacturer of the TPMS / TPRS / CTIS shall supply to the Technical Service an information document of the system(s) requiring performance verification. This document shall contain at least the information defined in Appendix 1 and if applicable Appendix 2 to this Annex.
 - 2.2. If applicable the manufacturer(s) of an ISO11992-2 Towed Vehicle ECU (Gateway ECU) shall supply to the manufacturer of the TPMS / TPRS / CTIS an information document of the system(s) requiring performance verification to be submitted to the Technical Service by the manufacturer of the TPMS / TPRS / CTIS. This document shall contain at least the information defined in Appendix 2 to this Annex.
3. Definition of test vehicles
 - 3.1. Based on the information supplied in the information document, in particular the trailer applications defined in paragraph 2. of Appendix 1, the Technical Service shall carry out tests on representative trailer(s) having up to maximum number of axles defined in the information document and equipped with the respective to TPMS / TPRS / CTIS configuration. Additionally, when selecting trailer(s) for evaluation consideration shall also be given to the parameters defined in the following paragraphs.
 - 3.1.1. Number of axles.
 - 3.1.2. Number and type of rim and tyre sizes per axle
 - 3.1.3. Number and position of lift axles
 - 3.1.4. Distance between wheels and receiver/antenna
 - 3.1.5. Supported range of reference/nominal pressure
 - 3.2. For the purpose of the approval, semi-trailers, full trailers, dolly trailers and center axle trailers shall be deemed to be of the same vehicle type.
4. Test schedule for reference trailer
 - 4.1. The following tests shall be conducted by the Technical Service on the vehicle(s) defined in paragraph 3. of this Annex for each TPMS / TPRS / CTIS configuration taking into consideration the application list defined in paragraph 1.4. of Appendix 1 and if applicable Appendix 2 to this Annex.
 - 4.1.1. In case of TPMS: Puncture Test: Conduct a test according to Annex 3 to this Regulation
 - 4.1.2. In case of TPMS: Diffusion Test: Conduct a test according to Annex 3 to this Regulation

- 4.1.3. In case of TPRS / CTIS: Refill Test: Conduct a test according to Annex 4 to this Regulation
- 4.1.4. In case of TPMS: Malfunction Test: Conduct a test according to Annex 3 to this Regulation
- 4.1.5. In case of TPRS / CTIS: Malfunction Test: Conduct a test according to Annex 4 to this Regulation
- 4.1.6. Data communication: In case of usage of ISO11992 Gateway: Communication Test: Conduct a test according to Annex 6 to this Regulation.

Annex 7 - Appendix 1

Tyre Pressure Monitoring System / Tyre Pressure Refill System/ Central Tyre Inflation System Information document for reference trailer

1. General
 - 1.1. Name and address of manufacturer
 - 1.2. System name
 - 1.3. System variations
 - 1.4. System configurations (e.g. number of axles / number of tyres etc.)
 - 1.5. Explanation of the basic function and/or philosophy of the system.
2. Applications
 - 2.1. List of trailer types and TPMS / TPRS / CTIS¹ configurations for which approval is required.
 - 2.2. Schematic diagrams of the system configurations installed on the trailers defined in item 2.1. above with consideration given to the following parameters:
 - Number of axles;
 - Wheel locations;
 - Position of lift axles;
 - Position of receiver/antenna locations;
 - Position of sensors.
 - 2.3. Installation / Integration limitations (e.g. distance between receiver/antenna and wheel or rim, input messages and signals required by TPMS so that the vehicle shall meet the performance requirements contained in paragraphs 5.1.2. to 5.6. of this Regulation and fulfil the tests (puncture, diffusion and malfunction) as specified in Annex 3 to this Regulation e.g. vehicle-speed)
 - 2.4. Additional information (if applicable) to the application of the TPMS / TPRS / CTIS
3. Component description
 - 3.1. Sensor(s)
 - Function
 - Identification (e.g. part number(s))
 - 3.2. Receiver(s) / Antenna (s)
 - General description and function
 - Identification (e.g. part number(s))
 - Additional features (e.g. automatic configuration, variable parameters, diagnostics)
 - Failure modes
 - 3.3. Electrical equipment

¹ Strike out what does not apply

- Circuit diagram(s)
 - Powering methods
- 3.4. If applicable the Electro-magnetic compatibility according to UN Regulation No. 10 as last amended by
- (a) the 03 series of amendments for vehicles without a coupling system for charging the Rechargeable Electric Energy Storage System (traction batteries);
 - (b) the 06 series of amendments for vehicles with a coupling system for charging the Rechargeable Electric Energy Storage System (traction batteries).
- 3.5. Additional information (if applicable) to the component description of the TPMS / TPRS / CTIS

Annex 7 - Appendix 2

ISO11992-2 Gateway ECU Information document for reference trailer

1. General
 - 1.1. Name and address of manufacturer of the Gateway
 - 1.2. System name
 - 1.3. System variations
 - 1.4. System configurations (e.g. number of axles/ number of tyres etc.)
 - 1.5. Explanation of the basic function and/or philosophy of the system.
2. Applications
 - 2.1. List of trailer types and configurations for which approval is required.
 - 2.2. Schematic diagrams of the system configurations installed on the trailers defined in item 2.1. above with consideration given to the following parameters:
 - Enabling of TPMS gateway functionality.
 - 2.3. Installation limitations
 - 2.4. Additional information (if applicable) to the application of the TPMS / TPRS / CTIS.
3. Component description
 - 3.1. Gateway for ISO11992 according Annex 5
 - General description and function;
 - Identification (e.g. part number(s));
 - Limitations (e.g. compatibility with other CAN-bus attendees), output of messages and signals required by TPMS so that the vehicle shall meet the performance requirements contained in paragraphs 5.1.2. to 5.6. of this Regulation and fulfil the tests (puncture, diffusion and malfunction) as specified in Annex 3 to this Regulation e.g. vehicle-speed);
 - The verification of this element might be provided by a separate test report.
 - 3.2. Electrical equipment
 - Circuit diagram(s);
 - Powering methods.
 - 3.3. If applicable the Electro-magnetic compatibility according to UN Regulation No. 10 as last amended by
 - (a) the 03 series of amendments for vehicles without a coupling system for charging the Rechargeable Electric Energy Storage System (traction batteries);
 - (b) the 06 series of amendments for vehicles with a coupling system for charging the Rechargeable Electric Energy Storage System (traction batteries).
 - 3.4. Additional information (if applicable) to the component description of the TPMS / TPRS / CTIS.

Annex 7 – Appendix 3

Tyre Pressure Monitoring System/ Tyre Pressure Refill System / Central Tyre Inflation System Test Report for reference trailer

1. Identification
 - 1.1 Name and address of manufacturer of the Tyre Pressure Monitoring System (TPMS) / Tyre Pressure Refill System (TPRS) / Central Tire Inflation System (CTIS)²
 - 1.2 System name / model
 - 1.3 Monitoring function for TPMS
 - 1.4 Control Monitoring function for TPRS / CTIS
2. System(s) and installations approved:
 - 2.1 TPMS / TPRS / CTIS configurations (where appropriate): definition of parameters which have impact on the TPMS / TPRS / CTIS performance. All allowed sub-configurations shall be supported if marked accordingly, e.g. if only a subset of axles is implemented.

	<i>Number of axles</i>					
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>
Single Tyre						
Twin Tyre						
Nominal Pressure Range (kPa)						

- Type or specification of other factors, e.g. rim types and sizes,
 - Number and position of Lift Axles,
 - Position and configuration of receiver and /or antennas incl. the allowed installation area.
- 2.2 Other limitations defined by the Manufacturer (Range of application (trailer type(s) and number of axles, input messages and signals required by TPMS) so that the vehicle shall meet the performance requirements contained in paragraphs 5.1.2. to 5.6. of this Regulation and fulfil the tests (puncture, diffusion and malfunction) as specified in Annex 3 to this Regulation e.g. vehicle-speed)
 - 2.3 Additional features (if applicable)
 3. Test results
 - 3.1 Tyre Class, Marking and wheel size(s) of standard unit equipment
 - 3.2 Brief description of the Tyre Pressure Monitoring System (TPMS) / Tyre Pressure Refill System (TPRS) / Central Tyre Inflation System (CTIS) including implemented measures to avoid inadvertent reset control operation according to paragraph 5.1.6. to this Regulation, if applicable

² Strike out what does not apply

3.3 Result of the tests

3.4 According to Annex 3 (TPMS) to this Regulation, if applicable:

<i>Test</i>	<i>Measured Time to warning (mm:ss)</i>
Puncture Test	
Diffusion Test	
Malfunction Test	

3.5 According to Annex 4 (TPRS / CTIS) to this Regulation, if applicable²:

<i>Test</i>	<i>Measured Time to warning (mm:ss)</i>
Refill Test	
Malfunction Test	

4. Limits of installation

5. Date of test:

6. This test has been carried out and the results reported in accordance with Annex 3 / Annex 4 to UN Regulation No. 141 as last amended by the 01 series of amendments.

7. Technical Service conducting the test

Signed: Date:

Annex 7 – Appendix 4

ISO11992-2 Gateway ECU Test Report for reference trailer

1. Identification
 - 1.1. Manufacturer of the ISO11992-2 Gateway ECU (name and address)
 - 1.2. System name / model
2. System(s) and installations approved:
 - 2.1. Range of application (trailer type(s) and number of axles)
 - 2.2. System identification of TEBS system to provide ISO11992 Gateway function
3. Test results
 - 3.1. Brief description of ISO11992-2 Gateway ECU
 - 3.2. Result of the tests
 - 3.3. According to Annex 6 (Gateway Function) to this Regulation:

<i>Test</i>	<i>Measured Time to warning (mm:ss)</i>
Low Tyre Pressure Test	
Malfunction Test	

4. Limits of installation
 - 4.1. Other recommendations/limitations (Output of messages and signals required by TPMS so that the vehicle shall meet the performance requirements contained in paragraphs 5.1.2. to 5.6. of this Regulation and fulfil the tests (puncture, diffusion and malfunction) as specified in Annex 3 to this Regulation e.g. vehicle-speed)
 - 4.2. Other recommendations/limitations (Output of messages and signals required by TPRS / CTIS so that the vehicle shall meet the performance requirements contained in paragraphs 5.1.2. to 5.6. of this Regulation and fulfil the tests (puncture, diffusion and malfunction) as specified in Annex 4 to this Regulation e.g. vehicle-speed)
5. Date of test:
6. This test has been carried out and the results reported in accordance with Annex 6 to UN Regulation No. 141 as last amended by the 01 series of amendments.
7. Technical Service conducting the test
Signed: Date:

Annex 8

Alternative procedure for type approval of subject trailer(s)

1. General
 - 1.1. This Annex defines an alternative procedure for type approval of trailers, regarding their Tyre Pressure Monitoring System (TPMS) / Tyre Pressure Refill System (TPRS) / Central Tyre Inflation System (CTIS) utilizing information from test reports issued in accordance with Annex 7, Appendix 3 and / or Appendix 4 to this Regulation.
 - 1.2. On completion of the verification procedures described in Annex 3, the Type Approval Authority shall issue a UN type approval certificate conforming to the model specified in Annex 1 to this Regulation.
2. Application for type approval
 - 2.1. The application for UN type approval of a trailer type with regard to TPMS, TPRS or CTIS shall be submitted by the trailer manufacturer. The trailer manufacturer shall supply to the Type Approval at least the following:
 - 2.2. Test reports according Annex 7, Appendix 3 and / or Appendix 4 to this Regulation from the TPMS / TPRS / CTIS and/or Gateway supplier which confirms the function of the systems of a reference trailer, covering the application of subject trailer to be approved.
 - 2.2.1. The information documents of a trailer type hereafter referred to as the "reference trailer"³ according to Annex 7 to this Regulation on which the TPMS / TPRS / CTIS is to be based. This trailer will have been subject to the actual tests defined in Annex 3 and / or Annex 4 and / or Annex 6 to this Regulation for the appropriate trailer. A trailer that has been approved to the alternative procedure defined in this Annex shall not be used as a reference trailer.
 - 2.2.2. A trailer, representative of the trailer type to be approved hereafter referred to as the "subject trailer".
 - 2.3. A trailer, representative of the trailer type to be approved hereafter referred to as the "subject trailer".
3. Verification
 - 3.1. The requirements of Annex 3 and / or Annex 4 and/or Annex 6 are considered to be met if the subject trailer configuration is equivalent with the following conditions:
 - 3.1.1. The subject trailer configuration complies with one of the marked configurations in the test report in terms of number of axles, number of tyres and position of lift axles
 - 3.1.2. The allowed pressure range of the nominal pressure is within the range of the reference trailer.
 - 3.1.3. Installation/Integration and setup of TPMS / TPRS / CTIS and the ISO11992-2 Gateway ECU (if applicable) on the subject trailer is in accordance with the installation/integration and setup limitations specified for the reference trailer.
 - 3.2. Add information documents about subject trailer according to Appendix 1 and Appendix 2 of this Annex.
4. General

³ The reference trailer may be from a different manufacturer

- 4.1. Testing of a trailer in accordance with Annex 3 and / or Annex 4 to this Regulation may be waived by the Type Approval Authority at the time of type approval of the trailer provided that
- the Tyre Pressure Monitoring System (TPMS) complies with the requirements of Annex 3 or
 - the Tyre Pressure Refill System (TPRS) complies with the requirements of Annex 4 or
 - the Central Tyre Inflation System (CTIS) complies with the requirements of Annex 4
- and, if applicable, Gateway complies with the requirements of Annex 6 to this Regulation.
5. Installation limitation checks shall be made according to Annex 7, Appendix 1 and Appendix 2, paragraph 2.3. of this Regulation, if applicable.

Annex 8 - Appendix 1

Tyre Pressure Monitoring System / Tyre Pressure Refill System / Central Tyre Inflation System Information document for subject trailer(s)

1. General
 - 1.1. Name and address of manufacturer
 - 1.2. System name
 - 1.3. System configuration of the TPMS / TPRS / CTIS⁴ (e.g.: which components are included)
2. Application
 - 2.1. System configuration of the subject trailer:
 - Number of axles
 - Wheel locations
 - Position of lift axles
 - Position of receiver/antenna locations
 - Position of sensors
 - Nominal pressure range.
 - 2.2. Schematic diagrams of the system configuration installed on the trailer defined in item 2.1.
 - 2.3. Installation/ Integration limitations (e.g. input messages and signals required by TPMS so that the vehicle shall meet the performance requirements contained in paragraphs 5.1.2. to 5.6. of this Regulation and fulfil the tests (puncture, diffusion and malfunction) as specified in Annex 3 to this Regulation e.g. vehicle-speed)
 - 2.4. Additional information (if applicable) to the application of the TPMS / TPRS / CTIS
3. Component description
 - 3.1. Sensor(s)
 - Identification (e.g. part number(s)).
 - 3.2. Receiver(s) / Antenna (s)
 - Identification (e.g. part number(s)).
 - 3.3. Electrical equipment
 - Circuit diagram(s)
 - Powering methods.
 - 3.4. If applicable the electromagnetic compatibility according to UN Regulation No. 10 as last amended by
 - (a) the 03 series of amendments for vehicles without a coupling system for charging the Rechargeable Electric Energy Storage System (traction batteries);

⁴ Strike out what does not apply

- (b) the 06 series of amendments for vehicles with a coupling system for charging the Rechargeable Electric Energy Storage System (traction batteries).
- 3.5. Additional information (if applicable) to the component description of the TPMS / TPRS / CTIS.

Annex 8 - Appendix 2

ISO11992-2 Gateway ECU information document for subject trailer(s)

1. General
 - 1.1. Name and address of manufacturer
 - 1.2. System name
 - 1.3. System configuration in respect to TPMS / TPRS / CTIS⁵
2. Applications
 - 2.1. System configurations applied; e.g. other ECUs connected to the same CAN bus as the TPMS / TPRS / CTIS ECU
 - 2.2. Schematic diagrams of the system configurations installed on the subject trailers
 - 2.3. Limitations (e.g. compatibility with other CAN-bus attendees, output of messages and signals required by TPMS so that the vehicle shall meet the performance requirements contained in paragraphs 5.1.2. to 5.6. of this Regulation and fulfil the tests (puncture, diffusion and malfunction) as specified in Annex 3 to this Regulation e.g. vehicle-speed)
 - 2.4. Additional information (if applicable) to the application of the TPMS / TPRS / CTIS
3. Component description
 - 3.1. Gateway for ISO11992 according to Annex 5
 - Identification (e.g. part number(s))
 - Description of other connected components (e.g. on CAN-bus)
 - 3.2. Electrical equipment
 - Circuit diagram(s)
 - Powering methods
 - 3.3. If applicable the Electro-magnetic compatibility according to UN Regulation No. 10 as last amended by
 - (a) the 03 series of amendments for vehicles without a coupling system for charging the Rechargeable Electric Energy Storage System (traction batteries);
 - (b) the 06 series of amendments for vehicles with a coupling system for charging the Rechargeable Electric Energy Storage System (traction batteries).
 - 3.4. Additional information (if applicable) to the component description of the TPMS / TPRS / CTIS."

⁵ Strike out what does not apply