Commission Implementing Regulation (EU) 2016/799

of 18 March 2016

implementing Regulation (EU) No 165/2014 of the European Parliament and of the Council laying down the requirements for the construction, testing, installation, operation and repair of tachographs and their components

ANNEX I C

Requirements for construction, testing, installation, and inspection

Appendix 16

ADAPTOR FOR M1 AND N1 CATEGORY VEHICLES

1.ABBREVIATIONS AND REFERENCE DOCUMENTS

1.1. **Abbreviations**

TBD

To Be Defined

VU

Vehicle Unit

1.2. **Reference standards**

ISO16844-3 Road vehicles — Tachograph systems — Part 3: Motion sensor interface

2.GENERAL CHARACTERISTICS AND FUNCTIONS OF THE ADAPTOR

2.1. **Adaptor general description**

ADA_001The adaptor shall provide a connected VU with secured motion data permanently representative of vehicle speed and distance travelled.

The adaptor is only intended for those vehicles that are required to be equipped with recording equipment in compliance with this Regulation.

It shall be installed and used only in those types of vehicle defined in definition yy) ‘adaptor’ of Annex IC where it is not mechanically possible to install any other type of existing motion sensor which is otherwise compliant with the provisions of this Annex and its Appendixes 1 to 16.

The adaptor shall not be mechanically interfaced to a moving part of the vehicle, but connected to the speed/distance impulses which are generated by integrated sensors or alternative interfaces.

ADA_002A type approved motion sensor (according to the provisions of this Annex IC, section 8, Type approval of recording equipment and tachograph cards) shall be fitted into the adaptor housing, which shall also include a pulse converter device inducing the incoming pulses to the embedded motion sensor. The embedded motion sensor itself shall be connected to the VU, so that the interface between the VU and the adaptor shall be compliant with the requirements set out in ISO16844-3.

2.2. **Functions**

ADA_003The adaptor shall include the following functions:

- interfacing and adapting the incoming speed pulses,
- inducing the incoming pulses to the embedded motion sensor,
- all functions of the embedded motion sensor, providing secured motion data to the VU.

2.3. **Security**

ADA_004The adaptor shall not be security certified according to the motion sensor generic security target defined in Appendix 10 of this Annex. Security related requirements specified in section 4.4 of this Appendix shall apply instead.

3.REQUIREMENTS FOR THE RECORDING EQUIPMENT WHEN AN ADAPTOR IS INSTALLED

The requirements in the following Chapters indicate how the requirements of this Annex shall be understood when an adaptor is used. The related requirement numbers of Annex IC are provided between brackets.

ADA_005The recording equipment of any vehicle fitted with an adaptor must comply with all the provisions of this Annex, except otherwise specified in this Appendix.

ADA_006When an adaptor is installed, the recording equipment includes cables, the adaptor (including a motion sensor), and a VU [01].

ADA_007The detection of events and/or faults function of the recording equipment is modified as follows:

- the ‘power supply interruption’ event shall be triggered by the VU, while not in calibration mode, in case of any interruption exceeding 200 milliseconds of the power supply of the embedded motion sensor [79]
- the ‘motion data error’ event shall be triggered by the VU in case of interruption of the normal data flow between the embedded motion sensor and the VU and/or in case of data integrity or data authentication error during data exchange between the embedded motion sensor and the VU [83]

- the ‘security breach attempt’ event shall be triggered by the VU for any other event affecting the security of the embedded motion sensor, while not in calibration mode [85]

- the ‘recording equipment’ fault shall be triggered by the VU, while not in calibration mode, for any fault of the embedded motion sensor [88]

ADA_008The adaptor faults detectable by the recording equipment shall be those related with the embedded motion sensor [88].

ADA_009The VU calibration function shall allow to automatically pair the embedded motion sensor with the VU [202, 204].

4.CONSTRUCTION AND FUNCTIONAL REQUIREMENTS FOR THE ADAPTOR

4.1. **Interfacing and adapting incoming speed pulses**

ADA_011The adaptor input interface shall accept frequency pulses representative of the vehicle speed and distance travelled. Electrical characteristics of the incoming pulses are: *TBD by the manufacturer*. Adjustments accessible to only the adaptor manufacturer, and to the approved workshop performing the adaptor installation shall allow the correct interfacing of the adaptor input to the vehicle, if applicable.

ADA_012The adaptor input interface shall be able, if applicable, to multiply or divide the frequency pulses of the incoming speed pulses by a fixed factor, to adapt the signal to the k factor range defined by this Annex (4 000 to 25 000 pulses/km). This fixed factor may only be programmed by the adaptor manufacturer, and the approved workshop performing the adaptor installation.

4.2. **Inducing the incoming pulses to the embedded motion sensor**

ADA_013The incoming pulses, possibly adapted as specified above, shall be induced to the embedded motion sensor, so that each incoming pulse shall be detected by the motion sensor.

4.3. **Embedded motion sensor**

ADA_014The embedded motion sensor shall be stimulated by the induced pulses, thus allowing it to generate motion data accurately representing the vehicle movement, as if it was mechanically interfaced to a moving part of the vehicle.

ADA_015The identification data of the embedded motion sensor shall be used by the VU to identify the adaptor [95].

ADA_016The installation data stored in the embedded motion sensor shall be considered to represent the adaptor installation data [122].

4.4. **Security requirements**

ADA_017The adaptor housing shall be designed so that it cannot be opened. It shall be sealed, so that physical tampering attempts can be easily detected (e.g. through visual inspection, see ADA_035). Seals shall follow the same requirements of motion sensor seals [398 to 406]

ADA_018It shall not be possible to remove the embedded motion sensor from the adaptor without breaking the seal(s) of the adaptor housing, or breaking the seal between the sensor and the adaptor housing (see ADA_034).

ADA_019The adaptor shall ensure that motion data may only been processed and derived from the adaptor input.

4.5. **Performance characteristics**

ADA_020The adaptor shall be fully operational in the temperature range defined by the manufacturer.

ADA_021The adaptor shall be fully operational in the humidity range 10 % to 90 % [214].

ADA_022The adaptor shall be protected against over-voltage, inversion of its power supply polarity, and short circuits [216].

ADA_023The adaptor shall either:

- react to a magnetic field disturbing vehicle motion detection. In such circumstances, the vehicle unit will record and store a sensor fault [88] or,
- have a sensing element that is protected from, or immune to, magnetic fields [217].

ADA_024The adaptor shall conform to international regulation UN ECE R10, related to electromagnetic compatibility, and shall be protected against electrostatic discharges and transients [218].

4.6. **Materials**

ADA_025The adaptor shall meet the protection grade (*TBD by the manufacturer, depending on the installation position*) [220, 221].

ADA_026The colour of the adaptor housing shall be yellow.

4.7. **Markings**

ADA_027A descriptive plaque shall be affixed to the adaptor and shall show the following details:

- name and address of the manufacturer of the adaptor,
- manufacturer's part number and year of manufacture of the adaptor,

- approval mark of the adaptor type or of the recording equipment type including the adaptor,
- the date on which the adaptor has been installed,
- the vehicle identification number of the vehicle on which it has been installed.

ADA_028The descriptive plaque shall also show the following details (if not directly readable from the outside on the embedded motion sensor):

- name of the manufacturer of the embedded motion sensor,
- manufacturer's part number and year of manufacture of the embedded motion sensor,
- approval mark for the embedded motion sensor.

5.INSTALLATION OF THE RECORDING EQUIPMENT WHEN AN ADAPTOR IS USED

5.1. **Installation**

ADA_029Adaptors to be installed in vehicles shall only be installed by vehicle manufacturers, or by approved workshops, authorised to install, activate and calibrate digital and smart tachographs.

ADA_030Such approved workshop installing the adaptor shall adjust the input interface and select the division ratio of the input signal (if applicable).

ADA_031Such approved workshop installing the adaptor shall seal the adaptor housing.

ADA_032The adaptor shall be fitted as close as possible to that part of the vehicle which provides its incoming pulses.

ADA_033The cables for providing the adaptor power supply shall be red (positive supply) and black (ground).

5.2. **Sealing**

ADA_034The following sealing requirements shall apply:

- the adaptor housing shall be sealed (see ADA_017),
- the housing of the embedded sensor shall be sealed to the adaptor housing, unless it is not possible to remove the sensor from the adaptor housing without breaking the seal(s) of the adaptor housing (see ADA_018),
- the adaptor housing shall be sealed to the vehicle,

- the connection between the adaptor and the equipment which provides its incoming pulses shall be sealed on both ends (to the extent of what is reasonably possible).

6.CHECKS, INSPECTIONS AND REPAIRS

6.1. **Periodic inspections**

ADA_035When an adaptor is used, each periodic inspection (periodic inspections means in compliance with Requirement [409] through to Requirement [413] of Annex 1C) of the recording equipment shall include the following checks:

- that the adaptor carries the appropriate type approval markings,
- that the seals on the adaptor and its connections are intact,
- that the adaptor is installed as indicated on the installation plaque,
- that the adaptor is installed as specified by the adapter and/or vehicle manufacturer,
- that mounting an adaptor is authorised for the inspected vehicle.

ADA_036These inspections shall include a calibration and a replacement of all seals, whatever their state.

7.TYPE APPROVAL OF RECORDING EQUIPMENT WHEN AN ADAPTOR IS USED

7.1. **General points**

ADA_037Recording equipment shall be submitted for type approval complete, with the adaptor [425].

ADA_038Any adaptor may be submitted for its own type approval, or for type approval as a component of a recording equipment.

ADA_039Such type approval shall include functional tests involving the adaptor. Positive results to each of these tests are stated by an appropriate certificate [426].

7.2. **Functional certificate**

ADA_040A functional certificate of an adaptor or of recording equipment including an adaptor shall be delivered to the adaptor manufacturer only after all the following minimum functional tests have been successfully passed.

No	Test	Description	Related requirements
1.	**Administrative examination**		
1.1	Documentation	Correctness of documentation of the adaptor	
2.	**Visual inspection**		
2.1.	Compliance of the adaptor with documentation		
2.2.	Identification / markings of the adaptor		ADA_027, ADA_028
2.3	Materials of the adaptor		[219] to [223] ADA_026
2.4.	Sealing		ADA_017, ADA_018, ADA_034
3.	**Functional tests**		
3.1	Inducing the speed pulses to the embedded motion sensor		ADA_013
3.2	Interfacing and adapting incoming speed pulses		ADA_011, ADA_012
3.3	Motion measurement accuracy		[30] to [35], [217]
4.	**Environmental tests**		
4.1	Manufacturer test results	Results of manufacturer environment tests.	ADA_020, ADA_021, ADA_022, ADA_024
5.	**EMC**		
5.1	radiated emissions and susceptibility	Verify compliance with UNECE Regulation No 10	ADA_024
5.2	Manufacturer test results	Results of manufacturer environment tests.	ADA_024