

1. -----IND- 2018 0301 CZ- EN- ----- 20180711 --- --- PROJET

Executive summary for the EC (not part of this legislation)

Measuring devices for determining the load per axle or wheel of rolling stock are placed on the market and put into use in the Czech Republic in accordance with Directive 2014/31/EU (Non Automatic Weighing Instruments – NAWI). Once they have been put into use, they become subject to national metrology regulation – verification at specified intervals.

This notified legislation only applies to the verification of measuring instruments that have already been put into use. It does not concern placing them on the market or putting them into use.

(End of executive summary.)

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PUBLIC DECREE

As the authority with substantive and territorial jurisdiction in the matter of laying down metrological and technical requirements for legally controlled measuring instruments and stipulating the testing methods for type approval and verification of legally controlled measuring instruments pursuant to § 14(1) of Act No 505/1990 on metrology, as amended (hereinafter referred to as the 'Metrology Act'), and in accordance with the provisions of § 172 et seq. of Act No 500/2004, the Administrative Procedure Code (hereinafter referred to as the 'APC'), the Czech Metrology Institute (hereinafter referred to as the 'CMI') commenced ex officio proceedings on 4 April 2017 pursuant to § 46 APC, and, on the basis of supporting documents, issues the following:

I.

DRAFT GENERAL MEASURE

number: 0111-OOP-C085-16

laying down the metrological and technical requirements for legally controlled measuring instruments, including testing methods for type approval and verification of the following legally controlled measuring instruments:

'Measuring devices for determining load per axle or wheel of rolling stock'

1 Basic definitions

For the purposes of this general measure, terms and definitions pursuant to VIM and VIML¹ as well as the terms and definitions stated below shall apply:

1.1 Basic definitions

The definitions below apply to Figure 1.

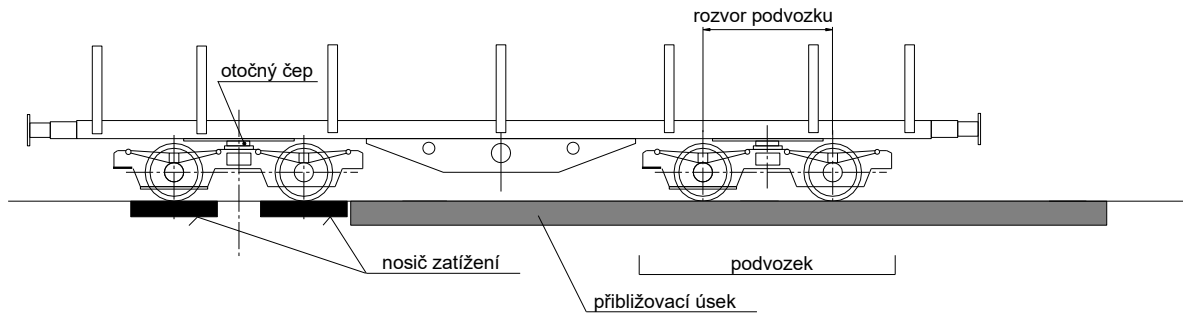


Figure 1 - Rolling stock and rail

otočný čep	pivot
rozvor podvozku	bogie wheelbase
nosič zatížení	load carrier
přibližovací úsek	approach section
podvozek	bogie

1.1.1 measuring devices for determining the load per axle or wheel of rolling stock (hereinafter referred to as 'devices')

a measuring device used to determine the wheel or axle load of rolling stock using the effect of gravity on this vehicle; the device has non-automatic operation with automatic balancing

1.1.2 measurement of wheel load

during measurement, the apparent mass of the rolling stock wheel is determined when it is stationary and its running surface is resting on the active running surface of the load carrier rail

1.1.3 running surface

the running surface base is the geometry of that part of the wheel's running profile that carries the rolling stock. It is in direct contact with the running surface of the load carrier rail; the wheel's running surface is a line, and the running surface of the rail in theory consists of points.

1.1.4 rail axis inclination

the divergence of the vertical axis of the rail from its horizontal footing; the chosen inclination is usually 1:20

1.1.5 rail gauge (gauge)

the spacing between the left and right rail; the distance between the railheads measured 14 mm below the running surface; for a normal track, the rail gauge on a straight rail has a nominal value of 1 435 mm

¹ TNI 01 0115 International Vocabulary of Metrology – Basic and General Concepts and Associated Terms (VIM) and International Vocabulary of Legal Metrology (VIML) are part of the technical harmonisation compendium 'Terminology in the field of metrology', which is publicly available at www.unmz.cz.

1.1.6 wheelset

the wheels of rolling stock, connected by an axle to a rigid unit, without the ability to turn independently of each other

1.1.7 bogie

for the purpose of this legislation, a bogie is defined as the mechanical connection of two or three wheelsets by a rigid frame

1.2 Main parts

1.2.1 load carrier

the part of the equipment intended to receive the load; the carrier must include the rail

1.2.2 evaluation and indication device (EID)

a part of the non-automatic device that processes information on the magnitude of the load; the main part of the indication device is the display that shows the load

1.2.3 load cell

a load cell is a transducer that converts a mechanical quantity (load) at its input into an electrical signal at its output; the magnitude of the electrical signal is directly proportional to the magnitude of the load

1.2.4 remote indicator

the part of the device situated in a location from where the device cannot be seen directly; the increment size of this device is identical to the increment on the main display of the EID

1.2.5 approach section

the part of the surrounding terrain adjacent to the location of the device; the approach section is part of the device (see figure 1)

1.2.6 joint bridge plates

devices that serve to bridge the joint gaps between rails; they permit the load carrier to move independently and the rolling stock to cross the joint from the settling section of the load carrier to the load carrier without impact

NOTE The upper surface is cylindrical.

1.3 Metrological characteristics

1.3.1 interval size for testing

interval setting and display with a minimum resolution of $1/5 e$ (for testing purposes)

1.3.2 capacity of the device (*Lim*)

the maximum permissible load to which the device can be subjected without damaging it or permanently impairing its metrological properties; the capacity of the device (*Lim*) is higher than its maximum capacity limit (*Max*)

1.4 Influences and reference conditions

1.4.1 influence quantity

a quantity that is not measured, but has an influence on the measured value or device indication

1.4.2 influence factor

an influence quantity that has a value within bounds specified by this legislation

1.4.3 operating conditions

conditions of use that specify the measuring range and influencing quantities for which metrological characteristics are within the limits of maximum permissible errors (*MPE*) stipulated by this legislation

1.4.4 reference conditions

a given set of specific values of influence factors to ensure the mutual comparison of measurement results

1.5 Electronic parts**1.5.1 electronic subsystem**

a part of an electronic device that comprises electronic elements and that has its own recognisable function

1.5.2 module

a part of a device that performs a specific function, can be tested separately and has had individual limit error values specified

2 Metrological requirements**2.1 Accuracy class**

Accuracy classes III or III are specified for this device.

2.2 Maximum permissible errors (*MPE*)

Maximum permissible errors used for loading greater than or equal to than the minimum capacity (*Min*) and less than or equal to the maximum capacity (*Max*) are specified for a given accuracy class in Table 1.

Table 1 – Maximum permissible errors (*MPE*)

Maximum permissible errors (<i>MPE</i>)	For load <i>m</i> , expressed by the quantity of verification intervals <i>e</i>	
	Class III	Class III
$\pm 0.5e$	$0 \leq m \leq 500$	$0 \leq m \leq 50$
$\pm 1.0e$	$500 < m \leq 2\ 000$	$50 < m \leq 200$
$\pm 1.5e$	$2\ 000 < m \leq 10\ 000$	$200 < m \leq 1\ 000$

2.3 Eccentricity load

Device errors when introducing a load equal to the maximum capacity (*Max*) to various places on the load carrier (track) must not exceed the corresponding maximum permissible errors (*MPE*) in Table 1.

2.4 Repeatability

The difference between two results when determining the loading exerted by the same load placed on the load carrier under the same conditions must not be greater than the absolute value of the maximum permissible errors (*MPE*) under Table 1 for a given load.

3 Technical requirements

3.1 Indicator

3.1.1 Reading quality

Reading of measurement results must be reliable, easy and unambiguous under conditions of normal use. The indication must be provided with the appropriate unit of weight, either in text or as a symbol.

All printing must be legible and indelible for the intended use. Printed numerals must be at least 2 mm high.

If being printed, the text or symbol of the unit of measurement must be either to the right of the measured value or above the values column^{*)}.

^{*)} A column is defined as an arrangement where at least three results of the same measured value are one above another.

3.1.2 Indication limits

The device must not display weight information that exceeds the maximum capacity (*Max*) by more than $9e$.

4 Markings

4.1 Descriptive markings

Scales must be marked in a visible, legible and indelible manner with the following information:

- a) the number of the EU type-examination certificate, if available;
- b) the manufacturer's name, registered trade name or registered trade mark;
- c) the accuracy class, enclosed in an oval or in two horizontal lines joined by two half circles;
- d) maximum capacity, in the form 'Max ...';
- e) minimum capacity, in the form 'Min ...';
- f) verification scale interval, in the form ' $e = \dots$ ';
- g) type, batch or serial number;

and where applicable:

- h) for instruments consisting of separate but associated units, an identification mark on each unit;
- i) the scale interval, if different from e , in the form ' $d = \dots$ ';
- j) the maximum additive tare effect, in the form ' $T = + \dots$ ';
- k) the maximum subtractive tare effect if it is different from the upper capacity (*Max*), in the form ' $T = - \dots$ ';
- l) the tare interval if it is different from d , in the form ' $dT = \dots$ ';
- m) maximum safe load if it is different from the maximum capacity (*Max*), in the form 'Lim ...',
- n) special temperature limits, in the form ' $^{\circ}\text{C}/\dots^{\circ}\text{C}$ ';
- o) the ratio between load carrier and load.

5 Type approval of the measuring instrument

These measuring instruments are placed on the market and into service with a conformity assessment in accordance with the Government Regulation on non-automatic weighing instruments², meaning that they are not subject to type approval.

6 Initial verification

These weighing instruments are placed on the market with a conformity assessment pursuant to the Government Regulation on non-automatic weighing instruments², meaning that they are not subject to type approval.

7 Subsequent verification

Tests are performed in non-automatic mode with a static load.

7.1 General conditions

Tests are performed using a standard test weight and rolling stock. If technically possible, a special test loading device may be used instead.

The combined uncertainty of the test load implemented in the above-specified ways must be less than one third of the maximum permissible error (*MPE*) of the tested device.

7.1.1 Temperature

Tests must be performed at a stable ambient temperature. The temperature is considered stable when the difference between temperature extremes recorded during the test does not exceed one fifth of the temperature range of the given device or 5 °C, whichever is lower, and the rate of change does not exceed 5 °C per hour.

7.1.2 Power

Tests must be performed with power supplied as stipulated by the device manufacturer.

7.1.3 Test arrangements

A device submitted for testing must be complete.

If the measuring instrument can be connected to a printer that was assessed for the purposes of the specified measuring instrument when placing the device on the market with a conformity assessment, and this printer is commonly used with the device, the party ordering the tests will also supply this device.

If the tested device is situated under overhead lines, for safety reasons the party ordering the tests will ensure power to the lines is switched off in a timely manner.

7.2 Standard weights

The standard weight must comply with the requirements of OIML R 111³.

² Government Regulation No 121/2016 on conformity assessment of non-automatic weighing instruments when being made available on the market.

³ OIML R 111 Weights of classes E₁, E₂, F₁, F₂, M₁, M₁₋₂, M₂, M₂₋₃ and M₃. This document is available to the public at www.oiml.org.

7.2.1 Reference wagon

The type of reference wagon is chosen according to the nature of the device installed. Figure 2 shows an example of a reference wagon.

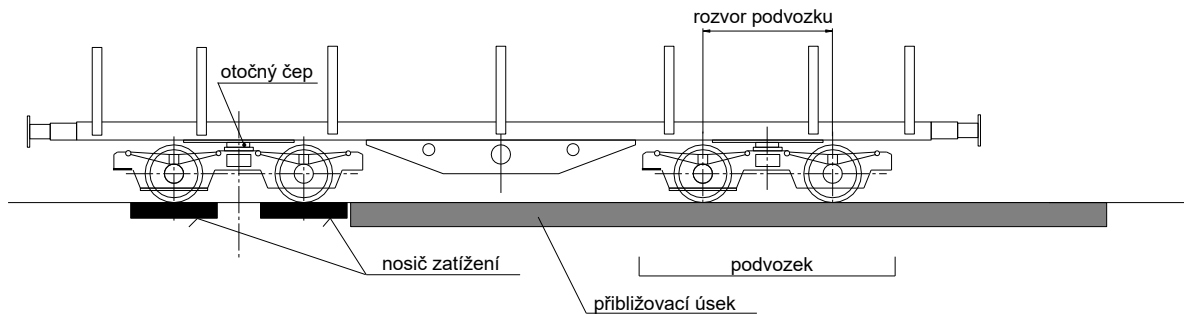


Figure 2 - Reference wagon example

otočný čep	pivot
rozvor podvozku	bogie wheelbase
nosič zatížení	load carrier
přibližovací úsek	approach section
podvozek	bogie

7.2.1.1 Wagon with two wheelsets

A wagon with two wheelsets can be used as a reference wagon.

7.2.1.2 Wagon with bogies

If several carriers are installed in sequence (for example for measuring and setting bogies), a wagon with four wheelsets (two bogies) is used. Figure 3 shows a bogie diagram.

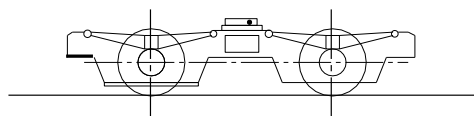


Figure 3 - Wagon bogie

7.2.1.3 Loading a reference wagon

If the axle load is not double the upper maximum capacity (*Max*) of the device, it is loaded with a known weight so that the load per wheel is equal to $0.9 \times Max$ at most.

7.3 Weighing test

One set of measurements is performed for loading and unloading with at least five load values, including zero, *Min*, *Max*, and points where the value of the maximum permissible error (*MPE*) changes.

Errors in the device must not be greater than the maximum permissible error (*MPE*) for the weight given in Table 1.

7.4 Eccentricity test with a rolling load

The device, more precisely the load carrier, must be tested at various locations on its active surface with a test weight that corresponds to the usual rolling load situated on it during regular operation. For the purposes of this legislation, the usual rolling load is equal to half the permissible load per axle of the stock that is being measured on the device.

Rolling stock loaded pursuant to Article 7.2.1.3 is used for the test.

The reference wagon wheel rolls onto the load carrier rail. Load data is read from the indication unit of the device when the wheel is around 100 mm from the edge of the carrier rail, in the centre of the carrier, and on the other edge of the carrier - see Figure 4. The reading is done when the reference wagon is stationary.

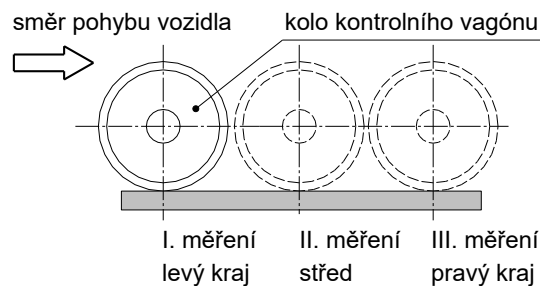


Figure 4 - Example of wheel placement when reading a measured value

směr pohybu vozidla	vehicle movement direction
kolo kontrolního vagónu	reference wagon wheel
I. měření levý kraj	I. measurement at left edge
II. měření střed	II. measurement at centre
III. měření pravý kraj	III. measurement at right edge

Load measurement results must not exceed the absolute value of the relevant maximum permissible error (*MPE*) as per Table 1.

If the device has automatic zeroing or zero monitoring, this function must not be activated during the test.

7.4.1 Measured value reading

Prior to the test, the interval value is reduced to at least $e/5$. A mark is placed on the measuring rail (load carrier) 100 mm from each edge of the rail and in its centre. When reading indicated values, the wheel axle must be at the marked location - see Figure 4. Once one set of measurements has been completed, three pieces of data are available:

- the value determined at measurement location I. on the left edge of the rail - per Figure 4 (I_L);
- the value determined at measurement location II. on the centre of the rail - per Figure 4 (I_S);
- the value determined at measurement location III. on the right edge of the rail - per Figure 4 (I_P).

The device can be zeroed after every set.

A total of ten sets of measurements are performed. For each set of measurements, the wheel always moves in only one direction with respect to the load carrier.

7.5 Repeatability test

For the repeatability test, three sets of measurements must be performed with a load close to 80 % *Max*. The maximum difference between measurement results for the same load must not be greater than the absolute value of the maximum permissible error (*MPE*) for the given device.

7.6 Error evaluation

7.6.1 Tests with a standard test weight

If the indication segment cannot be switched to a smaller value, the error (*E*), prior to rounding, is calculated using the following formula:

$$P = I + 0.5e - \Delta L \quad (1)$$

where *I* is the indication,

ΔL is the sum of the extra weights

$$E = P - L = I + 0.5e - \Delta L - L \quad (2)$$

where *L* is the nominal value of a reference test weight placed on the measuring device carrier during the test.

If the segment value can be reduced to at least *e/5*, the device error is calculated using the following formula:

$$E = I_Z - L \quad (3)$$

where *I_Z* is the measuring instrument indication under load.

None of the determined device errors (*E*) may exceed the value of the maximum permitted error (*MPE*) as per Table 1.

7.6.2 Tests using a rail vehicle

The average value of the three measurements on the carrier (of the measured rail) is calculated using the following formula:

$$I_M = (I_L + I_S + I_P) / 3 \quad (4)$$

Deviations of individual measurements from the average value:

$$E_L = I_L - I_M \quad (5)$$

$$E_S = I_S - I_M \quad (6)$$

$$E_P = I_P - I_M \quad (7)$$

No determined deviation (*E_L*, *E_S*, and *E_P*) device being tested using a rail vehicle may exceed the value of the maximum permitted error (*MPE*) under Table 1.

8 Measuring instrument re-test at the request of the persons concerned

When examining measuring instruments pursuant to § 11a of the Metrology Act at the request of a person who may be affected by an incorrect measuring instrument, please proceed according to Chapter 7. The maximum permissible error used will be double the maximum permissible errors (*MPE*) specified in Table 1.

9 Notified standards

For the purposes of specifying the metrological and technical requirements for measuring instruments and specifying the testing methods for their verification stemming from this general measure, the CMI shall notify Czech technical standards, other technical standards or technical documents of international or foreign organisations, or other technical documents containing more detailed technical requirements (hereinafter referred to as 'notified standards'). The CMI shall publish a list of these notified standards attached to the relevant measures, together with the general measure, in a manner accessible to the public (on www.cmi.cz).

Compliance with notified standards or parts thereof is considered, to the extent and under the conditions stipulated by a general measure, to be compliance with the requirements stipulated by this measure to which these standards or parts thereof apply.

For the purposes of specifying the metrological and technical requirements for measuring instruments and specifying the testing methods for their type approval and verification stemming from this general measure, the CMI shall notify Czech technical standards, other technical standards or technical documents of international or foreign organisations, or other technical documents containing more detailed technical requirements (hereinafter referred to as 'notified standards'). The CMI shall publish a list of these notified standards attached to the relevant measures, together with the general measure, in a manner accessible to the public (on www.cmi.cz).

Compliance with notified standards or parts thereof is considered, to the extent and under the conditions stipulated by a general measure, to be compliance with the requirements stipulated by this measure to which these standards or parts thereof apply.

Compliance with notified standards is one way of demonstrating compliance with the requirements. These requirements may also be met using another technical solution guaranteeing an equal or higher level of protection of legitimate interests.

II.

FOUNDATIONS

The CMI issues, pursuant to § 14(1)(j) of the Metrology Act, for the implementation of § 6(2), § 9(1) and (9) as well as § 11a(3) of the Metrology Act, this general measure laying down the metrological and technical requirements for the specified measuring instruments and for the verification of specified measuring instruments - 'Measuring devices for determining the load per axle or wheel of rolling stock'.

Implementing Decree No 345/2002 specifying measuring instruments for mandatory verification and measuring instruments subject to type approval, as amended, classifies the measuring instruments under item 2.1.5 a) in the annex entitled 'List of legally controlled measuring instruments' as measuring instruments subject to type approval and mandatory verification.

This legislation (general measure) will be notified in accordance with Directive (EU) 2015/1535 of the European Parliament and of the Council of 9 September 2015 laying down a procedure for the provision of information in the field of technical regulations and of rules on Information Society services.

III.

INSTRUCTIONS

In accordance with § 172(1), in conjunction with § 39(1) APC, the CMI has stipulated a time limit for comments of 30 days as of the date of posting on the official notice board. Comments submitted after this time limit will not be considered.

The persons concerned are hereby invited to comment on this draft general measure. With a view to the provisions of § 172(4) APC, the comments shall be submitted in writing and meet the requirements for submissions in accordance with § 37 APC.

The comments shall include the particulars referred to in § 37(2) APC and clearly state the following: who is making the comments; which general measure they concern; to what extent the comments challenge the measure; how the general measure runs contrary to legislation or how the general measure or the procedure that preceded it is inaccurate; which matters the comments concern and what is being proposed. Said comments must also identify the administrative authority to which they are addressed and be signed by the person making them.

The supporting documents for this draft general measure may be consulted at the Czech Metrology Institute, Legal Metrology Department, Okružní 31, 638 00 Brno, after making arrangements by telephone.

This general measure shall be posted for 15 days.

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RNDr. Pavel Klenovský
Director-General

Person responsible for accuracy: Mgr. Tomáš Hendrych

Posted on: 12 April 2018

Signature of the authorised person confirming posting:

Removed on:

Signature of the authorised person confirming removal: