

1. -----IND- 2018 0591 CZ- EN- ----- 20181217 --- --- PROJET

'Tyre pressure gauges for road motor vehicles' may be placed on the market and put into use in the Czech Republic as specified measuring instruments pursuant to Act No 505/1990 on metrology, as amended. According to the Act, specified measuring instruments are instruments which are included in the list of the types of specified measuring instruments (Implementing Decree No 345/2002) and, at the same time, intended (by the manufacturer/importer) for measurements of relevance to the protection of public interests in *consumer protection, contractual relations, imposition of sanctions, fees, tariffs and taxes, health protection, environmental protection, occupational safety, or the protection of other public interests protected by separate legislation*. This means that their purpose is similar to that used for defining specified products – measuring instruments and non-automatic weighing instruments – under Directives 2014/31/EU and 2014/32/EU. The requirements of this regulation do not apply to measuring instruments placed on the market in the Czech Republic for purposes other than the above purposes defined by Act No 505/1990 on metrology.

The subject matter of this notified regulation is to lay down the metrological and technical requirements for specified measuring instruments of this type. This regulation also lays down the tests for the purposes of type approval and verification of specified measuring instruments of this type.

(End of executive summary.)

Contact person: Mgr. Tomáš Hendrych

Telephone: +420 545 555 414

PUBLIC DECREE

As the authority with substantive and territorial jurisdiction in the field of laying down metrological and technical requirements for specified measuring instruments and laying down the methods for type approval and verification of specified measuring instruments under § 14(1) of Act No 505/1990 on metrology, as amended (hereinafter the 'Metrology Act'), and in accordance with the provisions of § 172 et seq. of Act No 500/2004, the Administrative Procedure Code (hereinafter the 'APC'), the Czech Metrology Institute (hereinafter the 'CMI') commenced ex officio proceedings on 2 February 2017 pursuant to § 46 of the APC, and, based on the supporting documents, issues the following:

I.

DRAFT GENERAL MEASURE

number: 0111-OOP-C021-17

laying down the metrological and technical requirements for specified measuring instruments, including testing methods for verification of the following specified measuring instruments:

'tyre pressure gauges for road motor vehicles'

1 Basic definitions

For the purposes of this General Measure, terms and definitions pursuant to VIM and VIML¹ and the following shall apply:

1.1

tyre pressure gauges for road motor vehicles

(hereinafter ‘tyre pressure gauges’)

measuring instruments, which indicate the pressure difference between the air in the tyre and the atmosphere; they also include all those parts between the tyre and the indicating device

1.1.1

type A tyre pressure gauges – fixed devices

devices with fixed measuring elements and a displaying device; they are generally connected to a source of air or compressed nitrogen and equipped with a controller placed either near the indicating device or the end of the hose; they allow for tyre pressure to be increased, checked and adjusted

1.1.2

type B tyre pressure gauges – portable devices

devices with portable measuring elements and a displaying device; they may generally be connected to a source of air or compressed nitrogen and are equipped with a controller; they allow for tyre pressure to be increased, checked and adjusted

1.1.3

type C tyre pressure gauges – handheld devices

devices with handheld measuring elements and a displaying device; they may be equipped with a controller and, depending on their design, allow for tyre pressure to be increased, checked and adjusted, or only checked.

2 Metrological requirements

The verification of the gauges shall be subject to the metrological requirements applicable at the time they were put into circulation.

Gauges put into circulation pursuant to separate legislation² are subject to the requirements set out by that separate legislation.

2.1 Working conditions

The gauges shall be capable of measuring tyre pressure within an ambient temperature range of $-10\text{ }^{\circ}\text{C}$ to $+40\text{ }^{\circ}\text{C}$.

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.

² Implementing Decree No 337/2000 establishing the requirements for road vehicle tyre pressure gauges marked with the EEC symbol, as amended. EEC type-approval certificates issued on the basis of the Implementing Decree shall remain valid in accordance with Article IV of Implementing Decree No 125/2015 until the validity of those certificates expires.

2.2 Measuring range

The measuring range shall correspond to the intended use of the tyre pressure gauges for the given type of road vehicles.

2.3 Maximum permissible errors

The maximum permissible errors (MPE) for the reference ambient temperature range of +15 °C to +25 °C are given in Table 1.

Table 1 – Maximum permissible errors

Values in bars (*kilopascals*)

Measured pressure p_m	Maximum permissible errors
$p_m \leq 4$ (400)	0.08 (8)
$4 < p_m \leq 10$ (400) (1,000)	0.16 (16)
$p_m > 10$ (1,000)	0.25 (25)

2.4 Maximum permissible errors outside the ambient temperature reference range

Maximum permissible errors for temperatures lying outside the ambient temperature reference range are given in Table 2.

Table 2 – Maximum permissible errors outside the ambient temperature reference range

Measured pressure p_m	Maximum permissible errors depending on ambient temperature t_{amb}	
	$t_{amb} < 15\text{ °C}$	$t_{amb} > 25\text{ °C}$
$p_m \leq 4$ bar (400 kPa)	$[0.005 \cdot (15 - t_{amb}) + 0.08]$ bar $[0.5 \cdot (15 - t_{amb}) + 8]$ kPa	$[0.005 \cdot (t_{amb} - 25) + 0.08]$ bar $[0.5 \cdot (t_{amb} - 25) + 8]$ kPa
$4 < p_m \leq 10$ bar (400 kPa) (1,000 kPa)	$[0.005 \cdot (15 - t_{amb}) + 0.16]$ bar $[0.5 \cdot (15 - t_{amb}) + 16]$ kPa	$[0.005 \cdot (t_{amb} - 25) + 0.16]$ bar $[0.5 \cdot (t_{amb} - 25) + 16]$ kPa
$p_m > 10$ bar (1,000 kPa)	$[0.005 \cdot (15 - t_{amb}) + 0.25]$ bar $[0.5 \cdot (15 - t_{amb}) + 25]$ kPa	$[0.005 \cdot (t_{amb} - 25) + 0.25]$ bar $[0.5 \cdot (t_{amb} - 25) + 25]$ kPa

2.5 Hysteresis error

Within the reference temperature range, hysteresis error shall not exceed the absolute value of the maximum permissible error according to Table 1. The temperature shall remain constant during the test.

2.6 Return of the instrument's index to a predetermined mark

In the case of mechanical tyre pressure gauges, at atmospheric pressure, the pressure gauge index shall stop opposite the zero mark or opposite a predetermined mark clearly differentiated from the scale intervals, within the limits of the maximum permissible error. A pressure gauge may possess a stop at a

distance corresponding to at least twice the value of the maximum permissible error below zero or below the predetermined mark.

In the case of electronic tyre pressure gauges, at atmospheric pressure, the indicating device of the gauges shall display zero pressure or zero pressure within the limits of the maximum permissible error.

3 Technical requirements

The verification of the gauges shall be subject to the technical requirements applicable at the time they were put into circulation.

Gauges put into circulation pursuant to separate legislation² are subject to the requirements set out by that separate legislation.

3.1 In general

The design of tyre pressure gauges shall ensure that the gauges retain their metrological properties throughout the relevant period of use.

Tyre pressure gauges are measuring instruments that are part of fixed (type A) or mobile (type B and C) devices for increasing road vehicle tyre pressure.

For the purposes of this regulation, the following classification of tyre pressure gauges is used:

- type A: fixed devices;
- type B: portable devices;
- type C: handheld devices.

Depending on the type of the pressure sensor and indicating device used, for the purposes of this regulation, tyre pressure gauges are divided into:

- a) electronic instruments (tyre pressure gauges with at least one electronic component in the measuring chain),
- b) mechanical instruments (tyre pressure gauges with no electronic components in the measuring chain).

3.2 Pressure sensor

In the case of mechanical tyre pressure gauges, the pressure sensor may be e.g. a flexible (Bourdon) tube, box or membrane. The elastic deformation of these flexible elements is mechanically transmitted to the indicating device.

Electronic tyre pressure gauges may use pressure sensors or pressure transducers that convert the information about pressure to an electrical output signal, which is further processed and converted to be indicated digitally.

3.3 Indicating device

In the measurement range, the indicating device shall make it possible to read off, directly and accurately, the value of the pressure measured. The indicating device shall display the pressure value in kilopascals (kPa) or bars (bar).

3.3.1 Analogue indicating device

The analogue scale shall have the scale interval fixed at 0.1 bar (10 kPa). The scale increments shall not be less than 1.25 mm. The arc of the scale usually covers an angle of 270°.

The thickness of the part of the index which covers the scale marks shall not be greater than the thickness of the scale marks themselves and shall cover approximately half the length of the shortest scale mark.

The maximum distance between the index and the plane of the scale of the circular dial shall not exceed 2 mm or $(0.02L + 1)$ mm, where L is the distance between the axis of rotation of the pointer and its extremity.

The scale numbering shall express the value of the measured pressure directly, without using a coefficient.

Within a distance corresponding to double the maximum permissible error given in Table 1, the movement of the pointer shall not be impeded by an index stop on either side of the zero mark or opposite a predetermined mark with.

3.3.2 Digital indicating device

Electronic tyre pressure gauges shall be equipped with a display. The height and width of the numerals shall be such as to ensure that the displayed data are clearly and unambiguously legible. The height of the displayed characters shall not be less than:

- 20 mm in the case of fixed devices (type A instruments),
- 10 mm in the case of portable devices (type B instruments),
- 6 mm in the case of handheld devices (type C instruments).

The digital indicating device shall have a resolution of no more than 0.1 bar (10 kPa); for the purposes of type approval and initial and subsequent verification, the resolution may be changed to a maximum of 0.02 bar (2 kPa).

3.4 Additional design requirements

3.4.1 Maximum supply gas pressure

Pressure gauges shall be capable of withstanding a short-term pressure overload of up to 125 % of the largest value on the scale without any changes to their metrological properties.

If the supply pressure exceeds 125 % of the largest value on the scale, the pressure gauges shall be protected by an effective protective device (a safety valve, pressure reducer or relief valve).

3.4.2 Installation position

The installation or working position of the gauges shall either be clearly determined by the working position of the gauges or clearly schematically indicated on the gauges.

Changes in the nominal position at a plane angle of $\pm 10^\circ$ shall not cause changes in indication of the measured quantity that are greater than 50 % of the maximum permissible error.

3.4.3 Supply voltage

Electronic tyre pressure gauges may be powered from the mains or replaceable batteries.

3.5 Software

In the case of electronic tyre pressure gauges, the software used for the gauges shall be identifiable (except for cases where its only function is to display the measured quantity without any other functions). The software shall be secured against accidental or intentional tampering and damage.

3.6 Resistance to environmental influences

3.6.1 Mechanical resistance

The design of tyre pressure gauges and the materials used shall guarantee sufficient strength, stability and resistance to mechanical shocks.

3.6.2 Resistance to climatic conditions

The gauges shall withstand the limit storage temperatures of -40 °C to $+70\text{ °C}$ without damage or deterioration of their metrological properties.

Tyre pressure gauges shall not be sensitive to relative humidity of the ambient air.

3.6.3 Protection against water ingress and foreign particles (degree of protection offered by the cover)

The tyre pressure gauges shall provide sufficient protection from contact with dangerous parts, infiltration of foreign particles and water ingress corresponding to the use of the gauges specified by the manufacturer.

The minimum degree of protection for tyre pressure gauges intended for outdoor use shall be IP 44; the minimum degree of protection for tyre pressure gauges intended exclusively for indoor use shall be IP 31.

3.6.4 Electromagnetic compatibility (EMC)

Electronic tyre pressure gauges shall either not be affected by electrical or electromagnetic interference or shall respond to it in a defined manner (e.g. by reporting an error, inhibiting measurement, etc.). In addition, they shall not emit unwanted electromagnetic fields.

4 Instrument markings

4.1 In general

Any inscriptions and markings shall be easily visible, legible and indelible under normal working conditions and shall not impede reading the instrument indication.

4.2 Inscriptions

Tyre pressure gauges shall bear inscriptions:

- a) on the front side of the gauges (on the dial or the display, or outside the display, but close to the indication of the measured quantity):
 - the symbol for the measured quantity: P_e ;
 - the symbol for the unit of measurement: bar or kPa;
 - where necessary, a sign indicating the working position of the instrument;
- b) on the dial, data plate or the instrument itself:
 - identification details of the manufacturer (brand or name);
 - name, type and serial number of the instrument;
 - pressure measuring range;
 - working temperature range (if other than -25 °C to $+55\text{ °C}$);
 - type-approval mark.

4.3 Marking with official marks

A suitable place shall be provided for affixing the official mark(s).

For gauges with built-in adjustment elements or means of changing their metrological parameters, the access to these elements shall be protected in an effective manner.

The software relevant to metrological characteristics shall be identified as such and secured to prevent accidental or intentional tampering and damage. The measuring instrument shall make it possible to readily identify the software.

5 Type approval of the measuring instrument

5.1 In general

The type-approval process for tyre pressure gauges shall include the following tests:

- a) external inspection;
- b) functional tests:
 - accuracy test;
 - determination of hysteresis error;
 - ambient temperature impact test;
 - stability test;
- c) test of the instrument's resistance to mechanical influences:
 - free-fall test;
 - installation position influence test;
- d) tests of resistance to environmental influences:
 - test of resistance to limit temperatures;
 - damp heat test;
 - salt spray test;
 - test of resistance to water ingress and foreign particles;
 - vibration resistance test;
- e) test of supply voltage influence;
- f) electromagnetic compatibility (EMC) tests.

5.2 External inspection

The purpose of external inspection of tyre pressure gauges shall be to assess:

- a) the completeness of the required technical documentation;
- b) the conformity of the metrological and technical characteristics specified by the manufacturer in the documentation with the technical and metrological requirements of this regulation as specified in Articles 2 and 3;
- c) the completeness and condition of the tyre pressure gauges according to the prescribed technical documentation;
- d) conformity of the software version of the tyre pressure gauges with the version specified by the manufacturer.

5.3 Test conditions during type approval

5.3.1 Test equipment requirements

The following equipment shall be used to test metrological properties:

- a pressure measurement standard based on an arbitrary physical principle with a measuring range corresponding to that of the tested gauges and with an expanded uncertainty of measurement (for

$k = 2$) less than or equal to $1/5$ of the maximum permissible error of the tested gauges as specified in Article 2.3;

- a thermometer for measuring temperature during the test whose measuring range is at least $(-25$ to $+55)$ °C and whose indicating device has a resolution of at least 0.2 °C.

Measuring instruments used as testing equipment shall have valid metrological traceability.

5.3.2 Test conditions

During the accuracy test, ambient temperature must be within the reference temperature range of $+15$ °C to $+25$ °C. Changes in ambient temperature during the period of the test may not exceed 5 °C.

When determining hysteresis error, ambient temperature shall be constant, within the reference temperature range of $+15$ °C to $+25$ °C.

For other tests, ambient temperature must meet the requirements for each type-approval test.

For the accuracy test, the relative ambient humidity must be within the range of 30 % to 70 %.

For other tests, the relative ambient humidity must meet the requirements for each type-approval test.

During measurement, vibrations and shocks may not cause pointer oscillation greater than $1/10$ of the maximum permissible error specified in Article 2.3.

The pressure in the gauges shall be generated by a non-corrosive gaseous pressure medium. Dry clean air or nitrogen are recommended.

The working position of the tested gauges shall correspond to that specified by the manufacturer of the tyre pressure gauges (or manufacturer of the pressure gauge).

During the test, the difference between the pressure level at the point of connection of the tested gauges and that at the point of connection of the measurement standard may not cause an error greater than $1/10$ of the maximum permissible error specified in Article 2.3.

The tightness of the ‘measurement standard – tested gauge’ system shall be such that a pressure drop while reading the indications on the measurement standard and the tested gauges may not cause an error greater than $1/10$ of the maximum permissible error specified in Article 2.3.

5.4 Functional tests

5.4.1 Accuracy test

The accuracy test shall be performed by taking readings at not fewer than five points distributed evenly over the measuring range of the tested tyre pressure gauges (including the upper and lower limits of the measuring range).

Prior to the test itself, the gauges shall be continuously loaded three times up to the upper limit of their measuring range.

If the tested tyre pressure gauges are designed as deformation pressure gauges, the pressure values must be read after lightly tapping the casing of the gauges. The reading of values on the scale of the gauges must be interpolated within $1/4$ to $1/10$ of the distance between two scale marks.

Every point shall be tested at increasing and decreasing pressure (except for gauges not intended for measuring decreasing pressures). After the increasing pressure test and prior to the decreasing pressure test, the gauges shall be kept at the upper limit of the measuring range at a pressure equal to the upper limit of the measuring range for 10 minutes.

Measurement errors at the individual points may not exceed the maximum permissible errors given in Table 1.

5.4.2 Determination of hysteresis error

This test shall only be performed on instruments designed to measure decreasing pressures in normal use.

Hysteresis error shall be determined by comparing the pressure readings taken at not fewer than five points (including points at the upper and lower limits of the measuring range) distributed evenly over the measuring range, at increasing and decreasing pressure.

Prior to the pressure drop, the tyre pressure gauges must be kept at a pressure equal to the upper limit of the measuring range for 10 minutes.

The hysteresis error may not exceed the absolute value of the maximum permissible error given in Table 1.

5.4.3 Ambient temperature impact test

The test consists of performing accuracy tests according to Article 5.4.1 at the following temperatures:

- reference temperature (+20 °C);
- lower limit of the temperature range (unless equal to -10 °C);
- -10 °C;
- 0 °C;
- +40 °C;
- upper limit of the temperature range (unless equal to +40 °C);
- reference temperature (+20 °C).

During the test at the reference temperature, measurement errors at the individual test points may not exceed the maximum permissible error given in Table 1. For other tests, measurement errors at the individual test points may not exceed the maximum permissible error given in Table 2.

5.4.4 Test of the stability of properties

During the stability test, the tyre pressure gauges shall be subjected to:

- a) a pressure exceeding the upper limit of the measuring range by 25 % for 15 minutes;
- b) 10,000 cycles of a pressure varying slowly from approximately 20 % to approximately 90 % of the upper limit of the measuring range at a frequency not exceeding 60 cycles per minute.

On completion of the tests referred to in points (a) and (b), the tyre pressure gauges shall be left to stand for one hour, after which the test referred to in Article 5.4.1 shall be performed; the gauges must meet the requirements set out in Articles 2.3, 2.5 and 2.6.

5.5 Tests of resistance to mechanical influences

5.5.1 Free-fall test

During the free-fall test, the tested gauges shall be allowed to fall freely from a height specified below onto a concrete test surface.

For type B tyre pressure gauges, 10 free falls from a height of 250 mm above the test surface and, for type C gauges, 10 free falls from a height of 500 mm, shall be performed.

The gauges shall be checked for changes in appearance immediately after the free falls. No changes in indication may occur after the test. When one hour has elapsed after the completion of the test, the gauges shall meet the requirements set out in Articles 2.3, 2.5 and 2.6 when tested within the reference temperature range.

5.5.2 Installation position influence test

The installation position influence test shall be performed for type A and B gauges by taking pressure readings in the prescribed installation position and with the gauges tilted by $\pm 10^\circ$.

Pressure indication changes may not exceed 50 % of the maximum permissible error given in Table 1.

5.6 Tests of resistance to environmental influences

5.6.1 Test of resistance to limit temperatures

The complete tyre pressure gauge, under no pressure load, must be placed in a climatic chamber for a period of at least 24 hours at both limit temperatures – -40°C and $+70^\circ\text{C}$.

Immediately after the completion of the test, it shall be checked for changes in appearance. The appearance of the gauge may not be changed and the material and surface may not be cracked, swollen or changed in colour.

When three hours have elapsed after the completion of the test, the gauge must meet the requirements set out in Articles 2.3, 2.5 and 2.6 when tested within the reference temperature range.

5.6.2 Damp heat test

The test using cyclic damp heat (12 h + 12 h) shall be performed in two cycles with the lower temperature limit at $+55^\circ\text{C}$ or $+40^\circ\text{C}$, depending on the gauge's temperature range according to Article 2.1. The gauge's air inlet must be closed during the test.

Immediately after the test, the gauge shall be checked for changes in appearance.

After three hours have elapsed, the gauge must meet the requirements set out in Articles 2.3 and 2.6 when tested within the reference temperature range.

5.6.3 Salt spray test

The salt spray test shall be performed for a period of 48 hours. The gauge's air inlet must be closed during the test.

Immediately after the test, the gauge shall be checked for changes in appearance.

When one hour has elapsed after the completion of the test, the gauge must meet the requirements set out in Articles 2.3 and 2.6 when tested within the reference temperature range.

5.6.4 Test of protection against water ingress and foreign particles (degree of protection offered by the cover)

This test shall examine whether the gauges comply with the degree of protection specified by the manufacturer according to Article 3.6.3.

5.6.5 Vibration resistance test

This test shall examine the influence of random vibrations on the gauges.

The gauges shall be exposed to the effects of random vibrations in three axes perpendicular to each other. The gauges shall be exposed to the effects of vibrations for a period of at least 2 minutes along each axis. During the test, the gauges shall be connected to a solid holding device using standard connecting elements.

Parameters of the vibration resistance test:

- total frequency range: 10 Hz to 150 Hz;
- total RMS level: $7\text{ m}\cdot\text{s}^{-2}$;
- spectral density acceleration within the range of 10 Hz to 20 Hz: $1\text{ m}^2\cdot\text{s}^{-3}$;

- spectral density acceleration within the range of 20 Hz to 150 Hz: -3 dB/octave.

During the test, the gauges shall be exposed to an overpressure of 200 kPa and the requirement specified in Article 2.3 must be met throughout the test.

After completing the test, the gauge must meet the requirements set out in Articles 2.3 and 2.6 when tested within the reference temperature range.

5.7 Test of supply voltage influence

The test of supply voltage influence shall be performed for electronic tyre pressure gauges for a given pressure, under the reference conditions and with supply voltage sequentially set to:

- $U_{\max} = 1.1U_N$ and $U_{\min} = 0.85U_N$ for mains-powered electronic tyre pressure gauges with single nominal supply voltage U_N ;
- $U_{\max} = 1.1 U_{N2}$ and $U_{\min} = 0.85U_{N1}$ for mains-powered electronic tyre pressure gauges with nominal voltage range between the lower limit value U_{N1} and the upper limit value U_{N2} ;
- $U_{\max} = U_{\text{bat.max}}$ and $U_{\min} = U_{\text{bat.min}}$ for battery-powered electronic tyre pressure gauges, where $U_{\text{bat.min}}$ is the battery's lowest operating voltage as specified by the supplier of the gauges for ambient temperature of 20 °C, and $U_{\text{bat.max}}$ is the voltage of a new battery under zero load.

In the case of battery-powered electronic tyre pressure gauges, low battery voltage must be indicated if the voltage falls outside the nominal range specified by the manufacturer.

During testing, the gauges must exhibit normal function within the limits of the maximum permissible error given in Table 1.

5.8 Electromagnetic compatibility (EMC) tests

EMC tests shall be performed for electronic tyre pressure gauges. When tested for EMC, the gauges shall be exposed to a pressure of approximately 2 bars (200 kPa). When tested for EMC, the tyre pressure gauges are allowed to behave as follows:

- the gauges exhibits normal function within the limits of the maximum permissible error given in Table 1, or
- the indications on the gauges cannot be interpreted as measurement results due to intermittent variations, etc., or measurement is inhibited due to an error message, for example.

After the EMC tests, the gauges must exhibit normal function within the limits of the maximum permissible error given in Table 1.

5.8.1 Immunity to voltage dips and short interruptions

The supply voltage is reduced to 75 % of the nominal supply voltage for a period of 5 seconds. In order to rule out transients, the ramp-up period should not be shorter than 100 ms.

For DC-powered devices, the interruptions must last 5 ms, 20 ms, 100 ms and 500 ms.

For AC-powered devices, dips always begin when the voltage crosses the zero point, sequentially before both the positive and negative cycle. The interruptions shall last for 1, 5, 10, and 25 AC voltage cycles.

5.8.2 Immunity to electrical fast transient/burst disturbances

Immunity to electrical fast transient/burst disturbances shall be tested with the gauges switched on using the following voltages:

- ± 2 kV on the terminals for connecting AC or DC mains;
- ± 1 kV on terminals for connecting signal and control lines longer than 3 m.

The impulse repetition frequency shall be 5 kHz, the burst disturbance repetition interval shall be 300 ms, the total duration of the test for each input and impulse polarity shall be at least 1 minute.

5.8.3 Immunity to electrostatic discharge

Immunity to electrostatic discharge shall be tested with the gauges switched on, preferably using a 6 kV contact discharge or an 8 kV air discharge. The discharges shall be applied to the enclosure of the gauges or a coupling plane adjacent to the tyre pressure gauges.

5.8.4 Immunity to surges

Immunity to surges shall be tested with the gauges switched on, with a surge of $t_r/t_h = 1.2/50$ (8/20) μ s at the following voltages:

- ±1 kV asymmetrical or 0.5 kV symmetrical, on signal and control lines longer than 30 m;
- ±2 kV asymmetrical and ±1 kV symmetrical on AC or DC mains inputs.

5.8.5 Immunity to voltage dips and short interruptions

Immunity to voltage dips, short interruptions and slow voltage variations on AC mains inputs with an input current of less than 16 A shall be tested with the gauges switched on, by applying a supply voltage dip to:

- 0 % of the nominal voltage for 0.5 periods;
- 0 % of the nominal voltage for 1 period;
- 70 % of the nominal voltage for 25 periods.

Each of the above disturbances shall be applied ten times at an interval of 10 s.

5.8.6 Immunity to a radiated radio-frequency electromagnetic field

Immunity to a radiated radio-frequency electromagnetic field shall be tested with the gauges switched on, within the following frequency ranges:

- 80 MHz to 800 MHz, with test field intensity amplitude of 3 V/m;
- 800 MHz to 960 MHz, with test field intensity amplitude of 10 V/m;
- 960 MHz to 1,400 MHz, with test field intensity amplitude of 3 V/m;
- 1,400 MHz to 2,000 MHz, with test field intensity amplitude of 10 V/m;
- 2,000 MHz to 2,700 MHz, with test field intensity amplitude of 1 V/m.

The test field intensity amplitude values given above are for measurement without modulation. The test field shall be amplitude modulated to a depth of 80 % and the modulation signal shall have a sinusoidal waveform with a modulation frequency of 1 kHz. The frequency step when sweeping the test field shall be no more than 1 %; the delay period for each frequency may not be less than the time needed to examine the tested instrument or for the tested instrument to react to the disturbances; however, it may never be less than 0.5 seconds. The test field shall be applied to all sides of the enclosure of the tyre pressure gauge.

5.8.7 Immunity to conducted disturbances induced by radio-frequency fields

Immunity to conducted disturbances induced by radio-frequency fields shall be tested with the gauges switched on, within the frequency range of 150 kHz to 80 MHz, at an open-circuit test voltage amplitude of 3 V. The disturbances shall be applied to signal lines longer than 3 m, all mains inputs and outputs and all connections to the functional earthing.

The open-circuit test voltage amplitude given above is for measurement without modulation. The test voltage shall be amplitude modulated to a depth of 80 % and the modulation signal shall have a sinusoidal waveform with a modulation frequency of 1 kHz. The frequency step when sweeping the test field shall be no more than 1 %; the delay period for each frequency shall not be less than the time needed to examine the tested gauges or for the tested gauges to react to disturbances; however, in no case may it be less than 0.5 seconds.

6 Initial verification

Initial verification shall follow a procedure identical to that used for subsequent verification referred to in Article 7.

Tyre pressure gauges that have undergone EEC type approval and that carry the EEC type-approval mark and have a valid EEC type-approval certificate shall be subject to initial EEC verification pursuant to separate legislation³ prior to being put into circulation. Initial EEC verification shall follow a procedure identical to that used for subsequent verification referred to in Article 7.

7 Subsequent verification

The following tests shall be performed when carrying out subsequent verification of road vehicle tyre pressure gauges:

- a) visual inspection;
- b) functional tests:
 - accuracy test;
 - determination of hysteresis error.

7.1 Visual inspection

The purpose of the visual inspection is to check that:

- a) the gauges submitted for verification conforms to the approved type;
- b) the gauges are not mechanically damaged, none of its parts are loose and there are no signs of corrosion on the gauges;
- c) the content and implementation of markings and inscriptions correspond to the information and requirements specified in the type-approval certificate for the gauges.

If the gauges fail to meet visual inspection requirements, no further tests are performed.

7.2 Test conditions during verification

7.2.1 Test equipment

The following equipment must be used to test metrological properties:

- a pressure measurement standard based on an arbitrary physical principle with a measuring range corresponding to that of the tested gauges and with an expanded uncertainty of measurement (for $k = 2$) less than or equal to $\frac{1}{4}$ of the maximum permissible error of the tested gauges as specified in Article 2.3;
- a thermometer for measuring temperature during the test whose measuring range is at least $(-10$ to $+40)$ °C and whose indicating device has a resolution of at least 0.2 °C.

7.2.2 Test conditions

The requirements pursuant to Article 5.3.2 et seq. shall apply to verification tests.

During the accuracy test and determination of hysteresis error, the ambient temperature range shall be extended to -10 °C to $+40$ °C. Changes in ambient temperature during the period of the tests shall not exceed 5 °C.

³ Implementing Decree No 332/2000 establishing certain procedures for type approval and verification of specified measuring instruments bearing the EEC mark, as amended.

The requirement relating to relative ambient humidity shall not apply during verification.

The working position of the tested gauges must correspond to that specified by the manufacturer or to the position specified in the type-approval certificate for the tyre pressure gauges.

7.3 Functional tests

7.3.1 Accuracy test

The accuracy test shall be performed using the method referred to in Article 5.4.1.

Instrument errors at the individual points may not exceed:

- the maximum permissible errors given in Table 1, when measuring within the reference ambient temperature between +15 °C and +25 °C, or
- the maximum permissible errors given in Table 2, when measuring within the ambient temperature ranges of -10 °C to +15 °C and +25 °C to +40 °C.

7.3.2 Determination of hysteresis error

Hysteresis error shall be determined using the method referred to in Article 5.4.2.

The difference between the values indicated by the tested gauges at the same pressure test point while increasing and decreasing pressure (hysteresis error ΔH) may not exceed the maximum permissible error of the gauges specified in Article 2.3.

8 Measuring instrument examination

When examining measuring instruments pursuant to § 11a of the Metrology Act at the request of a person who may be affected by incorrect measurement, the procedure under Chapter 7 shall be followed, except for the last sentence of Article 7.1. The maximum permissible error used shall be 1.25 times the maximum permissible errors referred to in Chapter 7.

9 Notified standards

For the purposes of specifying the metrological and technical requirements for measuring instruments and specifying the testing methods for their type approval and verification arising 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 '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 by using another technical solution guaranteeing an equivalent or higher level of protection of legitimate interests.

II.

REPEALING AND TRANSITIONAL PROVISIONS

General Measure number: 0111-OOP-C021-11, laying down the metrological and technical requirements for specified measuring instruments, including the testing methods for type approval and verification of the following specified instruments: ‘Road motor vehicle tyre pressure gauges, except for pressure gauges used exclusively for the measurement of tyre pressure by motor vehicle users’ is hereby repealed.

III.

GROUNDS

The CMI has issued this General Measure laying down metrological and technical requirements for specified measuring instruments and tests for type approval and verification of specified measuring instruments – tyre pressure gauges for road motor vehicle – pursuant to § 14(1)(j) of the Metrology Act, to implement § 6(2), § 9(1) and (9) and § 11a(3) of the Metrology Act.

Under item 2.3.3 in the Annex ‘List of the Types of specified Measuring Instruments’ to Implementing Decree No 345/2002 specifying the measuring instruments whose verification is mandatory and measuring instruments subject to type approval, as amended, this type of measuring instruments is classified as an instrument subject to 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.

IV.

INSTRUCTIONS

In accordance with § 172(1) APC, in conjunction with § 39(1) APC, the CMI has stipulated a time limit for comments of 30 days from the date of posting the draft 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. In light of the provisions of § 172(4) APC, the comments are to be submitted in written form.

Pursuant to the provisions of § 174(1) APC, in conjunction with the provisions of § 37(1) APC, it must be clearly stated who is submitting the comments, which general measure the comments concern, how the draft contradicts legislation or how the general measure is inaccurate. The comments must also contain the signature of the person making the comments.

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 draft general measure shall be posted for 15 days.

.....

RNDr. Pavel Klenovský m.p.

Director General

Person responsible for accuracy: Mgr. Tomáš Hendrych

Posted on: 1 June 2018

Signature of the authorised person confirming posting: Mgr. Tomáš Hendrych m.p.