

1.-----IND- 2018 0307 CZ- EN- ----- 20180712 --- --- PROJET

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

Fixed storage tanks used as instruments for measuring volume are placed on the market and put into use in the Czech Republic as legally controlled measuring instruments following type approval and initial verification pursuant to Act No 505/1990 on metrology, as amended. This notified legislation concerns national metrology regulation through type approval and verification of measuring instruments, i.e. fixed storage tanks used as instruments for measuring volume.

(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 22 January 2016 pursuant to § 46 APC, and, on the basis of supporting documents, issues the following:

I.

DRAFT GENERAL MEASURE

number: 0111-OOP-C065-16

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:

'Fixed storage tanks used as instruments for measuring volume'

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 fixed storage tank

a container suitable for storing of liquids other than water, which is fixed to its location and which serves to measure the volume of the stored liquid if it is equipped with a zero or other reference point, a litre table and equipment for determining the level of the stored liquid

1.2 volume measurement

a number of operations to determine (under nominal conditions) the relationship between the level of fluid in the tank and the volume of this fluid

1.3 nominal volume

the rounded value of the maximum volume of liquid the tank can contain under normal conditions of use

1.4 measurement window

an opening in the top of the tank used to measure the level and take samples

1.5 vertical measurement axis

a vertical line passing through the centre of the stabilising (guide) tube, if used, that corresponds to the position used for automatic or manual level measurement

1.6 submersion reference plate (baseline)

a horizontal plate situated along the vertical axis under the upper reference point, providing a fixed contact surface from which manual depth measurements are made

NOTE The expression 'datum plate' is a synonym.

1.7 submersion zero point

the intersection of the vertical measurement axis with the upper surface of the submersion reference plate, or with the surface of the bottom of the tank if the reference plate is not installed. This is the basis for measuring the liquid level (the zero reference point or submersion reference point).

1.8 upper reference point

this point on the vertical measurement axis is the reference point for measuring the height of empty space

1.9 reference height

the distance between the zero submersion point and the upper reference point

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.

1.10 height of empty space (ullage)

the distance between the surface of the liquid and the upper reference point, measured along the vertical measurement axis

1.11 reference conditions

the ambient conditions under which the volume measurement results apply

1.12 automatic level gauge (ALG)

a device intended for the automatic measurement and display of the level of liquid contained in the tank, taking into account the set compensation. An automatic level gauge contains at least a liquid level sensor, a transducer and a display

1.13 ballast

tank fittings, load-bearing structures, pipes and other accessories that influence the tank's volume. Ballast is termed 'positive ballast' if the volume of fittings increases the tank's effective volume or 'negative ballast' if the volume of fittings displaces the liquid and reduced the tank's effective volume.

1.14 calibration table

expression of the mathematical function $V(h)$ for the relationship between the height (independent variable) and volume (dependent variable) in the form of a table

1.15 minimum stored volume

the volume under which the maximum permissible error is exceeded due to the shape of the tank and the volume measurement method

1.16 dead space

the space on the bottom of the tank in which measurement is not performed

1.17 milking

the quantity of milk that is added to the tank during one milking

1.18 measurement conditions

the conditions under which liquid volume is measured (e.g. temperature, viscosity)

1.19 basic conditions

specific conditions for which the measured volume is recalculated (e.g. temperature, thickness)

1.20 influence quantity

a quantity that is not measured but that influences the measured value or indication in the tank

2 Metrological requirements

Metrological requirements are based on the requirements of OIML R71².

The maximum permissible uncertainty of volume measurement applies to values between the minimum storage volume and the nominal volume that are specified in the calibration table.

² OIML R71 Fixed storage tanks. General requirements (Fixed storage tanks. General requirements.) This document is available to the public at www.oiml.org.

The maximum permissible uncertainty calculated according to GUM³ for $k = 2$, positive or negative, must be as follows:

- 0.2 % of the indicated volume for cylindrical tanks with a vertical axis;
- 0.3 % of the indicated volume for cylindrical tanks with a horizontal or inclined axis;
- 0.5 % of the indicated volume for other tanks.

The maximum permissible uncertainties listed above do not include the uncertainty of the amount under the reference plate that is specified on the tank's calibration table.

Tanks for which the amount of liquid is determined using a measuring rod, a measuring strip with a length scale, or using an automatic level gauge, must be equipped with a table for converting the length scale to volume.

NOTE For the materials used for length measurement gauges to measure liquid levels, see the general recommendations in OIML R 35-1⁴.

3 Technical requirements

Technical requirements are based on the requirements of OIML R71².

3.1 Measuring instrument types and classification of tanks

Fixed storage tanks used as volume gauges are classified as follows:

- a) refrigerated and storage tanks for milk;
- b) concrete and masonry storage tanks;
- c) tanks of other materials;
- d) wooden barrels;
- e) barrels of other materials.

Tanks are also classified according to the following criteria:

- shape;
- position relative to their base;
- the means of measuring levels or volumes (amounts) of stored liquid;
- type of liquid(s) to be stored (hydrostatic pressure);
- conditions of use (additional influences on the amount).

Tanks are classified according to their shape as:

- cylindrical with a vertical or horizontal axis and with a flat, conical, truncated, spherical, elliptical or arched bottom or end;
- spherical or spheroid;
- cuboid.

Vertical cylindrical tanks can have a fixed or floating roof (or floating cover).

³ JCGM 100:2008 Evaluation of measurement data – Guide to the expression of uncertainty in measurement. The document is available to the public at www.bipm.org.

⁴ OIML R35-1 Material measures of length for general use. Part 1: Metrological and technical requirements (Material measures of length for general use. Metrological and technical requirements.) This document is available to the public at www.oiml.org.

According to their position relative to their base, tanks are classified as:

- above-ground,
- partly above-ground,
- underground,
- elevated.

The means of measuring levels or volumes (amounts) of stored liquid can be as follows:

- one volume mark;
- a measuring device with a scale (with a window or indicator);
- a measuring rod with a scale in volume or length units, a measuring strip with a scale in volume or length units with a weight, or with a float (manual measurement);
- an automatic level gauge.

NOTE For the materials used for length measurement gauges to measure liquid levels, see the general recommendations in OIML R 35-1³.

With regards to pressure and temperature, tanks are classified as:

- atmospheric;
- closed low-pressure (saturated vapour pressure less than 100 kPa);
- closed high-pressure (saturated vapour pressure greater than 100 kPa);
- unheated;
- heated, uninsulated;
- heated, insulated;
- refrigerated, insulated.

3.2 Technical characteristics of tanks

3.2.1 General requirements

Fixed storage tanks pursuant to this general measure (hereinafter 'tanks') are built for storing liquids under atmospheric pressure or under pressure and are intended for measuring the amount (volume or weight) of liquid they contain.

Tanks must be built in accordance with good engineering practices. In terms of design, position and conditions of use, tanks must comply with the requirements for storing liquids in relation to their characteristics (potable, chemical, flammable, etc.), and some must, for example, be double-walled.

Tanks must be built, installed and mounted so that significant volume indication errors cannot occur during filling and emptying, for example due to deformation, bending or shifting of the tank, measuring marks and built-in equipment.

Tanks must be made of materials that are adequately strong and durable for their purpose of use, and are resistant to permanent deformation, bending or shifting that could change the tank's volume.

All materials used to manufacture the tank shell must be resistant to the internal physical and chemical effects of liquids and the elements. Temperature changes in the liquid within the operating temperature range must not have a negative effect on the materials from which the tank is made.

Tanks must permanently resist the constant effects of pressure exerted by the liquid for which they were designed (maximum operating pressure) without malfunction, leaks, seepage through the walls or permanent deformation of the tank, measuring marks and built-in equipment.

Shape, material, reinforcements, construction and installation must be such that the tank is sufficiently resistant to its surroundings and the effects of the liquid it contains, and under normal operating conditions does not permit critical deformation that may have a negative effect on its volume.

The reference plate and upper reference point must be designed so that their positions remain stable, especially with regard to the effects of filling and emptying the tank and the ambient effects of its surroundings.

Stabilising pipes used to install or identify the reference point (upper end) and reference plates (bottom end) must be perforated to permit liquid flow and level and temperature measurement.

The tank's shape must prevent the occurrence of air pockets during filling or puddles during emptying.

A tank must be stable on its foundation; this may be achieved by anchoring or an appropriate stabilisation period - the tank remains full until the bottom stops undergoing significant changes.

If the tank is equipped with an apparatus for limiting evaporation losses, installation and operation of this apparatus must not result in measurement errors.

Tanks for which the amount of liquid is determined using a measuring rod, a measuring strip with a length scale, or using an automatic level gauge, must be equipped with an upper reference point and a reference plate.

NOTE For the materials used for length measurement gauges to measure liquid levels, see the general recommendations in OIML R 35-1³.

A foundation slab is not required if the bottom of the tank is sufficiently stable and there is no danger of sedimentation.

3.2.2 Special requirements for the design of refrigerated milk tanks

A refrigerated milk tank that is not designed to be installed on a fixed base must be equipped with adjustable supports or legs that allow it to be placed in its base position during installation on a floor with a maximum grade of 1:50 in any direction, and the difference in the height of adjacent supports must not exceed 50 mm. If the tank is equipped with an apparatus for measuring milk volume that is based on linear measurement, the supports or legs must be designed so that after the tank is levelled into a horizontal position, it remains securely fixed in this position.

All internal joints of the walls of the inner refrigerated milk container that are at an angle of less than 2.36 radians (135 °) must have a radius of at least 25 mm; all others must have a radius of at least 3 mm.

A refrigerated milk tank must have at least one inlet pipe or at least one outlet opening with a diameter of at least 180 mm, or both. If the inlet pipe is part of the tank, it must be designed to prevent the formation of foam, where possible.

A refrigerated milk tank must have an outlet opening for rinsing water. The mouth of the outlet opening and the bottom of the inner container must be designed so that all rinse water drains into the outlet opening. If the drain opening will also be used for milk outflow, it must meet the following requirements:

- a) the highest point on the interior of the outer end of the drainage pipe, including the outlet valve, must be lower than the lowest part of the bottom of the inner container;
- b) the outlet pipe must be made of stainless steel and must have an inside diameter of (50 ± 3) mm; it must not have more than one elbow and one joint; it may have a shut-off valve, and it must terminate with a fitting with an outer thread and a cap;
- c) the clearance below the outlet fitting must be at least 100 mm;
- d) if an apparatus with a stopper and rod is used, the stopper must provide a seal even if the rod is not secured; the stopper and rod must be out of reach of the mixer and must not prevent the milk from flowing out;
- e) milk must flow out of a refrigerated milk tank filled with 40 L of milk at a rate of at least 39.8 L per minute due to its own weight in the standard position;

- f) if the refrigerated milk tank is intended for accelerated milk outflow, drainage from all parts to the drain opening in the standard position must be at an incline of at least 1:20 for right-angled tanks, or 1:15 on the diameter for tanks with a vertical cylindrical shape; the tank must have a circular or elliptical outlet with a shaft at least 25 mm deep with a diameter of at least 100 mm and at most 200 mm.

3.2.3 Special requirements for the design of wooden barrels

The material from which barrels are made and their design must ensure resistance to deformation; internal reinforcements, such as partitions and struts, are not allowed; if the thickness and design of the barrel shell does not guarantee sufficient resistance to deformation, the shell is to be reinforced outside the ring. The barrel's filling opening must be situated and adapted so that it can be filled completely. Barrels made of solid wood with staves joined flush (flat faces), held together with metal hoops, must be curved so that the largest circumference is in the centre of the barrel, and must have two faces that are either flat or slightly curved.

4 Measuring instrument markings

4.1 Markings on the measuring instrument

The data plate must be made of a durable material which ensures that the information it bears is indelible and easily legible under normal conditions over the long term.

The data plate must be affixed to an integral part of the tank in a position where it is easy to see and read, is not subjected to damage and cannot be removed without damaging seals and verification marks.

The data plate must contain at least the following information:

- a) the tank's date of manufacture (construction);
- b) its manufacturer;
- c) its serial (record) number;
- d) its nominal volume;
- e) its maximum filling height;
- f) its reference height.

Room must be reserved on the data plate for the main official mark.

4.2 Documentation

Prior to initial verification, it is necessary to draw up tank documentation that must contain:

- a) a description of the tank for the assessment of technical requirements (or design documentation), including the tank classification;
- b) how the tank will be anchored to the ground or underground;
- c) positions of valves and inflow and discharge pipes that can be used to completely empty the tank for cleaning and regular measurement of volume;
- d) ballast positions and dimensions;
- e) details concerning the floating roof or floating cover (if applicable) including its weight;
- f) details concerning attachment of a level gauge to the tank (if applicable);
- g) the position of data plates on the tank;
- h) leak test records and results;

Measuring system documentation is part of the measuring system.

4.3 Placement of the official mark

The tank must have pre-prepared locations for attaching official marks. The location of the main official mark is on the tank's data plate.

All measuring systems must have official marks in order to prevent any tampering with system elements that could cause changes to the measuring instrument's metrological properties.

No seals are applied to the pipe system.

It must be possible to put official marks in place and perform an external inspection without obstacles.

5 Type approval of measuring instruments

Type approval is not performed for this type of measuring instrument.

A structural test and external inspection must serve to determine whether changes have occurred in relation to the documentation submitted. Minor changes may be addressed on site, otherwise documentation must be updated.

6 Initial verification

6.1 General

Initial verification can be split into two phases.

During phase one, the following is assessed from documentation:

- a) overall tank configuration;
- b) how the tank is anchored to its base (or underground);
- c) position of valves and inflow and drainage pipes for complete drainage for the purposes of cleaning and subsequent measurement;
- d) position and dimensions of ballast (positive or negative);
- e) details concerning the floating roof or floating cover (if installed) including its weight;
- f) details concerning the attachment of a level gauge to the tank (if applicable);
- g) details concerning the attachment of temperature and pressure sensors to the tank;
- h) the position of the data plate.

Phase two is performed at the installation site:

- During on-site testing, the compliance of the new tank with documentation is assessed. If compliance with all of the requirements is not achieved, verification cannot continue.

During initial verification, the following properties must be taken into account: uniformity of construction, all possible permanent deformations, structural strength, stability, inspection openings, access for level measurement, the ability to measure the volume (if needed, further activity may be required to facilitate the measuring of the tank's volume), interior fittings (ballast), floating roof or floating cover, and a prepared location to attach the data plate.

6.2 Tank measurement

Prior to measuring the tank, it must be subjected to a pressure test and a leak test, and must be cleaned. A record is made of these activities, which must be submitted prior to commencing volume measurement.

NOTE Spherical tanks for storing petroleum gases liquefied under pressure must not be tested using water. The significantly higher density of LPG could cause permanent deformation or even destruction of the tank.

The following methods are used to measure out the tank:

- geometric (e.g. optical, with a measuring tape);
- volumetric;
- a combination of the two;
- some other method that guarantees an appropriate quality of metrological measurement of the tank.

NOTE For the materials used for length measurement gauges to measure liquid levels, see the general recommendations in OIML R 35-1³.

6.3 Evaluation of tests

If the tank has complied with all of the requirements during testing, a verification sheet (calibration table) is issued, information is added to the data plate and official marks are placed on the tank.

7 Subsequent verification

Subsequent verification must always be performed when deformation changes the tank's metrological characteristics (reference points, influence of the floating roof and other changes).

7.1 General

During on-site testing, the compliance of the new tank with the documentation is assessed. If compliance with all of the requirements is not achieved, verification cannot continue.

Subsequent verification includes structural verification, all possible permanent deformations, stability, incline, dimensions and wall thickness.

7.2 Tank measurement

The tank measurement procedure is the same as in Article 6.2 of this general measure.

7.4 Evaluation of tests

If the tank has complied with all of the requirements during testing, a verification sheet (including a calibration table) is issued, information is added to the data plate and official marks are placed on the tank.

If the tank fails to comply with the requirements for the maximum permissible uncertainty of measurement under Article 2, it may be reclassified to a lower accuracy class (if permitted for the tank's intended use).

The calibration table must be recalculated if:

- there is a significant change in density (specific mass) of the liquid in the tank;
- encrustation occurs.

8 Examination of the specified measuring instrument

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.

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 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 by using another technical solution guaranteeing an equivalent or higher level of protection of legitimate interests.

II.

GROUND S

The CMI issues, pursuant to § 14(1)(j) of the Metrology Act, towards the implementation of § 6(2), § 9(1), § 9(9) and § 11a(3) of the Metrology Act, this general measure, stipulating metrological and technical requirements for the specified measuring instruments and test methods for the type approval and verification of the specified measuring instruments - 'fixed storage tanks used as volume gauges'.

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 1.3.6(a), (b), (c), and (d) as measuring instruments 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.

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.

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:.....