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REGULATION ON MEASURING INSTRUMENTS SUBJECT TO METROLOGICAL CONTROL

Chapter One

GENERAL PROVISIONS

Чл. 1. The Regulation lays down:

1. the technical and metrological requirements for measuring instruments subject to metrological control, hereinafter referred to as "control", and their use for their intended purpose;

2. the procedure and methods for the control of measuring instruments;

3. the procedure for keeping the register of the types of measuring instruments approved for use;

4. the signs certifying the results of the control of the measuring instruments;

5. the procedure for the entry in the register of types of measuring instruments under Regulation (EU) 2019/515 of the European Parliament and of the Council of 19 March 2019 on the mutual recognition of goods lawfully marketed in another Member State and repealing Regulation (EC) No 764/2008;

6. the procedure for carrying out metrological examination of measuring instruments.

Чл. 2. (1) Measuring instruments falling within the scope of the Regulation on the essential requirements and conformity assessment of measuring instruments or the Regulation on the essential requirements and conformity assessment of non-automatic weighing instruments shall be made available on the market and/or put into service following an assessment of their conformity in accordance with the Technical Requirements for Products Act (TRPA) and the applicable regulation under Article 7(1) of TRPA, and shall be subject to subsequent verification in accordance with this Regulation, where provided for in Chapter Two.

(2) Blood pressure meters, electrocardiographs and audiometers within the scope of the Regulation on the essential requirements and procedures for assessing conformity with the essential requirements of medical devices referred to in Article 2(1)(3) of the Medical Devices Act (MDA) shall be made available on the market and/or put into service following an assessment of their conformity in accordance with the procedure laid down in the MDA and shall be subject to subsequent verification in accordance with this Regulation when used in medicine for the purposes of medical surveillance, diagnosis and treatment.

(3) Subsequent verification, where they are subject to control under this Regulation, shall be carried out on measuring instruments with "EEC type approval" and "EEC initial verification" which have been made available on the market of the European Union (EU) or of the European Economic Area or of Turkey.

(4) Measuring instruments type-approved under the national legislation of another EU Member State or a State party to the Agreement on the European Economic Area, or of Turkey, manufactured and lawfully marketed in that State and which are not covered by Union harmonisation legislation and are intended for measurements pursuant to Article 5 of the Measurement Act (MA), shall be subject to registration under Article 473.

(5) Measuring instruments which are not covered by Union harmonisation legislation and for which there are no national technical rules in another EU Member State, or in a State party to the

Agreement on the European Economic Area, or in Turkey, manufactured and lawfully placed on the market of that State, but which are intended for measurements pursuant to Article 5 of the Measurement Act, shall be subject to control pursuant to Article 26 of this Act.

(6) The measuring instruments referred to in paragraph (4) shall be made available on the market on the territory of the Republic of Bulgaria provided that they comply with the requirements of this Regulation for the respective measuring instrument, following a procedure in accordance with the requirements of Article 5 of Regulation (EU) 2019/515.

(7) Measuring instruments referred to in paragraph (4) which have been entered in the register of types of measuring instruments in compliance with the requirements for mutual recognition under Regulation (EU) 2019/515 shall be subject to subsequent verification in accordance with this Regulation.

Chapter Two

INTENDED USE OF THE MEASURING INSTRUMENTS. TECHNICAL AND METROLOGICAL REQUIREMENTS FOR MEASURING INSTRUMENTS. CONTROL METHODS

Section I

Non-automatic weighing instruments

Чл. 3. (1) Non-automatic weighing instruments are a measuring instrument used to determine the mass of a body based on the force of gravity acting on that body.

(2) Non-automatic weighing instruments require the intervention of an operator during the measurement.

(3) Non-automatic weighing instruments shall be subject to control when used to measure mass:

1. for the purpose of commercial payments;

2. when calculating fees, duties, taxes, fines, remuneration, allowances, indemnities or other similar payments;

3. in the application of legal acts and for expert opinions in court cases;

4. in medicine in determining the weight of patients for the purposes of medical surveillance, diagnosis and treatment;

5. when preparing medicinal products in pharmacies and carrying out analyses in medical and pharmaceutical laboratories;

6. when determining the price according to the measured weight in the case of direct sale and for the manufacture of pre-packed quantities of products.

(4) Non-automatic weighing instruments intended for measuring the axle/wheel load of vehicles when carrying out traffic and/or customs control may be used to determine the total mass of vehicles only when, during the measurement, all axles/wheels are positioned simultaneously on the respective parts of the load-receiving devices.

Чл. 4. Non-automatic weighing instruments shall be made available on the market and/or put into operation after conformity with the essential requirements determined in accordance with the Regulation on essential requirements and conformity assessment of non-automatic weighing instruments has been assessed and certified and shall be subject to subsequent verifications in accordance with the provisions of this Regulation.

Чл. 5.(1) The subsequent verification of non-automatic weighing instruments, including

subsequent verification after repair, shall be carried out to establish compliance with the EU type examination certificate, if any, and:

1. the double amount of the maximum permissible errors for the relevant accuracy class according to BS EN 45501 – on subsequent verification;

2. the maximum permissible errors for the relevant accuracy class according to BS EN 45501 – on subsequent verification following repair.

(2) The subsequent verification of non-automatic weighing instruments shall be carried out:

1. at the place of use;

2. under laboratory conditions or in control points, where the transport of the weighing instrument to place of verification does not require its disassembly into parts or components."

Section II
Automatic weighing instruments

Чл. 6. (1) Automatic weighing instruments are measuring instruments that determine the mass of a product without the intervention of an operator and follow a predefined programme for the automatic processing of its characteristics.

(2) The requirements of this section apply to automatic weighing instruments used in the manufacture of pre-packed quantities of products.

Чл. 7. Automatic weighing instruments used in the manufacture of pre-packed quantities of products shall be made available on the market and/or put into service after conformity with the essential requirements laid down in the Regulation on the essential requirements and conformity assessment of measuring instruments has been assessed and verified, and shall be subject to subsequent verifications in accordance with the provisions of this Regulation.

Чл. 8. The subsequent verification of automatic weighing instruments, including subsequent verifications following repair, shall be carried out to establish conformity with the type/design (if any) and the maximum permissible errors for the relevant accuracy class set out in Annex 6 to Article 2 of the Regulation on the essential requirements and conformity assessment of measuring instruments.

Чл. 9. The subsequent verification of automatic weighing instruments shall be carried out at the place of use under the prescribed operating conditions and with the equipment in operation adjacent to it.

Section III
Automatic weighing instruments for measuring the mass and axle load of road vehicles in motion

Чл. 10. (1) Automatic weighing instruments for measuring in motion the mass and axle load of road vehicles (instruments measuring in motion) are measuring instruments designed to determine the mass, axle load or load on a group of axles of road vehicles while passing through the instrument.

(2) Weighing instruments that measure in motion shall show the mass in kilograms (kg) or tonnes (t).

(3) Weighing instruments measuring in motion shall be installed in a controlled measuring area in accordance with the installation requirements.

Чл. 11. (1) This section applies to weighing instruments measuring in motion, the readings of which are the basis for the collection of state receivables.

(2) This section does not apply to weighing instruments measuring in motion that determine the axle load as twice the load on a wheel or are mounted directly on the vehicle being measured.

Чл. 12. (1) For determining the mass of the vehicle, weighing instruments measuring in motion may be of the following accuracy classes: 0.2, 0.5 and 1.

(2) For the determination of the single-axle load and the load on a group of axles, weighing instruments measuring in motion may be of the following accuracy classes: A, B, C and D.

(3) Weighing instruments measuring in motion may have different accuracy classes for the determination of one-axle load and for determining the load on a group of axles.

(4) The relationship between the accuracy classes for single-axle load and for the load on a group of axles and the accuracy classes for vehicle mass is shown in Table 1 of Annex 1.

Чл. 13. (1) The maximum permissible error for determining the mass of the vehicle during its measurement in motion shall be the greater of the following values:

1. the value calculated in accordance with Table 2 of Annex 1, rounded to the value of the nearest scale division;

2. 1 *d* × total number of axles during initial verification or 2 *d* × the total number of axles during a subsequent verification.

(2) The maximum difference between the recorded value of the one-axle load and the conventional true value of the static uni-axial load when measuring a two-axle non-compound (on-board) reference vehicle in motion shall not exceed the greater of the following values:

1. the value in Table 3 of Annex 1, rounded to the value of the nearest scale division;

2. 1 *d* during the initial verification or 2 *d* during the subsequent verification.

(3) For all reference vehicles, except those referred to in paragraph (2), the maximum difference between the recorded value of one-axle load or the load on a group of axles during in-motion measurements and the corrected mean value of one-axle load or the corrected mean value of the load on a group of axles shall not exceed the greater of the following values:

1. the value in Table 4 of Annex 1, rounded to the value of the nearest scale division;

2. 1 *d* × n at the initial verification or 2 *d* × n at the subsequent verification, where n is the number of axles in a group and n = 1 per axle.

(4) The error limits for one-axle load and for the load on group of axles are:

1. under paragraph 2 – for a static reference one-axle load of a two-axle non-compound (flat-bed) reference vehicle;

2. under paragraph 3 – for one-axle load and for the load on a group of axles of reference vehicles not covered by sub-paragraph 1.

Чл. 14. The maximum permissible error for static measurement when increasing or decreasing the load is given in Table 5 of Annex 1.

Чл. 15.(1) For a given method of measurement in motion and a combination of load-receiving devices, each device displaying the mass and each device printing the results shall have the same scale division (*d*).

(2) The relationship between the accuracy class, the scale division and the number of scale divisions at maximum load is given in Table 6 of Annex 1.

(3) The scale division values of the display device and the printing device shall be selected from the rows 1×10^k, 2×10^k or 5×10^k, where k is a positive or negative integer or zero.

Чл. 16. The minimum load shall not be less than the load expressed in scale divisions as set out in Table 7 of Annex 1.

Чл. 17. The measurement results shown by the display device and the printing device with the same scale division shall be identical at the same load.

Чл. 18. (1) Weighing instruments measuring in motion shall meet the metrological and technical requirements applicable to them within a temperature range of minus 10 °C to 40 °C.

(2) The temperature range may be different but shall not be less than 30 °C and shall be marked on the weighing instruments measuring in motion.

Чл. 19. The effect of electromagnetic disturbances shall be such that the change in the measurement result does not exceed the maximum permissible error.

Чл. 20. Weighing instruments measuring in motion shall meet the metrological and technical

requirements applicable to them at vehicle speeds within the range of operating speeds of the weighing instrument.

Чл. 21. Weighing instruments measuring in motion shall meet the following technical requirements:

1. they shall be so designed as to be suitable for the vehicles, location and operating procedures for which they are intended;

2. they must not have features which allow fraudulent use;

3. they shall be so designed that no accidental failure can occur or no misconfiguration of controls causing incorrect operation can occur without this being obvious or demonstrated;

4. they shall have an interlock device that prevents operation or gives an indication when the instrument is operating outside the specified conditions, for example, where the supply voltage is below the minimum operating voltage, where the vehicle is not identified, where the wheels of the measured vehicle are incorrectly positioned on the load-receiving device, in the event of incorrect direction of travel, when driving at speeds outside the range of operating speeds;

5. where weighing instruments can operate in non-automatic mode and in this mode are used in the cases referred to in Article 5 of the Measurements Act, they must comply with the requirements of Section I and be equipped with means to allow non-automatic operation during which the automatic mode of operation and automatic measurement in motion must be locked;

6. they shall be designed so as to ensure a level of reliability that ensures that their accuracy and compliance with their requirements are maintained under operational conditions. They shall automatically and clearly show all defects by means of an indication of failure, by automatic shut-off or by other means;

7. they shall have an automatic or semi-automatic zero setting device which shall operate only when the instrument is in stable equilibrium. The semi-automatic zero setting device shall not operate during automatic operation mode of the weighing instrument. The zero setting device shall be capable of setting zero within ± 0.25 *d* and have a range of adjustment not exceeding 4% of the maximum load. The adjustment range of the zero setting device shall not exceed 20% of the maximum load.

8. they shall have a zero monitoring device operating only when the reading is zero, the balance is in stable equilibrium, the corrections are not more than 0.5 *d* per second and are within 4% of the maximum load around the actual zero;

9. the indication of the primary data shall be reliable, easy and unambiguous under operating conditions;

10. the printout shall be legible and durable for the intended purpose. The printed digits shall be not less than 2 mm high. At the time of printing, the name or symbol of the unit of measurement shall be on the right of the value or at the top on the value column;

11. they shall be able to store in their memory or external memory the measurement data for subsequent display, printing, data transfer, aggregation, etc. The stored data must be adequately protected against deliberate or accidental alterations during the transmission and/or storage process and must contain all the information necessary to restore a previous measurement;

12. they shall be equipped with a totaliser operating:

(a) automatically, in the case where the weighing instruments must have a vehicle identification device, or

(b) semi-automatically, in the case where the weighing instrument starts operating automatically after a manual command;

13. in the case of weighing instruments measuring in motion which can operate without the intervention of an operator, they shall be equipped with a vehicle identification device. This device recognises the presence of a vehicle in the measurement area and the when the whole vehicle has been weighed. These weighing instruments shall not display or print the mass data until all the axles of the vehicle have been measured;

14. they shall have a vehicle guidance device to ensure the correct positioning of the vehicle on the load-receiving device. Weighing instruments measuring in motion shall not display or print measurement data if any of the wheels has not fully passed through the load-receiving device. If the weighing instruments measuring in motion are intended to measure in only one direction, an error message shall be generated on arrival of the vehicle from the incorrect direction or the weighing instrument shall not display or print measurement data;

15. they shall not display or print data on the mass of the vehicle, the one-axle load or the load on a group of axles if the vehicle has passed the load-receiving device at a speed outside the operating speed range, without generating a clear message that the results have not been checked. The operating speed shall be shown and printed in km/h, rounded to the nearest full value, as part of each vehicle mass measurement record;

16. the software used in the weighing instrument measuring in motion shall be installed in such a way that it cannot be changed without breaking its protection or without an identification code signalling software changes;

17. they shall be so manufactured and installed as to minimise any adverse effects of the installation conditions on the measurement result. If certain installation conditions may affect the measurement process, this must be stated in the type-approval certificate. The installation of weighing instruments measuring in motion shall comply with the requirements of the relevant manufacturer's instructions.

Чл. 22. (1) Weighing instruments measuring in motion must bear the following visible, legible and indelible inscriptions:

1 manufacturer's name or logo;

2. type of weighing instrument;

3. serial number of the weighing instrument (on each load-receiving device, if applicable);

4. the warning 'Do not weigh liquid products', if applicable;

5. maximum vehicle speed during measurement in km/h;

6. the direction of measurement if the type of weighing instruments measuring in motion is not approved for two-way measurement;

7. scale division value for static load in kg or t, if applicable;

8. power supply voltage, V;

9. frequency in Hz;

10. temperature range in °C if it is different from minus 10 °C to 40 °C;

11. software identification, if applicable;

12. accuracy class for vehicle mass;

13. accuracy class for single-axle load, if applicable;

14. accuracy class for the load on a group of axles, if applicable;

15. maximum load, Max = kg or t;

16. minimum load, Min = kg or t;

17. value of scale division, d = kg or t;

18. maximum operating speed, v_{max} = km/h;

19. minimum operating speed, v_{min} = km/h;

20. maximum number of axles of vehicle A_{max} =, where applicable;

(2) The markings referred to in paragraph 1 shall be placed close to or on the display device.

Чл. 23. (1) In addition to the requirements set out in this section, electronic weighing instruments in motion shall comply with the following requirements:

1. they shall be so designed and manufactured as not to exceed the maximum permissible error under operating conditions;

2. they shall be so designed and manufactured that when exposed to interference:

(a) no significant additional (gross) errors shall occur, or

(b) they shall recognise and respond to significant additional (gross) errors;

3. if a significant additional (gross) error occurs, the weighing instruments measuring in motion shall:

(a) automatically switch off; or

(b) shall have a visual or audible signal, which must continue until the error has been rectified or until the operator intervenes;

4. at the warm-up time of the electronic weighing instrument specified by the manufacturer, the instrument shall not display or transmit measurement results and shall block its automatic operating mode;

5. the weighing instruments shall be equipped with a communication interface allowing their connection to external devices and a user interface that allows information to be exchanged between the operator and the weighing instrument. The interface shall not affect the correct functioning of the weighing instruments and shall not affect their metrological functions;

6. the communication interface and user interface shall not allow unauthorised interference with software and functions of legal significance, as well as measurement data, caused by connected devices, or by interference affecting the interface.

(2) The additional (gross) errors referred to in paragraph 1(2) which are less than or equal to 1 *d*, acceptable regardless of the value of the error of the indication.

(3) The requirements referred to in paragraph 1(2) may, at the choice of the manufacturer, be applied separately to:

(a) any single cause of significant additional (gross) error; or

(b) any part of the electronic weighing instruments measuring in motion.

Чл. 24.Metrological and technical requirements not specified in this section are defined in OIML R 134 Automatic action weighing instruments for measuring vehicles in motion and for measuring axle loads.

Чл. 25.(1) Weighing instruments measuring in motion shall be made available on the market and/or put into service after type-approval and initial verification and shall be subject to subsequent verifications.

(2) For type examination, a test shall be carried out on one weighing instrument fully installed at the place of use and one weighing instrument or main module thereof submitted for testing in a laboratory.

Section IV

Thermal energy meters

Чл. 26. (1) The thermal energy meter measures the thermal energy that is delivered into a heat exchange chain by means of a liquid called an energy-conveying liquid (heat-conveying liquid).

(2) A thermal energy meter is either a complete (indivisible) measuring instrument or a combined instrument consisting of the sub-assemblies – flow sensor, temperature sensor pair, and calculator (divisible), or a combination thereof (hybrid).

Чл. 27. Thermal energy meters shall be made available on the market and/or put into service after conformity with the essential requirements laid down in the Regulation on the essential requirements and conformity assessment of measuring instruments has been assessed and verified, and shall be subject to subsequent verifications in accordance with the provisions of this Regulation.

Чл. 28. (1) The maximum permissible relative errors for subsequent verification of thermal energy meters with assessed conformity and of an approved type, for the relevant accuracy class, applicable to the indivisible measuring instruments, expressed as a percentage of the actual value for each accuracy class, shall be as follows:

$E = E_f + E_t + E_c$,

where E_f, E_t, E_c are in accordance with paragraphs (2) to (4).

(2) The maximum permissible relative error of the flow sensor at a subsequent verification, expressed as a percentage, shall be as follows for the accuracy classes:

Class 1: $E_f = \pm (1+ 0.01 \bullet q_p/q)$, but not more than ±5%;

Class 2: $E_f = \pm (2 + 0.02 \bullet q_p/q)$, but not more than ± 5%;

Class 3: $E_f = \pm (3 + 0.05 \bullet q_p/q)$, but not more than ± 5%,

where the error E_f shows the relation between the registered value and the real value through the dependence between the output signal of the flow sensor and the real volume or mass.

(3) The maximum permissible relative error of the temperature sensor pair at a subsequent verification, expressed as a percentage:

$E_t = \pm (0.5 + 3 \bullet \Delta\theta_{min}/\Delta\theta)$,

where the error E_t shows the relation between the registered value and the real value through the dependence between the output signal of the temperature sensor pair, and the temperature difference.

(4) The maximum permissible relative error of the calculator, expressed as a percentage:

$E_c = \pm (0.5 + \Delta\theta_{min}/\Delta\theta)$,

where the error E_c shows the relation between the registered value and the actual value of the amount of heat.

(5) The error of the divisible and hybrid measuring instruments for the quantity of heat measured shall be determined by the errors of the constituent components and is equal to the arithmetic sum of their errors, expressed as a percentage.

(6) The values of flow rate, temperature and temperature difference for determining the maximum permissible errors for the component sub-assemblies of thermal energy meters shall be as defined under BDS EN 1434-5 (Thermal energy meters - Part 5: Initial verification tests).

(7) The values of flow rate and temperature difference for determining the maximum permissible error of a complete (indivisible) instrument for measuring thermal energy shall be as defined under BDS EN 1434-5.

(8) Subsequent verification marks shall be affixed to each separate assembly of divisible and hybrid thermal energy meters of an approved type or with assessed conformity, in the form and locations specified by the manufacturer and/or indicated in a certificate (attestation), if available. In the absence of such information, the marking shall be placed in a suitable place so as to be visible or to protect the inside structure of the assembly.

Чл. 29. (1) The period of validity of the subsequent verification of a batch of thermal energy meters intended for domestic, commercial and for use in the light industry may be extended if the conditions for applying the statistical control method have been met and the criteria set out in Annex 2 have been achieved when a sample of the batch was verified.

(2) The statistical control method may be applied if the validity period of the previous verification of thermal energy meters has not expired and the conditions for grouping the thermal energy

meters into a batch are present.

(3) Thermal energy meters may be grouped into a batch where:

1. they have the same: manufacturer, type or modification or extension of type designated in accordance with the EU-type/design examination certificate;

2. the year of manufacture of the measuring instruments does not differ by more than one year;

3. they have the same: nominal flow and flow measurement range;

4. they are used under the same operating and environmental conditions, including the flow sensors of thermal energy meters operating with water of identical or comparable quality;

5. the date of the previous inspection of all measurement equipment differs by no more than one year.

(4) Appropriate organisational and technical measures must be taken during the dismantling and transport of the thermal energy meters in the sample to prevent any interference leading to a change in their technical and metrological characteristics. Notwithstanding the size of the sample group, the period for disassembly and transportation must be as short as possible and not exceed one month.

(5) The input and output of the flow sensor of each thermal energy meter in the sample shall be sealed immediately after its disassembly.

Section V

Blood Pressure Meters (Sphygmomanometers)

Чл. 30. Blood pressure meters are measuring devices used by medical personnel for non-invasive measurement of arterial blood pressure by means of an inflatable cuff, display device and stethoscope.

Чл. 31. Blood pressure meters shall be made available on the market or put into service after conformity with the essential requirements laid down in the Medical Devices Act has been assessed and certified, and shall be subject to subsequent verifications in accordance with this Regulation when used in medicine for the purposes of medical surveillance, diagnosis and treatment.

Чл. 32. The subsequent verification of blood pressure meters shall be carried out to establish compliance with the maximum permissible errors according to BDS EN ISO81060-1.

Section VI

Manometers used in pressure equipment and in railway transport

Чл. 33. (1) Manometers are devices for measuring the pressure of a fluid confined or flowing in a volume by means of a resilient measuring element - a tubular spring (bourdon tube), a flat spring (membrane), a membrane box or a bellows.

(2) Depending on the type of pressure to be measured, manometers are:

1. for positive pressure;

2. for positive and negative pressure (manovacuum meters).

(3) The requirements of this section shall apply to manometers used in pressure equipment and railway transport with a range of measured pressure from minus 100 kPa up to 160 MPa.

Чл. 34. The manometers shall be made of materials and with a design that ensure their reliability, stability, tightness and resistance to environmental influences under the prescribed operating conditions.

Чл. 35. (1) The measurement ranges of positive pressure gauges shall be selected from the following series:

1. 0 to 60 kPa, 100 kPa, 160 kPa, 250 kPa, 400 kPa or 600 kPa;

2. 0 to 1 MPa, 1.6 MPa, 2.5 MPa, 4 MPa or 6 MPa;

3. 0 to 10 MPa, 16 MPa, 25 MPa, 40 MPa or 60 MPa;

4. 0 to 100 Mpa or 160 MPa;

5. 0 to 200 kPa or 500 kPa;

6. 0 to 2 MPa or 5 MPa;

7. 0 to 20 MPa or 50 MPa, the indicating arrow on the pressure gauges shall rotate clockwise as the pressure increases.

(2) The measurement ranges of positive and negative pressure gauges (manovacuum meters) shall be selected from the following series:

1. from minus 100 kPa to 60 kPa, 150 kPa, 300 kPa or 500 kPa, or

2. from minus 0.1 MPa to 0.9 MPa, 1.5 MPa or 2.4 Mpa, and the indicating arrow on the manovacuum meters shall rotate clockwise as the pressure increases.

Чл. 36. (1) The connecting threads of the nozzles of the gauges shall be selected from the following series: M 10 x 1, M 12 x 1.5 or M 20 x 1.5.

(2) The connecting threads of the nozzles of the gauges may be selected from the following series:

1. G 1/8 B, G 1/4 B, G 3/8 B, G 1/2 B – for cylindrical pipe thread, or

2. 1/8-27 NPT EXT, 1/4-18 NPT EXT, 1/2-14 NPT EXT – for cone tube thread.

(3) The nominal diameters of the manometer boxes shall be selected from the following series: 40, 50, 63, 80, 100, 150,160 or 250 mm depending on the accuracy class according to Annex 3.

Чл. 37. (1) The scale division value of the manometers shall be selected from the following series: 1×10^n, 2×10^n or 5×10^n pressure units where n is an integer positive or negative number or zero.

(2) The thickness of the scale division shall be at least 1 mm.

(3) The thickness of the scale marks shall be no greater than 20% of the length of the scale division.

(4) The length of the maximum scale division must not differ by more than 20% from the length of the minimum scale division on a linear scale.

Чл. 38. (1) The indicating arrow shall move smoothly without jumps and flaps when pressure changes smoothly.

(2) The indicating arrow shall cover from one tenth to nine tenths of the shortest scale marks.

(3) The tip of the indicating arrow shall not be wider than the scale mark.

(4) The indicating arrow of the manometer may be:

1. without a stop at an operating limit of measurement that coincides with the upper limit of measurement;

2. with or without a stop at an operating limit of measurement equal to 75 % of the upper limit of measurement.

(5) The displacement of the indicating arrow on the manometer due to friction forces shall not exceed half of the maximum permissible error.

(6) The zero corrector shall provide for an adjustment of the indicating arrow with a deviation less than the maximum permissible error.

Чл. 39. (1) The following data shall be marked on the face of the manometers:

1. the designation of the pressure unit;

2. the upper limit of measurement and the accuracy class;

3. a restriction mark for manometers operating at a maximum static pressure equal to the upper measuring limit;

4. an operating position mark where the manometer is operated in a position other than vertical;

5. the operating temperature where the manometer is operated at a temperature other than that prescribed;

6. an indication ‘G’ or the words ‘gas’, or the symbol ‘F’ or the words ‘liquid’ respectively, where the stated accuracy is achieved only in a gaseous medium or only in a liquid for pressure gauges of accuracy classes 0.1; 0.15 0.25 and 0.6 respectively;

7. the manufacturer’s name or trade mark;

8. the identification number for manometers of accuracy class 0.1; 0.15 and 0.25 and the year of production;

9. the material of the parts in contact with the fluid to be measured, where they are not made of brass or of tin bronze;

10. designations for safe pressure gauges – S1, S2, S3, according to BS EN 837-1;

11. the words ‘oxygen’ in English or ‘кислород’ in Bulgarian and the international designation ‘0248’ for ‘No oil and fat’ for oxygen manometers;

12. the words ‘acetylene’ in English or ‘ацетилен’ in Bulgarian for acetylene manometers;

13. the inscription in English or in Bulgarian of the relevant gas for which it is intended or indicated in the documents accompanying the manometer.

(2) The scales of the manovacuum meters shall bear an indication “-” (minus) before or below the numerical value indicating the maximum value of the negative pressure.

(3) Manometers of accuracy class 0.1 shall have a mirror scale.

(4) Dust and water-proof manometers shall be protected against the ingress of dust and water by a degree of protection in accordance with BS EN 60529:

1. at least IP31 indoors;

2. at least IP44 outdoor.

Чл. 40. (1) Space shall be provided on the manometer housing for the affixing of the verification marks.

(2) Verification marks may also be affixed on the safety glass of the manometer if they do not interfere with the readings.

(3) The design of the manometer must allow it to be sealed if necessary.

Чл. 41. (1) The manometers may be of the following accuracy classes: 0.1 0.15 0.25 0.6 1 1.6 or 2.5.

(2) The following accuracy classes are also allowed: 0.16 0.2 0.4 0.5 1.5 or 2.

Чл. 42. (1) The maximum permissible errors of the pressure gauges according to the accuracy class shall be within the limits of Annex 4.

(2) The permissible error limits shall be expressed as percentages:

1. of the upper measuring limit – for manometers;

2. of the sum of the absolute values of the two measuring limits, for vacuum manometers.

(3) For manometers with a limiter on the indicating arrow, the requirements for the maximum permissible errors of the manometers shall apply to a measuring range of 10 to 100 %.

Чл. 43. At a pressure equal to 0 Pa:

1. the manometer reading shall not exceed the maximum permissible error;

2. the indicating arrow shall not deviate from the limiter by more than the maximum permissible error.

Чл. 44. The hysteresis error of the manometer shall not be greater than the absolute value of the maximum permissible error.

Чл. 45. The maximum permissible error and the hysteresis error must not be exceeded at a prescribed temperature of 20 °C or 23 °C with tolerances:

1. ± 2 °C – for manometers of accuracy classes 0.1; 0.15 0.25 0.6 and 1 respectively;

2. ± 5°C – for manometers with accuracy classes 1.6 and 2.5, depending on the manufacturer's instructions and at relative air humidity up to 80%.

Чл. 46. (1) Permissible variations in manometer readings from the influence of temperature expressed as a percentage of the measuring interval, shall not be greater than the difference between the

ambient temperature and the prescribed temperature expressed in degrees Celsius (°C) multiplied by a temperature coefficient:

1. ± 0.04/1 °C – for bourdon tube manometers;

2. ± 0.06/1 °C – for manometers with membrane boxes;

3. ± 0.08/1 °C – for membrane manometers.

(2) A deviation from the normal operating position of up to 5° is permissible, provided that this will not cause the reading to change by more than half of the maximum permissible error.

Чл. 47. (1) Changes in the manometer readings in the operating temperature range from -20 °C to 60 °C must be within the limits of the permissible variations under Article 46.

(2) In the case of liquid-filled manometers, the operating temperature range of the manometer shall be consistent with the properties of the liquid.

(3) After being subjected to temperature effects the manometers shall comply with the maximum permissible error and hysteresis error under operating conditions requirements of Article 45.

Чл. 48. (1) Manometers with an operating limit of measurement of 75 % of the upper limit of measurement shall withstand for 15 min an overload pressure as specified in Annex 5;

(2) Manometers with an operating limit of measurement coincident with the upper limit of measurement shall withstand an overload pressure exceeding 30 % of the upper limit of measurement for 12 hours;

Чл. 49. (1) The manometers shall withstand mechanical vibration and impact.

(2) The variation of the manometer readings under the action of vibration in 3 mutually perpendicular axes with an acceleration of 5 m/s^2 and a frequency of 10 Hz to 150 Hz at a rate of change of 1 octave per minute over a period of 2 hours for each axis shall not exceed half of the maximum permissible error and the hysteresis error.

(3) There shall be no change in the manometer readings in the event of a mechanical shock with an acceleration of 150 m/s^2.

(4) Only manometers with accuracy classes 1 to 2.5 shall be subjected to mechanical vibration and impact tests.

Чл. 50. The number of specimens to be tested for type approval of manometers shall not be less than ten.

Чл. 51. (1) Manometers shall be made available on the market and/or put into service after type-approval and initial verification and shall be subject to subsequent verifications.

(2) During the type examination of the manometers, compliance with the requirements of this section shall be established.

Чл. 52. (1) The manometer submitted for verification shall be in good working order with no visible signs of corrosion or scratches on the casing, shall have a serviceable thread on the stem and their safety glass shall not be cracked or stained.

(2) The initial and the subsequent verification shall include:

1. verification of the presence of inscriptions and markings;

2. leak testing and checking;

3. verification of compliance with the maximum permissible errors requirements;

4. examination of hysteresis error.

(3) The verification referred to in paragraph 2 (3) and (4) shall be carried out at different pressure values evenly distributed over the measuring range as follows:

1. for manometers of accuracy class 0.1; 0.15 0.25 0.6 and 1 – at 8 values;

2. for manometers of accuracy classes 1.6 and 2.5 – at 5 values.

(4) The verifications shall be carried out under the operating conditions referred to in Article 45.

(5) During the verification, the change in temperature shall not cause the readings of the manometer being tested to change by more than one fifth of the maximum permissible error.

Чл. 53. (1) The uncertainty of the standards used shall be at least one quarter of the maximum permissible error of the manometer being tested.
(2) The operating environment of the standards used must ensure the prescribed accuracy of the standards and the manometer being tested, subject to the operating instructions.

Section VII

Pure cold and/or pure hot water meters

Чл. 54. (1) Pure cold and/or pure hot water meters are measuring instruments designed to measure, memorize and display the volume of pure cold or hot water passing through a measurement transducer, subject to the conditions of measurement.

(2) Water meters shall consist of at least a measuring unit, a calculator (including an adjusting or correcting device, if present) and a display device, which may be in different housings.

(3) Cold water is water with a temperature of 0°C to 30°C, hot water is water with a temperature above 30°C to at least 90°C.

Чл. 55. Clean cold and/or hot water meters shall be made available on the market and/or put into service after conformity with the essential requirements laid down in the Regulation on the essential requirements and conformity assessment of measuring instruments has been assessed and verified, and shall be subject to subsequent verifications in accordance with the provisions of this Regulation.

Чл. 56. (1) Subsequent verification of water meters shall include:

1. verification of the error of the readings of water meters assessed for compliance with the essential requirements in the measurement of actual volume, determined at least at the following three flow rates: between Q_1 and 1.1 Q_1; between Q_2 and 1.1 Q_2; between 0,9 Q_3 and Q_3For combination meters, a check of the reading error shall be performed for each of the water meters at the following flow rates: between Q_1 and 1.1 Q_1; between Q_2 and 1.1 Q_2; between 0.9 Q_3 and Q_3.

2. a leak test shall be carried out at periodic and subsequent inspection after repair, where the water meter shall withstand, without leakage or seepage of water through the walls, a pressure equal to 1.6 times the maximum working pressure for a period of 1 minute;

(2) The errors found at each of the flow rate values referred to in paragraph (1) shall not exceed the following values:

1. in case of periodic verification:

(a) ± 5% in the upper zone ($Q_2 \le Q \le Q_4$), at each water temperature;

(b) ± 5 % in the lower zone ($Q_1 \le Q < Q_2$) at each water temperature.

2. after repair:

(a) ± 2% in the upper zone ($Q_2 \le Q \le Q_4$), for water with a temperature of ≤ 30 C;

(b) ± 3 % in the upper zone ($Q_2 \le Q \le Q_4$), for water with a temperature of > 30°C;

(c) ± 5 % in the lower zone $(Q)_1 \le Q < Q_2$) at each water temperature.

(3) The temperature of the water during the verification shall be:

1. for water meters with temperature classes T30 and T50 – in the range between 10°C and 30°C;

2. for water meters with temperature classes T70 – T180 at a temperature of 50°C ± 5°C;

3. for water meters with temperature classes T30/70 – T30/180 at a temperature of 50°C ± 5°C.

(4) Upon subsequent verification following repair, if all errors in the measuring range of the water meter are of the same sign, at least one of the errors shall be less than half the value of the maximum permissible error.

Чл. 57. (1) The laboratory carrying out the verification shall ensure that:

1. the expanded uncertainty of the actual volume does not exceed 1/5 of the applicable maximum permissible error for subsequent verifications;

2. the uncertainty in the pressure measurement is within ± 5 % of the measured value;

3. during each measurement, the relative change in the flows shall not exceed ± 2.5 % between Q_1 and Q_2 and ± 5 % between Q_2 and Q_4;

4. the uncertainty of the temperature measurement shall not exceed ± 2 C.

(2) Water meters shall be checked individually or in such a way as to show their individual characteristics.

(3) The outlet pressure of the water meter during the test shall be high enough to avoid cavitation.

Чл. 58. (1) On subsequent verification of cold water meters the requirements of Article 56 shall be met.

(2) On subsequent inspection of hot water meters, the requirements of Article 56 shall be met, with the exception of the temperature requirements at which tests for cold water meters shall be carried out.

(3) The water meters may be verified in series, in which case the output pressure of all water meters shall be sufficient to avoid cavitation, and special measures must be taken to avoid any interference between the water meters.

(4) The equipment used may include automatic instruments, by-pass valves, flow restrictors, etc., provided that each test circuit between the water meters to be checked and the control tanks is clearly defined and it is possible to check their internal pressure drop at any time.

(5) Any type of system may be used to supply water. If several test rounds work together, reciprocal interferences incompatible with the requirements of Article 57 shall not be permitted.

Чл. 59. (1) The period of validity of the subsequent verification of a batch of water meters intended for domestic, commercial and for use in the light industry may be extended if the conditions for applying the statistical control method have been met and the criteria set out in Annex 2 have been achieved when a sample of the batch was checked.

(2) The statistic control method shall be applied if the validity period of the previous water meter test has not expired and conditions are present to group water meters into series.

(3) Water meters shall be grouped into series, if:

1. they have the same: manufacturer, type or modification or extension of type designated in accordance with the EU-type/design examination certificate;

2. the year of manufacture of the measuring instruments does not differ by more than one year;

3. they have the same nominal flow and accuracy class;

4. they are used under the same prescribed operating and ambient conditions, including water meters operating with water of identical or comparable quality;

5. the date of the previous inspection of all measurement equipment differs by no more than one year.

(4) In dismounting and transportation of water meters from the sample batch, adequate organizational and technical steps shall be taken to prevent any act that may result in changes in their technical and metrological characteristics. Notwithstanding the size of the sample group, the period for disassembly and transportation must be as short as possible and not exceed one month.

(5) The inlet and outlet of the sampled water meters shall be sealed immediately after their disassembly.

Чл. 60. Water meters may have protective devices that are sealed by sealing in such a way that, after sealing, before and after the water meter has been properly installed, they prevent disassembly or alteration of the water meter or its setting device without breaking the seals.

Чл. 61. The flow rate values at which the maximum permissible error of water meters of an approved type is determined, the maximum permissible errors and the accuracy class are defined in Annex 6.

Section VIII
Water meters for impure cold water

Чл. 62. (1) Water meters for impure cold water are measuring instruments designed to continuously measure, memorize and display the volume of impure cold water passed through them under measurement conditions in pressure flows in closed pipelines.

(2) The water meter shall consist of at least a measuring unit, a calculator (including an adjusting and correcting device, if present) and a display device, which may be in different housings.

(3) Impure cold water is cold untreated natural water or cold waste water.

(4) Cold water is water having a temperature of 0 °C to 30 °C.

Чл. 63. The requirements of this section apply to water meters that operate on a mechanical, electronic, or electrical principle to measure the volume of impure cold water.

Чл. 64.(1) The flow characteristics of water meters shall be determined by the following values:

1. minimum flow rate, Q_1– the lowest flow value at which the water meter must operate within the maximum permissible error;

2. transitional flow rate, Q_2— a flow value between the fixed flow Q_3 and the minimum flow Q_1 which divides the flow rate range into two zones, the “upper zone” and the “lower zone”, each characterised by its own maximum permissible error;

3. constant flow rate, Q_3 – the highest value of the flow rate within the prescribed operating conditions at which the water meter is capable of operating satisfactorily within the maximum permissible error;

4. overload flow rate, Q_4– the highest flow rate value at which the water meter must operate, for a short period of time, within the maximum permissible error, while maintaining its metrological characteristics after the prescribed operating conditions are restored;

5. combined water meter switching flow rate, Q_x::

(a) the switching flow rate Q_{x1} occurs at a decreasing flow rate when the pressure in the combined water meter suddenly decreases simultaneously with an interruption in flow through the large water meter and an increase in flow through the small water meter;

(b) the switching flow rate Q_{x2} occurs at an increasing flow when the pressure in the combined water meter suddenly increases simultaneously with the onset of flow through the large water meter and a decrease in flow through the small water meter.

(2) The numerical value of the constant flow rate Q_3 expressed in cubic metres per hour (m^3/h) shall be determined in accordance with the table in Annex 7.

(3) The flow rate measurement range shall be determined by the ratio Q_3/Q_1. The values for this ratio shall be determined in accordance with the table in Annex 8.

(4) The overload flow rate Q_4 shall be determined by the ratio $Q_4/Q_3 = 1.25$.

(5) The transitional flow rate Q_2 shall be determined by the ratio $Q_2/Q_1 = 1.6$.

(6) The flow rate the value of which is used as a prescribed flow rate shall be determined according to the following formula $0.7\ (Q_2 + Q_3) \pm 0.03\ (Q_2 + Q_3)$.

Чл. 65.(1) Water meters shall be designed and manufactured so that their errors (of reading) do not exceed the maximum permissible errors as defined in paragraph (2) or paragraph (3) under prescribed operating conditions. Water meters shall be designated as accuracy class 1 or accuracy class 2 as required in paragraph (2) or (3).

(2) The maximum permissible error for water meters of accuracy class 1 shall be:

1. for the upper flow rate area ($Q_2 \leq Q \leq Q_4$) = ± 1%,

2. for the lower flow rate area ($Q_1 \leq Q < Q_2$) = ± 3%.

(3) The maximum permissible error for water meters of accuracy class 2 shall be:

1. for the upper flow rate area ($Q_2 \leq Q \leq Q_4$) = ± 2 %,

2. for the lower flow rate area ($Q_1 \leq Q < Q_2$) = ± 5%.

Чл. 66.The relative error (of the reading) shall be expressed as a percentage and determined by the following formula:

$$R = (Q_{\text{reading}} - Q_{\text{actual}})/Q_{\text{actual}}\text{ , \%,}$$

whereby:

Q_{reading} — the volume reported;

Q_{actual} — the actual volume.

Чл. 67. (1) If a water meter is designed to measure reverse flow, the volume passed during reverse flow must either be subtracted from the volume reading or must be recorded separately.

(2) The maximum permissible errors referred to in Article 65(2) and (3) must be met not only for straight flow but also for reverse flow.

(3) Water meters that are not designed to measure reverse flow must either not allow reverse flow or be capable of withstanding accidental reversal of flow without degradation or change in their metrological performance under straight flow.

(4) The requirements regarding the maximum permissible errors shall be met for any variation in temperature and pressure within the prescribed operating conditions of the water meter.

Чл. 68. The water meter counter should not change when the flow is zero.

Чл. 69. The water meter shall withstand the following pressure test without leakage and without failure:

1. 1.6 times the maximum permissible pressure applied for 15 minutes;

2. Two times the maximum permissible pressure applied for 1 minute.

Чл. 70. The connections between the measurement transducer, the calculator and the display device shall be reliable and durable.

Чл. 71. The water meter may be equipped with an electronic setting device that can replace a mechanical setting device.

Чл. 72. (1) In order to reduce errors (of indication) as close as possible to zero, water meters may be fitted with corrective devices, which in this case are considered to be an integral part of the water meter.

(2) All requirements applicable to the water meter, and in particular to the maximum permissible errors, shall also apply to the corrected volume reported under reference measurement conditions. In normal operation mode, the corrected volume shall be indicated.

(3) Water meters with corrective devices shall pass operational tests.

(4) All parameters that are not measured and which are necessary for the correction shall be contained in the calculator at the beginning of the measurement.

(5) The corrective device shall not allow correction of a predetermined drift, for example in terms of time or volume.

Чл. 73. (1) All parameters necessary to obtain a reading subject to metrological control, e.g. a calculation table or correction polynomial, must be contained in the calculator at the start of the measurement.

(2) The calculator may be equipped with an interface that allows connection to peripheral devices. Where these interfaces are used, the water meter software and hardware shall continue to function properly and its metrological functions shall remain unaffected.

Чл. 74. The display device on the water meter shall provide an easily readable, reliable and unambiguous visual indication of the flowed volume.

Чл. 75. (1) The water meter may include auxiliary devices. The addition of such devices, whether temporary or permanent, shall not alter the metrological characteristics of the water meter.

(2) The auxiliary device may be used to detect the activity of the flow sensor before it is clearly visible from the readings of the display device. This device may be used for testing, checking and

remote sensing of the water meter readings if by other means its proper functioning is ensured.

Чл. 76.(1) Water meters with electronic devices shall be designed and manufactured in such a way that no significant errors occur when exposed to disturbances.

(2) An error greater than one-half of the maximum permissible error in the upper flow zone shall be considered to be a significant error.

(3) The following are not considered to be significant errors:

1. errors caused by simultaneous and independent causes in the water meter or control devices; and

2. short-term errors representing instantaneous changes of the indication that cannot be interpreted, stored or transmitted as a result of measurement.

Чл. 77.(1) Water meters using electronic devices may have the following types of power supplies:

1. external power supply;

2. a non-removable battery;

3. a replaceable battery.

(2) The power supplies referred to in paragraph 1 may be used alone or in combination.

Чл. 78. (1) Water meters with an external electrical supply shall be designed so that in the event of a failure of the external electrical supply (DC or AC), the water meter reading for the measured volume immediately prior to the failure is not lost and is accessible for at least one year. The corresponding recording in the memory shall be performed at least once per day or at each volume equivalent to 10 minutes flow at Q_3.

(2) Changes or interruptions of the power supply shall not affect other properties or characteristics of the water meter. The compliance with this paragraph does not necessarily guarantee that the meter will continue to read the volume flowing at the time of the power failure.

(3) The power supply must be capable of being protected from external interference.

Чл. 79. In the case of water meters with a non-replaceable battery, the manufacturer must ensure that, for the specified life of the battery, the water meter will function properly for at least one year longer than its service life.

Чл. 80. (1) Where the electrical power is from a replaceable battery, the manufacturer shall provide precise instructions for battery replacement and the date for battery replacement shall be indicated on the water meter.

(2) The characteristics of the water meter shall not be affected by the interruption of the power supply when changing the battery.

(3) The battery compartment shall be protected against tampering in case it is possible to remove the battery without damaging the mandatory metrological seal.

Чл. 81. (1) Water meters must be manufactured from materials of appropriate strength and durability appropriate to the purpose for which the water meter is intended to be used.

(2) All parts of the water meter which are in contact with the water flowing through it must be manufactured from non-toxic, non-polluting or non-biologically inert materials.

(3) The water meter shall be made of materials which are resistant to internal and external corrosion or which are protected by appropriate surface treatment.

(4) The display device on the water meter shall be protected by a transparent window. As an additional protection, the display device may also be provided with a cover of an appropriate type.

(5) The water meter shall include devices to remove condensation where there is a risk of condensation occurring inside the window of the display device on the water meter.

Чл. 82. The water meter may be fitted with an adjustment device and/or a corrective device. These devices must be sealed.

Чл. 83.(1) The water meter shall be installed in such a way that it is fully filled with water under normal conditions.

(2) If the accuracy of the water meter is likely to be aggravated by the presence of solid particles in the water (e.g. in turbine or volume meters), the water meter shall be fitted with a mesh or other filter.

Чл. 84.(1) The water meter shall withstand effects of flow disturbances. During the effects of these flow disturbances, the error (of indication) shall be within the maximum permissible errors according to the accuracy class of the water meter.

(2) The manufacturer shall determine the flow profile sensitivity class in accordance with Annex 9.

(3) Any section which causes a change in flow and includes a jet rectifier and/or straight sections shall be specified by the manufacturer and shall be regarded as an auxiliary device connected to the type of water meter under examination.

Чл. 85.The operating conditions of a water meter shall be in accordance with Annex 10.

Чл. 86.(1) The maximum pressure loss of the water meter, including its filter and its jet rectifier, when they comprise an integral part of the water meter, shall not exceed 63 kPa (0.63 bar) at a flow rate between Q_1 and Q_3

(2) The pressure loss class shall be chosen by the manufacturer from the values given in Annex 11.

(3) Concentric water meters, regardless of their type and operating principle, shall be tested together with the corresponding collector.

Чл. 87.(1) Water meters with electronic devices shall be divided into the following three classes according to the climatic and mechanical conditions of the environment:

1. class B for water meters installed in a building;
2. class O for outdoor water meters;
3. class M for mobile water meters.

(2) The manufacturer shall define the environmental class of climatic and mechanical conditions in accordance with which in-service type-approval tests shall be carried out.

Чл. 88.(1) Water meters with electronic devices are divided into two classes of electromagnetic conditions in the surrounding environment:

1. class E1 for commercial and in the light industry premises;
2. class E2 for industrial premises.

(2) The appropriate class referred to in paragraph 1 shall be determined by the manufacturer. Depending on the environmental class of electromagnetic conditions, the water meter must be subjected to an electromagnetic disturbance.

Чл. 89.(1) A space shall be provided on the water meters for affixing a verification mark, which shall be visible without disassembling the water meter.

(2) All water meters shall be clearly and permanently marked with the following information, grouped or distributed on the housing, the display scale and the water meter identification plate or lid, if not disassembled:

1. unit of measurement: cubic metre;
2. accuracy class, if different from Class 2;
3. the numerical value of Q_3;
4. the ratio Q_3/Q_1(preceded by “R”, e.g. “R160”);
5. the ratio Q_2/Q_1, if different from 1.6;
6. the maximum permissible pressure, if different from 1 MPa (10 bar);
7. direction of flow (shown on both sides of the housing; or only on one side of the housing if the arrow indicating the direction of flow is clearly visible from each position);

8. the letter V or H, if the water meter can operate only in a vertical or only in a horizontal position;

9. pressure loss class, if different from ΔP 63;

10. classes of sensitivity to variations in speed fields, if different from U_0/D_0;

11. the manufacturer's name or trade mark,

12. year of manufacture (last two digits) and serial number (placed as close as possible to the display device);

13. type-approval marking;

14. the degree of stringency of climatic or mechanical environmental conditions;

15. electromagnetic compatibility class (EMC);

16. output signals to auxiliaries (type/levels), if any;

17. external power supply requirement: voltage – frequency,

18. in cases where the power supply is from a battery: end date at which the battery is to be replaced (in the case of a replaceable battery) or end date at which the water meter is to be replaced (in the case of an integrated battery).

(3) Other information, which must not affect the clarity of the mandatory information, may also be displayed. If the additional volume readings are not subject to legal control, there shall be a clear indication thereof.

Чл. 90. (1) The display device on the water meter shall provide an easily readable, reliable and unambiguous visual indication of the volume. The device may contain additional elements for testing and adjustment by other methods such as automatic testing and adjustment.

(2) The volume of water must be expressed in cubic metres. The indication of the unit of measurement "m^3" shall be visible on the face or in close proximity to the digital display device.

(3) The range of readings shall correspond to the values given in Annex 12.

(4) The colour black shall be used to denote cubic metres and their multiples.

(5) The colour red shall be used to denote fractions of a cubic metre.

(6) The colours referred to in paragraphs (4) and (5) shall be used for indicators, arrows, digits, gears, discs, dials or creels.

(7) Other means of indicating the cubic metre, its multiples and fractions may be used, and there must be no ambiguity in distinguishing between the whole part and the decimal part of the volume value.

Чл. 91. The display devices may be analogue, digital or a combination of both.

Чл. 92. (1) In the case of analogue displays, the volume reading shall be shown by the continuous movement of:

(a) one or more arrows moving on a graduated scale;

(b) one or more circular scales or rolls with numbers passing the index.

(2) The value expressed in cubic metres for each scale division shall have a format of 10^n where n is a positive or negative integer or zero, thus creating a row of consecutive decades. Each scale shall be graduated in values expressed in cubic metres or accompanied by a multiplier (x 0.001; x 0.01 x 0.1 x 1 x 10 x 100 x 1,000 etc.).

(3) The rotational motion of the arrows or circular scales shall be clockwise.

(4) The linear movement of switches or scales shall be from left to right.

(5) The movement of digital indicator rolls shall be bottom-up.

Чл. 93.(1) In the case of digital displays, the volume shall be indicated by a series of adjacent digits appearing in one or more windows. The increment of a digital discharge shall be completed when the figure with the previous lower deck is changed from 9 to 0.The apparent numerical height shall be at least 4 mm.

(2) For non-electronic display devices:

1. the movement of digital indicator rolls shall be bottom-up.

2. the lowest-valued decade may have continuous movement, and the window must be large enough to allow unambiguous reading of the figure.

(3) Electronic display devices may be permitted to operate in an intermittent mode, even when measuring, but it must be possible to display the volume on demand at any time. If the display device is operating in discontinuous mode, the volume reading shall be held for at least ten seconds. It shall be possible to verify the correct functioning of the display device, for example by consistently displaying different characters. Each step of this series shall last at least one second.

Чл. 94. In the case of a combination of analogue and digital displays, the volume reading shall be given by a combination of analogue and digital display devices, applying the relevant requirements for each of the two types.

Чл. 95. (1) Each display device shall allow visual and unambiguous inspection and adjustment.

(2) The display device for visual inspection may have continuous or interrupted movement.

(3) The display device for visual inspection may also be equipped with additional elements for rapid inspection (e.g. discs, stars, etc.) that provide signals from external sensors.

Чл. 96.(1) The value of the verification scale division, expressed in cubic metres, shall be of the type: 1×10^n, 2×10^n or 5×10^n, where **n** is a positive or negative integer or zero.

(2) For analogue and digital displays with continuous movement of the first element, the verification scale may be formed by dividing two, five or ten equal parts of the interval between two consecutive digits of the first element. Graduations must not be indicated in numbers.

(3) For digital display devices with discontinuous movement of the first element, the check scale division is the interval between two consecutive digits or incremental movements of the first element.

Чл. 97. (1) In the case of indicators with continuous movement of the first element, the apparent length of the scale division shall not be less than 1 mm nor more than 5 mm. The scale shall consist of:

(a) lines of uniform thickness not exceeding one quarter of the distance between the axles of two consecutive lines, the lines of which may differ only in length from each other, or

(b) by contrast strips of equal width equal to the length of the scale division.

(2) The apparent width of the head of the arrow shall not exceed one quarter of the length of the scale division and shall not exceed 0.5 mm.

Чл. 98. (1) The verification scale division shall be sufficiently small so that the error due to the resolution of the display device does not exceed 0.25 % for water meters of accuracy class 1, and 0.5 % for water meters of relevant accuracy class 2, of the volume corresponding to 1 hour and 30 minutes at minimum flow rate Q_1.

(2) Additional verification elements may be used provided that the reading uncertainty is not more than 0.25 % of the volume tested for water meters of accuracy class 1 and 0.5 % of the volume tested for water meters of accuracy class 2.

(3) Where the reading of the first element is continuous, the permissible maximum reading error shall not be greater than half the verification scale division.

(4) Where the reading of the first element is interrupted, the maximum permissible error of reading shall not be greater than one digit from the verification scale.

Чл. 99. For combined water meters with two display devices, the requirements apply to both display devices.

Чл. 100. The water meters shall include protective devices which can be sealed in such a way that, if the seals before and after the water meter are correctly affixed, the water meter and its adjusting or corrective device cannot be removed or altered without damaging the seal or protective devices. In the case of combined water meters, these requirements apply to both water meters.

Чл. 101. (1) Where access to change the parameters affecting the determination of the

measurement results is not protected by mechanical devices, the protection shall meet the following requirements:

1. access must be allowed only for authorised persons, for example by means of a code (keyword) or a special device (e.g. coded key), and the code must be modifiable and

2. at least the last intervention must be stored and the record must contain the date to be inserted and a characteristic element identifying the authorised person who intervened. The traceability of the last intervention must be ensured for at least two years. If it is possible to have more than one intervention recorded in memory, and if a record for a previous intervention is deleted for a new record, it is the oldest record that must be deleted.

(2) For water meters the parts of which can be disassembled by the user, the following requirements shall be met:

1. it shall not be possible to access the parameters involved in determining the measurement results through the disconnected points unless the requirements of paragraph (1) are met;

2. interference with the operation of any device affecting accuracy shall be prevented by electronic or data processing or, if that is not possible, by mechanical means.

(3) Water meters whose parts are not interchangeable must be provided with devices which prevent them from operating if some of the parts are not connected according to the manufacturer's configuration. Disassembly that is not allowed for the user can be prevented, for example by means that prevent measurement after disconnection and re-connection.

Чл. 102. Water meters for impure cold water shall be made available on the market and/or put into service after type-approval and initial verification, and shall be subject to subsequent verifications.

Чл. 103. (1) During the tests for type approval of a water meter, all other influencing quantities, with the exception of the influence quantity tested, shall be maintained under the reference conditions according to Annex 13.

(2) The type examination tests must be carried out on the minimum number of samples of each type shown in Annex 14 and additional samples may be requested.

(3) Additional samples are also required for water meters equipped with electronic devices.

Чл. 104. (1) The (reading) errors of the water meter (measured volume to actual volume) shall be determined at least at the following rates:

1. Q_1; Q_2; 0.35 (Q_2 + Q_3); 0.7 (Q_2 + Q_3); Q_3; and Q_4;
2. for combined water meters: 0.9 Q_{x1}; 1.1 Q_{x2}.

(2) The errors (of the reading) observed for each of the flows referred to in paragraph 1 shall not exceed the maximum permissible errors. If all errors of the water meter have the same sign, at least one of the errors shall not exceed one half of the maximum permissible error.

(3) If the water meter is designed and marked to operate in only one orientation, it shall be tested only in that orientation. In the absence of such markings, the water meter must be tested in at least three orientations.

(4) The water meter shall have repeatability: the standard deviation of three measurements at the same flow rate value shall not exceed one-third of the maximum permissible error for the respective accuracy class. The repeatability tests shall be carried out at nominal values of the flow rate Q_1, Q_2 and Q_3.

Чл. 105. (1) Only integral water meters that have been approved as integral water meters, or as compatible separately approved assemblies, and assembled as integral water meters shall be subject to initial inspection.

(2) Water meters of the same dimensions and of the same type may be tested sequentially. In this

case, the water pressure at the outlet of the last water meter in the series shall be greater than 30 kPa (0.3 bar).

(3) The initial verification of water meters shall include:

1. verification of the accuracy of the readings of the water meters when measuring the actual volume, determined at least at the following three nominal flow values: Q_1; Q_2 and Q_3.

2. verification of the accuracy of the readings of the combined water meters when measuring the actual volume, determined at least at the following nominal flow values: Q_1; Q_2; Q_3 and Q_{x2} .

3. a leak check in which the water meter shall withstand, without leakage or seepage of water through the walls, at pressure equal to 1.6 times the maximum working pressure for a period of 1 minute.

(4) The water temperature during the verification shall be between 10°C and 30°C.

(5) The errors found at each of the flow rate values referred to in paragraph (3) shall not exceed the maximum permissible errors for the relevant accuracy class.

Чл. 106. (1) The subsequent verification of water meters shall include:

1. verification of the error of the readings of water meters when measuring the actual volume and shall be determined at least at flow rate values Q_1, Q_2 and Q_3.

2. verification of the error of the readings of the combined water meters when measuring the actual volume and shall be determined at least at flow rate values Q_1, Q_2, Q_3 and Q_{x2}.

3. a leak check in which the water meter shall withstand, without leakage or seepage of water through the walls, at pressure equal to 1.6 times the maximum working pressure for a period of 1 minute.

(2) The errors found at each of the flow rate values referred to in paragraph (1) shall not exceed the maximum permissible errors for the relevant accuracy class.

(3) The water temperature during the verification shall be between 10°C and 30°C.

Чл. 107. In the initial and the subsequent verification, if all errors in the measuring range of the water meter are of the same sign, at least one of the errors shall be less than half the value of the maximum permissible error.

Чл. 108. The flow rate values for determining the maximum permissible error of the flow meters for impure water of an approved type before the entry into force of this Regulation and their maximum permissible errors are set out in Annex 15.

Section IX
Measuring systems for the continuous and dynamic measurement of quantities of liquids other than water

Чл. 109. (1) Measuring System for the continuous and dynamic measurement of quantities of liquids other than water, is the system consisting of a flowmeter and all devices necessary to ensure correct measurement or which are intended to facilitate measurement operations.

(2) The measuring systems referred to in paragraph 1 shall be designed for the continuous and dynamic measurement of a quantity (volume or mass) of liquids other than water and shall consist of a flowmeter, a hydraulic system and a transmission point.

Чл. 110. Measuring systems for liquids other than water shall be made available on the market and/or put into service after assessed and certified compliance with the essential requirements, as laid down in the Regulation on the essential requirements and conformity assessment of measuring instruments, has been fulfilled, and shall be subject to subsequent verifications in accordance with the provisions of this Regulation.

Чл. 111. (1) If several flowmeters intended for individual measurement operations work together with common components, each flowmeter together with the common components shall form a

single measuring system.

(2) When a part of a measuring system not common to the other measuring systems (flow sensor, pulse transducer) is repaired, the validity period of the subsequent verification of all measuring systems within the measuring device shall be maintained. The verified measuring system after repair shall be authenticated only with a seal. The validity of the sticker from a previous periodic verification of the measuring device shall not be affected.

(3) Where a part, common to several measuring systems (electronic unit, metering system controller) is repaired, a subsequent verification following the repair shall be performed on all measuring systems for which this part is common and the verification shall be verified by a new validity verification mark.

Чл. 112. (1) For measuring systems for liquids other than water, the maximum permissible error of indication for quantities equal to or greater than two litres shall be within the accuracy class according to OIML R 117-1:

1. for accuracy class 0.3: a maximum permissible error of the measuring system ± 0.3% and a maximum permissible error of the flowmeter ± 0.2%;

2. for accuracy class 0.5: a maximum permissible error of the measuring system ± 0.5% and a maximum permissible error of the flowmeter ± 0.3%;

3. for accuracy class 1.0: a maximum permissible error of the measuring system ± 1.0% and maximum permissible error of the flowmeter ± 0.6%.

4. for accuracy class 1.5: a maximum permissible error of the measuring system ± 1.5% and maximum permissible error of the flowmeter ± 1.0%.

(2) With regard to measuring systems the maximum permissible error of the reading for quantities of less than two litres shall be within the following limits:

1. for a measured quantity of less than 0.1 l: ± four times the values referred to in paragraph (1) applied per 0.1 litres;

2. for a measured quantity greater than or equal to 0.1 l and less than 0.2 l: ± four times the values referred to in paragraph 1;

3. for a measured quantity greater than or equal to 0.2 l and less than 0.4 l: ± twice the values referred to in paragraph (1) applied per 0.4 litres;

4. for a measured quantity greater than or equal to 0.4 l and less than 1 l: ± twice the values referred to in paragraph (1);

5. for a measured quantity greater than or equal to 1 l and less than 2 l: ± the values referred to in paragraph (1) applied per 2 litres.

(3) Regardless of the quantity measured, the magnitude of the maximum permissible error shall be determined from the greater of the following two values:

1. the absolute value of the maximum permissible error referred to in paragraph (1) or (2);

2. the absolute value of the maximum permissible error for the minimum measured quantity (F_{min}).

(4) For minimum measured quantities greater than or equal to 2 litres, the following conditions shall apply:

1. E_{min} must meet the condition $E_{min} > 2R$, where R is the smallest scale division of the display device;

2. E_{min} shall be determined by the formula $E_{min} = (2V_{min}) \times (A/100)$, where V_{min} is the minimum quantity measured and A – the numerical value of the error of the measuring system.

(5) For a minimum measured quantity of less than 2 litres or its equivalent mass, the condition set out in paragraph (4), point (1) shall apply, and E_{min} shall be twice the value set out in paragraph (2) for error values of a measuring system referred to in paragraph (1).

Чл. 113. (1) In case of subsequent verification of measuring systems for liquids other than water

they shall be deemed to satisfy the maximum permissible error requirement when compliance is established at values of expenditure equal to:

1. the minimum flow rate;

2. the maximum achievable flow rate.

(2) The values referred to in paragraph (1) may vary by ± 5 %.

Чл. 114. (1) For measuring systems for liquids other than water, for liquids other than water with conformity assessment, the maximum permissible errors of the conversion device, positive or negative, shall be equal to the difference of the error of the measuring system and the error of the flowmeter for the respective accuracy class in accordance with Article 112 (1).

(2) The maximum permissible errors of auxiliary measuring devices, part of the sensors, are as follows:

1. temperature measurement:

(a) ± 0.3°C for measuring systems of accuracy class 0.3;

(b) ± 0.5°C for measuring systems of accuracy classes 0.5, 1.0 or 1.5.

2. density measurement:

(a) ± 1 kg/m^3 for measuring systems of accuracy class 0.3;

(b) ± 2 kg/m^3 for measuring systems of accuracy classes 0.5, 1.0 or 1.5

3. pressure measurement, for all accuracy classes of measuring systems:

(a) ± 50 kPa when measuring a pressure of less than 1 MPa;

(b) ± 5 % when measuring a pressure of 1 to 4 MPa;

(c) ± 200 kPa when measured at pressures greater than 4 MPa.

(3) The values under paragraph (2) shall refer to the readings of the quantities listed by the conversion device.

Чл. 115. (1) In case of subsequent verification of measuring systems for liquids other than water, the reference equipment used shall have an expanded uncertainty of less than 1/3 of the maximum permissible error of the measuring system being checked at $k = 2$.

(2) During the subsequent verification of the measuring systems the following shall be performed:

1. in the case of a periodic verification, one measurement of the minimum flow rate and one of the maximum achievable flow rate;

2. in the case of subsequent verification following a repair:

(a) in addition to measurements at the flow rate values referred to in point (1), a re-measurement at the maximum achievable flow rate;

(b) a third measurement at the maximum achievable flow rate if the error in one of the two previous measurements exceeds the maximum permissible error, in which case the mean value of the error of the reading from the three measurements shall not exceed the maximum permissible error.

(3) The quantity measured shall be selected in such a way that it is greater than the following values:

1. five times the minimum quantity measured;

2. the quantity that passed within 60 seconds at the measured flow rate;

3. 2,000 times the scale division of the display device.

Чл. 116. (1) The subsequent verification of the measuring system for liquids other than water shall be carried out under operating conditions at the location where it is installed and with the liquid for which the system is intended.

(2) The subsequent verification of the measuring system shall include:

1. examination of the conformity of the measuring system, including the flowmeter and the auxiliary devices;

2. examination of the metrological characteristics of the flowmeter and auxiliary devices included in the measuring system;

3. examination of the gas removal device, if any, and it shall not be necessary to check whether the maximum permissible error for this device is exceeded;

4. examination of the setting of the pressure regulating device;

5. examination of variations in the inner volume of hoses in the case of a full hose system.

Section X
Level measuring systems

Чл. 117. (1) The requirements of this section apply to the level measuring systems that are used to measure the volume of liquid available in a tank and to measure the volume of liquid upon receipt (delivery) transfer of liquid fuels at liquid fuel outlets that are required to use electronic fiscal memory systems (EFMS).

(2) The requirements of the section do not apply to level measuring systems used in the sale of liquid fuels from a tax warehouse within the meaning of the Excise and Tax Warehouses Act or the sale of kerosene intended for refuelling civil aircraft through an airport operator or ground handling operator.

Чл. 118. (1) The level measuring systems consist of:

1. a stationary measuring tank equipped with auxiliary and additional devices;

2. an electronic automatic level meter;

3. temperature sensors/thermometers.

(2) The stationary tanks referred to in paragraph (1), point (1) shall be designed for the storage of light petroleum products at atmospheric pressure or of liquefied petroleum gas (LPG) under pressure.

(3) The electronic automatic level meters under paragraph (1), point (2) shall be means for measuring and displaying the liquid level in stationary tanks with constant characteristics and shall consist of at least a liquid level sensor, a conversion device and a calculator with a display device.

Чл. 119. (1) Determination the volume with a level measuring system shall be performed by measuring the level and temperature and calculating the volume under operating and baseline conditions.

(2) The level measurement shall be carried out by means of an electronic automatic level meter – float/display level meter with magnetic or magneto-strictive electronic detector, ultrasonic level meter, radar level meter or other non-contact level meters.

(3) Temperature shall be measured by temperature sensors or thermometers arranged to allow determination of the average temperature of the volume of liquid in the tank. It is permissible for temperature sensors to be installed in the level sensor. The minimum number of temperature sensors should be:

1. four – for tank heights up to 9 metres;

2. five – for tank heights from 9 to 15 metres;

3. six – for tank heights above 15 metres.

(4) The calculation of the volume of liquid in the tank under operating conditions and at baseline conditions (at the reference temperature of 15°C) shall be performed by means of a calculator which uses data from the tank calibration table, the volume adjustment table for adjustment to baseline conditions and the liquid level measured by the electronic level meter.

Чл. 120. (1) The tanksreferred to in Article 118(1), point (1), shall be of a construction, position and conditions of use which comply with the regulatory requirements for the storage of the liquids contained therein with respect to the characteristics of those liquids.

(2) The tanks referred to in Article 118(1), point (1) shall comply with the following requirements:

1. the bulkheads and reinforcements which can be fitted to the tank shall be of suitable shape and shall be provided with suitable openings so as not to interfere with the filling, draining and

inspection of the tank;

2. the lower reference point and the upper reference point shall be so constructed that their positions remain constant in practice;

3. the impacts due to filling and emptying of the tank and changes in ambient conditions shall be minimised;

4. the tanks must be fitted with an information identification plate made of metal and the inscriptions must remain unchanged under operating conditions;

5. the plate shall be affixed to a monolithic part of the tank and positioned in such a way that it is easily visible and legible, non-modifiable and cannot be removed without destruction of the seals bearing the inspection marks; at least the following particulars shall appear on the plate:

(a) the year of construction of the tank;

(b) manufacturer;

(c) nominal capacity;

(d) maximum filling height;

(e) reference height;

6. the tanks must be calibrated and have a calibration table for determining and measuring the volume; the calibration shall be done by laboratories authorized in accordance with the requirements of standard BS EN ISO/IEC 17025.

7. the tanks must have a measuring opening and a submersible base plate, the inner diameter of the measuring opening must allow metrological control. A submersible base plate is not required when the bottom of the tank is sufficiently stable and there is no risk of sludge formation or this sludge can be accounted for by the level measuring device;

8. the tank must have an observation opening unless safety requirements or other regulations preclude it. The observation opening and the measuring slot must be sealed to prevent external interference;

9. the tank may be divided into several measuring compartments, in which case each compartment shall be considered a separate tank and shall comply with the requirements of this section.

(3) The requirements in paragraph (2), point (7) and (8) shall not apply to tanks intended for the storage of liquefied petroleum gas (LPG) under pressure.

(4) The expanded uncertainty in tank calibration applies to values between the lower capacity limit and the nominal capacity specified in the calibration table. The maximum uncertainty calculated for k=2 shall not exceed:

1. ± 0.2% of the displayed volume for vertical cylindrical tanks;

2. ± 0.3% of the displayed volume for horizontal or cylindrical inclined tanks;

3. ± 0.5% of the displayed volume for other tanks and tanks storing liquefied gases under pressure.

(5) The maximum uncertainty referred to in paragraph 4 shall not include the uncertainty of the quantity below the immersible base plate, which is indicated in the calibration table of the tank.

(6) The tank liquid level index or the level of free space above the tank liquid shall be expressed in units of length.

(7) The display of information not subject to metrological control is permitted provided that it cannot be confused with the metrological information.

Чл. 121. (1) Electronic level meters referred to in Article 118(1), point (2) must show the level of liquid in the tank. Other measured values, such as the level of free space above the liquid in the tank, can be shown on the same display, but this data must be replaced by the liquid level in the tank within 10 s. The readings shall be reliable and allow easy and unambiguous reading.

(2) The electronic level meters referred to in Article 118(1), point (2) may operate with auxiliary devices which are an integral part thereof and are designed to perform separate functions directly involved in the processing, transmission or display of the measurement results. The auxiliary

devices can be:

1. repetitive indication devices;

2. printing devices;

3. storage devices;

4. conversion devices.

(3) The requirements of Article 120(6) shall also apply to printing devices.

(4) The auxiliary devices shall not affect the measuring precision and shall not have characteristics allowing for unregulated use of electronic level meters.

(5) Electronic level meters shall have an identification plate containing at least the following information:

1. the name of the manufacturer or trademark;

2. the type designation;

3 serial number and year of manufacturing;

4 a type-approval marking;

5. tank identification.

(6) The inscriptions on the plate shall be indelible and of size, shape and clarity which are easily legible. The plate must be securely fastened and cannot be removed without destruction, and if this condition is not fulfilled, its sealing must be ensured.

(7) The parts of the electronic level meter which may affect the accuracy of the measurement shall be sealed.

(8) The following requirements shall be met in the installation of the electronic level meters:

1. to provide a true, easy, accessible and understandable reading;

2. to be verifiable;

3. the deviation of the reference length due to the movement of the shell, bottom and roof of the tank remains within the maximum permissible errors after installation;

4. the liquid level sensor shall be installed in such a way that its operation is not hindered by the constituent elements of the tank. The level sensor can be mounted in an “emergency” / “siege” tube to secure quick attenuation of the liquid surface waves. For non-pressurized tanks, the liquid level sensor should be adjacent to the measuring opening;

5. the lower and upper reference points shall be clearly identified and marked.

(9) If the electronic level meter is equipped with a level correcting device, the latter shall be located in a manner to to obtain a reliable measurement value.

(10) For float level measurement:

1. the float shall not change its mass and volume under the influence of the measured product;

2. the pressure in the tank shall not lead to a change in the volume of the float;

3. the form of the float shall be such that it does not retain liquid, except for the liquid layer caused by capillary effects;

4. no gas or air cushion shall form under the float.

(11) Electronic level meters shall be designed and manufactured in such a way that their errors do not exceed the following maximum permissible errors:

1. ± 1 mm before mounting;

2. ± 4 mm after mounting;

3. 1 mm – the hysteresis error when changing the direction of level movement.

(12) The errors of electronic level meters shall be determined in two stages:

1. by testing under reference conditions prior to installation;

2. by comparing their readings with the measured reference level after installation.

(13) Accuracy tests prior to installation shall be performed at a minimum of 10 evenly spaced levels in a sequence of increasing from zero to a value near the upper limit of the measuring range, and decreasing from the maximum value reached in the increase to zero.

(14) To convert the measurement results from level to volume, the data processing calculator shall store the tank calibration table by level/volume value pairs for each measurement compartment, with the number and range of these value pairs shall be selected according to the actual tank geometry, and the intermediate values not included in the table shall be calculated by appropriate interpolations (extrapolation is not allowed).

(15) The tank calibration table shall be determined for each compartment of the measuring tank by volumetric, geometric, a combination of the two, and other recognized methods. Calculation of the tank calibration table solely on the basis of the construction documentation shall not be allowed.

(16) The level range in the tank calibration table shall cover all full level values existing in tank during operation.

(17) The tank calibration table shall be kept in the calculator of the level measuring systems in a manner that would prevent manipulation.

Чл. 122. (1) For level measuring systems, depending on their area of application, the following accuracy classes are defined:

1. class 0.5 – measuring systems for liquids with up to 20 mPa.s viscosity at operation temperature and measuring systems for air plane refuelling;

2. class 1.0 – measuring systems for pressurized liquefied petroleum gas (LPG) measured at a temperature greater than or equal to minus 10°C.

(2) The maximum permissible errors of the level measuring systems at type-approval, initial and subsequent verifications are:

1. ± 0.5 % for class 0.5 systems fitted to horizontal tanks, vertical cylindrical tanks or inclined cylindrical tanks;

2. ± 1.0 % for class 1.0 systems fitted to tanks other than those mentioned in point 1 or to tanks for liquefied gases under pressure.

(3) The level measuring systems shall meet the requirements of paragraph 2 at an ambient temperature of minus 25 C to 55 C. Where the calculator equipped with a display is installed in a room, the ambient temperature of the measuring device may be between 5 C and 30 C.

(4) The accuracy of the fuel temperature measurement in the tank shall be less than or equal to ± 0.5 C.

Чл. 123. (1) Level measuring systems shall be made available on the market and/or put into service after type-approval and initial verification and shall be subject to subsequent verifications.

(2) The type-approval test of the level measuring systems shall include:

1. testing of electronic automatic level meters under reference conditions prior to installation;

2. testing of electronic automatic level meters after installation of a functioning tank;

3. comparison of temperature readings with a reference thermometer at different temperatures;

4. determination of the liquid level in light petroleum product storage tanks at atmospheric pressure and the volume of liquid in the tank from the data of the calibration table and the level determined by electronic level meters in storage tanks for liquefied hydrocarbon gases under pressure.

(3) The initial and subsequent verification of the level measuring systems shall be carried out after installation and shall include:

1. checking electronic automatic level meters in the installed position on a functioning tank;

2. comparisons of temperature readings with a reference thermometer;

3. determination of the liquid level in storage tanks forb light petroleum product at atmospheric pressure and the volume of liquid in the tank from the data of the calibration table and the level determined by electronic level meters in storage tanks for liquefied hydrocarbon gases under pressure.

Section XI
Flowmeters and measuring systems for compressed natural gas.

Чл. 124. (1) A compressed natural gas flowmeter is a measuring device designed to measure continuously and to display the total quantity of natural gas flowing through the measurement transducer under the conditions of measurement. The flowmeter shall include at least a measurement transducer, a calculator and a display device.

(2) The compressed natural gas metering system shall be designed for the refuelling of motor vehicles with compressed natural gas and shall include at least a flowmeter and a transfer point.

(3) The measuring system referred to in paragraph (2) may also include auxiliary and additional devices.

(4) The auxiliary devices shall include:

1. a resetting device;
2. a repetitive indication device;
3. a printing device;
4. a storage device;
5. a price display device;
6. a summing-up display;
7. a pre-setting device;
8. a self-service device.

(5) The additional devices shall include:

1. a filter;
2. a device used as a transfer point;
3. an anti-vortex device;
4. deviations and by-passes;
5. valves, tubes and all gas pipes.

Чл. 125. (1) Where several flowmeters intended for individual measurement operations work together with common components, each flowmeter together with the common components shall form a separate measuring system.

(2) A compressed natural gas measuring system shall include only one flowmeter.

(3) The operating range of the compressed natural gas metering system shall be set by the manufacturer and defined by the following characteristics:

1. minimum quantity measured;

2. a measurement range limited by the minimum flow rate, Q_{min} and by the maximum flow rate Q_{max};

3. maximum gas pressure at the gas storage filling station, P_{st};

4. the pressure at maximum rapid filling with gaseous fuel, P_v;

5. minimum gas pressure, P_{min} if critical, and maximum gas pressure, P_{max};

6. maximum gas temperature, T_{max};

7. minimum gas temperature, T_{min};

8. class of the ambient conditions.

(4) The minimum measured quantity of the compressed natural gas metering system shall be formed from the line 1 x 10^n2 x 10n or 5 x 10^n kg, where *n* is a positive or negative integer or zero. The minimum measured volume shall meet the conditions for use of the measuring system. The measuring system shall not be used to measure volumes smaller than the minimum measured volume.

(5) The minimum measured quantity of measuring systems shall not exceed:

1. 1 kg at a maximum flow rate not exceeding 12 kg/min;
2. 2 kg at a maximum flow rate greater than 12 kg/min but not more than 30 kg/min;
3. 5 kg at a maximum flow rate greater than 30 kg/min but not more than 70 kg/min;
4. 10 kg at a maximum flow rate greater than 70 kg/min.

Чл. 126. The measuring range shall meet the conditions for the use of measuring systems. The latter shall be designed so as to guarantee a flow rate volume between the minimum and the

maximum flow rate, with the exception of the volume at the beginning and the end of the measuring, or where disruptions occur.

(2) Under operating conditions, the flow control system shall prevent charging at values lower than the minimum flow rate of the measuring system. The measuring system range shall be within the measuring range of each of its elements.

(3) The ratio between maximum and minimum flow rate shall be at least 10:1.

(4) The measuring system for compressed natural gas shall only be used to measure gas with characteristics within its operating range as specified in the type-approved certificate.

Чл. 127. (1) The measuring systems for compressed natural gas shall be equipped with a display indicating the mass of the measured quantity of gas. If the systems also have a display showing the price, the readings should guarantee that:

1. the unit price indications and the total amount payable indications relate only to the mass of the gas;

2. the price indications shall only be shown when displaying the mass.

(2) The mass shall be displayed in kg, with the agreed measuring unit appearing in the immediate vicinity of the index.

(3) The measuring system may have several devices indicating the same quantity, each of which shall meet the requirements of this section if subject to control. The scale divisions of the different readings must be the same

(4) For each measured volume related to the same measurement, the values displayed on the different devices shall not differ.

(5) It is permissible to use a single display device with more than one measuring system, provided that it does not read the readings of two or more systems simultaneously and that the reading system is clearly identified.

(6) The scale division shall be from the line $1 \times 10^n 2 \times 10^n$ or 5×10^n kg, where n is a positive or negative integer or zero. The scale division shall be equal to or less than half the deviation from the minimum specified mass.

(7) Where applicable, the requirements relating to mass readings shall also apply to price readings.

Чл. 128. (1) The measuring systems for compressed natural gas shall have a point defining the quantity of gas as delivered, called a transfer point. This point shall be located downstream of the flowmeter.

(2) Measured gas quantity shall not be allowed to deviate after the flowmeter during filling.

(3) Two or more supply transfer points may be permanently installed and operated simultaneously or consecutively, provided that no diversion of gas flow to other than the intended vessel can occur.

(4) Where only one one transfer point is used during a delivery and the point is changed after the transfer, the next delivery shall be prohibited until the display device is reset.

Чл. 129. Where there is a risk of the flow exceeding Q_{max}on delivery, flow limiting device shall be provided to the measuring system.

Чл. 130. A pressure meter shall be fitted to the compressed natural gas measuring system to check P_{max} and P_{min}.

Чл. 131. (1) The maximum permissible relative errors of the mass readings at type approval shall be equal to:

1. ± 1 % of the volume measured for the flowmeter itself, and

2. ± 1.5 % of the measured quantity for the whole measuring system.

(2) The values referred to in paragraph (1) shall be applied in the case of an initial verification carried out under laboratory conditions.

(3) The maximum permissible relative errors of the mass reading under operating conditions at the initial spot check or at a subsequent check shall be equal to ± 2 % of the measured quantity for the whole measuring system.

(4) The maximum permissible errors for the minimum quantity measured shall be twice as high as the corresponding value set out in paragraph 3.

(5) The deviation of the minimum mass determined (E_{min}) for the measuring system shall be calculated by the formula:

$E_{min} = 2 \times M_{min} \times$ MPE,

where M_{min} is the minimum quantity measured,

MPE – Maximum permissible error for the system.

(6) The deviation of the minimum mass is the absolute value of the maximum permissible error.

(7) The maximum permissible error magnitude for the whole system, expressed as absolute error, for each measured quantity shall not be less than the deviation of the minimum mass specified.

(8) The repeatability error of a flowmeter tested at constant flow for quantities equal to or greater than 1000 scale divisions of the flowmeter shall not be greater than 0,6 %.

(9) The repeatability error of the measuring system or of the flowmeter tested under variable flow conditions for quantities equal to or greater than 1000 scale divisions of the flowmeter shall not be greater than 1 %.

(10) The maximum permissible errors refer to all measured gases, temperatures and pressures and flow rates for which the system or flowmeter is approved.

(11) The measuring system or the flowmeter shall meet the requirements at the time of testing, without preliminary adjustment.

Чл. 132. The operational range of the flowmeter shall be set by the manufacturer and shall be defined by the following characteristics:

1. measuring range limited by the minimal flow rate, Q_{min}, and the maximum flow rate, Q_{max};
2. maximum gas pressure, P_{max};
3. minimum gas pressure, P_{min}, if critical;
4. where suitable, the nature and characteristics of gases subject to measuring,
5. maximum gas temperature, T_{max};
6. minimum gas temperature, T_{min},

Чл. 133. (1) Compressed natural gas flowmeters may have an adjustment device that allows the ratio between the measured and actual mass of gas passed through the flowmeter to change.

(2) Where the setting device changes the ratio discretely, the successive ratio values shall not differ by more than 0.001.

(3) No adjustment through by-passes of the flowmeter shall be allowed.

Чл. 134. (1) Compressed natural gas flowmeters may be fitted with corrective devices which are considered to be part of the flowmeter, in which case the flowmeter requirements, including those for maximum permissible errors, shall be applied to the corrected mass.

(2) During normal operation of the display, the uncorrected mass shall not be indicated.

(3) No correction of previously calculated drift shall be allowed.

Чл. 135. (1) The measuring systems for compressed natural gas shall be equipped with digital displays.

(2) The mass must be displayed continuously during measurement.

(3) The height of the digits of the display device shall be equal to or greater than 10 mm.

Чл. 136. (1) The measuring systems for compressed natural gas shall be equipped with a device for zeroing the mass reading.

(2) The zeroing device shall not allow the measurement result reported on the mass display device to be altered.

(3) Following the start of nullifying, the mass display shall not indicate a result differing from

the previous measuring, until the nullifying is over.

(4) The measuring systems shall not allow nullifying during the measuring process.

(5) Where the measuring system incorporates a price display, the latter has to be equipped with a nullifying device.

(6) The nullifying device at the price indicator, and mass indicator, shall be designed so as to make it possible for the nullifying effect in the one to automatically result in a nullifying effect in the other.

Чл. 137. (1) A measuring system with a print device shall not allow printing during measurement. The next measuring shall only be possible when the nullifying process is over. In printing, the value indicated on the display should not change.

(2) If the measuring system is designed in such a way that mass registration could take place without any actual flow rate, the device must register this apparent flow rate and compensate the measurement result for it.

(3) The table display device may be supplemented by a price indicator indicating both the unit price and the amount due.

(4) The currency used or its symbol must appear in close proximity to the indication.

(5) The selected single price shall be shown on the display before the measuring begins. It should be able to change. The change in the single price can be made either directly by the measuring system, or by a peripheral device.

(6) The indicated single price at the beginning of measuring shall be valid for the entire transaction. The new unit price can only enter into force when a new metering operation starts.

(7) When changing the price via a peripheral device, there must be a pause of at least 5 s from the moment the new unit price is displayed before the next measurement.

(8) Only errors resulting from a price round off shall be allowed. They shall refer to the smallest significant figure in the paying price.

(9) A printing device may be connected to the display, to print off the measured mass.

(10) the printed mass shall be expressed in kilograms (kg).

(11) The digits, the unit used or its symbol and the decimal point, if any, shall be printed on the note issued by the device.

(12) If the printing device is connected to more than one measuring system, it must print out the identification number of the related system.

(13) The printing device can also print out information for the related measurement such as: sequential number, date, identification of the metering system, type of gas, etc. If the printing device allows re-printing before the start of a new refill, all copies must be clearly marked. The printing device may print, in addition to the measured quantity, the price to pay or the price to pay accompanied by the unit price.

Чл. 138. (1) The measuring systems for compressed natural gas may be equipped with a storage device for storing the measurement results. The devices used to read the stored information shall be incorporated into the memorizing devices.

(2) The data shall be kept in a medium guaranteeing their integrity and protection at normal storage conditions.

(3) The memorized data may be deleted in case the memory is full, if the following conditions have been met:

1. the data shall be erased in the order in which they are entered;

2. deletion shall be performed after a special manual operation.

(4) The storage method must not allow the stored data to be altered in normal use.

Чл. 139. The measuring systems for compressed natural gas may be equipped with a pre-setting device that allows to pre-select the quantity to be measured and automatically stop the flow when the selected quantity is measured.

Чл. 140. (1) The selected volume shall be set and indicated, by a digital display, before the measuring begins.

(2) Where it is possible to observe simultaneously the digits of a pre-setting device and the readings of the mass display device, the two readings shall be clearly distinguishable.

(3) The reading of the pre-set quantity during measurement may remain unchanged or decrease to zero.

(4) The difference at the end of the measuring operation between the pre-set quantity and the quantity read by the mass display device shall not exceed the deviation from the minimum specified quantity under operating conditions.

(5) The pre-set quantity must be expressed in kilograms. This unit or its symbol (kg) shall be marked on the pre-setting device.

(6) The scale division of a pre-setting device shall be equal to the scale division of the display device.

(7) The pre-setting device may incorporate a device for immediate emergency stopping of the flow.

Чл. 141. The measuring systems for compressed natural gas with a price display device may also be equipped with a price-setting device that stops the flow when the set quantity corresponds to the pre-set price. These devices shall be subject to the requirements of Article 140.

Чл. 142. (1) The maximum permissible errors, positive or negative, of the gas quantity reading applicable to the calculator, when checked separately, are equal to 0.05 % of the true value.

(2) All parameters necessary to process the readings, such as unit price, calculation table, correction polynomial, etc., shall be inserted into the calculator at the beginning of the measurement operation. The calculator may be equipped with an interface to connect peripheral devices. The use of interface shall not affect its metrological functions.

Чл. 143. (1) Each compressed natural gas metering system shall prominently display the following information:

1. a type approval mark;

2. the manufacturer’s name or trade mark;

3. an indication chosen by the manufacturer, if appropriate;

4. serial number and year of manufacture;

5. the characteristics in accordance with Article 125(3) and Article 132;

6. the minimum or maximum gas temperatures if they differ from minus 10°C and 50°C respectively.

(2) The minimum measured quantity of the measuring system shall be clearly displayed on the front of the display device, visible to the user during the measurement.

(3) Where a measuring system can be transported without disassembly, the required marking for each component can be combined.

(4) All parts of the measuring system which cannot otherwise be protected against actions affecting the accuracy of the measurement shall be subject to sealing. The sealed devices must prevent any possibility of changing the parameters important for identifying the measuring results. Where access has not been protected by mechanical seals, electronic protection shall be secured.

Чл. 144. The expanded uncertainty in determining the errors of the mass indication shall be less than:

1. 1/5 of the maximum permissible error applicable for type-approval test;

2. 1/3 of the maximum permissible error applicable to verification.

Чл. 145. Flowmeters and measuring systems for compressed natural gas shall be made available on the market and/or put into service after type approval and initial verification and shall be subject to subsequent verifications.

Чл. 146. (1) Type-approval tests shall be carried out at the following flow rates:

1. flow rate at pressure 0 to 0.5 P_v;

2. flow rate at pressure 0.5 P_v to P_v.

(2) The initial verification of a measuring system shall be done at a stage allowing for the system to be transported without dismounting and when tested under the conditions which are going to apply to its normal use. In all other cases the testing shall be carried out in two stages.

(3) Where the initial verification is done in two stages, the first stage shall include:

1. checking that the flowmeter, including connected auxiliary devices, complies with the approved type;

2. verification of the metrological characteristics of the flowmeter together with the connected auxiliary devices.

(4) The second stage of the initial verification includes:

testing of the compatibility of the measuring system, together with the flowmeter and the auxiliary and additional devices;

2. verification of the metrological characteristics of the measuring system.

(5) An initial verification at one stage shall be carried out in accordance with paragraph (4).

(6) The subsequent verification of a measuring system shall be carried out in accordance with paragraph (4).

(7) Auxiliary devices shall be checked if security marks or seals have been breached.

(8) The initial verification and the subsequent verification of the flowmeter shall be done at the actual achievable flow rate under operating conditions.

Section XII
Gas flowmeters and volume correction devices

Чл. 147. (1) A gas flowmeter is a measuring instrument designed to measure, memorize and display the amount of gas (volume or mass) passed through it.

(2) According to their construction and measuring principle, gas flow meters can be diaphragm, rotary, turbine, thermal, ultrasonic, vortex, Coriolis and designed based on other principles and technologies.

Чл. 148. (1) A volume correction devices for the gas volume is a device that is fitted to a gas flowmeter and automatically converts the quantity measured at measurement conditions into a quantity at baseline conditions.

(2) Gas volume correction devices may be:

1. type 1 – devices with integrated temperature and pressure transducers, or temperature converters only.

2. type 2 – devices with external temperature and pressure transducers, or temperature transducers only, and a calculator.

(3) Depending on the conversion function, gas volume correction devices may be:

1. with temperature conversion (*T*-correcting devices);

2. with temperature and pressure conversion (*PT*-correcting devices);

3. with temperature, pressure and deviation from the ideal gas law conversion (*PTZ*-correcting devices).

Чл. 149. Gas flowmeters and volume correction devices shall be made available on the market and/or put into service after conformity with the essential requirements laid down in the Regulation on the essential requirements and conformity assessment of measuring instruments has been assessed and verified, and shall be subject to subsequent verifications in accordance with the provisions of this Regulation.

Чл. 150. (5) The locations where the verification markings and the seals shall be affixed shall

be so selected that the removal of the part sealed by the markings or seals shall result in their destruction.

Чл. 151. (1) The measurement errors of gas flow meters shall be expressed as a relative value by the ratio in percentage of the difference between the reported and actual volume through the meter to the actual volume through the meter.

(2) The errors relate to the measurement of air volumes with a relative density of 1.2 kg/m^3. Under normal atmospheric conditions, the ambient air in the laboratory is considered to satisfy the requirement.

(3) The maximum permissible errors shall be determined for a specific direction of flow of the gas.

Чл. 152. The measurement errors of the gas volume correction device shall be expressed in relative terms by the ratio in percentage of the difference between the reported corrected volume and the calculated corrected volume towards the calculated corrected volume.

Чл. 153. (1) Upon subsequent verification, Class 1.5 gas flow meters (including diaphragm, micro-thermal and thermal mass flow meters) shall be deemed to comply with the maximum permissible error requirements when they are met with at least the following flow rates:

1. the minimum flow rate;
2. 1/5 of the maximum flow rate;
3. the maximum flow rate.

(2) During a subsequent periodic verification of class 1 flowmeters they shall be deemed to comply with the requirements on maximum permissible errors when those are satisfied at least at the following flow rate values:

1. the minimum flow rate;
2. 2/5 of the maximum flow rate;
3. the maximum flow rate.

(3) The flow rate values referred to in paragraphs (1) and (2) must be within a range of ± 5 %.

Чл. 154. (1) During subsequent verification following repair of class 1 gas flowmeters which measure volume and volume flow rate they shall be deemed to comply with the requirements on maximum permissible errors where those are satisfied at least at the following flow rate values:

1 the minimum flow rate;
2 1/10 of the maximum flow rate;
3 1/4 of the maximum flow rate;
4 2/5 of the maximum flow rate;
5 7/10 of the maximum flow rate;
6 the maximum flow rate.

(2) The values of the flow rate referred to in paragraph 1 shall be within the range of ± 5 %.

Чл. 155. (1) During the subsequent verification of type 1 gas volume correction devices, the errors shall be determined in the following points:

1. for *T*-correcting devices: T_{min} , $(T_{min} + T_{max})/2$ and T_{max}, where T_{min} and T_{max} are respectively the lower and upper limits of temperature measurement of the correction device;

2. for *PT*-correcting devices and *PTZ*-correcting devices: T_{min} and P_{max}; $(T_{min} + T_{max})/2$ and $(P_{min} + P_{max})/2$; and T_{max} and $P_{min}$where T_{min} and T_{max} are respectively the lower and upper limits of measurement of the temperature of the correction device, and P_{min} and P_{max} are the lower and upper pressure measurement limits of the correction device. When the manufacturer's specified lower measurement limit, P_{min}, of the pressure transducer is less than the ambient pressure, then the error check in P_{min} and T_{max} shall be performed at the ambient pressure.

(2) During the subsequent verification of type 2 gas volume correction devices, the errors shall

be determined separately for:

1. the calculator – at the points set out in paragraph (1), and the temperature, pressure and volume indications shall be simulated;

2. the temperature transducer – at three points, respectively: T_{min}, 0 C, and T_{max}, depending on the scope of the correction device;

3. the pressure sensor – at three points, respectively: P_{min}, $(P_{min} + P_{max})/2$ and P_{max}, whereas for transducers for absolute pressure with $P_{min} = 0$ bar the first point of inspection P_1shall be equal to the ambient pressure, the second shall be $(P_{min} + P_{max})/2$ and the third shall be P_{max}, depending on to the scope of the correction device.

(3) In order to restrict access to structural components of gas volume correcting devices, inspection marks shall be affixed to those which have passed the post-inspection and, after installation, in accordance with the approved type certificate or EC type-examination certificate. If the person carrying out the verification cannot restrict access immediately after the verification, the verification markings shall be affixed after the installation of the device at the place of use.

Чл. 156. (1) For subsequent verification of gas flowmeters showing volume or mass, the maximum permissible errors shall be:

1. for accuracy class 1.5: ± 3 % in the range of Q_{min} to Q_t and ± 1.5 % in the range of Q_t (inclusive) to Q_{max};

2. for accuracy class 1.0: ± 2 % in the range of Q_{min} to Q_t and ± 1 % in the range of Q_t (inclusive) to Q_{max}.

(2) In the case of gas flowmeters incorporating a volume conversion device and showing the volume only under baseline conditions, the maximum permissible errors referred to in paragraph 1 shall be increased by 0.5 % within the temperature range of (t_{SP} — 15) °C to (t_{SP} + 15) °C, where t_{sp} is the specific temperature specified by the manufacturer in the range from 15 °C to 25 °C. Outside this temperature range, an additional increase in the maximum permissible error of 0,5 % for every 10 °C shall be allowed.

(3) For subsequent verification following the repair of gas flowmeters, the weighted average errors shall be within the following limits:

1. for accuracy class 1.5: ± 0.6%;

2. for accuracy class 1.0: ± 0.4%.

Чл. 157. The maximum permissible errors of the volume correction devices when checked are:

1. a) 0.5 % at ambient temperature of 20 °C ± 3 °C, ambient humidity 60 % RH ± 15 % RH, nominal value of electricity supply voltage.

2. 0.7 % for *T*-correcting devices under operating conditions.

3. 1.0 % for other correcting devices under operating conditions.

Чл. 158. The error of the gas flowmeter shall not be taken into account when determining the maximum permissible errors of the correction devices.

Чл. 159. (1) The period of validity of the subsequent inspection of a batch of gas flowmeters intended for domestic, commercial and use in the light industry may be extended if the conditions for applying the statistical control method have been met and the criteria set out in Annex 2 have been achieved when a sample of the batch was checked.

(2) The statistical control method may be applied, if the period of validity of the preceding inspection of the gas flowmeters has not expired and the gas flowmeters may be grouped into batches.

(3) Gas flowmeters may be grouped into a batches when:

1. they have the same: manufacturer, type or modification or extension of type according to the EU-type/design examination certificate;

2. the year of manufacture of the measuring devices does not differ by more than one year;

3. they are used under the same operating and environmental conditions;

4. the date of the previous inspection of all measurement equipment differs by no more than

one year.

(4) When disassembling and transporting the gas flowmeters from the sample batch, adequate organizational and technical steps shall be taken to prevent any act that may result in changes in their technical and metrological characteristics. Notwithstanding the size of the sample group, the period for disassembly and transportation must be as short as possible and not exceed one month.

(5) The gas meters from the sample group shall be blown with air or inert gas and the entry and exit points must be sealed immediately after their disassembly."

Чл. 160. The flow values for determining the maximum permissible error of the gas meters and the gas volume correction devices of an approved type and the maximum permissible errors are set out in Annex 16.

Section XIII
Natural gas or steam measuring instruments operating with a standardised constricting device – an orifice

Чл. 161. Measuring instruments for natural gas or steam, which operate with a standardised constricting device, the orifice, measure the flow rate of natural gas or steam in a closed pipeline with a circular section.

Чл. 162. The requirements under this section refer to:

1. variable pressure flowmeters designed on the basis of the principle of measuring the pressure difference before and after a standardised constricting device – the orifice, with a concentric opening, inserted using a defined method into circular pipelines with defined geometrical parameters;

2. temperature transducers that convert the measured temperature into a standardised analogue or digital output signal, designed to measure the temperature of natural gas or steam;

3. pressure transducers that convert the measured pressure into a standardised analogue or digital output signal, designed to measure the pressure of natural gas or steam;

4. a calculator designed to provide information on the amount of flow through a flowmeter with a standardised constricting device – orifice, for natural gas or steam, by automatically processing the signals received from the individual pressure, differential pressure, barometric pressure and temperature sensors.

Чл. 163. Variable pressure flowmeters measure the flow rate of natural gas or steam flowing through a primary measuring converter, which is a standardised constricting device – an orifice, in a closed pipeline with a circular section under measurement conditions.

Чл. 164. The basic design of variable pressure flowmeters consists of a standardised constricting device – a concentric-hole orifice, differential pressure leads stabilising a straight section of a tube of an overall length of up to 10 D before the orifice and stabilising straight section of a tube of an overall length of 2 D after the orifice.

Чл. 165. The main characteristics of variable pressure flowmeters are:

1. the ratio of the orifice diameter to the inside diameter of the tube before the orifice $\beta = d/D$;

2. the Reynolds number Re_D – dimensionless unit, expressing the relationship between inertia and friction forces in the tube before the orifice;

3. flow rate coefficient C, defined for the natural gas or steam stream, which indicates the ratio of the actual flow through the concentric opening of the orifice to the theoretical flow;

4. the expansion coefficient ε which takes into account the compressibility of natural gas or steam.

Чл. 166. Variable pressure flowmeters shall be used to measure constant or very slowly time-varying flow rate without pulsations, within the following limits:

1. tube internal diameter D from 50 mm to 1,000 mm;

2. hole diameter $d \geq 12.5$ mm;

3. ratio β of the diameters from 0.1 to 0.75.

Чл. 167. The orifice is a primary measuring sensor consisting of a thin circular plate with a concentric round hole characterised by:

1. a front side, denoted by capital letter A, the side of the orifice mounted against the direction of flow, to which there are higher quality requirements;

2. a rear side, denoted by capital letter B, the side of the orifice mounted in the direction of flow, to which there are lower quality requirements and a space for marking;

3. orifice thickness E;

4. concentric hole – round hole of a thickness e, concentric on the circular orifice;

5. bevelling angle α of the concentric hole;

6. front edge G and rear edge H of the round hole with thickness e of the orifice;

7. rear edge I of the orifice at which the thickness E is greater than the thickness of the circular hole e.

Чл. 168. (1) Differential pressure outlets may be separate cylindrical openings or ring holes that can be made directly into the wall of the tube, in flanges or in a support ring.

(2) Angle pressure leads and distance leads D and $D/2$ to be used for $0.10 \leq \beta \leq 0.56$ and $Re_D \geq 5{,}000$ or for $0.56 < \beta \leq 0.75$ and $Re_D \geq 16{,}000\beta^2$.

(3) Flanged pressure terminals are used for $Re_D \geq 5{,}000$ and $Re_D \geq 170\beta^2 D$, where D is in mm.

Чл. 169. Variable pressure flowmeters and their design shall comply with the requirements of BDS EN ISO 5167-1 and BDS EN ISO 5167-2.

Чл. 170. Flowmeters with variable pressure drop shall be designed and manufactured from materials resistant to corrosion and the effects of the various gases or vapours normally transported or imported by some of their condensates during the period intended for their use.

Чл. 171. (1) Variable pressure drop flowmeters shall be so designed, manufactured and installed as to protect the metrological characteristics and to prevent alterations without breaking inspection marks or protective seals.

(2) The design of flowmeters with variable pressure drop shall provide:

1. locations for the markings of metrological control;

2. protecting the orifice from unauthorised disassembly or alteration.

Чл. 172. (1) The design of the orifice and the intended method of assembly shall enable periodic inspection and verification of the conformity of the orifice with the requirements of this section.

(2) The mounting position of the orifice shall be clearly defined by its design or shall be schematically marked directly on the orifice.

Чл. 173. The orifice shall be made of a material resistant to corrosion and erosion with respect to the natural gas or vapour flowing, of which the coefficient of temperature expansion in the operating range of natural gas or steam temperature is known.

Чл. 174. (1) The orifice shall be designed and mounted in such a way that it is not subjected to plastic or elastic deformation caused by the drop of pressure of the natural gas or vapour flowing, or such deformation is negligible.

(2) The orifice shall be so designed as not to distort the plane of the front side A when the orifice is mounted in the tube and the differential pressure is zero.

Чл. 175. The orifice requirements apply only to the parts installed in the pipe.

Чл. 176. The part of the orifice with diameter D which is inside the tube shall be circular and centred on the axis of the tube, and the front and rear sides of the orifice shall be parallel.

Чл. 177. The maximum deviation of the plane of the front side A of the orifice shall be less than $0.005\ (D-d)/2$, i.e. the slope of the plane of the front side A of the orifice shall be less than 0.5 %.

Чл. 178. The roughness of the front side A of the orifice in the part with diameter D centred in relation to the diameter d of the orifice opening must be $R_\alpha < 10\text{-}4d$.

Чл. 179. The rear side B of the orifice shall be flat and parallel to the front side A of the orifice.

The roughness of the rear side B of the orifice need not meet the requirements for roughness on the front side A of the orifice.

Чл. 180. (1) The thickness of the hole *e* on the orifice must be between 0.005 *D* and 0.02 *D*.

(2) Maximum deviation of the values of *e* measured at any point on the orifice, shall not exceed 0.001 *D*.

Чл. 181. (1) The thickness *E* on the orifice must be within the boundaries between *e* and 0.05*D*. Where the part of the orifice diameter *D* inside the tube, is in the range 50 mm ≤ *D* ≤ 64 mm, thickness allowed is *E* ≤ 3.2 mm.

(2) The maximum deviation of the values of *E* measured at any point on the diameter part of the orifice *D* inside the tube shall be:

1. 0.001*D* at *D* ≥ 200 mm;

2. 0.2 mm at *D*<200 mm.

Чл. 182. Where the thickness *E* of the orifice is greater than the thickness of the concentric hole *e,* the concentric hole on the rear side B of the orifice shall be bevelled with a smooth finished surface and the angle of bevelling α must be equal to $45° \pm 15°$.

Чл. 183. The leading edge G of the circular hole of the orifice shall be sharp, with straight angles and a radius of curvature not exceeding 0.0004*d* free of roughness or other damage. The angle between the whole with thickness *e* and the front side A of the orifice must be $90° \pm 0{,}3°$.

Чл. 184. The rear edges of the orifice may not meet the quality requirements for the front edge.

Чл. 185. The actual diameter *D* of the hole of the orifice is defined as the arithmetic mean of the results measured in at least four equally spaced diametrical directions and shall be greater than or equal to 12.5 mm and the ratio β must be greater than or equal to 0.1 and less than or equal to 0.75.

Чл. 186. The orifice opening of a length *e* shall be cylindrical and the diameter measured at the rear edge of the opening must not differ from the actual diameter *d* by more than 0.05 %.

Чл. 187. The roughness of the surface of the cylindrical part of the hole of the orifice with a length *e* shall be such that it does not affect the measurement of the sharpness of the leading edge G of the orifice.

Чл. 188. The technical and metrological requirements for the front side A of the orifice shall apply to both sides of the orifices which are designed, manufactured and used to measure the flow rate of natural gas or vapour in both directions.

Чл. 189. Variable pressure flowmeters shall be designed, manufactured and installed with differential pressure terminals, which may be at a distance *D* and *D*/2, angled or flanged terminals.

Чл. 190. Variable pressure flowmeters in which the orifice measures the flow rate of natural gas or steam in both directions and the outlets for differential pressure are at a distance *D* and *D*/2, there must be two pairs of these terminals located before and after the orifice.

Чл. 191. Variable pressure flowmeters may be used with one orifice and more than one set of differential pressure terminals. In this case, the differential pressure outlets on each side of the orifice shall be positioned in such a way as to avoid their reciprocal influence by moving them at an angle of at least 30°.

Чл. 192. The minimum length of the straight stabilisation sections of the tube before and after the orifice shall be determined by the diameter ratio value β, the type and manner of deployment of fittings and pipeline elements.

Чл. 193. (1) The straight section of the tube situated between the first element before the orifice and the orifice may be made up of one or more parts.

(2) The part of the tube at length 2D before the orifice should always be made from one tube.

(3) The design and manufacture of straight sections of a pipe shall permit verification of the geometrical parameters of the straight stabilisation sections.

Чл. 194. (1) Stabilisation sections must be straight.

(2) Stabilizing straight sections are considered straight when the deviation of the straight section from a straight line running parallel to the axis of the pipeline is less than or equal to 0.4% of the length of the straight section before and after the orifice.

(3) In the straight section of the pipeline there may be discharge openings and/or aeration openings for the removal of solid sludge and fluids, which shall be closed during the measurement.

Чл. 195. (1) The shape of the inner part of the straight stabilisation sections shall be circular over their entire length.

(2) Internal diameter *D* on the straight section is defined as the arithmetic mean of the values of at least twelve measured diameters, four diameters placed approximately at the same angles to one another in at least three cross sections, which must be evenly distributed over a length of 0.5*D* before the orifice.

(3) Two of these cross-sections shall lie in the plane of the front pressure terminal and at a distance of 0.5*D* from the front pressure outlet.

(4) In cases where at distance 0.5*D* before the front pressure socket there is a welded joint, the third cross-section must pass just through this welded joint.

Чл. 196. (1) Deviation of inside diameter *D* from its mean value, in any cross section of the straight section at distance 2*D* before the orifice must be less than or equal to 0.3 %.

(2) Where the straight section of a pipeline situated between the first element before the orifice and the orifice consists of more than one part, the difference between the inside diameters of two parts along the straight section at a distance of 2*D* up to 10*D* must be less than or equal to 0.3 % of the mean value of the inner diameter *D*.

(3) Where the straight section situated between the first element before the orifice and the orifice consists of more than one part, the displacement caused by bias and/or diameter difference *D* on the internal diameters of any two parts of the straight section connected to each other shall be less than or equal to 0.3 % of the mean value of the internal diameter *D*.

Чл. 197. Deviation of inside diameter *D* on a straight section at a distance of at least 2*D* after the orifice must be less than or equal to 3 % of the mean value of the inner diameter *D*.

Чл. 198. (1) The inner surface of the straight stabilisation areas shall be clean and free from visible defects.

(2) Roughness profile R_a on the inner surface of straight sections is defined as the arithmetic mean of at least four values of the roughness profile measured, approximately in the same cross sections as the measurements taken to determine the internal diameter *D* on the tube.

(3) Arithmetic mean of the roughness profile R_a must be such that the ratio $10^4 R_a/D$ to be less than the maximum value specified in Table 1 of BDS EN ISO 2-5167 and greater than the minimum value specified in Table 2 of that standard.

Чл. 199. (1) Variable pressure flowmeters shall bear the following inscriptions, markings and indications:

1. the manufacturer’s name or trade name;
2. type of design;
3. identification number and year of production;
4. inner diameter value D_{20} on the straight stabilisation section, at a temperature of 20°C;
5. direction of flow;
6. design pressure *PN*;
7. type approval marking.

(2) The type approval marking shall be affixed to all the separate essential parts of the variable pressure flowmeter.

(3) The type approval marking shall be affixed to all individual parts of the straight stabilisation section before the orifice, where the straight section situated between the first element before the orifice

and the orifice consists of more than one part.

Чл. 200. The orifice must be marked with:

1. identification number;

2. inner diameter value d_{20} at the orifice at a temperature of 20 C;

3. direction of flow;

4. an indication of the orifice material.

Чл. 201. Variable pressure flowmeters shall be made available on the market and/or put into service after type-approval and initial verification and shall be subject to subsequent verifications.

Чл. 202. (1) The type-approval test shall include:

1. verification of the conformity of the metrological and technical characteristics specified by the manufacturer in the technical documentation with the technical and metrological requirements set out in this Section;

2. verification of geometrical parameters.

(2) The ambient temperature during the orifice test must be in the range of 18 C to 22°C and the ambient temperature variation shall not exceed 2 C.

(3) The ambient temperature during the test of the straight stabilisation sections shall be:

1. within the range of 15 C to 25 C, the ambient temperature change may not exceed 2 C for pipes less than or equal to *DN* 300;

2. in the range of 10 C to 30 C, the ambient temperature variation may not exceed 5 C for pipelines greater than *DN* 300.

Чл. 203. (1) The verification of geometrical parameters for type approval testing shall include:

1. verification of the orifice geometrical parameters:

(a) determination of the inside diameter d_{20} at the orifice opening at 20°C;

(b) flatness of the front side A of the orifice;

(c) the surface roughness of the front side A of the orifice;

(d) thickness *e* at the orifice opening and thickness *E* of the orifice;

(e) bevelling angle;

(f) the forward edge of the orifice;

(g) cylindricity of the orifice opening;

(h) roughness of the surface of the orifice;

2. verification of the geometrical parameters of the straight stabilisation sections:

(a) determination of the inside diameter D_{20} at the orifice opening at 20 C;

(b) the straightness of the straight section;

(c) average value of the internal diameter *D* of the straight section;

(d) roughness of the inner surface of the straight section of the pipeline.

3. verification of the geometrical parameters of differential pressure outlet for compliance with the manufacturer’s design and technical specification.

(2) The tests referred to in paragraph 1(1) for orifices intended to measure the flow in both directions shall be carried out on both sides of the orifice.

(3) The tests referred to in paragraph 1(2) for straight stabilisation sections for variable pressure flowmeters intended to measure the flow in both directions shall be carried out on straight sections located before and after the orifice.

Чл. 204. (1) The initial verification of variable pressure flowmeters shall include:

1. visual on-site inspection;

2. verification of metrological characteristics.

(2) The visual inspection shall verify the conformity of the design, markings and indications to those specified in the type-approval certificate.

(3) Verification of metrological characteristics shall include verification of the geometrical parameters of the orifice, of the straight stabilisation sections before and after the orifice and of the

differential pressure outlet for compliance with those defined in the manufacturer's technical documentation and in the type approved certificate.

(4) The initial verification of the orifice geometrical parameters shall include:

1. determination of the inner diameter d_{20} at the orifice opening at a temperature of 20 C, whereas the established value of the inner diameter d_{20} must be legibly and indelibly marked in the prescribed space on the orifice;

2. the flatness of the front side of the orifice;

3. the surface roughness of the front side of the orifice;

4. the thickness of the orifice opening and the thickness of the orifice;

5. bevelling angle;

6. the forward edge of the orifice;

7. cylindricity of the orifice opening.

(5) The initial verification referred to in paragraph 4 for orifices intended to measure the flow in both directions shall be carried out on both sides of the orifice.

(6) The initial verification of the geometrical parameters of the stabilisation straight sections shall include:

1. determination of inner diameter D_{20} at a temperature of 20°C, whereas the established internal diameter D_{20} shall be marked in the space provided on the variable pressure drop flowmeter in a legible and indelible manner;

2. the straightness of the straight section;

3. cylindricity and roundness of the straight section;

4. roughness of the inner surface of the straight section.

(7) The initial verification referred to in paragraph 6 for straight stabilisation sections for variable pressure flowmeters intended to measure the flow in both directions shall be carried out on straight sections located before and after the orifice.

(8) The initial verification of the geometrical parameters of differential pressure terminals shall include verification of compliance with the manufacturer's design and technical specification and with the type-approval certificate.

Чл. 205. (1) The subsequent verification of variable pressure flowmeters shall include:

1. verification of the inner diameter of the orifice opening;

2. verification of orifice geometrical parameters – flatness of the front side, surface roughness of the front side of the orifice, leading edge of the orifice.

(2) Subsequent verification of the straight stabilisation sections shall not be carried out.

Чл. 206. (1) The relative uncertainty of the flow coefficient C, irrespective of the type of differential pressure terminals and in compliance with all technical and installation requirements, shall be within the following limits:

1. (0.7-β)% where $0,1 \le \beta \le 0,2$;

2. 0.5 % where $0,2 \le \beta \le 0,6$;

3. (1.667β-0.5)% where $0,6 \le \beta \le 0,75$.

(2) In circumstances where D<71.12 mm, the relative uncertainty values in paragraph 1 shall be added to the uncertainty value calculated according to the formula $0,9(0,75-\beta)\cdot(2,8-D/25,4)$ % where D is in mm.

(3) Where $\beta > 0,5$ and $R_{e_D} < 10000$, 0.5 % shall be added to the relative uncertainty values referred to in paragraph 1.

Чл. 207. Relative uncertainty of the expansion factor ε subject to compliance with all

technical and installation requirements, the formula $3{,}5^{\frac{\Delta p}{k p_1}}$ where k is the adiabatic exponent, Δp is the differential pressure, and p_1 is the absolute static pressure of natural gas or steam.

Чл. 208. (1) The pressure shall be measured through a single circular cylindrical opening:

(2) The centreline of the hole shall intersect the centreline of the pipeline at an angle of $90° \pm 3°$.

(3) The hole diameter of the pressure measuring terminals shall be within the range of 0.13*D* to 13 mm.

(4) The holes for measuring differential pressure on the front and rear sides of the orifice shall have equal diameters.

Чл. 209. (1) The pressure shall be measured with a pressure transducer with an accuracy of less than or equal to 0.2 %.

(2) Natural gas pressure measurements may be made with absolute pressure transducers or relative pressure sensors.

Чл. 210. (1) In cases where a relative pressure transducer is used to measure pressure, the barometric pressure shall be measured at the location of the flowmeter with a barometric pressure transducer having an accuracy of less than or equal to 0,2 %.

(2) Barometric pressure may be assumed to be constant when the deviation from current values of absolute pressure caused by a change in barometric pressure does not exceed 0.5 %.

Чл. 211. (1) The pressure drop shall be measured with a differential pressure transducer with an accuracy of less than or equal to 0.2 %:

1. at angular terminals for differential pressure – as the difference between the static pressures, taken immediately adjacent to the plane of the orifice, at the angles formed between this plane and the wall of the straight section of pipeline;

2. in the case of differential pressure flanged terminals – as the difference between static pressures taken at a distance l_1 and l_2 before and after the orifice.

(2) Distances l_1 and l_2 are respectively:

1. 25.4 mm ± 0.5 mm, where $\beta > 0.6$ and $D < 150$ mm;

2. 25.4 mm ± 1 mm for all other cases, i.e. $\beta \leq 0.6$ or $\beta > 0.6$ but 150 mm $\leq D \leq$ 1,000 mm.

Чл. 212. The drop of pressure at angular outlets for differential pressure shall be measured through separate cylindrical holes or through ring chambers, each of which is connected to the interior of the pipeline by an annular hole or a group of holes evenly distributed around the circumference.

Чл. 213. (1) The temperature measurement shall be carried out on a straight line section of the line before or after the orifice with a Class A temperature transducer.

(2) The location of the temperature converter or of the safety shield, if any, shall be determined in such a way as to minimise the flow movement.

(3) The dipping depth of the temperature converter or its thick shall be 0.3 *D* up to 0.7 *D*.

Чл. 214. The calculator shall automatically calculate the values of the flow parameters as well as the flow values in accordance with the requirements of BDS EN ISO 5167-1 and BDS EN ISO 5167-2.

Чл. 215. (1) The calculator shall ensure stability and preservation of the technical and metrological characteristics for the period for intended use and in accordance with the manufacturer's instructions.

(2) The design of the calculator shall provide a degree of protection against ingress of solids and liquids specified by the manufacturer according to the prescribed operating conditions.

(3) The calculator shall be designed and manufactured in such a way as to protect metrological characteristics and to prevent alterations without infringing the inspection marks or protective seals.

(4) The calculator shall provide:

1. protection against any foreseeable misuse;

2. locations for the markings from metrological control;

3. the possibility to check the compliance of the calculator with the requirements of this section and with the type-approved certificate.

Чл. 216. (1) The calculator shall be equipped with a display that shows, not necessarily simultaneously, the instantaneous values of the input quantities, the measured or calculated quantities, the instantaneous values, the integrated values of the consumption, energy and/or heat output unit of each quantity or parameter, and indications of the emergency signals.

(2) The calculator shall be capable of converting signals from the associated pressure and temperature sensors as well as from other measuring instruments and additional devices specified by the manufacturer.

(3) The calculator shall be able to read measured and calculated parameter values and configure through serial interface channels.

(4) The calculator, when used for natural gas, shall be capable of obtaining the measured values of calorific value, density or relative density, natural gas composition and other parameters necessary for the calculation by means of frequency input channels, analogue input channels or serial interface, depending on the measurement and calculation functions of the calculator specified by the manufacturer.

Чл. 217. (1) The calculator shall perform diagnostics on the connection to the temperature, pressure and differential pressure sensors as well as on the limits of the input values.

(2) The calculator shall archive events and, where the calculator operates outside the configured limits of the input values, it shall continue to calculate with nominal values.

(3) The nominal values shall be capable of being introduced into the calculator configuration.

Чл. 218. The calculator shall, under prescribed operating conditions and in the absence of interference, have a measurement error less than or equal to the value of the maximum permissible error.

Чл. 219. The climatic, mechanical and electromagnetic conditions of the environment in which the calculator, power supply and other accuracy influences are intended to be used shall be determined by the manufacturer.

Чл. 220. (1) The metrological characteristics of the calculator shall not be affected by the connection of other measuring instruments or other auxiliary devices to the calculator.

(2) The calculator software, which is decisive for the metrological characteristics, must be identified and its protection provided for, including measures providing evidence of possible interference.

(3) The calculator shall archive and store configuration data, measurement results and calculations made, information on the presence of events or interference leading to the modification of data affecting the result of the measurement and calculations.

Чл. 221. (1) The calculator shall display all necessary configuration and measurement data.

(2) The calculator shall be capable of transmitting the measurement data, calculations made and/or measurement results, with measures to protect the information transmitted.

(3) The calculator shall control, detect and display, by means of an alarm or other means specified by the manufacturer, when operating outside the manufacturer’s specified operating range of parameters relevant to the accuracy of the measurement.

Чл. 222. The calculator shall bear the following inscriptions, markings and indications:

1. the manufacturer’s name or trade name;

2. the type identification;

3. identification number and year of production;

4. a type approval marking;

5. ambient class temperatures in the form of: $t_{amb,max}$ = …°C; $t_{amb,\ min}$ = …°C;

6. classification of the danger zone for the calculator, if applicable;

7. power supply voltage;

8. the degree of protection against penetration of solids and liquids;

9. information on additional functions, where applicable.

Чл. 223. Calculators shall be made available on the market and/or put into service after type-approval and initial verification and shall be subject to subsequent verifications.

Чл. 224. The type-approval test shall include verification of the conformity of the metrological and technical characteristics specified by the manufacturer in the technical documentation with the technical and metrological requirements for the calculator set out in this section.

Чл. 225. (1) The maximum permissible errors of the calculator at initial verification shall be 0.2 %.

(2) The maximum permissible errors of the calculator for subsequent verifications shall be 0.3 %.

Чл. 226. (1) During initial and subsequent verifications of the calculator, the errors shall be determined by simulating temperature, pressure and differential pressure signals on the inlet channels at the following points:

1. T_{min}; $0.3\Delta P_{min}$ and $P_{operat.}$;

2. T=0°C; $0.7\Delta P_{max}$ and $P_{operat.}$;

3. T_{max}. ΔP_{max} and $P_{operat.}$.

(2) The verification of the calculator shall be carried out after an examination of the orifice and shall include:

1. check of the channel by temperature at three points in the temperature range entered in the calculator configuration;

2. check of the channel by pressure at three points of the pressure range;

3. check of the channel by differential pressure at three points of the differential pressure range.

(3) The maximum permissible errors on the channel by temperature, by pressure and by differential pressure shall be less than or equal to 0.1%.

(4) The subsequent verification of the calculator shall be carried out at the places of use, within the limits of the influencing factors defined in this section and the verification methodology.

Чл. 227. For natural gas or steam temperature measurement, platinum resistance thermometers shall be used without or with a transmitter that converts the temperature to a uniform electrical output signal from 4 mA to 20 mA and/or a digital signal standard HART or MODBUS protocols with RS232/RS485 interface, used alone or as parts of a measuring instrument (temperature sensors).

Чл. 228. The sensing element of temperature sensors is a resistor in the form of a metal wire or thin film with leads for connection to the connecting wires, which responds to a change in temperature by a change in resistance and for which the dependence of electrical resistance on temperature is known.

(2) Platinum temperature transducer is a converter in which platinum is used as a sensing element.

Чл. 229. The protective housing is a part of the temperature transmitter design intended to protect the sensing element and internal wiring from damage, which may terminate with a head, splice or cable.

Чл. 230. Temperature transducers shall meet the requirements for class A according to BS EN IEC 60751: 2022 and are characterised by:

1. nominal resistance $R_o[\Omega]$ – the resistance at 0˚C specified by the manufacturer of the temperature sensor, rounded as an integer, indicated in its marking.

2. measurement range – the temperature range at which the specified temperature dependence of resistance is met.

3. the lower limit of the measurement range – the lowest temperature at which the specified

value of the maximum permissible error of the temperature sensor is guaranteed.

4. the upper limit of the measurement range – the highest temperature at which the specified value of the maximum permissible error of the temperature transducer is guaranteed.

3. operating temperature range – a temperature range within or equal to the measurement range within which the temperature transducers meet the stability requirements and the technical and metrological characteristics specified by the manufacturer in the technical documentation.

4. the nominal temperature – the temperature at which the temperature sensor is used and at which the manufacturer has specified the period of use.

5. immersion length – the maximum possible depth of immersion in the measured medium at a temperature equal to the upper limit of the operating temperature range at which the performance of the temperature sensor is not impaired.

6. minimum depth of immersion – the depth of immersion in a medium of uniformly distributed temperature at which on further immersion the measured temperature values do not change more than 1/5 of the tolerance, as the resistance remains within the tolerance.

7. nominal static characteristic – the dependence of resistance on temperature, calculated with a specific value of nominal resistance R_0 .

8. temperature coefficient $\alpha, °C^{-1}$ – coefficient determined according to the formula in Annex 17

9. tolerance/tolerance class – the maximum allowable deviation from the nominal static characteristic, expressed in ˚C.

10. the relationship between resistance and temperature is expressed by the platinum temperature transducer formula and temperature coefficient $\alpha = 0,00385 °C^{-1}$ under Annex 18

Чл. 231. (1) The design of the temperature sensors shall provide protection against corrosion, moisture penetration and against mechanical and thermal effects.

(2) Temperature sensors shall be designed in such a way that their nominal resistance at 0 °C is 100 Ω.

Чл. 232. (1) The material of which the protective housing is made shall not be aggressive to platinum, retain its mechanical stability also at the upper limit of a measuring range at which the manufacturer has determined the use of the temperature converter.

(2) The protective housing shall withstand a pressure of 3.5 MPa.

(3) The resistance of the electrical insulation between the sensor and the protective housing at the highest nominal temperature shall be respectively:

1. 100 MΩ at a temperature of 15˚C to 25˚C and at a voltage of 100 V DC;
2. 10 MΩ at a temperature of 100˚C to 300˚C and at a voltage of 10 V DC;
3. 2 MΩ at a temperature of 301˚C to 500˚C and at a voltage of 10 V DC;
4. 0.5 MΩ at a temperature of 501˚C to 850˚C and at a voltage of 10 V DC

(4) The design of the temperature transducers shall be capable of being used in DC or AC supply at a frequency of up to 500 Hz.

(5) Temperature converters shall be designed with a four-wire connection circuit and shall be used in accordance with the connection method specified by the manufacturer.

Чл. 233. (1) The design of the temperature transducers shall provide a degree of protection against ingress of solids and liquids specified by the manufacturer according to the specified operating conditions.

(2) Temperature transducers must be designed and manufactured in such a way as to protect metrological characteristics.

(3) The design of the temperature transducers shall provide:

1. protection against any foreseeable misuse;

2. locations for the markings from metrological control;

3. the possibility of checking the conformity of temperature transducers with the requirements of this section and with the type-approval certificate.

Чл. 234. Temperature converters shall bear the following inscriptions, markings and signs:

1. the manufacturer’s name or trade name;

2. the type identification;

3. identification number and year of production;

4. a type approval mark;

5. probe type;

6. measurement range;

7. nominal resistance R_0 ;

8. class A;

9. hazard zone classification for the temperature transducer, if applicable.

Чл. 235. Temperature sensors for measuring the temperature of natural gas or steam shall be made available on the market and/or put into service after type approval and initial verification and shall be subject to subsequent verifications.

Чл. 236. (1) The type-approval test shall include verification of the conformity of the metrological and technical characteristics specified by the manufacturer in the technical documentation with the technical and metrological requirements for temperature sensors set out in this section.

(2) A subsequent verification may be carried out in the premises of the places of use, after dismantling, in accordance with the verification methodologies.

Чл. 237. (1) The maximum tolerances of temperature sensors for class A according to BDS EN IEC 60 751 shall be equal to $0,15+0.002\cdot|t|$ where $|t|$ is the absolute value of the temperature in ˚C.

(2) For initial and subsequent verification of temperature transducers, the errors shall be determined at three points of the measurement range, respectively: T_{min}, 0°C, and T_{max}.

Чл. 238. (1) Pressure transducers shall be used to measure the pressure of natural gas or steam either alone or as parts of a measuring instrument.

(2) For the purposes of this section, a pressure sensor is a pressure measurement device that measures and continuously converts pressure to a uniform 4-20 mA electrical output signal and/or a digital signal standard HART or MODBUS protocols with RS232/RS485 interface.

(3) Pressure converters are absolute/barometric pressure transducers, differential pressure transducers and relative pressure transducers.

Чл. 239. (1) The design and constituent elements of pressure transducers specified by the manufacturer shall ensure stability and preservation of technical and metrological characteristics for the period for the intended use and in accordance with the manufacturer's instructions with respect to strength and integrity of the measuring chambers, dielectric strength and resistance to insulation, overload, resistance to shock and vibration, climatic and other conditions.

(2) The design of pressure sensors shall provide protection against corrosion, moisture penetration and against mechanical and thermal effects.

(3) The design of the pressure sensors shall provide a degree of protection against ingress of solids and liquids specified by the manufacturer according to the specified operating conditions.

(4) Pressure sensors must be designed and manufactured in such a way as to protect metrological characteristics.

(5) The design of pressure sensors shall provide:

1. protection against any foreseeable misuse;

2. locations for the markings of metrological control;

3. the possibility of checking the conformity of pressure sensors with the requirements of this section and with the type-approval certificate.

Чл. 240. The climatic, mechanical, and electromagnetic ambient conditions under which the pressure sensors are intended to be used, the power supply, and other variables affecting accuracy shall be determined by the manufacturer.

Чл. 241. (1) Pressure sensors shall display the measured values directly or remotely and may be analogue or digital.

(2) Information on measured values may be taken from the pressure sensor itself as well as from the display of the calculator.

(3) Pressure sensors may have one or more measuring channels.

Чл. 242. Pressure sensors shall bear the following inscriptions, markings and signs:

1. the manufacturer's name or trade name;
2. the type identification;
3. identification number and year of production;
4. a type approval marking;
5. the type of pressure to be measured;
6. the measurement range including the unit of measurement;
7. the output signal range;
8. maximum working pressure;
9. power supply data;
10. classification of the danger zone for the pressure sensor, if applicable;
11. other symbols and indications relating to the use of the pressure sensor.

Чл. 243. Pressure sensors shall be made available on the market and/or put into service after type-approval and initial verification and shall be subject to subsequent verifications.

Чл. 244. (1) During the type examination of the pressure sensor, compliance with the requirements of this section shall be established.

(2) For initial and subsequent verification of pressure sensors, the errors shall be determined at three points of the measurement range, respectively P_{min}, $(P_{min} + P_{max})/2$ and P_{max}.

(3) For absolute pressure transducers at P_{min}, the atmospheric pressure shall be used.

Чл. 245. The maximum permissible relative errors of the pressure transducers expressed as a percentage of the range output signal shall be 0.2 %.

Section XIV
Test benches for measuring braking forces of road vehicles

Чл. 246. (1) The test benches for measuring braking forces are designed to determine the braking performance of road vehicles according to the Road Traffic Act.

(2) The test benches for measuring braking forces intended for road vehicles (combination of power-driven vehicles and a trailer, a semi-trailer) with a compressed-air braking system shall be fitted with a pressure measuring device in the braking system.

Чл. 247. The test benches for measuring braking forces of road vehicles shall consist of:

1. roller system with drive units for transmitting the braking force through the supporting surface of the vehicle wheel;
2. an axle load measuring instrument;
3. a display device;
4. a system for managing, recording and processing measurement data with a standardised data interface;
5. a printing device.

Чл. 248. (1) Test benches for measuring the braking forces of road vehicles equipped with an automatic or semi-automatic setting device shall not take measurements before they are set up.

(2) All component parts and configurations that have an influence on the technical and

metrological characteristics of the test benches for measuring braking forces of road vehicles shall be adequately protected against undue influences.

Чл. 249. (1) The peripheral speed of the rollers shall not be less than 2 km/h and not more than 6 km/h. Throughout the range of brake force measurement, the peripheral speed of the rollers shall not fall below 75% of their unloaded speed.

(2) The diameter of the rollers shall not be less than 200 mm and, in the case of ground-based test benches for measuring braking forces, not less than 150 mm.

(3) The length of each roller shall not be less than 900 mm.

(4) The distance between the rollers shall allow testing vehicles with a wheel diameter between 550 mm and 1,300 mm.

(5) In order to achieve locking of the tested axle under greater braking force (greater actuator pressure), the height of the upper surface of the rear roller may be increased up to 40 mm, but to no more than 100 mm above the front roller. For testing on a multi-axle road vehicle, the rollers may be raised. It is recommended that the upper surface of the rear rollers and the front rollers can be raised by 40 mm, but not more than 100 mm above the surface of the test bench.

(6) The manufacturer must declare that the friction coefficient between the motor vehicle tyres and the roller surface must be at least 0.7 given dry conditions and at least 0.5 given wet conditions.

(7) The working surface of the rollers shall not cause intense wear or damage to the tyres of the road vehicle during the brake system test, and it shall be possible to switch off the test bench automatically when a slip between the roller and the wheel of not more than 27 % ± 3 % is detected.

Чл. 250. The following minimum requirements shall be met when installing and operating the test bench for measuring braking forces of road vehicles:

1. if the test bench has an automatic starting function, the wheels shall be driven after not less than 3 seconds of the vehicle positioning on it;

2. the drive of the rollers shall stop automatically once the axle of the vehicle leaves the test bench;

3. a safety function shall be provided to ensure that both pairs of rollers are driven only when both are loaded simultaneously by the wheels of the tested vehicle;

4. the working channels over which test benches for measuring braking forces are installed shall be fitted with a duct safety system;

5. if the test bench for measuring braking forces is installed over a channel, it shall have the function of automatically stopping the roller drive when a person enters the danger zone of the channel (the total length of the duct or at least 2.5 m from the rollers in each direction);

6. emergency stop buttons on the test bench located in accessible positions shall be mandatory;

7. protection shall be provided to prevent the inadvertent starting of the roller motors.

Чл. 251. The upper limit of the measurement range of braking forces shall be determined by equation A.1 under Annex A to BDS ISO 21069-1.

Чл. 252. (1) The display device shall have a minimum resolution of 100 N or better in the range to 5,000 N and a minimum resolution of 500 N or better than 5,000 N:

(2) The display device shall be easily legible from the normal position of the test. If fitted with an analogue scale, the diameter of the display device shall be not less than 280 mm.

(3) The brake force display device shall indicate zero when there is no vehicle on the rollers. The rolling resistance of the vehicle’s wheels and rollers shall be indicated as a force relative to the actual mechanical zero and shall not justify a new zero point adjustment.

Чл. 253. (1) The maximum permissible errors on the test benches for measuring the braking forces of road vehicles shall not exceed:

1. for brake force readings error:

(a) ± 40 N for values below 2,000 N and ± 2 % for values exceeding 2,000 N of the measured value for test benches with a maximum braking force range up to 8 kN;

(b) ± 100 N for values below 5,000 N and ± 2 % for values exceeding 5,000 N of the measured value on test benches with a braking force range greater than 8 kN.

2. for errors of axle load readings: ± 300 N for values below 10,000 N and ± 3 % for values exceeding 10,000 N of the measured value;

3. for errors in the pressure readings for those fitted with a pressure measuring device in compressed-air braking systems of road vehicles: ± 10 kPa for values below 500 kPa and ± 2% for values above 500 kPa of the measured value.

(2) The test benches for measuring the braking forces of road vehicles shall not exceed the maximum permissible errors at ambient temperature specified by the manufacturer.

(3) The difference between measurements of the right and left braking forces shall not exceed 2.5 % for the same braking force applied on both sides.

(4) The test benches for measuring braking forces shall be capable of measuring and recording the following parameters:

1. the braking force of each wheel;
2. the rolling resistance of each wheel, including roll;
3. the variation of braking force during each wheel revolution;
4. the unevenness of braking forces for each axle;
5. the pressure in the actuator of the braking system.

Чл. 254. The test benches for measuring braking forces of road vehicles shall be made available on the market and/or put into service after type-approval and initial verification and shall be subject to subsequent verifications.

Чл. 255. (1) The test of braking force, axle load and pressure shall be carried out at least at 5 points within the measurement range.

(2) The errors of the test equipment shall be at least 3 times lower than those on the test bench.

Чл. 256. (1) The initial and subsequent verifications of the test benches for measuring the braking forces of road vehicles shall include the verification of:

1. the diameter of the rollers;
2. the peripheral speed of the rollers;
3. the error in the measurement of the braking force;
4. the errors of the measurement of axle load;
5. the errors of the pressure measurement.

(2) The verifications shall be carried out at least at 3 points within the measurement range.

Section XV
Alcohol meters

Чл. 257. (1) Alcohol meters are measuring instruments designed to determine the concentration of ethyl alcohol in mixtures of water and ethanol.

(2) Alcohol meters which measure and display the ratio of the volume of pure alcohol contained in a mixture at 20°C to the total volume of the mixture at the same temperature, hereinafter referred to as "alcohol concentration by volume", are volumetric alcohol meters.

(3) Alcohol meters may be glass or electronic.

Чл. 258. (1) Glass alcohol meters are made of glass and consist of:

1. a cylindrical body, the bottom of which is shaped like a cone or hemisphere so as not to retain air bubbles;

2. a hollow cylindrical stem connected by melting to the upper part of the body with a closed upper end.

(2) The glass used for the manufacture of glass alcohol meters must be transparent and free

from defects preventing reading on the scale.

Чл. 259. The outer surface of each glass alcohol meters shall be symmetrical in relation to its main axis and shall not show abrupt changes on cross-section.

Чл. 260. The lower part of the body of the glass alcohol meter shall contain a filling material fixed to the bottom of the body to regulate the mass of the measuring instrument.

Чл. 261. The stem of the glass alcohol meter shall have a scale applied to a cylindrical support fixed to its interior.

Чл. 262. (1) Glass alcohol meters shall be graduated at 20°C and in accordance with the values in the International Alcholometric Tables published in OIML R 22.

(2) Glass alcohol meters shall be graduated to indicate the free horizontal surface of the liquid.

Чл. 263. (1) Glass alcohol meters shall not have more than one scale.

(2) The scale and inscriptions shall be affixed to a base of a solid matt surface.

(3) The base shall be rigidly attached to the stem and shall bear a sign indicating that the scale in relation to the stem may be changed.

Чл. 264. (1) Glass alcohol meters shall have a nominal scale graduated in per cent volume.

(2) The range shall not exceed 10 % of the alcohol by volume measured and scales shall be 0.1 % by volume.

(3) Each scale shall include from 5 to 10 additional scale division below and above the nominal range limits.

Чл. 265. (1) The scale division shall be:

1. located in planes perpendicular to the vertical axis;

2. in black colour, except those below the nominal range, and clearly and indelibly marked;

3. bright, having a uniform thickness of not more than 0.2 mm.

(2) The length of short lines must be at least one-fifth, the middle lines at least one third and the long lines at least one-half of the stem circumference.

Чл. 266. (1) Every tenth scale sign of glass alcohol meters, counted at one end of the nominal range, shall be marked with a long line.

(2) Between two adjacent long lines, four short lines, one medium line and four other short lines shall be arranged in series.

(3) Only long lines are indicated in figures.

Чл. 267. For glass alcohol meters, the following data shall be legibly and indelibly marked inside the measuring instrument:

1. the accuracy class;

2. the unit of measurement ‘% by volume’;

3. the words ‘ethanol’ as the type of alcohol measured;

4. the manufacturer’s name or trademark;

5. the measuring instrument identification number;

6. temperature at which the graduation ‘20°C’ was performed.

(3) Glass alcohol meters may be of the following accuracy classes:

1. class I – with a length of one scale division not less than 1.5 mm and without an built-in thermometer;

2. class II – with a length of one scale division not less than 1.05 mm, without an built-in thermometer;

Чл. 268. (1) The outer diameter of the body of the glass alcohol meter shall be between 19 and 40 mm.

(2) The outer diameter of the stem shall be at least 3 mm for Class I and Class II.

(3) The stem shall be at least 15 mm long after the top rock mark.

(4) The cross-section of the stem must be maintained along the whole scale and beyond the scale at least 5 mm below the lowest rock mark.

Чл. 269. The maximum permissible errors of glass alcohol meters shall be:

1. ± one half of a scale division for each registered reading for class I, or

2. ± one scale division for each referred reading for class II.

Чл. 270. (1) For electronic alcohol meters, the manufacturer shall specify:

1. the measurement range;

2. the climatic, mechanical and electromagnetic conditions under which the measuring instrument is intended to be used, the power supply and other influencing quantities which may affect the accuracy of the measuring instrument;

3. the power supply parameters: the nominal value of the alternating current supply voltage and/or the limits of direct current supply.

(2) The effect of specific conditions referred to in paragraph 1(2) shall be such that the change in the measurement result does not exceed the maximum permissible error.

Чл. 271. Electronic alcohol meters shall display the measurement results for alcohol concentration in % by volume or per extract in degrees Plato.

Чл. 272. Electronic alcohol meters shall bear an indelible indication of:

1. the manufacturer’s name or trademark;

2. the type and identification number;

3. the year of manufacture.

4. voltage and current ranges for AC power supply and limits for DC power.

Чл. 273. (1) The maximum permissible errors of the electronic alcohol meters shall be ± 0.1 % by volume.

(2) The maximum permissible errors of electronic alcohol meters measuring alcohol strength in percent by volume and extract in degrees Plato shall be:

1. ± 0.1 % for alcoholic strength by volume;

2. ± 0.1 degrees Plato for extract.

Чл. 274. (1) In an subsequent verification, the maximum permissible errors of the electron alcohol meters must be ± 0.2 % by volume.

(2) In subsequent verification, the maximum permissible errors of electronic alcohol meters measuring alcohol strength in percent by volume and extract in degrees Plato shall be:

1. ± 0.2 % for alcoholic strength by volume;

2. ± 0.2 degrees Plato for extract.

Чл. 275. Glass alcohol meters shall be made available on the market and/or put into service after type-approval and initial verification and shall be subject to subsequent verifications.

Чл. 276. Electronic alcohol meters shall be made available on the market and/or put into service after type-approval and initial verification and shall be subject to subsequent verifications.

Чл. 277. (1) Three samples shall be submitted for type approval of glass alcohol meters.

(2) One sample shall be submitted for type-approval of electronic alcohol meters.

Чл. 278. Initial and subsequent verification shall be carried out at least at 3 points of the measurement range.

Чл. 279. (1) The initial verification mark shall not change the mass of the glass alcohol meters.

(2) Due to the specific requirements for marking glass measurement equipment, the initial verification mark shall be made by sand-blasting, and the letters and numbers shall be placed on the glass in such a way as to be indelible. The initial verification mark may be placed on the inspection protocol.

Section XVI
Opacimeters

Чл. 280. (1) Smoke meters are measuring instruments designed to determine the exhaust opacity of diesel powered motor vehicles.

(2) The opacimeter measures the amount of light placed on a receiver when a beam is transmitted through a specified volume filled with the exhaust gases of the engine.

(3) The smoke meters shall consist of:

1. measuring probe;

2. a hose;

3. a measuring chamber consisting of a light source, a receiver and a device to protect the optics against dirt;

4. neutral optical filter;

5. a data-processing system, signal processing system, display device and device for recording measurement results.

Чл. 281. The light source shall consist of a filament to white filament lamp having a temperature in the range 2800 K to 3250 K or with a green light from a transmission diode with a spectral peak between 550 nm and 570 nm.

Чл. 282. The receiver shall be a photocell or a photodiode with a filter, if necessary.

Чл. 283. (1) The design of the opacimeter shall ensure that the gas chamber is filled with exhaust gases with homogeneous transparency during engine operation at full load and constant speed.

(2) The inner surface of the gas chamber shall be glare-free and shall be such that the combined effect of stray light resulting from internal reflection and light scattering does not alter the instrument reading by more than 0.5 % opacity, or 2 % of full range when the chamber is approximately 50 % filled with gas.

(3) The temperature of the exhaust gases at the time of measurement must be higher than 70°C and lower than the maximum permissible temperature specified by the opacimeter manufacturer. Where measuring the temperature within these limits, the opacimeter readings shall not differ by more than 2 % opacity when the chamber is filled with approximately 50 % gas.

Чл. 284. The warm-up time of the opacimeter shall not be more than 15 min.

Чл. 285. It shall be possible to use opacimeters under the following conditions:

1. the temperature limits and relative humidity of the air are suitable for the operation of the opacimeter in enclosed spaces of uncontrolled temperature and humidity;

2. the limits of mechanical influences are suitable for operation of the opacimeter in areas with minor vibration and shocks;

3. specify the power supply parameters: voltage and current ranges for AC power supply and DC limits;

4. the effect of electromagnetic disturbances shall be such that the change in the measurement result does not exceed the maximum permissible error.

Чл. 286. (1) The opacimeter shall have a linear scale for measuring opacity from 0 % to 100 % and a resolution of less than 0.1 % of full range.

(2) The opacimeter may have a second scale for reading the values of the light absorption coefficient in a range of 0 m^{-1} up to at least 10 m^{-1} and a resolution of at least 0.01 m^{-1}.

(3) The relationship between opacity and absorption coefficient are set out in Annex 19.

Чл. 287. (1) The zero and full range drift of the opacimeter shall not exceed 0.5 % opacity or 2 % of full scale with a measurement duration of 1 h.

(2) The zero and full scale of the opacimeter for reading the absorption coefficient shall have a drift of not more than 0.025 m^{-1}or 2 % of full range, with a measurement duration of 1 h.

Чл. 288. The maximum permissible errors of opacimeters shall be within the following limits:

1. ± 2 % for opacity;

2. ± 0.15 m^{-1} — for a light absorption coefficient.

Чл. 289. Opacimeters shall be made available on the market and/or put into service after type-approval and initial verification and shall be subject to subsequent verifications.

Чл. 290. (1) The type approval test shall be carried out with neutral optical filters at least at 3 points in the measuring range.

(2) Neutral optical filters shall have the following values:

1. for opacity between 15 % and 80 % and an uncertainty of ± 1 %;

2. for a light absorption coefficient between 1.5 m^{-1} and 2 m^{-1} and an uncertainty of ± 0.05 m^{-1}.

Чл. 291. Initial and subsequent verifications shall be carried out with neutral optical filters at least at 3 points within the measurement range.

Section XVII
Exhaust gas analysers of motor vehicles

Чл. 292. (1) Exhaust gas analysers of motor vehicles are measuring devices designed to determine the volume fractions of the exhaust gas components of spark ignition motor vehicles: carbon monoxide (CO), carbon dioxide (CO_2), hydrocarbons (HC) and oxygen (O_2).

(2) The gas analysers shall calculate the lambda value (λ) for the volume parts of the exhaust gas components.

(3) Lambda is a dimensionless quantity indicating the combustion efficiency of an engine as a ratio of air/fuel in the exhaust.

(4) The volume fractions of gas components shall be expressed as a percentage (% volume) for CO, CO_2 and O_2 and in parts per million (ppm by volume) for HC.

Чл. 293. The minimum ranges and the resolution of the gas analysers are given in Annex 20.

Чл. 294. The maximum permissible errors of the exhaust gas analysers of motor vehicles in use shall comply with the requirements set out in Annex 20.

Чл. 295. Exhaust gas analysers from motor vehicles shall be made available on the market and/or put into service after conformity with the essential requirements laid down in the Regulation on the essential requirements for conformity assessment of measuring instruments has been assessed and verified, and shall be subject to subsequent verifications in accordance with this Regulation.

Чл. 296. (1) Subsequent verifications shall be performed with certified gas mixtures for each component at least at three points within the measurement range.

(2) subsequent verifications of exhaust gas analysers from motor vehicles shall include:

1. leak check;

2. a response time check;

3. check for the presence of residual hydrocarbons;

4. determination of the gas analyser errors;

5. check for activation of low flow sensing device and low flow lockout by restricting the flow of gases delivered to the probe;

6. verification of oxygen sensor with no oxygen mixture (only CO and/or CO_2 and/or HC in N_2) and with certified gas containing 20.9 % by volume O_2.

Чл. 297. (1) The gas mixtures used for the testing of motor vehicle exhaust gas analysers shall have values in accordance with Annex 21.

(2) The content of each component in the gas mixture shall be expressed in molar or volume parts.

(3) The certified value of the components in the gas mixture shall be within 1% uncertainty. For hydrocarbons with a content of 1,000 ppm or less, the uncertainty shall be up to 2 %.

Section XVIII
Individual dosimeters and dosimetry systems

Чл. 298. The requirements of this section apply to active individual dosimeters and passive dosimetry systems.

Чл. 299. (1) The active individual dosimeters are electronic dosimeters with direct reading.

(2) Passive dosimetry systems are thermoluminescent and film, and include:

1. a passive device containing thermoluminescent or film detectors (individual dosimeter);

2. a thermoluminescent or film detector reader;

3. computer with suitable software designed to control the recording device and to evaluate the individual doses;

4. additional equipment.

Чл. 300. (1) Individual electronic dosimeters are designed to measure an individual equivalent dose and/or power of the individual photon and/or neutron equivalent dose.

(2) Passive dosimetry systems are designed to measure an individual equivalent dose of photon radiation.

Чл. 301. (1) Individual dosimeters must have dimensions and mass allowing the dosimeter to be worn on a person's work clothes.

(2) Individual dosimeters must have an attachment on work clothes.

(3) The individual dosimeters shall be clearly marked with the point to which the measured quantity refers.

Чл. 302. Individual dosimeters must be designed in such a way that they do not retain radioactive contamination and can be easily deactivated.

Чл. 303. Individual dosimeters should emit an acoustic and/or optical signal when a certain equivalent dose level and/or equivalent dose power has been reached and this level can be adjusted by an operator.

Чл. 304. (1) The minimum prescribed measurement range of individual electronic dosimeters by dose equivalent rate is:

1. from 0.5 μSv/h to 1 Sv/h for photon radiation;

2. from 5 μSv/h to 1 Sv/h for neutron radiation.

(2) Where the upper limit of the range referred to in paragraph 1 declared by the manufacturer is lower than that prescribed, this shall be specifically indicated on the dosimeter.

Чл. 305. (1) The minimum prescribed measurement range of individual electronic dosimeters at the equivalent dose shall be:

1. from 100 μSv to 10 Sv for photon radiation;

2. from 100 μSv to 1 Sv for neutron radiation.

(2) Where the upper limit of the range referred to in paragraph 1 as declared by the manufacturer is lower than that prescribed, this shall be specifically indicated on the dosimeter.

Чл. 306. The minimum prescribed range of passive dosimetry systems shall be: 10 μSv to 10 Sv.

Чл. 307. (1) Under normal conditions of use, when the electronic photon dose meter is adjusted according to the instructions for use, the maximum permissible error shall not be greater than ± 15 % for the equivalent dose and ± 20 % for a capacity of the equivalent dose at photon energy of 662 keV of ^{137}CS or 1,332 keV of ^{60}Co.

(2) The error at the smallest decade for the magnitude of the equivalent dose rate shall be allowed to be within ± 30 %.

(3) The requirement under paragraph (1) shall apply to equivalent dose rates above 100 μSv/h.

(4) Under prescribed operating conditions, when the neutron radiation dosimeter is set up in accordance with the instructions for use, the maximum permissible error for equivalent dose and/or

equivalent dose rate shall not be greater than minus 17 % to 25 % for radiation from ^{241}Am-Be or ^{252}Cf. radiation. Where necessary, other sources may be used.

(5) When the equivalent dose rate changes in a stepwise manner, the individual electronic dosimeter shall indicate the new value with an error of not more than 10 % for a time of 5 s after the change.

(6) Under normal conditions of use, the maximum permissible error for passive dosimetry systems shall not be greater than ± 15 % at a photon energy of 662 keV of ^{137}Cs.

Чл. 308. (1) The non-linearity of the readings of active dosimeters within their measuring range shall not be greater than ± 15 %.

(2) The non-linearity of the readings of passive dosimetry systems in their measurement range shall be within the range of minus 9 % to 11 %.

Чл. 309. (1) The statistical fluctuations of the equivalent dose readings of the individual electronic dosimeters for photon radiation shall be within the following limits:

1. no more than 15 % for a dose no greater than 1 μSv;

2. not more than (16-H)%, where H is the dose in μSv, for a dose from 1 μSv to 11 μSv;

3. not more than 5 % for a dose of more than 11 μSv.

(2) The statistical fluctuations of the equivalent dose rate readings of the individual electronic dosimeters for photon radiation shall be within the following limits:

1. not more than 20 % for a dose rate not greater than 10μSv/h;

2. not more than (21 – 0.1.H)%, where H is the dose rate in μSv/h, for a dose rate from 10 μSv/h to 60 μSv/h;

3. not more than 15 % for a dose rate no more than 60μSv/h.

(3) The statistical fluctuations of the equivalent dose readings of the individual electronic dosimeters for neutron radiation shall be within the following limits:

1. not more than 25 % for a dose no greater than 100 μSv;

2. not more than $(25,4-H/(2.5H)_0)\%$, where H is the dose in μSv and H_0 is the lower measurement limit, for a dose from 100 μSv to 5.1 mSv;

3. not more than 5 % for a dose of more than 5.1 mSv.

(4) The statistical fluctuations of the equivalent dose rate readings of the individual electronic dosimeters for neutron radiation shall be within the following limits:

1. not more than 20 % for a dose rate not greater than 1 mSv/h;

2. not more than (21-0.01.H)%, where H is the dose rate in μSv/h, for a dose rate from 1 mSv/h to 6 mSv/h;

3. not more than 15 % for a dose rate greater than 6 mSv/h.

(5) The statistical fluctuations of the dose equivalent readings of passive dosimetry systems shall be within the following limits:

1. not more than 15 % for a dose no greater than 0.1 mSv;

2. not more than (16-H/0.1)%, where H is the dose in mSv, for a dose from 0.1 mSv to 1.1 mSv;

3. not more than 5 % for a dose of more than 1.1 mSv.

Чл. 310. (1) The readings of the individual active photon dosimeters shall be within a range of minus 29 % to 67 % for photon energy from 80 keV to 1.5 MeV or 20 keV to 150 keV and irradiance angles of 0° to ± 60°.

(2) The readings of the active individual neutron radiation dosimeters shall be within a range of minus 35 % to 300 % for radiation energy from 0.025 eV to 100 keVor within a range of minus 35 % to 122 % for radiation energy from 100 keV to 10 MeV and irradiance angles of 0° to ± 60°.

(3) The readings of passive dosimetry systems shall be in the range from minus 29 % to 67 % for photon energies from 30 keV to 250 keV and irradiation angles from 0° to ± 60°.

Чл. 311. (1) Active individual dosimeters shall be made available on the market and/or put

into service after type approval and initial verification and shall be subject to subsequent verifications.

(2) The number of dosimeters for type approval is three samples.

(3) Where during type approval a discrepancy is established between the dosimeters and the requirements of this section, more samples may be required."

Чл. 312. Passive dosimetry systems shall be made available on the market and/or put into operation after initial verification and shall be subject to subsequent verification.

Чл. 313. The metrological control of active individual dosimeters and passive dosimetry systems shall use radiation according to BDS EN 61526 and ISO 4037.

Чл. 314. The testing and verification of active individual dosimeters and the verification of passive dosimetry systems shall be carried out with a water phantom measuring (30 x 30 x 15) cm.

Чл. 315. (1) During testing and initial verification of the active individual dosimeters, the following shall be examined:

1. the measuring range and linearity of the readings;
2. the maximum permissible error;
3. the statistical fluctuations of the readings;
4. the response of the readings to the energy of the radiation and the angle of exposure;
5. the signalling levels
6. overloading.

(2) During the initial verification of passive dosimetry systems the following shall be investigated:

1. the measuring range and linearity of the readings;
2. the maximum permissible error;
3. the response of the readings to the energy of the radiation and the angle of exposure;
4. the statistical fluctuations of the readings;
5. the determination of the residual dose;
6. the detection threshold.

(3) During subsequent verification of the individual active dosimeters the maximum permissible error and the alarm levels shall be verified.

(4) During subsequent verification of passive dosimetry systems the maximum permissible error shall be verified.

Чл. 316. (1) In addition to the characteristics referred to in Article 315 (3), during subsequent verification following repair of active dosimeters, the measuring range and the linearity of the readings shall also be checked.

(2) In addition to the characteristics referred to in Article 315 (4), during subsequent verification following repair of passive dosimetry systems the linearity of the readings shall be verified.

Section XIX
Radiation control equipment and systems

Чл. 317. Radiation control devices are portable or transportable measuring instruments used to provide radiation protection and are designed to measure one or more of the following values:

1. the ambient equivalent dose and/or ambient equivalent dose rate of photon radiation;
2. the equivalent dose and/or equivalent dose rate and/or flux and/or neutron flux density;
3. the specific surface activity and/or particle flux density;
4. the concentration of radioactive aerosols, noble gases and iodine in the air.

Чл. 318. (1) Portable and transportable radiation control instruments shall consist of a detector element and a display device. The detector element(s) and the display device may be contained in a single housing or in separate units which are suitably connected.

(2) Where a variety of detector elements can be connected to a single display device, these

instruments are called combined radiation control instruments.

Чл. 319. Stationary radiation monitoring systems are used to provide radiation protection and are designed to measure one or more of the following values:

1. the rate of the ambient equivalent dose of photon radiation;

2. the equivalent dose rate and/or the neutron flux density.

Чл. 320. Stationary radiation control systems consist of one or more detector elements and an imaging device. The measuring circuit consisting of a detector element, a display device and technical means for their connection, which perform a complete function from the perception of the measured value to the display of the reading, is called a measuring channel. Radiation control systems may have one or more measuring channels.

Чл. 321. (1) Radiation control instruments and systems shall be designed to be as insensitive as possible to all electromagnetic fields and ionizing radiation except the type of ionizing radiation they measure.

(2) The design of the appliances and systems shall be such as to prevent the retention of radioactive substances and shall ensure easy deactivation.

(3) The housings of the measuring instruments shall be resistant to the effects of external mechanical factors, moisture and dust.

Чл. 322. Instruments and systems shall be protected against unauthorised actions that alter their metrological characteristics.

Чл. 323. The scale of appliances and systems may be analogue and/or digital.

Чл. 324. (1) Portable radiation control equipment shall be capable of operating continuously for at least 8 hours.

(2) Appliances and systems shall remain fully operable after 10 times the measuring range overload for 5 minutes.

Чл. 325. Stationary radiation control systems shall be so designed as to ensure continuous operation and the measurement results are maintained when the power is lost for a certain period of time.

Чл. 326. Instruments that measure equivalent dose, photon equivalent dose rate, surface contamination and concentration of radioactive aerosols and gases may have a radioactive source control to allow periodic checking of their operability.

Чл. 327. (1) Radiation control systems must be designed in such a way that they can be checked periodically.

(2) The control and measuring devices of the systems shall be so designed as to be connected and controlled from a central control panel and to send the measurement results to that panel.

(3) Alarm devices shall be suitable for the purpose of measurement. The alarm shall be optical and audible and duplicated in the central control panel.

(4) All alarm devices shall be capable of being checked for operability by the operator of the central control panel.

Чл. 328. (1) The minimum prescribed range of instruments for measuring photon equivalent dose rate shall be from 1 μSv/h to 10 mSv/h.

(2) The minimum prescribed range of stationary radiation control systems shall be from 0.1 μSv/h to 1.0 Sv/h.

(3) The upper limit of the minimum prescribed range of instruments for measuring contamination of surfaces with radioactive substances is $1.0.10^5$ $cm^{-2}.s^{-1}$.

(4) Where the upper limit of the range declared by the manufacturer is lower than that prescribed, this must be specifically marked on the instrument.

Чл. 329. For instruments that measure contamination of surfaces with radioactive substances and the concentration of radioactive aerosols and gases in air, an algorithm for determining the minimum detectable activity or the minimum detectable activity concentration and the conditions under

which it is determined shall be specified.

Чл. 330. (1) The minimum prescribed range of instruments for measuring the concentration of radioactive aerosols and gases in the air shall be:

1. for aerosols (including radon subsidiaries) – 10 Bq/m^3 up to 10^5 Bq/m^3;

2. for gases – from 10^3 Bq/m^3 up to 10^6 Bq/m^3.

(2) The minimum prescribed range of instruments for measuring equivalent dose and/or equivalent dose rate and/or flux and neutron flux density shall be:

1. for the equivalent dose, from 10 μSv to 1.0 Sv;

2. for the equivalent dose rate, from 10 μSv/h to 1.0 Sv/h;

3. for neutron flux – from 10^2 cm^{-2} to 10^5 cm^{-2}

4. for neutron flux density – from 10^1 $cm^{-2}.s^{-1}$ to 10^4 $cm^{-2}.s^{-1}$.

(3) Where the upper limit of the range declared by the manufacturer is lower than the prescriptive limit, this must be specifically marked on the instrument.

Чл. 331. (1) Under prescribed operating conditions and when the instrumentation is set according to the manufacturer's prescriptions, the maximum permissible error shall not exceed:

1. for equivalent dose measurement and equivalent dose rate measurement instruments ± 20%;

2. for instruments for measuring surface contamination with radioactive substances of ± 25%;

3. for instruments measuring a concentration of radioactive aerosols and gases ± 40%;

4. for instruments measuring the equivalent dose and the equivalent dose rate and/or neutron flux and neutron flux density ± 25 %.

(2) Where radiation control systems are set according to the manufacturer's prescriptions, the maximum permissible error shall not exceed ± 20 %.

Чл. 332. The statistical fluctuations of the readings of the instruments for measuring the equivalent dose and power of an equivalent photon dose shall be within the following limits:

1. not more than 15 % for a dose (dose rate) no greater than 1 μSv (1 μSv/h);

2. not more than (16-H)%, where H is the dose (dose rate) in μSv (μSv/h) for a dose (dose rate) from 1 μSv to 11 μSv (from 1 μSv/h to 11 μSv/h);

3. not more than 5 % for a dose (dose rate) no greater than 11 μSv (11 μSv/h).

Чл. 333. The readings of the instruments measuring the equivalent dose and the photon equivalent dose rate shall be within the range of minus 29 % to 67 % for photon energies from 80 keV to 1.5 MeV or from 20 keV to 150 keV and irradiation angles from 0° to ± 45°. For irradiation angles of 0° to ± 90°, the deviation shall be specified by the manufacturer.

Чл. 334. (1) Portable and transportable radiation control equipment shall be made available on the market and/or put into service after type approval and initial verification and shall be subject to subsequent verifications.

(2) The number of samples tested for type approval is one.

(3) Where during type approval a discrepancy is established between the devices and the requirements of this section, more samples may be required.

Чл. 335. (1) Stationary radiation monitoring systems shall be made available on the market and/or put into operation after initial verification and shall be subject to subsequent verifications.

(2) The initial verification of systems shall be performed in two stages - in the laboratory and at the site of use after installation.

(3) Subsequent verifications of the systems shall be carried out at the place of use.

Чл. 336. (1) Radiation according to BDS EN 60846 and IEC 60532 shall be used to perform metrological control of instruments and systems for measuring equivalent dose and rate at an equivalent dose.

(2) For metrological control of instruments for measuring surface contamination, reference sources according to BDS EN 60325 and ISO 8769 shall be used.

(3) For metrological control of instruments for measuring equivalent dose and power of

equivalent dose and/or flux and flux, neutron flux, radiation according to BDS EN 61005 and IEC 61322 shall be used.

(4) For metrological control of instruments for measuring the concentration of radioactive aerosols and gases in the air, appropriate reference radioactive sources shall be used.

Чл. 337. (1) During testing and initial verification of the radiation control instruments, the following shall be examined:

1. the measuring range and linearity of the readings;

2. the maximum permissible error;

3. the statistical fluctuations of the readings;

4. the relationship of the readings on the energy of the radiation and the angle of exposure (where applicable);

5. the signalling levels (where applicable);

6. the overload (test only).

(2) The maximum permissible error and alarm levels (where applicable) shall be checked during subsequent verification of the radiation control equipment.

(3) In addition to the characteristics referred to in paragraph (2), the measurement range and linearity of the readings shall be verified following their repair.

Чл. 338. (1) During initial verification of stationary radiation monitoring systems the following shall be examined:

1. the own radiation background;

2. the maximum permissible error;

3. the linearity of the reading;

4. energy and angular dependence;

5. alarm devices;

6. determination of a control value for ex-post verification

(2) During subsequent verification of stationary radiation control systems the following shall be examined:

1. the repeatability of the readings relative to the initial verification;

2. alarm devices

Section XX
Systems for measuring activity incorporated into the human body

Чл. 339. (1) Systems for measuring activity incorporated into the human body, referred to as ‘body meters’, are measuring instruments intended to identify incorporated gamma emitting radio-nuclides entering the human body by inhalation, ingestion and/or through skin, and to determine incorporated activity.

(2) Systems for measuring activity incorporated into the human body are used to control internal exposure of staff working in an environment of ionising radiation.

(3) Systems for measuring activity incorporated into the human body may be:

1. stationary or mobile;

2. scanning (allowing determination of the distribution of the activity incorporated into the human body) or with fixed geometry of measurement.

(4) The incorporated activity is determined by gamma-spectrometric analysis of radio-nuclides.

(5) The results of measurement of the activity of the incorporated gamma emitting radio-nuclides shall be presented in Bq.

Чл. 340. Systems for measuring activity incorporated into the human body shall consist of:

1. gamma spectrometer comprising a detection system and a multichannel analyser;

2. protection;

3. a device determining the geometry of measurement;

4. a personal computer with appropriate software for processing and presenting measurement results.

Чл. 341. Systems for measuring activity incorporated into the human body, including the software used, shall be protected against unauthorised actions that alter their metrological characteristics.

Чл. 342. (1) The detection system may consist of one or more detectors that are movable or stationary.

(2) Detectors shall be of high resolution.

Чл. 343. The system software for measuring activity incorporated into the human body must allow the identification of the radio-nuclides and the determination of the incorporated activity for each radionuclide identified.

Чл. 344. Multi-channel analysers shall have at least 4096 channels.

Чл. 345. The protection of the measured object from the natural radiation background may be complete or partial. The protection must ensure sufficient environmental background reduction to achieve the declared minimal detectable activity (MDA) for the specific measurement conditions.

Чл. 346. Systems for measuring activity incorporated into the human body shall bear the following indications:

1. the manufacturer’s name or trade mark;

2. the type of system;

3. the identification number and the year of production.

Чл. 347. (1) A technical file of systems for measuring activity incorporated into the human body shall contain data on:

1. the measurement geometry of the human body (vertical, horizontal or seated);

2. measurement mode – static or scanning;

3. the measurement time per person;

4. the type of protection – type (total or partial), material (e.g. steel, lead) and thickness in centimetres;

5. the type, number and size of detectors;

6. the possibility of identifying incorporated radio-nuclides in the whole human body and/or in individual organs thereof;

7. the limits of detection for specific radio-nuclides under specified measurement conditions;

8. the type of software for processing measurement results;

9. the reference material (phantom) used to calibrate the system.

(2) The technical documentation shall contain the following metrological characteristics of the systems for measuring activity incorporated into the human body:

1. energy coverage;

2. resolution in keV;

3. relative efficiency in%;

4. peak/compound ratio;

5. minimum detectable activity (MDA) for certain nuclides under given measurement conditions;

6. the shape of the line.

Чл. 348. (1) The errors of the systems for measuring activity incorporated into the human body must be determined under operating conditions.

(2) The ambient gamma radiation background shall be less than 0.25 μSv/h.

(3) The metrological characteristics of systems for measuring activity incorporated into the human body shall meet the following requirements:

1. energy range: from 50 keV to 2,000 keV;

2. gamma resolution of 1,332 keV per ^{60}Co: shall be less than or equal to 2.8 keV.”

3. the relative efficiency is equal to or greater than 20 %;

4. MDA for ^{60}Co shall be less than or equal to 200 Bq with person in the defence.

Чл. 349. The maximum permissible error of indication of systems for measuring activity incorporated into the human body, assessed with a particular certified reference material under given measurement conditions, shall be 20 %.

Чл. 350. Systems for measuring activity incorporated into the human body shall be made available on the market and/or put into service after initial verification and shall be subject to subsequent verifications.

Чл. 351. (1) The initial verification of systems for measuring activity incorporated into the human body shall include:

inspection of resolution capacity ^{60}Co and ^{57}Co;

2. line shape check;

3. verification of relative effectiveness;

4. checking the peak/composition ratio;

5. software verification;

6. use of control sources to establish a minimum of two counting speed values at different energy intervals given certain reproducible measurement conditions.

(2) The subsequent inspection of systems for measurement of activity incorporated in the human body shall include:

inspection of resolution capacity ^{60}Co and ^{57}Co;

2. line shape check;

3. verification of relative effectiveness;

4. checking the peak/composition ratio;

5. verification of the reproducibility of the two count rate values established with control sources during the initial check under the specified measurement conditions.

(3) Systems used for the measurement of activity incorporated within the human body shall be submitted for inspection after the completion of the adjustments necessary for their operation.”

Чл. 352. The comparative material (phantom) used in the tests must be certified and the following characteristics must be indicated:

1. phantom type – modular, torso, whole body;

2. ability to model human bodies with different sizes and geometries;

3. radio-nuclides used, location, homogeneity, type (point or other.) and number of modules;

4. expiry date.

Section XXI
Systems for control of radioactive emissions into the environment and measuring equipment for the release of solid materials from control

Чл. 353. Systems for the control of radioactive emissions into the environment are stationary measuring instruments designed to measure the volumetric and/or mass activity of radio-nuclides released into the environment in gaseous, aerosol and/or liquid form.

Чл. 354. Measuring equipment for the release of solid materials from control are stationary measurement devices designed to measure the specific activity of solid materials for the purpose of releasing them from control.

Чл. 355. (1) Depending on their intended use, systems for controlling radioactive emissions into the environment may be designed to have one or more measurement channels.

(2) One measurement channel may serve to control emissions of:

1. radioactive aerosols in the air;

2. radioactive iodine in the air;

3. radioactive noble gases in the air;

4. other specific radio-nuclides in the air;

5. radio-nuclides in waste water released into the environment

Чл. 356. (1) Systems for controlling radioactive emissions into the environment must be designed to ensure continuous operation. The results of the measurement must be stored in the event of interruption to the electricity supply to the system for a specified period of time.

(2) The time after connection of a system until it is operational must be no more than 30 minutes.

Чл. 357. (1) Measuring equipment for the release of solid materials from control shall have a well-defined location of the transport vessel containing the materials whose specific activity is to be measured or the reference radioactive sources relative to the detectors of the facility.

(2) The equipment shall have a precise definition, made of a particular substance, for a specific geometry of the materials to be measured.

(3) The equipment shall have a marked or specified point by the manufacturer to which the perception of the detection of the systems during metrological verification applies.

Чл. 358. (1) The display device(s) of the systems may be analogue or digital. The scale of the analogue display device may be linear or logarithmic.

(2) The system indications must be in units for volume activity or in units for another suitable operational magnitude.

Чл. 359. Systems for the control of radioactive emissions into the environment shall provide an indication of:

1. system on indication;

2. pump on (if appropriate);

3. absence/presence a fault;

4. absence/presence of alarm for exceeded level of the measured value.

Чл. 360. Systems for the control of radioactive emissions into the environment must be capable of remote reading and storage of measurement results.

Чл. 361. Systems for controlling radioactive emissions into the environment must be designed in such a way that they can be checked periodically.

Чл. 362. (1) Alarm devices shall ensure that two levels of volumetric activity are provided independently of each other. The signal must consist of light and sound and must control at least two exits.

(2) The systems shall be such that external alarms can be switched on.

(3) All alarm devices shall be capable of being checked for operability by the operator. In case the alarm is set, it shall be possible to check outside the alarm range.

(4) Alarm devices shall retain their status until a specific zero signal is given or shall be reset automatically when the reason for the alarm disappears. Each measuring system shall have at least two alarm modes.

(5) The operating point of each alarm device shall not change outside the limits of 80 % X and 120 % X, where X is the nominal alarm level for a period of 500 h of operation.

Чл. 363. (1) The measuring range of linear scale radioactive emission control systems in the environment shall be between 10 % and 100 % of the range of readings.

(2) The measurement range of systems for the control of radioactive emissions in the environment with logarithmic scale shall be between one third of the smallest deck and the full range of indication.

(3) The measuring range of radio-emission control systems in the environment with a numerical indication shall be between the second smallest decade and the full range of indication.

Чл. 364. Under operating conditions, a factor shall be specified to establish a relationship

between the system readings and the activity of a dedicated radioactive source on a solid support.

Чл. 365. Under prescribed operating conditions and when the system for the control of radioactive emissions into the environment and the measuring equipment for the release of solid materials from control have been adjusted as instructed by the manufacturer:

1. the maximum permissible error shall not exceed ± 20 %;

2. the linearity of the readings shall not exceed ± 10 % over the whole measurement range.

Чл. 366. (1) The system for the control of radioactive emissions into the environment must give an indication that the upper limit of the measuring range is exceeded, when activity is available, ten times the activity giving rise to an indication at the end of the range.

(2) The system shall operate correctly after the overload has been removed.

Чл. 367. The fluctuations of the indication due to the accidental nature of radioactivity shall be:

1. for a linear scale, not more than 10 % for activity giving an indication corresponding to one third of the most sensitive range scale;

2. for logarithmic and numerical scale, not more than 10 % for activity giving an indication corresponding to the youngest significant deck or digit.

Чл. 368. Readings under operating conditions after 30 minutes of system operation shall not change by more than 10 % from the end of the scale for each range (on a linear scale) or from the reading (numerical scale) for the next 100 h.

Чл. 369. The manufacturer shall specify how to determine the minimum detectable activity and/or the detectable activity concentration and the conditions under which it is determined.

Чл. 370. (1) Systems for the control of radioactive emissions into the environment shall be made available on the market and/or put into service after initial verification and shall be subject to subsequent verifications.

(2) Where possible, the initial verification of the systems shall be carried out in two stages, in the laboratory and at the point of their use after installation.

(3) Subsequent verifications of the systems shall be carried out at the place of use.

Чл. 371. Measuring equipment for the release of solid materials from control shall be made available on the market and/or put into service after an initial verification and shall be subject to subsequent verifications.

Чл. 372. (1) In the case of initial verification, of the systems for control of radioactive emissions in gaseous and aerosol form, it shall be examined:

1. maximum permissible error under operating conditions;

2. measurement range;

3. linearity of the reading;

4. fluctuations of the readings;

5. the overload reading;

6. alarm devices.

(2) Subsequent verification of radioactive emission control systems in gaseous and aerosol form shall examine:

1. the repeatability of the readings relative to the initial verification;

2. alarm devices

Чл. 373. (1) During initial verification of systems for the control of radioactive emissions in liquid form the following shall be examined:

1. the own radiation background;

2. the maximum permissible error;

3. the linearity of the reading;

4. the scope of measurement.
5. the energy dependency and the discrimination threshold;
6. the stability of the readings over time;
7. the fluctuations of the readings;
8. the overload readings;
9. the alarm devices;
10. the determination of a control value for subsequent verification.

(2) During subsequent verification of radioactive emission control systems for liquid form the following shall be examined:

1. the own radiation background;
2. the maximum permissible error;
3. the alarm devices.

Чл. 374. (1) In the case of an initial verification on measuring equipment for the release of solid materials from control, the following shall be examined:

1. the own background;
2. the maximum permissible error;
3. the linearity of the reading;
4. the overload readings;
5. the minimum detectable activity;
6. the determination of a reference value.

(2) During subsequent verification of measuring equipment for the release of solid materials from control the following shall be examined:

1. the own background;
2. the error of indication.

Section XXII
Electricity meters

Чл. 375. (1) The requirements under this section shall apply to:

1. electricity meters for active energy with an accuracy class of 0.2 S and electricity meters for reactive energy;
2. electricity meters for active energy with an accuracy class of 0.5 S; 0.5 1 and 2 respectively;
3. electricity meters with assessed and certified conformity used for household, commercial and light industrial use.

(2) Electricity meters are measurement instruments designed to measure active and reactive energy in single phase and three-phase (3 and 4 conductor) circuits by means of integration active and reactive energy in relation to time.

(3) Depending on the principle the meters may be electromechanical or static.

(4) Recording of electricity meter readings can be carried out directly or remotely.

(5) Basic unit of measurement is kilowatt-hour (kWh), kilowar-hour (kvarh), kilovolt-ampere-hour (kVAh), or megawatt-hour (MWh), megawar-hour (Mvarh), megavolt-ampere-hour (MVAh).

Чл. 376. (1) Electricity meters Article 375 (1), point (1) must be designed and manufactured in such a way as to meet the following requirements:

1. in normal use and, under prescribed operating conditions, to avoid the occurrence of any danger so as to ensure, in particular: personal safety from electric shock; personal safety from the effects of excess temperature; fire protection; protection against ingress of solids, dust and water;

2. the construction must be suitably strong, the components must be reliably affixed and protected against loosening during transport and normal use; all parts which, under the operating conditions, are susceptible to corrosion shall be effectively protected;

3. the method of connecting the conductors to terminals must ensure a durable contact in such a way that there is no risk of loosening or unnecessary heating. terminals with different potentials grouped close to each other shall be protected against accidental short circuits;

4. electricity meters designed for connection to the mains, in which the phase voltage at prescribed operating conditions exceeding 250 V and whose housing is wholly or partly made of metal must be fitted with a protective earthing terminal, unless otherwise specified;

5. the openings in the insulation material which extend over the clamps shall be of sufficient size to allow the wires to be easily connected together with their insulation;

6. meter terminalsif grouped in a Cluster block and if not otherwise protected, they shall have a separate lid which may be sealed independently of the meter lid; The cover of the terminal block must cover the terminals, the conductor fixation screws and if no other provision is envisaged, a sufficient length of external conductors and their insulation.

in the case of electromechanical meter counters, the constantly spinning rotors, i.e. those with the smallest units, must be graded and numbered in ten units, and each unit in turn must be divided into ten units or in another way so as to maintain accuracy of recording. rolls showing the decimal divisions of the unit shall be marked differently when visible;

8. each digital element of the electronic display must show all digits from “zero” to “nine”.

9. the power losses in voltage circuits and in current circuits under prescribed operating conditions shall not exceed the limit values;

10. if prescribed operating conditions of electrical circuits and insulation shall not reach a temperature which may adversely affect the operation of the meter.

(2) The standard values for the electrical quantities of the meters referred to in Article 375 (1) (1) and (2) are:

1. standard values of I_N(A) for directly connected meters are: 5, 10, 15, 20, 30, 40, 50; As an exception the following is possible: I_b = 80A; for directly connected meters, it is preferable I_{max} be an integer multiple of the base current;

2. standard values of I_n, (A) for meters connected through a transformer are: 1, 2, 5; As an exception the following is possible: I_n = 1.5 - 2.5 A; for meters connected through a transformer, the maximum current is 1.2I_n; 1.5I_n or 2I_n;

3. standard prescribed voltages for directly connected meters are: 120 - 230 - 277 - 400 - 480 V; Values which are permitted as an exception shall be: 100 - 127 - 200 - 220 - 240 - 380 - 415 V;

4. standard prescribed voltages for meters connected through a transformer are: 57.7 - 63.5 - 100 - 110 - 115 - 120 - 200 V; Values which are permitted as an exception shall be: 173 - 190 - 220 V;

5. the standard value of the prescribed frequency is 50 Hz.

(3) The electrical meters referred to in Article 375(1), points (1) and (2) and the additional devices incorporated, if any, must retain their insulation properties under the prescribed operating conditions, taking into account the influence of climatic conditions and the various stresses to which they are subjected under the prescribed operating conditions.

(4) Standard values for electrical magnitudes of the electricity meters referred to in Article 375(1)(3) shall be:

1. standard values for directly connected meters:

I_{tr}: 0.5 – 1 – 1.5 – 2 A

I_{ref} = 10 x I_{tr}: 5 – 10 – 15 – 20 A

Recommended voltages: 230/400 V, limit values are 220/380 V, 240/415 V;

2. standard values for meters connected through a transformer:

I_{tr}: 0.05 – 0.1 – 0.25 A,

$I_n = I_{ref}$: 1 – 2 – 5 A,

Recommended voltages: 100/√3-110/√3 V, permissible values shall be 200/√3 V

3. the standard value of the prescribed frequency is 50 Hz.

Чл. 377. Electricity meters shall meet the accuracy requirements where the electrical energy quality meets the following requirements:

1. the voltage deviations from its nominal value shall be ± 10 %;

2. the frequency deviations from its nominal value shall be ± 5 %;

3. the power factor shall be within the range of 0.5 inductive to 0.8 capacitive.

Чл. 378. For electricity meters under Article 386 (1), point (1), the manufacturer must determine the values of:

1. prescribed voltage (U_n)/prescribed frequency (f_n) as voltage/frequency values according to which the relevant performance of the meter is determined;

2. declared current (I_n) as the current value according to which the relevant performance profile of an electric meter operating with a transformer is determined;

3. base current (I_b) as the current value according to which the relevant performance of a direct connection meter is determined;

4. maximum current (I_{max}) as the highest current value at which the meter still meets the accuracy requirements;

5. the minimum current value I_{min}, above which the error is intended to be within the prescribed limits.

Чл. 379. Class of the meter shall be determined by reference to the climatic, mechanical and electromagnetic conditions of the environment in which it is intended to be used.

Чл. 380. Depending on from climatic conditions, the electricity meters may come from:

1. class C2 – applies to enclosed spaces whose temperature and humidity are not controlled; electricity meters can be exposed to solar and thermal radiation, flow, condensate, water from various sources (free of rain) and icing;

2. class C3 – applies to open spaces with average climate conditions excluding polar and desert areas.

Чл. 381. Depending on the mechanical conditions, the electrical meters shall be class M1, which applies to spaces with minor vibration and shocks.

Чл. 382. Depending on the electromagnetic conditions, the electricity meters may be of:

1. class E1 – applies to residential, commercial and light industrial premises; or

2. class E2 – applies to industrial spaces.

Чл. 383. Manufacturer shall determine the normal conditions of use of the meters using the following classes:

1. class B, which corresponds to Class M1 for mechanical conditions and Class C2 for climatic conditions;

2. class C, which corresponds to Class M1 for mechanical conditions and Class C3 for climatic conditions.

Чл. 384. (1) The electricity meter under Article 375(1), points (1) and (2), must be fitted with a display device, such as an electromechanical register or an electronic display. Where possible, the display device shall be visible to the user.

(2) The register shall be capable of recording and displaying, starting from zero, for a minimum of 1,500 hours of energy corresponding to the maximum current at the prescribed voltage and a power factor of unit.

(3) The current tariff must be shown (indicated).

(4) In the case of multiple values provided by a single display, it shall be possible to display the content of all relevant memories. Where displaying the memory, each tariff used must be identifiable, and in the case of an automatically consecutive display, each register image must remain on the display

for a minimum of 5 s.

Чл. 385. The reading of the total electrical energy accumulated during use must be impossible to change.

Чл. 386. For static electricity meters, the permanent memory must be able to be stored for a minimum of four months.

Чл. 387. (1) Every electricity meter referred to in Article 375(1), points (1) and (2) must bear at least the following information:

1. the manufacturer’s name or trade mark;

2. the type designation and type approval mark;

3. the number of phases and number of wires for which the meter is adapted (e.g. single-phase two-conductor); these markings can be replaced with graphic marks;

4. serial number and year of manufacturing; if the serial number is marked on a plate affixed to the cover, this number must also be marked on the meter base or stored in the meter's non-volatile memory;

5. the prescribed voltage;

6. the main and maximum current for direct connection meters (for example: 10-40 A or 10 (40) A - for electricity meters with base current 10 A and maximum current 40 A); for electricity meters connected through transformers, the declared secondary current of the transformer(s) to which the meter is to be connected (it shall be indicated e.g. as follows: /5 A); the declared and maximum current of the meter can be included in the type designation;

7. the prescribed frequency in hertz;

8. the electricity meter constant;

9. the class of the electricity meter;

10. the prescribed temperature, if different from 23 C;

11. double square sign for electricity meters with a protection class II insulation box.

(2) The information referred to in par. 1, items 1 - 3 may be given on an external plate permanently attached to the electricity meter cover. The information referred to in paragraph 1 (4) to (11) shall be marked on a label on the electricity meter. The marking on the outside of the electricity meter shall be indelible, clearly and legible.

(3) The electricity meter may also bear other information (place of manufacture, ownership information, trade description, special serial number, connection scheme identification number).

(4) The connection circuit shall be indelibly marked on each electricity meter. If the terminals of the electricity meter are marked, this marking shall also be affixed to the diagram.

(5) For three-phase electricity meters, indicate the sequence of phases for which they are intended.

(6) The connection scheme may be indicated by means of identifying graphic.

(7) Every electricity meter referred to in Article 375(1)(3) must be indicated in accordance with the Regulation on the essential requirements and conformity assessment of measuring instruments.

Чл. 388. The technical file of the electricity meters referred to in Article 375 (1) (1) – at the time of type-approval, must additionally contain:

1. the intended use of the measuring instrument;

2. specific data necessary for identification of type;

3. connections and marking of terminals.

Чл. 389. The markings from the initial verification (seals) shall be placed on the electricity meters in such a way that access to the internal working parts is possible only after destruction.

Чл. 390. For electricity meters the following accuracy classes are defined:

1. active energy electricity meters: 0.2S 0.5S 0.5 1.0 2.0

2. reactive energy electricity meters: 0.5S 1S; 1 2.0 3.0

3. electricity meters referred to in Article 375(1), point (3): index for classes A, B and C.

Чл. 391. The error limits shall be:

1. for electromechanical active energy meters (class 0.5; 1; 2 and with indices for classes A and B) – in accordance with Annex 22;

2. for static electricity meters for active energy (class 1; 2; 0.2S 0.5S and with indices for classes A, B and C) – in accordance with Annex 23;

3. for static electricity meters for reactive energy – in accordance with Annex 24.

Чл. 392. (1) The electricity meters referred to in Article 375(1), point (1) shall be made available on the market and/or put into service after type-approval and initial verification and shall be subject to subsequent verifications.

(2) The electricity meters referred to in Article 375 (1), point (2) with a valid type-approval certificate, put into service after an initial verification until 30 October 2016, shall be subject to post-clearance checks.

(3) The meters referred to in Article 375 (1) (3) shall be made available on the market and/or put into service after conformity with the essential requirements laid down in the Regulation on the essential requirements for conformity assessment of measuring instruments has been assessed and verified, and shall be subject to subsequent verification in accordance with this Regulation.

Чл. 393. Where some test results go beyond the error limits from current changes due to measurement uncertainty or other parameters affecting the measurements, the zero line may be shifted once in parallel by:

1. 1 % for static electricity meters for active accuracy class 2, for electromechanical meters for active accuracy class 2 and for static meters for reactive energy;

2. 0.5 % for static electricity meters for active energy accuracy class 1 and electromechanical meters for active energy accuracy class 1;

3. 0.3 % for electromechanical electricity meters for active energy accuracy class 0.5;

4. 0.2 % for static electricity meters for active energy accuracy class 0.5S;

5. 0.1 % for static electricity meters for active energy accuracy class 0.2S.

Чл. 394. All tests for the type-approval of electricity meters referred to in Article 386(1), point (1) shall be carried out under prescribed operating conditions.

Чл. 395. (1) During an initial verification, each electricity meter presented shall be checked in the following order:

1. testing of AC insulation properties;

2. verification of technical requirements;

3. test for unladen operation (self-propellant);

4. starting test – response threshold (if the meter is designed to measure energy in both directions, the test shall be performed in both directions);

5. verification of the accuracy of the meter (if the meter is designed to measure energy in both directions, the test shall be carried out in both directions);

6. checking the electricity meter constant.

(2) The test shall be carried out with the cover fitted, except when the initial check is carried out in the manufacturer's laboratories, provided that it has been established beforehand that the cover has practically no effect on the performance of the electricity meter.

(3) Where checking the dielectric properties of the electricity meter, the lid shall be installed regardless of whether it affects the operation of the electricity meter.

(4) After successful completion of the dielectric strength test, before proceeding to the next test, the meters shall be connected for at least half an hour to a mains supply at a voltage equal to that prescribed, with a current equal to 0.1 I_b and a power factor of one.

(5) The error of multi-tariff electromechanical meters shall be determined under prescribed operating conditions for all tariffs at a current equal to 0.1 I_b and with a power factor of unity.

(6) For multi-tariff electricity meters, the compliance of the meter reading device with the

meter constant shall be verified for all tariffs at rated or maximum current and with a power factor of one.

Чл. 396. (1) During the subsequent verification of the meters, the following shall be carried out:

1. test for unladen operation;

2. testing of start-up conditions;

3. testing for changing current for compliance of electricity meter errors with their limit values referred to in Article 391;

4. verification of the meter constant at long-term start, such as:

(a) for electromechanical meters, the last roll must make one complete revolution when checked;

(b) for static meters, the set amount of energy shall, when checked, provide a reading error of less than 1/2 of the allowable error for the accuracy class and the indicating device shall have a corresponding change in the significant digits.

(c) the error of multi-tariff electromechanical meters shall be determined under prescribed operating conditions for all tariffs at a current equal to 0.1 I_b and with a unit power factor.

(2) For multi-tariff electricity meters, the compliance of the meter reading device with the meter constant shall be verified for all tariffs at rated or maximum current and with a unit power factor.

Чл. 397. (1) The period of validity of the subsequent verification of a batch of electricity meters intended for domestic, commercial and light industrial use may be extended if the conditions for applying the statistical control method have been met and the criteria set out in Annex 2 have been achieved when a sample of the batch was checked.

(2) The statistical control method may be applied if the validity of the previous electricity meter verification has not expired and the conditions for grouping the electricity meters into a batch are met.

(3) Electricity meters may be grouped into a batch where:

1. they have the same: manufacturer, type or modification or extension of type, identified in accordance with the type-approval certificate and the type-approval mark or the EC type/design examination certificate;

2. the year of manufacture of the measuring instruments does not differ by more than one year;

3. they have the same: main current, maximum current, prescribed voltage and accuracy class;

4. they are used under the prescribed operating and environmental conditions;

5. the date of the previous inspection of all measurement equipment differs by no more than one year.

(4) In dismounting and transportation of electricity meters from the sample batch, adequate organizational and technical steps shall be taken to prevent any act that may result in changes in their technical and metrological characteristics. Notwithstanding the size of the sample group, the period for disassembly and transportation must be as short as possible and not exceed two months.

Section XXIII
Measuring transformers

Чл. 398. (1) Measuring transformers are auxiliary devices that provide the meters to which they are connected with reduced voltage and/or current values in the network. Measuring transformers are designed to transmit an information signal to measuring instruments, measuring instruments, protective or control devices.

(2) Measurement transformers are current, voltage and combined transformers. Depending on the voltage the transformers are for low, medium and high voltage.

(3) Measuring transformers can also be electronic.

(4) The manufacturer shall determine the values of the measurand and of the influencing quantities which represent the normal conditions of use.

Чл. 399. (1) The following particulars shall be marked on each measuring transformer or on a plate securely fastened thereto:

1. the name of the manufacturer or any other mark by which he can be easily identified;

2. designation of type and identification number, year of manufacture;

3. for current transformers – declared primary and secondary current;

4. for voltage transformers – declared primary and secondary voltage;

5. declared output power and corresponding accuracy class; if there is more than one secondary winding – the marking must indicate the output power of each secondary winding in VA and the corresponding accuracy class;

6. security factor for the measurement coils of current transformers;

7. declared frequency;

8. mass in kg (at values ≥ 25 kg);

9. temperature range;

10. type of fluid, nominal filling pressure, minimum working pressure, volume of fluid (or mass) contained in the measuring transformer (when the insulation is fluid);

11. maximum network voltage;

12. declared insulation level.

13. in the case of a combined transformer – U_e induced by the effective value of the declared short-term thermal current flowing through the current part when the primary winding of the voltage part is short-circuited.

(2) The indications referred to in paragraph (1), points (11) and (12) may be combined into one, for example 1.2/6/- kV or 72.5/140/325 kV.

(3) In addition, the following data must be entered:

for voltage transformers — the declared voltage ratio and the corresponding application time;

2. for current transformers – declared continuous thermal current (I_{cth}), declared thermal resistance current (Ith) and declared dynamic resistance current (I_{dyn}) if it differs from 2.5 I_{th};

3. insulation class, if different from class A; if materials with several insulation classes are used, it is necessary to specify the material that will limit overheating of the windings;

for transformers with more than one secondary coil — the use of each coil and the relevant outputs.

Чл. 400. Measurement transformers may be of the following accuracy classes:

1. voltage transformers:

(a) measuring coils – 0.1; 0.2; 0.5 1.0; 3.0;

(b) protective coils – 3P and 6P.

2. current transformers:

(a) measuring coils – 0.1; 0.2; 0.2S 0.5; 0.5S 1.0; 3.0; 5.0;

(b) protective coils – 5P, 10P, 5PR, 10PR (in addition to these may include TPX, ТРУ and TPZ coils that take into account transient processes and/or classes PX and PXR).

Чл. 401. (1) The error limits of the measuring transformers shall correspond to those specified for:

1. electrical transformers – in Annex 25;

2. voltage transformers – in Annex 26;

(2) In the accuracy test of compound transformers, the influence of the current part on the error of the voltage windings and the influence of the voltage part on the error of the current windings should be considered.

Чл. 402. Measurement transformers shall be made available on the market and/or put into service after type-approval and initial verification.

Чл. 403. The type approval examination of measuring transformers shall be carried out under operating conditions.

Чл. 404. Initial verifications on measurement transformers shall include:

1. verification of the outlet marking;
2. testing of primary coils at withstanding voltage at industrial frequency;
3. testing of secondary coils at withstanding voltage at industrial frequency;
4. a sustained voltage test with an industrial frequency between sections;
5. partial discharge measurement;
6. accuracy test;
7. measuring of capacity and dielectric loss ratio – for capacitor voltage transformers;
8. a ferro-resonance check – for capacitive voltage transformers;

Чл. 405. At the request of the applicant, the initial verification of batches of metering transformers may be carried out using the statistical method specified in Annex 27 by checking a sample of the batch.

Section XXIV
Electrocardiographs

Чл. 406. An electrocardiograph is a measuring instrument designed to record changes in the bioelectric activity of the human heart as a function of time.

Чл. 407. (1) The requirements of this section apply to electrocardiographs with a printing device or from which an electrocardiogram printout can be extracted by means of a computer.

(2) The requirements of this section shall not apply to vector electrocardio-instruments and electrocardio-instruments for special purposes.

Чл. 408. Electrocardiographs shall be made available on the market or put into service after conformity with the essential requirements laid down in the Medical Devices Act has been assessed and certified, and shall be subject to subsequent verifications in accordance with this Regulation when used in medicine for the purposes of medical surveillance, diagnosis and treatment.

Чл. 409. During subsequent periodic verification of electrocardiographs they shall be deemed to comply with the requirements in case of:

1. relative error of voltage measurement within ± 5 %;
2. relative error of measurement of time intervals within ± 5 %;
3. the relative error of the internal calibrator and the time stamp, if any, within ± 5 %. ;
4. time constant $T_{C,}$ greater than 3.2 s;
5. an amplitude response covering the frequency range from 0.05 Hz to 100 Hz;
6. current in the patient circuit.I_P not more than 0.1 μA.

Чл. 410. In addition to the requirements of Article 409, in case of subsequent verification after repair, the following requirements must be met:

1. the relative sensitivity adjustment error shall be within ± 5 %;
2. the relative error of the movement speed of the recording medium is within ± 5 %;
3. the Z_{BX} input impedance to be greater than 5 MΩ.

Чл. 411. The markings of metrological control shall be placed in a visible position on the electrocardiograph.

Section XXV
Audiometers

Чл. 412. (1) Audiometers are measuring instruments designed for the study of human hearing, with pure tones and masking noise with binaural action by air and monaural action by bone conduction

(2) The requirements of this section apply to audiometers used in healthcare with a frequency range of 125 Hz to 10,000 Hz.

Чл. 413. (1) Audiometers shall be made available on the market or put into service after

conformity with the essential requirements laid down in the Medical Devices Act has been assessed and certified, and shall be subject to subsequent verifications in accordance with this Regulation when used in medicine for the purposes of medical surveillance, diagnosis and treatment.

(2) During subsequent verification the error of the set discrete value, the error in level and frequency of the audiometer test audible signal and a hearing bone conductivity level error shall be determined.

Чл. 414. The maximum permissible errors of the audiometers in setting the frequency and level of the sound signal shall not exceed the values specified in Annex 28.

Чл. 415. The markings of metrological control shall be placed in a visible position on the audiometer.

Section XXVI
Speedometer

Чл. 416. (1) Speedometer are measuring instruments designed to control the speed of road vehicles (RVs).

(2) The radar speedometer measures the rate by reproducing the Dopler effect.

(3) The laser speedometer measures the speed by emitting laser pulses to a RV and receiving the signals reflected by its surface, while measuring the time taken to reach the RV and vice versa.

(4) The speedometer for average speed, determines the average speed of a vehicle by measuring the time taken to travel a reference distance on a section of the road:

1. average speed is the speed obtained by dividing the distance between the two reference points by the measured time for which the RV passes between these reference points is calculated;

the reference distance of a road section is the distance between two control points between which the average speed is measured.

Чл. 417. (1) Speedometers shall be capable of identifying the vehicle whose speed is measured, including in the case of two or more vehicles moving simultaneously and in the case of a divergence.

(2) If the speedometer is not adapted to meet the requirement of paragraph (1), it shall cancel the results of its own measurements when two or more vehicles enter the measurement area simultaneously but at different speeds.

(3) When measuring with an average speedometer, at least one of the cameras shall have a field of view sufficient to ensure that the vehicle is clearly identified when leaving the exit control point and its position relative to it. An average speedometer shall automatically record the presence, time and identification of vehicles as they pass through the control points at the time of entering or leaving the base distance of the road section by image recognition.

Чл. 418. (1) When not in operation, the speedometer shall withstand temperatures from minus 25°C to 70°C without damage.

(2) The speed measurement range shall include at least the range from 30 km/h to 150 km/h.

(3) The resolution of speedometers shall be no greater than 1 km/h.

Чл. 419. Speedometer exposed to external influences must be dust- and watertight and have good mechanical strength.

Чл. 420. Speedometer shall automatically exclude false results caused by external influences and interference, as well as those caused by supply voltage changes outside the manufacturer's specified range.

Чл. 421. (1) When switched on, speedometers shall carry out a mandatory inspection of their constituent components, verifying their completeness.

(2) When measuring the average speed, it is necessary to time the recording devices installed at the control points from a single source.

(3) Any discrepancy must prevent further measurements.”

Чл. 422. (1) Speedometers must be connected to a filming device.

(2) The record shall contain at least the following information:

1. date and time (hour, minute, second) of the measurement;

2. the measured speed;

3. the direction of travel, if measurement is in both directions;

4. the identification of the measuring instrument with which the measurement was made;

5. the configuration settings and the operating mode if applicable;

6. the speed of the road vehicle in which the speedometer is installed for the speedometer operating in mobile mode;

7. the location of the section of road where the measurement is conducted, the fixed distance along this section, the time of travel between the control points and the time synchronisation status for average speed speedometers.

8. the registration number of the road vehicle.

(3) The speedometer, including the recording area, shall ensure that the recording of the position of the vehicle in the recording area and the associated image document can unequivocally assign the measured speed to the same vehicle. Documented evidence must be protected from manipulation. The manufacturer must determine the method for assessing the object of the documented evidence and the measured speed and for checking the authenticity of the documented evidence.

(4) The direction of emission of the speedometer and the optical axis of the camera shall coincide. A mechanical connection must be provided to ensure that the system is pointed in the right direction. In the absence of this requirement, this shall be ensured by the operations described in the instructions for use.

Чл. 423. (1) The manufacturer must ensure that the measurement results are within the specified permissible limits and specify the conditions under which this requirement is met.

(2) For medium speed indicators, in addition to the information specified in paragraph (1), the manufacturer shall provide information on how to synchronise the time of the two reference points and how the reference distance is determined.

(3) The fixed distance along a section of road for measuring average speeds shall be the shortest possible trajectory of movement permitted under the Road Traffic Act. The fixed distance shall be measured on a single occasion with a permissible error of ± 1 % before the initial installation and shall be reliably marked. In the event of a change in the road geometry and/or in the infrastructure leading to permanent changes in the section of road, the fixed distance must be measured again.

(4) The technical documentation of the medium speed meter shall contain evidence of how the time is synchronised. The time synchronisation check shall be performed automatically, without the intervention of the operator, so that the synchronisation status of the filming devices is reliably established from the initial installation without the need for further measurements.

Чл. 424. (1) The speedometer shall bear indelible markings for:

1. the name of the manufacturer;

2. the type and identification number.

(2) Each device connected shall bear an appropriate type or identification number.

Чл. 425. (1) Maximum tolerances for speedometer errors shall be:

1. when measuring speed by signal simulation: ± 1 km/h for speeds up to 100 km/h or ± 1 % of the measured value for speeds exceeding 100 km/h;

2. when measuring speed under operating conditions: ± 3 km/h for speeds up to 100 km/h or ± 3 % of the measured value for speeds exceeding 100 km/h.

(2) The speedometer shall be capable of making measurements with an accuracy not exceeding the maximum permissible temperature range of at least – 10 °C to 55 °C.

(3) For speedometers installed in a road vehicle, the temperature range referred to in paragraph (2) shall be from 0°C to 50°C.

(4) If the limits of the temperature range specified by the manufacturer are exceeded, the speedometer shall automatically stop measuring.

Чл. 426. (1) An operator-assisted laser speedometer shall be equipped with a targeting device directed in the direction of the light beam.

(2) The emission power of laser speedometers must not exceed class 1 in accordance with BDS EN 60825-1.

(3) The laser speedometer shall be fitted with a device for measuring the distance to the RV with a maximum permissible error of ± 0.3 m.

Чл. 427. (1) The speedometer for average speed shall detect the presence of the road vehicle at the moment of entry and exit at the base distance and identify the road vehicle.

(2) The speedometer shall be designed to make two or more measurements using independent methods.

(3) The basic average speed measurement method shall be used to provide the primary evidence of the speed of the road vehicle.

(4) The reference method for measuring the average speed of the road vehicle shall be independent of the basic method and shall be used to verify the accuracy of the measurement of the speedometer.

(5) The time interval used for the control measurement must begin within 0.1 s of the beginning and must end within 0.1 s of the end of the main measurement. The accuracy of the reference measurement shall be within 10 % of the average speed determined by the basic measurement.

Чл. 428. Speedometers shall be made available on the market and/or put into service after type-approval and after initial verification and shall be subject to subsequent verifications.

Чл. 429. The field test shall be carried out by measuring the speed in real traffic for complex purposes assessment of the factors influencing the results of the speed measurements. Measurements shall be conducted under conditions of changing speeds, traffic density and, if possible, at different temperatures.

Чл. 430. (1) One speedometer shall be tested for type approval and the test shall include:

1. microwave section measurement, for radar speedometers;
2. preliminary test of effects of the electronic unit;
3. measurement of mechanical endurance;
4. measurement of climate resistance;
5. water test for parts exposed to water;
6. the error of measurement of distance to the road vehicle for laser speedometers;
7. the error in speed measurement in signal simulation and field test.

(2) Devices for the recording of medium speed indicators shall be tested in accordance with paragraph 1 (2) to (5).

(3) In the field test of the average speedometer, the base distance, the speed measurement error, the installation of the recording devices, the timing method and the timing synchronization method shall be measured.

Чл. 431. (1) The initial verification shall include:

1. for radar speedometers: checking the control points on the antenna emission diagram;
2. frequency range verification, for radar speedometer devices;
3. the speed measurement error in signal simulation and field test;
4. verification of the emitted power;
5. the error of measurement of distance to the road vehicle for laser speedometers.

(2) The initial verification for the medium speed indicators shall be carried out at the installation site. The reference distance, the speed measurement error, the mounting of the capture devices and the timing method shall be measured.

Чл. 432. (1) The subsequent verification shall include:

1. for radar speedometers: checking the control points on the antenna emission diagram;

2. frequency range verification, for radar speedometer devices;

3. the error in speed measurement in signal simulation and field test;

4. the error of measuring the distance to the road transport vehicle for laser speedometers.

(2) In the case of a field test of an average speed meter, the marking of the reference distance, the control points and the installation of the filming devices shall be checked.

Section XXVII
Breath alcohol analyzers

Чл. 433. Breath alcohol analyzers are measuring devices designed to be used to determine the concentration of ethyl alcohol in the air exhaled from the lungs.

Чл. 434. The breath alcohol analyser shall be designed as to guarantee the maximum permissible error without adjustment for a period of 6 months after initial start-up.

Чл. 435. (1) The breath alcohol analyser shall only take a measurement if the sample taken is taken to be representative of the air exhaled from the lungs.

(2)The breath alcohol analyser shall not give a result if the flow of exhaled air is interrupted or if alcohol is present in the upper respiratory tract.

(3) The breath alcohol analyser shall display an error message if one or more of the following conditions are not met:

1. exhaled volume: greater than or equal to 1.2 litres;

2. flow rate: greater than or equal to 0.1 l/s;

3. exhalation time: greater than or equal to 3 s.

Чл. 436. (1) Before each measurement, the breath alcohol analyzer shall automatically indicate that it is ready to make a correct measurement.

(2) The measurement shall not be carried out if the automatic check indicates that it is being carried out incorrectly.

Чл. 437. (1) Breath alcohol analysers shall be designed and manufactured in such a way that their errors do not exceed the maximum permissible errors at ambient temperature specified by the manufacturer.

(2) Breath alcohol analysers shall be designed to operate in areas with a significant or high degree of vibration and shock and at atmospheric pressure from 860 hPa to 1,060 hPa.

Чл. 438. The effect of an electromagnetic disturbance shall be such that the variation of the measurement result is not greater than the maximum permissible error.

Чл. 439. (1) The breath alcohol analyser shall display the measurement result in mg/l.

(2) The breath alcohol analyser may display the result of the measurement in miles ‘‰’ in accordance with Annex 29.

Чл. 440. The measurement range of ethyl alcohol concentration shall be from 0 mg/l to at least 2 mg/l.

Чл. 441. The maximum permissible errors of the breath alcohol analysers at type approval, initial verification and subsequent verification following repair shall comply with the requirements set out in Annex 30.

Чл. 442. The maximum permissible errors of the alcohol analysers in the breath of a subsequent check shall comply with the requirements set out in Annex 30.

Чл. 443. The resolution shall be at least 0.01 mg/l in the measuring mode and equal to 0.001 mg/l under metrological control.

Чл. 444. The standard deviation for all mass concentrations must be less than or equal to one third of the maximum permissible errors

Чл. 445. Breath alcohol analysers shall be made available on the market and/or put into service after type approval and initial verification and shall be subject to subsequent verifications.

Чл. 446. (1) Steam gas mixtures at 34 °C ± 0.5 °C and nominal mass concentration values of 0.05 mg/l to 0 mg/l, 0.95 mg/l, 1.50 mg/l, 1.90 mg/l, 0.10 mg/l, 0.25 mg/l, 0.40 mg/l, 0.70 mg/l shall be used to perform metrological control of alcohol analysers in the breath.

(2) For breath alcohol analyser ranges above 2 mg/l, the mass concentration used must be equal to 90% of the upper limit of the range.

(3) The steam gas mixtures shall be obtained at the outlet of the gas generator from aqueous solutions of ethyl alcohol in accordance with Annex 29.

Чл. 447. Initial and subsequent verifications shall be carried out with steam gas mixtures at least at 3 points within the range of measurement.

Section XXVIII
Taximeters

Чл. 448. (1) Taximeters are measuring instruments installed in taxi cars and designed to calculate and display the amount payable in use on the basis of the distance travelled and/or the duration of the car's rental.

(2) Taximeters shall be made available on the market and/or put into service after conformity with the essential requirements laid down in the Regulation on the essential requirements and conformity assessment of measuring instruments has been assessed and certified.

(3) Taximeters installed in a car shall be subject to subsequent verifications in accordance with this Regulation.

Чл. 449. (1) The subsequent verification of taximeters installed in a car shall be carried out together with the distance signal generator.

(2) The subsequent verification shall include:

1. external inspection;

2. compliance examination of the management program;

3. functional verification;

4. when calculating the fare on the basis of applying the time tariff below the cross-over speed and applying the distance tariff above the cross-over speed:

(a) examination for measuring the stay time;

(b) examination for distance measurement.

5. when calculating the charge on the basis of the simultaneous application of the time tariff and the distance tariff for the entire trip, an examination with both time and distance measurement.

(3) The maximum permissible errors are as follows:

1. for time passed: ± 0.2 % when calculating the charge on the basis of simultaneous application of the time tariff and the distance tariff for the entire trip;

2. for stay time: ± 1 s per minute – when calculating the fare on the basis of applying the time tariff below the cross-over speed and applying the distance tariff above the cross-over speed.

3. for distance travelled: ± 2%.

Section XXIX
Requirements for software used in measuring instruments

Чл. 450. (1) Where the measuring instrument has software that is determinative of the metrological characteristics, the software shall be identifiable as appropriate software, easily identifiable, protected and shall store data for possible interference.

(2) The measurement data, the software specified in paragraph 1 and the data on the

metrological characteristics to be stored and transmitted must be protected from accidental or deliberate interference.

(3) The metrological characteristics of the measuring instrument must not be influenced by any other device connected to it, by the characteristics of the connected device or by any remotely connected device.

(4) Where the measuring instrument is provided with software that also fulfils functions apart from measurement, the part of the software determining the metrological characteristics must be subject to identification and must not be influenced by the measuring instrument."

Chapter Three

PROCEDURE FOR THE CONTROL OF MEASURING INSTRUMENTS

Section I

General provisions

Чл. 451. The procedure for the control of measuring instruments shall include:

1. procedure for the type-approval of measuring instruments and the withdrawal of the type-approval of measuring instruments;

2. procedures for keeping the register of types of measuring instruments approved for use;

3. procedure for the entry in the register of types of measuring instruments in accordance with Article 2 (4);

4. the procedure for the initial verification of the measuring instruments;

5. procedure for performing ex-post verification of measuring instruments.

Section II

Procedure for the type-approval of measuring instruments

Чл. 452. The type-approval of measuring instruments shall include:

1. examination of the documents and technical file of the type of instrument;

2. examination of the type of measuring instrument;

3. assessing the conformity of the type of measuring instrument with its technical and metrological requirements;

4. issue of an approved instrument type certificate and entry in the register of the types of measuring instruments approved for use.

Чл. 453. (1) Manufacturers or importers who place on the market measuring instruments subject to type approval under Chapter Two and intended for use in the cases referred to in Article 5 of the Measurements Act shall submit an application for type approval to the Bulgarian Metrology Institute.

(2) The application for type-approval shall specify:

1. the name, address, telephone and fax and/or e-mail address of the applicant and the name and address of the manufacturer of the measuring instruments;

2. the name and type of the measuring instrument, components, auxiliaries or auxiliary devices;

3. the factual basis for the application of the type of measuring instrument for approval:

(a) new production or import;

(b) modification or addition of an approved type;

(c) restricted type-approval;

(d) the extension of the period of validity of the type-approval;

(e) extension of the period of validity for limited type-approval;

4. the intended use of the measuring instrument;

5. the technical and metrological characteristics of the type of measuring instrument;

(3) A range of instruments may also be declared for type-approval and the application shall specify the technical and metrological characteristics of the measuring instruments in the range.

(4) Applications for extension of the period of validity of the type-approval or restricted type-approval shall be submitted no later than six months before the expiry of the corresponding period of validity.

Чл. 454. (1) The application for type-approval shall be accompanied by the following documents:

1. the technical file of the type of measuring instrument with the content according to Annex 31 in Bulgarian language, and for those imported – in original;

2. copies of declarations of conformity and test reports or certificates of conformity, if the measuring instrument is also subject to conformity assessment with the essential requirements determined in accordance with the Law on Technical Requirements for Products (LTRP);

3. proof of payment of the fee for instrument document examination at type approval, except where the fee has been paid electronically.

(2) The application referred to in paragraph 1 shall also be accompanied by copies of other documents, if available to the applicant, such as instrument type test reports issued by laboratories accredited by an internationally recognised accreditation body for testing the relevant measuring instruments and/or a national metrological institute.

(3) In the case of modification or addition of an approved type of measuring instrument, the technical file of the measuring instrument shall detail the modification or supplement carried out and indicate the new technical and metrological characteristics of the type.

(4) Where the application is submitted electronically, scanned images of the documents required under paragraphs 1 and 2 shall be attached to it.

Чл. 455. Where extending the term of validity of approval/limited approval of the type of measuring instrument, the applicant shall attach the technical documentation of the measuring instrument granted with approval or limited approval and shall declare in writing that the type granted with approval or limited approval has not been altered.

Чл. 456. The Bulgarian Metrology Institute shall review the application, the documents and the content of the technical file, the described technical and metrological characteristics of the type of measuring instrument and the intended use prescribed by the manufacturer within the time limits laid down in Article 29a (2) of the Measurements Act.

Чл. 457. (1) Where deficiencies and inconsistencies in the documents submitted under Article 453 are found, the applicant shall be notified in writing and a time limit shall be set for their rectification, which may not be less than 15 working days and longer than 3 months. The review period referred to in Article 456 shall start to run from the date of their removal.

(2) In the event that the deficiencies and non-compliances are not remedied within the prescribed time limit, the Chairman of the Bulgarian Metrology Institute shall terminate the type-approval procedure.

Чл. 458. (1) In the case of completeness and consistency, the documents submitted under Article 453 shall determine:

1. the tests to be carried out by the measuring instrument type, depending on the applicable national and international documents and/or good practices for the measuring instruments concerned;

2. in agreement with the applicant, the laboratories in which the tests are to be carried out;

3. the time limits for submitting samples of the type of measuring instrument to the laboratories of the Bulgarian Metrology Institute.

(2) Where the application is for modification or addition to an approved type referred to in

Article 453 (3), the content of the modification shall be reviewed and the relevance of the test results of the approved type shall be assessed.

(3) In the event of a positive conclusion under paragraph (2), the test results may be accepted without repeating the test.

Чл. 459. (1) If the documents submitted to the application referred to in Article 453(4) are complete and consistent, the Chairman of the Bulgarian Metrology Institute shall extend the period of validity of the approved type or restricted type-approval.

(2) Where the documents submitted to the application referred to in Article 453(4) are found to be incomplete, the applicant shall be notified in writing and a period of one month shall be set for their removal.

(3) If discrepancies in the documents submitted with the application referred to in Article 453(4) are found and/or the time limit referred to in paragraph 2 is not complied with, the Chairman of the Bulgarian Metrology Institute shall refuse to extend the period of validity of the approved type or restricted type-approval.

Чл. 460. The examination of the type of instrument shall be carried out by testing the technical and metrological characteristics of samples of its type, including examination of the software referred to in Article 450, to establish their conformity with their requirements and the performance of the measuring instrument under operating conditions.

Чл. 461. (1) The testing of measuring instruments shall be carried out in laboratories of the Bulgarian Metrology Institute.

(2) Testing of measuring instruments may also be carried out in laboratories accredited by an internationally recognised accreditation body for testing the relevant measuring instruments and/or a national metrological institute and/or at the applicant's premises in accordance with Article 27 of the Measurements Act.

(3) Where testing is carried out in laboratories of the Bulgarian Metrology Institute, the applicant shall submit the samples of the type of measuring instrument for testing within the time limit laid down in Article 458(1)(3) and pay a fee for the test. Where the test is carried out in the locations referred to in paragraph 2, the applicant shall also pay the costs of secondment of staff of the Bulgarian Metrology Institute.

(4) Where testing is conducted in the cases specified in Article 27 of the Measurements Act, the applicant must provide:

1. evidence of the traceability of the reference gauges and the measuring equipment to be used in testing;

2. the necessary conditions for performing the test.

Чл. 462. (1) On the basis of the results of the test reports, a report on the conformity of the measuring instrument type with its technical and metrological requirements shall be drawn up within 30 days of receipt of the reports. The experts carrying out the conformity assessment of the type shall be different from the experts involved in the type examination.

(2) Within 7 days of the submission of the report referred to in paragraph 1, a reasoned proposal shall be made to the Chairman of the Bulgarian Metrology Institute for type-approval or refusal of type-approval of the measuring instrument.

Чл. 463. Within 7 days of receipt of the proposal referred to in Article 462(2), the Chairman of the Bulgarian Metrology Institute shall adopt the approval report and, within 3 working days of acceptance of the report, a type-approval certificate or a supplement to the type-approval certificate shall be issued and entered in the register of the types of measuring instruments approved for use or a reasoned refusal of type-approval and notified to the applicant.

(2) The type-approval certificate shall contain:

1. the name and type of the measuring instrument or range of instruments;

2. the name and address of the manufacturer of the measuring instrument;

3. the number of the type-approval certificate and the serial number of the register of the types of measuring instruments approved for use under which the type is to be entered;

4. the date of issue of the measuring instrument's type-approval certificate;

5. the period of validity of the type-approval;

6. an image of the approved type mark.

(3) The type-approval certificate shall be accompanied by:

1. a description of the type, which includes the intended purpose, the principle of operation and the technical and metrological characteristics of the measuring instrument or measuring instruments included in the range and other specific data necessary for identification of the type;

2. a description, drawing or photograph of the places where the signs certifying the results of the control are to be affixed and the places where the measuring instrument is to be sealed;

3. a description of the protection of the software against accidental or intentional interference in the cases referred to in Article 450.

(4) The type-approval certificate for components, auxiliaries and instrumentation accessories shall additionally specify:

1. the types of measuring instruments in which they can be incorporated or to which they can be connected;

2. the conditions for the overall operation of the measuring instruments for which they are approved.

Чл. 464. (1) At the time of approval of a modification or addition to an approved type of measuring instrument, the Chairman of the Bulgarian Metrology Institute shall issue a supplement to the type-approval certificate.

(2) The supplement to the type-approval instrument certificate shall contain:

1 the data referred to in Article 463(2), points (1) to (5);

2. a description of the modification or addition made to the type of instrument;

3. the technical and metrological characteristics of the measuring instrument which have been altered as a result of the modification or addition made to the type of instrument.

(3) The supplement shall be issued with the period of validity of the type-approval certificate issued.

(4) A supplement to the approved type certificate shall also be issued when the duration of the type-approval certificate referred to in Article 30 (3) and (2) of the Measurements Act is extended.

(5) The extension supplement to the type-approval certificate shall contain:

1 the data referred to in Article 463(2), points (1) to (4);

2. the date of issue of the extension supplement of an approved/restricted type approval certificate;

3. the period of validity of the supplement issued.

Чл. 465. (1) In the case of limited type approval of measuring instruments, the procedure laid down in Articles 457 and 460 to 464 shall apply and the following restrictions may be laid down:

1. for the number of measuring instruments considered to be type-approved and may be made available on the market and/or put into service;

2. for the area of use of the type of measuring instrument;

3. special restrictions arising from the technology used.

(2) In the examination and assessment of the type of instrument, the requirements for measuring instruments having the same or similar purposes and the methods for their control shall apply.

(3) The measuring instruments referred to in paragraph 1 may not be approved if the maximum permissible errors of the measuring instrument are greater than the maximum permissible errors laid down in the Regulation for measuring instruments having the same or similar purposes.

Чл. 466. (1) The restrictions referred to in Article 465(1) shall be justified by a proposal to the Chairman of the Bulgarian Metrology Institute.

(2) The restrictions referred to in paragraph 1 shall be entered in the type-approval certificate.

Чл. 467. Persons making available on the market and/or putting into service measuring instruments whose type is restricted are obliged to notify the Bulgarian Metrology Institute of the place of installation of each measuring instrument.

Чл. 468. The applicant shall receive the certificate referred to in Article 463 or the supplement to a certificate issued under Article 464 in return for payment of a fee for issuing them; except where the fee is paid electronically.

Чл. 469. Type approval shall be subject to revocation where, on the basis of the results of the initial and subsequent verifications of the measuring instruments and metrological supervision, the grounds referred to in Article 36 (1) of the Measurements Act are met.

Чл. 470. Refusal of type approval of measuring instruments and withdrawal of type-approval shall be subject to appeal in accordance with the procedures and within the time limits laid down in the Code of Administrative Procedure.

Чл. 471. For the period of validity of the type-approval certificate, the applicant may apply for changes to the particulars referred to in Article 463(2), point (2) to be entered in the approved type certificate when applying for new circumstances to be entered in the Commercial Register and the Register of Non-Profit Legal Entities or submit a copy of the certificate of modification, if the applicant is a foreign person.

Чл. 472. The documents referred to in Articles 453 to 455 and Article 467 may also be submitted electronically under the conditions and procedures of the Electronic Document and Electronic Certification Services Act and the Electronic Governance Act.

Section III

Procedure for entry in the register of types of measuring instruments referred to in Article 2(4)

Чл. 473. (1) Persons making measuring instruments available on the market under Article 2(4) shall apply for registration with the Bulgarian Metrology Institute.

(2) When submitting the application, the persons referred to in paragraph 1 shall provide information on the lawfulness of the marketing of the measuring instruments concerned in accordance with the requirements of Regulation (EU) 2019/515.

(3) The persons referred to in paragraph (1) shall attach to the application:

1. a description of the technical and metrological characteristics of the type in original and in Bulgarian;

2. a copy of a type-approval document in accordance with the national legislation of the country concerned and a translation into Bulgarian;

3. a voluntary mutual recognition declaration under Article 4 of Regulation (EU) 2019/515, if any;

4. an image of the approved type mark;

5. an image of the initial verification character;

6. proof of payment of the fee, except where the fee is paid electronically.

Чл. 474. Within 30 days of the submission of the application and the documents referred to in Article 473, the Bulgarian Metrology Institute shall carry out a review of the conformity documents meeting the requirements of the Regulation on the measuring instrument concerned.

Чл. 475. (1) Where deficiencies and inconsistencies in the documents submitted under Article 473 are found, the applicant shall be notified in writing and a time limit shall be set for their rectification, which may not be less than 15 working days and longer than 3 months. The review period referred to in Article 474 shall start to run from the date of their removal.

(2) The Chairman of the Bulgarian Metrology Institute shall refuse to register the type of

measuring instruments used in the cases referred to in Article 5 of the Measurements Act by order and shall notify the applicant if:

1. the deficiencies and inconsistencies referred to in paragraph 1 are not remedied within the prescribed time limit;

2. an application has been submitted for the registration of measuring instruments under Article 2(5).

(3) The Chairman of the Bulgarian Metrology Institute shall notify the refusal order to the Commission and the other EU Member States no later than 20 working days from its issue, in accordance with the requirements of Article 5(9) of Regulation (EU) 2019/515.

(4) The order specified in paragraph 2 shall specify:

1. the national provisions on which the decision is based;

2. the areas of public interest which impose national provisions and on which the decision is based;

3. a summary of the information and documents provided by the persons referred to in Article 473, if any;

4. the reasons on which the decision is based;

5. the remedies and time limits laid down in the Code on administrative procedure (CAP);

6. the possibility for the applicant to use the European network for the resolution of cross-border disputes arising from the incorrect application of European Union internal market law – SOLVIT and the procedure under Article 8 of Regulation (EU) 2019/515.

Чл. 476. (1) If the documents submitted to the application referred to in Article 473 are complete and consistent, the Bulgarian Metrology Institute shall enter the type in the register of types of measuring instruments approved for use.

(2) The following data shall be entered in the register:

1. the serial number of the register and the date of entry;

2. the name of the measuring instrument;

3. the type of instrument;

4.technical and metrological characteristics;

5. manufacturer

6.заявител;

7. the period of validity of the type-approval;

8. an image of an approved type approval mark;

9. an image of an initial verification mark;

10. number of the type-approval certificate

(3) Subsequent amendments to or modification and extension of the period of validity of an approval carried out in accordance with the national law of the country where the approval took place shall be entered in the register.

(4) For entry in the register, the applicant shall pay a fee.

(5) The applicant shall be notified of the circumstances of the listing.

Section IV

Procedure for keeping the register of types of measuring instruments approved for use referred to in Section II

Чл. 477. The following types of measuring instrument shall be subject to entry in the register of types of measuring instruments approved for use:

1. the types of measuring instruments, components, auxiliary equipment and devices approved in accordance with the Regulation;

2. the types of measuring instruments whose approval has been withdrawn.

Чл. 478. (1) The register of types of measuring instruments approved for use shall record the data from the type-approval certificate referred to in Article 463 (2).

(2) The register shall also record subsequent amendments to the approved type – Appendix or modification and extension of the period of validity of the approval, as well as the number and date of the order of the Chairman of the Bulgarian Metrology Institute in the event of withdrawal of the type-approval.

Section V

Procedure for the initial verification of measuring instruments

Чл. 479. (1) The initial verification of measuring instruments is an examination to confirm their conformity with the approved type where the measuring instruments are to be type-approved, or with the technical and metrological requirements applicable to them where the measuring instruments are not to be type-approved.

(2) The initial verification of the measuring instruments shall include:

1. verification of the presence of markings, plates and signs of control;

2. verification of compliance with the technical requirements and their influence on the metrological characteristics of the measuring instrument under operating conditions;

3. examination of the metrological characteristics and maximum permissible errors of the measuring instrument.

(3) An initial verification shall also be carried out on measuring instruments of a valid "EEC approved type" and bearing the marking referred to in Annex 33 and not having been subjected to "EEC initial verification".

Чл. 480. (1) The period of validity of the initial verification referred to in Article 39 (2) of the Measurements Act shall apply to measuring instruments that have not been put into service.

(2) Where the measuring instruments are put into service by the end of the calendar year following the year of the initial verification, the period of validity of the initial verification shall be equal to the period of validity of the ex-post verification.

(3) Where measuring instruments have not been put into service by the end of the calendar year following the year in which the initial verification is carried out, they shall be declared and resubmitted for an initial verification before they are first put into service by the persons who will use them.

Чл. 481. (1) The initial verification may be carried out in one or more stages.

(2) The initial verification shall be carried out at one stage for measuring instruments which, by design, form a single whole and can be transferred to the place of installation and/or use without prior dismantling.

(3) The initial verification shall be carried out in two or more stages for instruments the correct functioning of which depends on the conditions in which they are installed and/or used.

(4) The first stage of the initial verification shall ensure that the measuring instrument conforms to the approved type or, where not subject to type-approval, to the technical and metrological requirements for the measuring instrument.

(5) In the second step, a check shall be made of the characteristics of the measuring instrument which are affected by the method of installation and the conditions of use of the measuring instrument after installation.

Чл. 482. (1) Where the verification of a measuring instrument is a single step and the location for carrying it out is not specified in the Regulation, it shall be carried out at a location chosen by the person verifying the measuring instrument.

(2) Where the verification of a measuring instrument is carried out in several stages, each of them may be carried out by different persons and in different locations.

(3) In the cases referred to in paragraph (2), the last step shall be carried out at the place of installation of the measuring instrument and each of the preceding steps shall be carried out at a place chosen by the person, unless otherwise provided for in Chapter Two.

(4) Where the initial verification is carried out in the cases referred to in Article 27 of the Measurements Act, the applicant shall:

1. provides the evidence and conditions referred to in Article 461 (4);

2. pay an inspection fee.

Чл. 483. (1) The Bulgarian Metrology Institute shall carry out an initial verification of measuring instruments in accordance with the requirements laid down in Chapter Two, on the basis of methodologies approved by the chairman or by an official designated by him.

(2) Initial verification methodologies may also be used by authorised persons.

Чл. 484. (1) The application for an initial verification shall be submitted to the Bulgarian Metrology Institute or to the persons authorised by the Chairman of the State Agency for Metrological and Technical Supervision to carry out an initial verification of measuring instruments.

(2) The application for the initial verification of the measuring instruments shall specify:

1. the applicant's name, address, e-mail address, telephone number;

2. the name and type of the measuring instrument, components, auxiliaries or auxiliary devices;

3. the purpose of the measuring instrument;

4. the number and identification numbers of the measuring instruments;

5. the principal metrological characteristics of the measuring instrument: measurement range, accuracy class or error tolerance, resolution, etc. if the measuring instrument is placed on the market and/or put into service without type approval;

6. the number of the register of approved types of measuring instruments, if the measuring instrument is to be type-approved;

7. the place of installation of the measuring instruments, where their type is restricted, subject to notification of their place of installation or where this regulation requires the initial verification to be carried out at the installation site.

(3) In the cases described in Article 479(3), a copy of the EEC approved type certificate shall be attached to the application, accompanied by a translation into Bulgarian.

(4) The documents referred to in paragraph 1 may also be submitted electronically under the conditions and procedures of the Electronic Document and Electronic Certification Services Act and the Electronic Governance Act.

Чл. 485. (1) Within 7 days of the date of submission of the application, the person carrying out the verification shall notify the applicant of:

1. the place and date of the inspection;

2. the standards, auxiliary equipment, consumables and auxiliary staff required to carry out the check – in the cases referred to in Article 27 of the Measurements Act.

(2) The time limit for the initial verification of the measuring instruments shall be 30 days from the date of its application, unless the applicant has indicated a longer period.

(3) The applicant shall submit the measuring instruments for initial verification of the location and date referred to in paragraph 1.

Section VI

Procedure for performing ex-post verification of measuring instruments

Чл. 486. (1) The subsequent verification of the measuring instruments shall be carried out to verify their conformity with the approved type and with the requirements for maximum permissible errors in use, unless otherwise specified in Chapter Two.

(2) In the subsequent verification of a measuring instrument following its repair its compliance with the requirements for maximum permissible errors when placed on the market and/or put into service shall be established.

(3) The Bulgarian Metrology Institute shall carry out subsequent verifications of measuring instruments in accordance with the requirements laid down in Chapter Two, according to methodologies approved by the Chairman of the Bulgarian Institute of Metrology or an official designated by him, and the subsequent verification methodologies may also be used by authorised persons.

(4) Subsequent verification shall also be carried out on measuring instruments placed on the market and/or put into service under 'EEC approved type' and 'EEC initial verification', marked with marks in accordance with Annex 33 and Annex 36, unless otherwise specified in Chapter Two.

(5) Subsequent verification shall also be carried out on measuring instruments placed on the market and/or put into service under Article 479(3).

(6) Subsequent verification shall also be carried out on measuring instruments entered in the register referred to in Article 476.

(7) Subsequent verification shall also be carried out on software measuring instruments that have changed parameters affecting their metrological characteristics.

(8) The subsequent verification of the measuring instrument referred to in paragraph (7) shall provide proof of the modification of the parameters and establish compliance with the maximum permissible errors requirements during an initial verification or in accordance with the ordinances referred to in Article 7 of the Law on Technical Requirements for Products.

Чл. 487. (1) Applications for subsequent verification shall be submitted to the Bulgarian Metrology Institute or to the persons authorised by the Chairman of the State Agency for Metrological and Technical Supervision to carry out subsequent verification of measuring instruments.

(2) The application for subsequent verification of the measuring instruments shall contain:

1. the applicant's name, address, e-mail address, telephone;

2. the name and type of the measuring instruments;

3. the number of the approved type, the 'EEC type-approval' or the notified person's number and the number of the EU-type/design examination certificate;

4. the type of subsequent verification;

5. declaration of use under Article 5 of the Measurements Act;

6. the number and location of the measuring instruments;

7. metrological characteristics: measurement range, accuracy class or margin of error, resolution if the measuring instrument is placed on the market and/or put into service without type approval;

8. a description of the repairs carried out and the elements replaced by the person who repaired the measuring instruments – at a subsequent verification after repair;

9. a copy of the document on the type of repair carried out.

(3) Applications for the subsequent verification of measuring instruments shall be drawn up in duplicate for each measuring instrument, the second copy being kept with the applicant.

(4) Applications for periodic checks on measuring instruments shall be submitted no later than 14 days before the expiry of the validity period of the previous verification (initial or subsequent).

(5) Applications for verification following repair shall be submitted within 7 days of the completion of the repair.

Чл. 488. (1) The periodic inspection shall be carried out within 14 days of the date of filing.

(2) The verification of the measuring instruments following a repair or modification of parameters or settings affecting their metrological characteristics or, in the event of destruction of the sign from a previous inspection, shall be carried out within 14 days of the date of application.

(3) The subsequent verification requested by the person using the measuring instrument referred to in Article 5 of the Measurements Act shall be carried out within a period not exceeding 3

months from the date of the application.

(4) The first subsequent regular verification of measuring instruments assessed for conformity with the essential requirements under the Technical Requirements for Products Act shall be carried out after one period of validity of the subsequent inspection from the year of application of the CE conformity marking and the supplementary metrology marking, and of measuring instruments assessed for conformity with the essential requirements under the Medical Devices Act from the year of entry into service.

(5) The first subsequent regular verification of measuring instruments with "EEC type-approved" and "EEC initial verification" shall be carried out after one period of validity of the subsequent inspection starting from the year of the "EEC initial verification".

Чл. 489. Persons shall present the measuring instruments for inspection in good working order, cleaned, complete and accompanied by a technical file at initial verification and with instructions for instrument operation during subsequent verification.

Чл. 490. (1) Where the subsequent verification is carried out in the cases referred to in Article 27 of the Measurements Act, Article 482(4) shall apply.

(2) The structural units of the Bulgarian Metrology Institute, together with the mayors of municipalities, town halls or districts, may organise temporary inspection points to carry out subsequent verifications on measuring instruments.

(3) Local authorities shall assist the structural units of the Bulgarian Metrology Institute to communicate the location and period of organisation of the temporary inspection point and the types of measuring instruments to be checked.

Чл. 491. (1) Applications for an extension of the period of validity of the subsequent verification of electricity meters, water meters for clean cold and/or clean hot water, thermal energy meters or gas flowmeters used for household, commercial and light industrial use shall be submitted to the Bulgarian Metrology Institute.

(2) The application referred to in paragraph (1) shall be drawn up in accordance with the model approved by the Chairman or by an official designated by him or her, stating:

1. the name and address of the applicant;

2. the name, type and manufacturer of the measuring instruments;

3. data on the technical and metrological characteristics of the measuring instruments:

(a) for electricity meters: the main current, the maximum current, the prescribed voltage and the accuracy class;

(b) for water meters for clean cold and/or clean hot water: the nominal flow rate and accuracy class;

(c) for thermal energy meters: the nominal flow rate and the limits of the flow rate;

(d) for gas flowmeters: the designation, the material of the membrane, the type of temperature correction devices (if any) and the type of pressure correction devices (if any);

4. details of the previous verification carried out: type of verification, date and period of validity of the check, information on whether the validity of the check has been extended, name of the person who carried out the check;

5. batch data of measuring instruments: batch size, identification numbers, location, operating conditions and conditions of use of the measuring instruments;

6. the statistical control method chosen by the applicant shall: with a single-step or two-step sample in accordance with the method set out in Annex 2;

7. the person chosen by the applicant authorised for the verification of the measuring instruments concerned;

8. information on the period during which the sample measuring instruments can be removed and submitted for verification.

(3) The application shall be accompanied by a sampling procedure developed by the applicant, including measures to prevent the intentional manipulation or deterioration of the technical and metrological characteristics of the measuring instruments during the period from their disassembly to their presentation to the person who will carry out the verification.

(4) Within one month of receipt of the application, the documentation shall be reviewed, a written statement of the applicability of the method set out in Annex 2 shall be sent to the applicant and the sampling procedure shall be agreed. The opinion shall indicate the individual sample instrument numbers to be removed and verified.

(5) The final list of approved individual instrument numbers in the sample shall be sent to the person referred to in paragraph (7), point (2).

(6) Verification of the measuring instruments in the sample is carried out in the presence of officials designated by the Bulgarian Metrology Institute.

(7) Within two weeks of receipt of the results of the inspection, the staff of the Bulgarian Metrology Institute shall apply the statistical control method set out in Annex 2 and draw up a report which shall be drawn up in duplicate and shall contain:

1. applicant data:
2. a description of the batch of measuring instruments;
3. description of the sample;
4. data on the results of the verification of the measuring instruments from the sample;
5. the sampling plan;
6. the results of the application of the statistical control method;
7. conclusion on the extension of the validity period of the subsequent verification of the measuring instruments in the batch.

(8) Where the statistical control results meet the criteria of the method set out in Annex 2, the period of validity of the subsequent verification of the measuring instruments in the batch shall be extended by 50 % of the time limit set by order of the Chairman of the State Agency for Metrological and Technical Supervision.

(9) Where the results of the verification of the sampled measuring instruments comply with the requirements, the period of validity of those measuring instruments shall be in accordance with the order of the Chairman of the State Agency for Metrological and Technical Supervision.

(10) where the statistical control results do not meet the criteria of the method set out in Annex 2, the applicant shall present the measuring instruments in the batch for subsequent verification before the expiry of the previous one or replace them by other measuring instruments with a valid verification period.

(11) the applicant shall receive a copy of the report referred to in paragraph (7) in return for payment of the state fee, except where the fee is paid electronically. Information on the extension of the period of validity of the ex-post verification of the batch of measuring instruments shall be published on the official website of the Bulgarian Metrology Institute.

Чл. 492. The documents referred to in Article 487 (1) and Article 491 (1) may also be submitted electronically under the conditions and procedures of the Electronic Document and Electronic Certification Services Act and the Electronic Governance Act.

Чл. 493. The Bulgarian Metrology Institute keeps an official register of the initial and subsequent verifications carried out by the Institute on measuring instruments subject to metrological control. Remote access to the register may also be granted to other public administration bodies.

Chapter 4.

MARKS TO AUTHENTICATE THE RESULTS OF CONTROL ON MEASURING INSTRUMENTS

Чл. 494. The signs which attest the control results of the measuring instruments are:

1. a type approval mark according to Annex 32;

2. the “EEC type approved” mark referred to in Annex 33;

3. a restricted type-approval mark according to Annex 34;

4. signs for initial verification in accordance with Annex 35;

5. the “EEC initial verification” marks in accordance with Annex 36;

6. a sign for subsequent verification in accordance with Annex 37;

7. a sign prohibiting the use of the measuring instrument in accordance with Annex 38.

Чл. 495. (1) The signs referred to in Article 494, pointa (1) to (6) shall be affixed when its conformity with the technical and metrological requirements of the measuring instrument and/or the approved type is established during the control of the measuring instrument.

(2) The sign referred to in Article 494(7) shall be affixed when a subsequent check reveals non-compliance of the measuring instrument with the approved type and with the requirements for maximum permissible errors in use, unless otherwise specified in Chapter Two.

Чл. 496. (1) The alphabetical and numerical markings in the control marks shall comply with Annex 39.

(2) The letters and numerical markings in the ‘EEC type-approval’ and ‘EEC initial verification’ marks shall comply with Annex 39.

Чл. 497. (1) Where, pursuant to Chapter Two, the measuring instrument is not subject to type approval, a mark shall be affixed in accordance with Annex 40 or, where it is not subject to initial verification, a mark in accordance with Annex 42.

(2) Where the initial verification is one step, the two characters referred to in Annex 35 shall be affixed.

(3) Where the initial verification is a multi-stage check, a partial check mark referred to in Part A of Annex 35 shall be affixed at each stage preceding the last stage and the two characters of that Annex shall be affixed at the final stage.

(4) Where the measuring instrument is not subject to ‘EEC type-approval’, a mark shall be affixed in accordance with Annex 41 and, where it is not subject to ‘EEC initial verification’, a mark in accordance with Annex 43.

Чл. 498. (1) The marks shall be affixed to each instrument at the locations defined in Chapter Two and/or in the type-approval certificate in such a way that:

1. they shall be durable, visible and protected from erasure and deletion while using the measuring instruments;

2. they do not damage the measuring instruments or interfere with the readings.

(2) A mark for the subsequent verification of measuring instruments with assessed conformity shall be affixed at the locations specified by the manufacturer and/or in the type/design examination certificate, where the person carrying out the verification is aware of it. Where the person carrying out the verification does not have such information, the sign shall be placed in such a way that the indication is visible and/or to protect access to the inside structure of the measuring instrument.

(3) A subsequent verification marking shall additionally be affixed where, in the case of repair, signs placed at the locations intended to protect access to structural components which determine the metrological characteristics of the measuring instrument have been infringed.

(4) The markings referred to in paragraphs (1) and (2) shall be destroyed in an attempt to reuse.

(5) Other markings or inscriptions may be affixed to the measuring instrument, provided that they do not give rise to confusion with the signs which attest the results of the control.

(6) The MI may also bear a QR code containing the information for subsequent verification, with parameters defined in accordance with ISO/IEC 18004, provided that the requirements of paragraph 5 are met.

Чл. 499. (1) The carriers of the markings may be adhesive marks, seals or embossed or flat

stamps.

(2) Glue marks bearing signs referred to in Article 494, points (4) and (6) must be metallised, holographic.

Чл. 500. (1) The individual numbers of the inspection marks assigned to the staff of the Bulgarian Metrology Institute by order of the Chairman of the Bulgarian Metrology Institute shall be published on the site of the Bulgarian Metrology Institute.

(2) The individual numbers of the inspection marks assigned to the authorised persons in the authorisation order shall be published on the site of the State Agency for Metrological and Technical Supervision.

Chapter Five.

PROCEDURE FOR CARRYING OUT METROLOGICAL EXPERTISE ON MEASURING INSTRUMENTS

Чл. 501. Metrological expertise shall be carried out on measuring instruments in use used in the cases referred to in Article 5 of the Measurements Act.

Чл. 502. (1) Metrological instrument expertise shall be carried out by examination and determination of the condition of the measuring instrument, including its technical and metrological characteristics of an application submitted to the structural units of the Bulgarian Metrology Institute.

(2) The application referred to in paragraph 1 may be submitted electronically through a publicly accessible web-based application, in compliance with the requirements of the Electronic Governance Act and the Electronic Document and Electronic Certification Services Act.

Чл. 503. Metrological instrument expertise shall be carried out by the Bulgarian Metrology Institute.

Чл. 504. Employees, carrying out metrological expertise on measuring instruments shall be appointed by order of the Chaiman of the Bulgarian Metrology Institute or persons authorised by him/her.

Чл. 505. (1) The results of a metrological examination shall be provided in reports of findings certified by the signatures of the persons who carried out the metrological examination.

(2) At the request of the applicant, the statement of findings may also be issued in electronic form. The electronic statement of findings shall contain the names of the persons who carried out the metrological expertise and shall be signed with a qualified electronic signature by the President of the Bulgarian Metrology Institute.

Чл. 506. Original reports of findings in paper form shall be made available to the applicants for the metrological expertise.

Чл. 507. Certified copies of the statements of findings in paper form or electronic reports of findings shall be made available to the parties concerned by the results of the metrological expertise where they have indicated that they wish to obtain them in electronic form.

Чл. 508. Metrological expertise on measuring instruments shall be carried out with technical equipment with metrological traceability proven by calibration.

Чл. 509. (1) In cases where the measuring instrument has to be removed by an organisation which is an interested party, it is necessary to provide a removal report accompanying the measuring instrument applied for.

(2) The report shall contain the following information:

1. date of dismantling;
2. the names and signatures of all interested parties present at the dismantling;
3. location of the measuring instrument;
4. instrument data to uniquely identify the measuring instrument;

5. presence of the necessary metrological control signs;

6. existence of assurance signs from unauthorised access to the internal structure.

Чл. 510. Metrological expertise on measuring instruments shall be carried out in accordance with a procedure approved by the Chairman of the Bulgarian Metrology Institute.

Additional provision

§ 1. Within the meaning of this Regulation:

1. 'Range of measuring instruments' means an established/identified group of measuring instruments belonging to the same manufactured type within the same category, which has the same design characteristics and metrological measurement principles, but which may differ in certain metrological and technical performance characteristics.

2. "Pressure equipment" means steam and hot water boilers, boilers with organic heat carriers, pressure vessels, steam and hot water piping, gas equipment, natural gas and liquefied petroleum gas piping and installations, and acetylene installations.

3. "EEC type-approval" and "EEC initial verification" shall be carried out on measuring instruments covered by the technical directives of Directive 2009/34/EC of the European Parliament and of the Council of 23 April 2009 relating to common provisions for both measuring instruments and methods of metrological control (OJ L 106/7 of 28.4.2009) by the competent authorities of the EU Member States notified to the European Commission. With EEC type approval and/or EEC initial inspection, glass alcohol meters and water meters for impure cold water may be placed on the market and/or put into service.

4. 'Impedance' is a physical quantity introduced in the analysis of linear electrical circuits at a sinusoidal current. Impedance is a summary of electrical resistance including all losses of active, inductive and capacitive components in the chains.

5. 'Interpolation' in numerical analysis is a method of creating new numerical values in an area of multiple isolated points of known numerical values.

6. 'Interface' means an electrical, electronic, electromagnetic or optical system, whether or not including software, which enables interconnection or the exchange of signals between equipment connected via it, subject to compliance with the relevant technical specifications.

7. The 'peak-to-compton ratio' (for the 1332 keV line of 60Co) is the ratio of the height of the full energy absorption line for ^{60}Co measured at 1,332 keV to the mean height of the corresponding Compton plateau between 1,040 keV and 1,096 keV.

8. 'Fluctuations of the readings' are random deviations of the readings from the average value.

9. 'Hysteresis' is the property of a function f(x) to behave differently as the variable x increases and then decreases.

10. An 'union nipple' is a type of connection tip.

11. 'Operating conditions' are conditions that must be met during the measurement so that the measuring instrument or measuring system performs as designed. The operating conditions define ranges of values for the measurand and for each influencing quantity.

12. 'Measuring system transfer point' means the point at which a liquid is defined as supplied or received.

13. 'Ambietary equivalent dose H * (d)' means the equivalent dose at a given point of a radiation field that would be generated by the relevant extended and ordered field in the field of the International Commission on Radiation Units (ICU) in depth *D* by the radius in the direction of the arranged field.

14. "Minimum detectable activity (minimum detectable activity concentration)" is a value of the relevant quantity that serves to determine the lower limit of the measuring instrument range.

15. "Homogeneous batch" means a batch in which equivalent parts or materials are

manufactured and/or tested in the same way, without interruption, usually on the same day or within the same time period, produced by the same person or with the same equipment setting and meeting the same specification.'

16. 'Evidence of parameter change' means displaying or printing data (record) of changes made to instrument parameters affecting metrological characteristics identification of the modified parameter, the time and date when it was changed and its new value.

17. "Making available on the market" means any supply of a measuring instrument for distribution or use on the European Union market in the course of a commercial activity, whether in return for payment or free of charge;

18. 'Lawfully marketed in another Member State' means measuring instruments the type of which conforms to the relevant rules applicable in that Member State or which are not covered by such rules in that Member State and are made available to end-users in that Member State;

19. 'Cross-over speed (cut-off speed) of an electronic taximeter' means the value of the speed found by division of a time tariff value by a distance tariff value.

Transitional and final provisions

§ 2. The Regulation is adopted on the basis of Article 28 of the Measurements Act.

§ 3. Volumetric flowmeters for liquids, other than water, of an approved type, installed in measuring systems to road tankers and put into service with an initial verification before 19.3.2015, shall be subject to subsequent verification of compliance with the maximum permissible errors specified in their type-approval certificate by 31 December 2024. The last check shall be carried out without removal from the measuring system to which they are installed.

§ 4. Natural gas or steam measuring instruments that operate with standardised limiting devices – blends put into service before the entry into force of this Regulation shall be brought into compliance with the requirements of the Regulation within 3 years from the date of its entry into force and shall be subject to subsequent verifications.

§ 5. Secondary electronic transducers for measuring gas flow rate referred to in § 4 put into service before the entry into force of this Regulation shall be checked for compliance with the maximum permissible errors specified in their type-approval certificate within the time limit referred to in § 4.

§ 6. Type-approved measuring instruments put into service which fall within the scope of harmonised European legislation and for which no time limits are specified in other legislation must comply with the requirements of the Regulation within 10 years from the date of its entry into force.

§ 7. Test benches for measuring the braking forces of RVs and water meters of an approved type shall, before the entry into force of the Regulation, be made available on the market and/or put into service until the expiry of the type-approval certificate and checked against the approved type.

§ 8. (1) Weighing scales in motion which were put into operation before the date of entry into force of Decree No 342 of the Council of Ministers of 2022 (promulgated in SG No. 86/2022, in force as of 28.10.2022) shall be subject to subsequent inspections and may continue to be used if the first inspection establishes compliance with the requirements of Chapter Two, Section III.

(2) Weighing scales in motion, for which, on the date of entry into force of Decree No. 342 of the Council of Ministers of 2022 (promulgated in SG issue No 86/2022, in force since 28.10.2022), a contract for delivery has been concluded, but have not been put into operation, shall be put into

operation after verification, at the request of the user, if compliance with the requirements of Chapter Two, Section III is established. They shall be subject to subsequent verifications.

§ 9. “EC type-approved” (type approved under a European Community Directive) and valid “EC type-approval certificates” (EC type-approval certificate) issued until 30 November 2 015 in accordance with Directive 75/33/EEC for water meters for impure cold water and Directive 76/765/EEC for alcoholmeters and alcohol aerometers, remain in force until the expiry of the certificate.

§ 10. Alcoholomers and water meters for impure cold water with valid ‘EC type-approval certificates’ shall be placed on the market or put into service after an initial verification in accordance with this Regulation and shall be subject to subsequent verification if provided for in Chapter Two.

§ 11. Pending and completed type-approval procedures, initial and subsequent verification of measuring instruments until the entry into force of this Regulation shall be completed in accordance with the current procedure.

Annex 1
to Article 12(4), Article 13(2), (1) and (3), Article 14, Article 15(2) and Article 16

Table 1 relating to Article 12 (4)

Accuracy class for single-axle load and for load on group of axles	Accuracy class for vehicle mass		
	0.2	0.5	1
A	x	x	
B	x	x	x
C		x	x
D			x

Table 2 relating to Article 13 (1), point (1)

Accuracy class for vehicle mass	Percentage of conventional true mass value	
	Testing and initial verification	Subsequent verification
0.2	±0.10%	±0.20%
0.5	±0.25%	±0.50%
1	±0.50%	±1.00%

Table 3 relating to Article 13(2), point (1)

Accuracy class for single-axle load	Percentage of conventional true value of static reference one-axle load	
	Testing and initial verification	Subsequent verification
A	±0.25%	±0.50%
B	±0.50%	±1.00%
C	±0.75%	±1.50%
D	±1.00%	±2.00%

Table 4 relating to Article 13(3), point (1)

Accuracy class for single-axle load and load on a group of axles	Percentage of the corrected average of one-axle load or load value on group of axles	
	Testing and initial verification	Subsequent verification
A	±0.50%	±1.00%
B	±1.00%	±2.00%
C	±1.50%	±3.00%
D	±2.00%	±4.00%

Table 5 relating to Article 14

Accuracy class for vehicle mass	Loading (m), expressed in scale divisions	Maximum permissible errors	
		Testing and initial verification	Subsequent verification
0.2 0.5 1	$0 \leq m \leq 500$	±0.5 d	±1.0 d
	$500 \leq m \leq 2{,}000$	±1.0 d	±2.0 d
	$2{,}000 \leq m \leq 5000$	±1.5 d	±3.0 d

Table 6 relating to Article 15(2)

Accuracy class for vehicle mass	d (kg)	Minimum number of scale divisions	Maximum number of scale divisions
0.2	≤ 5	500	5,000
0.5	≤ 10		
1	≤ 20		

Table 7 relating to Article 16

Accuracy class for vehicle mass	Minimum load in scale divisions
0.2 0.5 1	50

Annex No 2 to Article 29(1), Article 59(1), Article 159(1), Article 397(1) and Article 491(2), point (6), 491(4), (7), (8) and (10)

Statistical method for extending the validity of the previous verification of measuring instruments used for domestic, commercial and light industrial use

The batch size shall be taken as the number of measuring instruments applied for and to be verified ex post, with a maximum batch size of 35,000 measuring instruments.

A sample of measuring instruments selected randomly shall be drawn from the lot so that the probability of each measuring instrument in the lot being or not sampled is the same. The number of instruments in the sample determines the sample size.

Where the sample contains measuring instruments:

(a) which are clearly defective;

(b) whose protection mark (seal) is damaged, or

(c) which are not found at the specified installation location or the data for which are incorrectly recorded, shall be allowed, before the verification of the sampled measuring instruments has started, to be replaced by non-sampled measuring instruments.

The permissible number of replaceable measuring instruments shall be determined according to the size of the sample.

The replacement shall be carried out once immediately after the external

Size of the sample of measuring instruments	Number of measuring instruments, which can be replaced
50	3
80	5
125	8
200	12

inspection. The choice of the replacement measuring instruments shall be made using the methods by which the baseline sample is taken. The measuring instruments taken out of the sample shall be excluded from the lot. Where, after replacing the permissible number of measuring instruments, a sample of measuring instruments cannot be drawn in which they satisfy the requirements on external inspection, the application of the method shall be discontinued.

The verification of each instrument in the sample shall be carried out in compliance with the requirements of the methods for subsequent verification of the measuring instrument concerned.

Statistical control on the basis of signs is an inspection in which the measurement instruments in the sample are classified as defective and non-effective in accordance with the method described.

Acceptance number is the highest number of defective measuring instruments found in the sample checked, where, if reached, the sampled portion can still be accepted.

The rejection number is the smallest number of defective measuring instruments found in the sample checked which, if reached, leads to the rejection of the sampled portion.

The number of measuring instruments tested shall be equal to the sample size as defined in the sampling plan.

If the number of non-effective measuring instruments in the sample is less than or equal to the acceptance number, the batch must be accepted and the period of validity of the subsequent verification of the measuring instruments in the batch may be extended by 50 % of the time limit set by order of the Chairman of the State Agency for Metrological and Technical Supervision.

If the number of defective measuring instruments is greater than or equal to the rejection number, the batch shall be rejected and any measuring instrument in the batch shall be submitted for subsequent verification.

One of the following inspection procedures may be applied: by a one-step sample, referred to as method A, and by a multilevel sample, referred to as method B, where the test consists of counting the number of defective measuring instruments in the sample. Substitution of the chosen method is not allowed when statistical controls have already begun.

Method A:

Single sampling plan at a cut-off quality level of 8 %

№ by sequence	Size of batch	Size of the sample	Number of defective devices for measurement	
			acceptance number	number of reject-ion
1.	up to 1,200	50	1	2
2.	from 1,201 to 3,200	80	3	4
3.	from 3,201 to 10,000	125	5	6
4.	from 10,001 to 35,000	200	10	11

Method B:

Dual-stage sampling plan

№ by	Size of batch	Sample	Size of the sample	Total number in the sample	Number defective measuring instruments [1]		
					reception	rejection	Criterion

sequen					number (c)	number (d)	for the second sample [2]
1.	up to 1,200	first	32	32	0	2	1
		second	32	64	1	2	
2.	from 1,201	first	50	50	1	4	2 to 3
	up to 3,200	second	50	100	4	5	
3.	from 3,201	first	80	80	2	5	2 to 4
	up to 10,000	second	80	160	6	7	
4.	from 10,001	first	125	125	5	9	6 to 8
	up to 35,000	second	125	250	12	13	

Notes:

1. In each row titled “Second sample”, the number of defective measuring instruments refers to the total number of instruments in the sample.

2. The second sample shall be of the same size as the first sample and shall be randomly selected from the batch if the first sample contains the number of defective measuring instruments indicated in the column.

Annex No 3 to Article 36(3)

Nominal casing diameter and accuracy class of manometers

Nominal diameter of the casing, mm	Accuracy class					
	0.1 and 0.15	0.25	0.6	1	1.6	2.5
40 and 50					x	x
63				x	x	x
80				x	x	x
100			x	x	x	x
150 and 160		x	x	x	x	
250	x	x	x	x	x	

Annex No 4 to Article 42(1)

Maximum permissible errors and accuracy class of manometers

Accuracy class	Limits of the permissible error, %	Accuracy class	Limits of the permissible error, %
0.1	± 0.1	1	± 1
0.15	± 0.15	1.6	± 1.6
0.25	± 0.25	2.5	± 2.5
0.6	± 0.6		

Annex No 5 to Article 48(1)

Overload for manometers with an operating measurement limit of 75 % of the upper measurement limit

Overloading

Upper limit (UL) of measurement of positive pressure, bar	Overload above UL of instrument measurement, %
up to 100	25
more than 100, up to 600	15
more than 600, up to 1,600	10

Annex 6 to Article 61

1. The subsequent verification of cold water meters of an approved type shall include a check of the accuracy of at least three flow rates between 0.9. Q_{max} and Q_{max}between Q_t and 1.1 Q_t and between Q_{min} and 1.1 Q_{min}.

2. The maximum permissible errors on cold water meters for subsequent verification shall be:

1. after repair:
(a) ± 5 % in the lower zone for $Q_{min} \leq Q < Q_t$;
(b) ± 2 % in the upper zone $Q_t \leq Q \leq Q_{max}$;
2. in case of periodic verification:
(a) ± 5 % in the lower zone for $Q_{min} \leq Q < Q_t$;
(b) ± 5 % in the upper zone $Q_t \leq Q \leq Q_{max}$.

3. The subsequent verification of hot water meters of an approved type shall include a check of the accuracy at a temperature (50 ± 5) °C, at least in three values between 0.9 and °C. Q_{max} and Q_{max}between Q_t and 1.1 Q_t and between Q_{min} and 1.1 Q_{min}.

4. The maximum permissible errors of hot water meters for subsequent verification shall be:

1. after repair:
(a) ± 5 % in the lower zone for $Q_{min} \leq Q < Q_t$;
(b) ± 3 % in the upper zone $Q_t \leq Q \leq Q_{max}$.
2. in case of periodic verification:
(a) ± 5 % in the lower zone for $Q_{min} \leq Q < Q_t$;
(b) ± 5 % in the upper zone $Q_t \leq Q \leq Q_{max}$.

5. In a subsequent verification following repair, if all errors in the measuring range of the meter have the same sign, at least one of the errors shall be less than half of the maximum permissible error value.

6. After checking the water meters for clean cold and hot water, a pressure leakage check shall be carried out.

7. The accuracy class of water meters shall be determined by reference to the values of Q_{min} and Q_t and according to the tables:

Accuracy classes of cold water meters:

Classes	Q_n	
	< 15 m^3/h	≥ 15 m^3/h
Class A		

Value of Q_{min} Value of Q_t	0.04 Q_n 0.10 Q_n	0.08 Q_n 0.30 Q_n
Class B Value of Q_{min} Value of Q_t	 0.02 Q_n 0.08 Q_n	 0.03 Q_n 0.20 Q_n
Class C Value of Q_{min} Value of Q_t	 0.01 Q_n 0.015 Q_n	 0.006 Q_n 0.015 Q_n

Accuracy classes of hot water meters:

Classes	Q_n	
	< 15 m^3/h	≥ 15 m^3/h
Class A Value of Q_{min} Value of Q_t	 0.04 Q_n 0.10 Q_n	 0.08 Q_n 0.20 Q_n
Class B Value of Q_{min} Value of Q_t	 0.02 Q_n 0.08 Q_n	 0.04 Q_n 0.15 Q_n
Class C Value of Q_{min} Value of Q_t	 0.01 Q_n 0.06 Q_n	 0.02 Q_n 0.10 Q_n
Class D Value of Q_{min} Value of Q_t	 0.01 Q_n 0.015 Q_n	

Annex 7 to Article 64(2).

1.0	1.6	2.5	4.0	6.3
10	16	25	40	63
100	160	250	400	630
1000	1600	2500	4000	6300

Annex 8 to Article 64(3).

40	50	63	80	100
125	160	200	250	315
400	500	630	800	1000

Annex 9 to Article 84(2).

Sensitivity classes to irregularities in velocity fields upstream of the water meter (U)

Class	**Required length of straight section (x DN)**	**Need for a jet rectifier**
U0	0	No

U3	3	No
U5	5	No
U10	10	No
U15	15	No
U0S	0	Yes
U3S	3	Yes
U5S	5	Yes
U10S	10	Yes

Sensitivity classes to irregularities in velocity fields after the water meter (D)

Class	**Required length of straight section**	**Need for a jet rectifier**
D0	0	No
D3	3	No
D5	5	No
D0S	0	Yes
D3S	3	Yes

Annex 10 to Article 85

Flow rate range:	Q_1 to Q_3 inclusive;
Ambient temperature range:	+ 5 °C up to + 55 °C;
Water temperature range:	+ 0.1 °C up to + 30 °C;
Ambient relative humidity range:	0 % to 100 %, except for remote display devices where the range shall be from 0 % to 93 %
Working pressure range:	0.03 MPa (0.3 bar) to at least 1 MPa (10 bar), except DN flowmeters ≥ 500 mm, where the maximum permissible pressure (MAP) shall be at least 0.6 MPa (6 bar).

Annex 11 to Article 86(2)

Pressure loss classes

Class	**Maximum pressure loss** (bar)
Δ*P* 63	0.63
Δ*P* 40	0.40
Δ*P* 25	0.25
Δ*P* 16	0.16
Δ*P* 10	0.10

Annex 12 to Article 90(3)

Water meter reading range

***Q*₃** (m3/h)	**Reading range (minimum values)** (m3)
$Q_3 \leq 6{,}3$	9,999
$6{,}3 < Q_3 \leq 63$	99,999

63 <Q_3≤ 630	999,999
630 <Q_3≤ 6,300	9,999,999

Annex 13 to Article 103(1)

Reference conditions

flow rate:	0.7.(Q_2 + Q_3) ± 0.03 (Q_2 + Q_3);
Water temperature:	(20 ± 5) °C
Water pressure	within the prescribed operating conditions
Ambient temperature:	(20 ± 5) °C
Ambient relative humidity:	(60 ± 15) %;
Atmospheric pressure:	86 kPa to 106 kPa [0.86 to 1.06 bar].
Supply voltage (mains AC voltage)	Rated voltage (U_{nom}) ± 5 %
Frequency of supply voltage	Nominal frequency (f_{nom}) ± 2 %
Feed voltage (battery)	Voltage U in the range: $U_{bmin} \leq U \leq U_{bmax}$

Annex 14 to Article 103(2)

Minimum number of water meters to be tested

Indication of the water meter Q_3 (m^3/h)	Minimum number of water meters
Q_3≤160	3
160 <Q_3≤ 600	2
1,600 <Q_3	1

Annex 15 to Article 108

1. The subsequent verification of the flowmeters for impure water of an approved type shall include a check of the accuracy of at least three flow values in the range from 0.9. Q_{max} and Q_{max} between Q_t and 1.1 Q_t and between Q_{min} and 1.1 Q_{min}.

2. The maximum permissible error of the volumetric and turbine flowmeters for impure water for flowmeters of accuracy classes 0.3; 0.5 1.0 1.5 and 2.5 shall be ± (0.2; 0.3, 0.6; 1.0 and 1.5)%.

3. The maximum permissible error of the electromagnetic flowmeters for impure water shall be within the limits specified by the manufacturer for the particular type and as specified in the type-approval certificate.

4. The maximum permissible error of the mass flowmeters for impure water for flowmeters of accuracy classes 0.3; 0.5 1.0 1.5 and 2.5 shall be ± (0.2; 0.3, 0.6; 1.0 and 1.5)%.

5. The maximum permissible error of the ultrasonic flowmeters for impure water shall be within the limits specified by the manufacturer for the particular type and specified in the type-approval certificate.

6. The maximum permissible error of the flowmeters designed for a difference in pressure for impure water during subsequent verification shall be within the limits specified by the manufacturer for the particular type and as specified in the type-approval certificate.

Annex No 16 to Article 160

1. During subsequent verification of diaphragm gas flowmeters of an approved type, they shall be considered to comply with the requirements on maximum permissible errors where they are satisfied at a flow rate:

- equal to the minimum flow rate;
- in the order of 1/5 of the maximum flow rate;
- equal to the maximum flow rate.

2. The maximum permissible errors of the diaphragm flowmeters for gas of an approved type during verification shall be within the following limits:

- at rates greater than or equal to the minimum flow rate and less than twice the minimum flow rate - ± 3%;
- at rates equal to or greater than twice the minimum flow rate and less than or equal to the maximum flow rate - ± 2%;
- Upon verification the errors of a flowmeter at values equal to or greater than twice the minimum flow rate and less than or equal to the maximum flow rate shall not exceed 1 % if all errors bear the same sign.

3. The subsequent verification of rotary and turbine flowmeters for gas of an approved type shall be deemed to comply with the maximum permissible errors when they are met at values equal to:

- the minimum flow rate;
- 2/5 of the maximum flow rate;
- the maximum flow rate.

4. During a subsequent verification following repair of rotary and turbine gas flowmeters, they shall be considered to comply with the maximum permissible errors when they are met at a flow rate equal to:

- the minimum flow rate;
- 1/10 of the maximum flow rate if this amount is greater than the minimum flow rate;
- 1/4 of the maximum flow rate;
- 2/5 of the maximum flow rate;
- 7/10 of the maximum flow rate;
- the maximum flow rate.

5. The maximum permissible errors on rotational and turbine flowmeters for gas of an approved type during verification shall not exceed the limits:

- at flow rates greater than or equal to the minimum flow rate and less than 0.2 times the maximum flow rate - ± 2 %;
- for flow rates greater than or equal to 0.2 times the maximum flow rate and less than or equal to the maximum flow rate - ± 1 %;
- errors must not exceed half of the maximum permissible errors when they have the same sign.

6. The maximum permissible errors of the type approved volume correction devices are:

- a) 0.5% given an ambient temperature of 20 °C ± 3 °C, ambient humidity 60% RH ± 15 % RH, nominal value of electricity supply voltage;
- 1% under operating conditions

7. (1) During a subsequent examination of type 1 volume correction devices, errors shall be defined in the following points:

- T_{min}, (T_{min} + T_{max})/2 and T_{max} - for *T*-correcting devices
- T_{min} and P_{max}; (T_{min} + T_{max})/2 and (P_{min} + P_{max})/2; and T_{max} and P_{min} – for *PT*-correcting devices and *PTZ*-correcting devices.
- When the manufacturer's specified lower measurement limit, $P_{min}$of the pressure transducer is less than the ambient pressure, then the error check in P_{min} and T_{max} shall be performed at ambient pressure.

8. During subsequent verification of type 2 volume correction devices, errors shall be determined separately for:

- the calculator, at the points defined in paragraph (7), via simulating temperature, pressure and volume signals;
- the temperature sensor – at three points, respectively: T_{min}, 0°C, and T_{max}, according to the scope of the correction device;
- pressure sensor – at three points respectively: P_{min}, (P_{min} + P_{max})/2 and P_{max}, whereas for absolute pressure sensors with P_{min} = 0 bar first point of inspection P_1 is equal to the ambient pressure, the second is (P_{min} + P_{max})/2 and the third is P_{max}, according to the scope of the correction device.

Annex 17 to Article 230(8)

The Temperature Factor $\alpha, °C^{-1}$ shall be determined by the formula:

$$\alpha = \frac{R_{100} - R_0}{R_0 \cdot 100\,°C},$$

where R_{100}, R_0 are the resistance values of the nominal static characteristic at $100\,°C$ and $0\,°C$ rounded to five decimal places.

Annex 18 to Article 230(10)

Relationship between resistance and temperature is expressed in terms of platinum temperature converter formula and temperature coefficient $\alpha = 0,00385\,°C^{-1}$:

1. within the minus range $200\,°C$ to $0\,°C$

$$R_t = R_0\left[1 + At + Bt^2 + C(t - 100\,°C)\cdot t^3\right]$$

2. within the scope of $0\,°C$ to $850\,°C$

$$R_t = R_0\left(1 + At + Bt^2\right)$$

whereby: R_t — resistance at temperature $t, °C$

R_0 — nominal resistance at temperature $0\,°C$.

$A = 3,9083 \cdot 10^{-3}\,°C^{-1}$

$B = -5,775 \cdot 10^{-7}\,°C^{-2}$

$C = -4,183 \cdot 10^{-12} \circ C^{-4}$
$R_o = 100,00\,\Omega$

Annex No 19 to Article 286(3)

Relationship between opacity and light absorption coefficient

Leak factor, τ

Ratio of intensity of receiver light when measured in a burnt gas zone *I*and the intensity of light in the receiver when measured in a clean air area I_0.

$$\tau = \frac{I}{I_0} 100$$

Opacity, *N*

$$N = 100 - \tau$$

Length of the effective optical path, L_A, mm

Optical path length travelled by light through the exhaust gases

The absorption coefficient of the light, *K*

The light absorption coefficient is determined by Béer-Lambert law by one of the following formulae:

$$k = -\frac{1}{L_A} \ln\left(\frac{\tau}{100}\right)$$

or

$$k = -\frac{1}{L_A} \ln\left(1 - \frac{N}{100}\right)$$

Annex 20 to Article 293 and Article 294

Minimum measurement ranges for exhaust gas analysers from motor vehicles

Class	Measurement ranges				
	CO	CO_2	O_2	HC:	Lambda, λ
0 I	0 to 5 % by volume, %	0 to 16 % by volume	0 to 21 % by volume	0 to 2,000 ppm by volume	from 0.8 to 1.2

The minimum resolution shall be equal to or one order of magnitude higher than the values given in the table

Class	Resolution	

	CO	CO_2	O_2	HC:	Lambda, λ
0	0.01 % by volume	0.1 % by volume	0.01 % by volume, if $O_2 \leq 4$ % by volume	1 ppm by volume	0.001
I			0.1 % by volume, if $O_2 > 4$ % by volume		

Maximum permissible errors in subsequent verifications of vehicle exhaust gas analysers. Absolute or relative, whichever is greater.

Class	Error	Maximum permissible errors			
		CO	CO_2	O_2	HC:
0	absolute	± 0.03 % by volume	± 0.5 % by volume	± 0.1 % by volume	± 10 ppm by volume
	relative	± 5%	± 5%	± 5%	± 5%
I	absolute	± 0.06 % by volume	± 0.5 % by volume	± 0.1 % by volume	± 12 ppm by volume
	relative	5	5	5	5

The maximum permissible errors for the calculation of Lambda shall not exceed 0.3 %.

Annex No 21 to Article 297(1)

Certified reference values of gas mixtures used for the verification of vehicle exhaust gas analysers

(components)	Volume parts				
CO	0.5 % by volume	1 % by volume	3.5 % by volume and/or 5 % by volume	0.5 % by volume	3.5 % by volume
CO_2	6 % by volume	10 % by volume	14 % by volume	14 % by volume	-
HC:	100 ppm by volume	300 ppm by volume	1000 ppm by volume	100 ppm by volume	1000 ppm by volume
O_2	0.5 % by volume	10 % by volume	20.9 % by volume	0 % by volume	-

Annex 22 to Article 391(1)

Electromechanical active energy meters of accuracy class 0.5; 1; 2 and with indices for classes A and B

Current change error limits (single-phase meters and multiphase meters with balanced loads)

Value of the current	Power factor	Limits of error [%] for electricity meters

For directly connected electricity meters	For meters connected through transformers		0.5	1	2
$0.05I_b \le I$Forthwith $0.1I_b$ *	$0.02I_N \le I < 0.05I_N$ *	1	±1	±1.5	±2.5
$0.1I_b \le I \le I_{max}$	$0.05I_N \le I \le I_{max}$	1	0.5.	1.	±2
$0.1I_b \le I < 0.2I_b$	$0.05I_N \le I < 0.1I_N$	0.5 inductive	±1.3	±1.5	±2.5
		0.8 capacitive	±1.3	±1.5	-
$0.2I_b \le I \le I_{max}$	$0.1I_n \le I \le I_{max}$	0.5 inductive	±0.8	±1	±2
		0.8 capacitive	±0.8	±1	-
By special consumer requirement					
$0.2I_b \le I \le I_b$	$0.1I_n \le I \le I_n$	0.25 inductive	±2.5	±3.5	-
		0.85 capacitive	±1.5	±2.5	-

* Not carried out at subsequent verification.

Error limits in case of current change (multi-phase meters loaded single-phase but with balanced multi-phase voltages applied to voltage circuits)

Value of the current		Power factor	Error limits [%] for electricity meters of class		
For directly connected electricity meters	For electricity meters connected through transformers		0.5	1	2
$0.2I_b \le I < I_b$	$0.1I_n \le I < I_n$	1	±1.5	±2	±3
$0.5I_b$	$0.2I_n$	0.5 inductive	±1.5	±2	-
I_b	I_n	0.5 inductive	±1.5	±2	±3
$I_b \le I \le I_{max}$	$I_n \le I \le I_{max}$	1	-	-	±4

Difference between the percentage errors of the meter when loaded with single-phase load and equilibrium multiphase load at base I_b current and power factor unit – in case of directly connected meters at rated current I_N and a power factor – for meters connected through transformers, shall not be greater than 1 %, 1.5 % and 2.5 % for meters of classes 0.5, 1 and 2 respectively.

The test current must be applied to every element in succession.

Electromechanical active energy meters with class A and B indices

Maximum permissible error under operating conditions (single-phase meters and multiphase meters with balanced load)

Value of the current for directly connected electricity meters or	Power factor	Maximum permissible error [%] for meters with a class index

electricity meters operating via transformers		A	C
$I_{min} \le I < I_{tr}$	1	± 2.5	± 1.5
$I_{tr} \le I \le I_{max}$	0.5 ind…1…cap 0.8	± 2	± 1

Maximum permissible error under prescribed operating conditions (multiphase meters loaded single-phase but with balanced multi-phase voltages applied to voltage circuits)

Value of the current for directly connected electricity meters or electricity meters operating via transformers	Power factor	Maximum permissible error [%] for meters with a class index	
		A	C
$5I_{tr} \le I \le I_{max}$	0,5 ind…1	± 3	± 2

The difference between the percentage errors of the meter when loaded with a single-phase load and a balanced multi-phase load at the prescribed current I_{ref} and power factor unity shall not exceed 2.5% and 1.5% for meters of index class A and B respectively.

Annex 23 to Article 391(2)

Static meters for active energy class 1; 2; 0.2S 0.5S and with indices for Classes A, B and C
Current change error limits (single-phase meters and multiphase meters with balanced loads)

Accuracy class 0.2S and 0.5S			
Value of the current	Power factor	Limits of error [%] for meters of Class 0.2S and 0.5S	
		0.2S	0.5S
$0,01I_n \le I < 0.05I_n$	1	±0.4	±1
$0.05I_n \le I \le I_{max}$	1	±0.2	±0.5
$0.02I_n \le I < 0.1I_n$	0.5 inductive 0.8 capacitive	±0.5 ±0.5	±1 ±1
$0.1I_n \le I \le I_{max}$	0.5 inductive 0.8 capacitive	±0.3 ±0.3	±0.6 ±0.6
By special consumer requirement			
$0.1I_n \le I \le I_{max}$	0.25 inductive	±0.5	±1
	0.5 capacitive	±0.5	±1

Accuracy class 1 and 2		
Value of the current	Power factor	Limits of error [%] for Class 1 and Class 2 meters

For directly connected electricity meters	For meters connected through transformers		1	2
$0.05I_b \le I < 0.1I_b$	$0.02I_n \le I < 0.05I_n$	1	±1.5	±2.5
$0.1I_b \le I \le I_{max}$	$0.05I_n \le I \le I_{max}$	1	±1	±2
$0.1I_b \le I < 0.2I_b$	$0.05I_n \le I < 0.1I_n$	0.5 inductive 0.8 capacitive	±1.5 ±1.5	±2.5 -
$0.2I_b \le I \le I_{max}$	$0.1I_n \le I \le I_{max}$	0.5 inductive 0.8 capacitive	±1 ±1	±2 -
By special consumer requirement				
$0.2I_b \le I \le I_b$	$0.1I_n \le I \le I_n$	0.25 inductive	±3.5	-
		0.5 capacitive	±2.5	-

Error limits in case of current change (multi-phase meters loaded single-phase but with balanced multi-phase voltages applied to voltage circuits)

Accuracy class 0.2S and 0.5S			
Value of the current	Power factor	Limits of error [%] for meters of Class 0.2S and 0.5S	
		0.2S	0.5S
$0.05I_n \le I \le I_{max}$	1	±0.3	±0.6
$0.1I_n \le I \le I_{max}$	0.5 inductive	±0.4	±1

The difference between the percentage errors of the meter when loaded with a single-phase load and a balanced multiphase load at rated current I_N and a power factor per unit shall not be greater than 0.4 % and 1.0 % for meters of Classes 0.2S and 0.5S respectively. The test current must be applied to every element in succession.

Accuracy class 1 and 2				
Value of the current		Power factor	Limits of error [%] for class 1 and class 2 electricity meters	
For directly connected electricity meters	For meters connected through transformers		1	2
$0.1I_b \le I \le I_{max}$	$0.05I_n \le I \le I_{max}$	1	±2	±3
$0.2I_b \le I \le I_{max}$	$0.1I_n \le I \le I_{max}$	0.5 inductive	±2	±3

The difference between the percentage errors of the meter when loaded with single-phase load and equilibrium multiphase load at base current I_b and power factor for directly connected meters at rated current I_N and a power factor for meters connected through transformers shall not be greater than 1.5 % and 2.5 % for Class 1 and Class 2 meters respectively.

The test current must be applied to every element in succession.

Static active energy meters with class A, B and C indices

Maximum permissible error under prescribed operating conditions (single-phase meters and multiphase meters with balanced loads)

Value of the current for directly connected electricity meters or electricity meters operating via transformers	Power factor	Maximum permissible error [%] for meters with a class index		
		A	C	C
$I_{min} \le I < I_{tr}$	1	± 2.5	± 1.5	± 1
$I_{tr} \le I \le I_{max}$	0.5 ind…1…cap 0.8	± 2.0	± 1	± 0.5

Maximum permissible error under prescribed operating conditions (multiphase meters loaded single-phase but with balanced multi-phase voltages applied to voltage circuits)

Value of the current for directly connected electricity meters or electricity meters operating via transformers	Power factor	Maximum permissible error [%] for meters with a class index		
		A	C	C
$I_{tr} \le I \le I_{max}$	0.5 ind…1	±3	± 2	± 1

The difference between the percentage errors of the electricity meter when under single-phase load and balanced multi-phase load and under a prescribed current Iref and a power factor of one must not exceed 2.5 %, 1.5 % and 1 % respectively for index class A, B and C electricity meters.

Annex 24 to Article 391(3)

Static meters for reactive energy (classes 2 and 3)

Error limits in case of current change (multi-phase meters loaded single-phase but with balanced multi-phase voltages applied to voltage circuits)

Value of the current		sin φ (inductive or capacitive)	Limits of error [%] for class 2 and class 3 electricity meters	
For directly connected electricity meters	For meters connected through transformers		2	3
$0.05I_b \le I < 0.1I_b$	$0.02I_n \le I < 0.05I_n$	1	±2.5	±4
$0.1I_b \le I \le I_{max}$	$0.05I_n \le I \le I_{max}$	1	±2	±3
$0.1I_b \le I < 0.2I_b$	$0.05I \le {}_N I < 0.1I_n$	0.5	±2.5	±4
$0.2I_b \le I \le I_{max}$	$0.1I_n \le I \le I_{max}$	0.5	±2	±3
$0.2I_b \le I \le I_{max}$	$0.1I_n \le I \le I_{max}$	0.25	±2.5	±4

Error limits in case of current change (multi-phase meters loaded single-phase but with balanced multi-phase voltages applied to voltage circuits)

Value of the current		sin φ (inductive or capacitive)	Limits of error [%] for class 2 and class 3 electricity meters	
For directly connected electricity meters	For meters connected through transformers		2	3
$0.1I_b \le I \le I_{max}$	$0.05\ I_n \le I \le I_{max}$	1	±3	±4
$0.2I_b \le I \le I_{max}$	$0.1\ I_n \le I \le I_{max}$	0.5	±3	±4

Difference between the percentage errors of the meter when loaded with single-phase load and equilibrium multiphase load at base current I_b and $\sin\varphi = 1$ at directly connected meters at rated current I_N and $\sin\varphi = 1$ for meters connected through transformers shall not be more than 2.5 % and 3.5 % for Class 2 and Class 3 meters respectively.

The test current must be applied to every element in succession.

Static electricity meters for reactive energy, classes 0.5S; 1S and 1

Error limits in case of current change (multi-phase meters loaded single-phase but with balanced multi-phase voltages applied to voltage circuits)

Value of the current		sin φ (inductive or capacitive)	Limits of error [%] for class 0.5S electricity meters; 1S and 1		
For directly connected electricity meters	For meters connected through transformers		0.5S	1S	1
$0.05I_b \le I < 0.1I_b$	$0.01I_n \le I < 0.05I_n$	1	±1	±1.5	±1.5
$0.1I_b \le I \le I_{max}$	$0.05I_n \le I \le I_{max}$	1	±0.5	±1	±1
$0.1I_b \le I < 0.2I_b$	$0.05I_n \le I < 0.1I_n$	0.5	±1	±1.5	±1.5
$0.2I_b \le I \le I_{max}$	$0.1I_n \le I \le I_{max}$	0.5	±0.5	±1	±1
$0.2I_b \le I \le I_{max}$	$0.1I_n \le I \le I_{max}$	0.25	±1	±2	±2

Error limits in case of current change (multi-phase meters loaded single-phase but with balanced multi-phase voltages applied to voltage circuits)

Value of the current		sin φ (inductive or capacitive)	Limits of error [%] for class 0.5S electricity meters; 1S and 1	
For directly connected electricity meters	For meters connected through transformers		0.5S	1 and 1S

$0.1I_b \le I \le I_{max}$	$0.05\ I_n \le I \le I_{max}$	1	±0.7	±1.5
$0.2I_b \le I \le I_{max}$	$0.1\ I_n \le I \le I_{max}$	0.5	±1	±2
$0.2I_b \le I \le I_{max}$	$0.1\ I_n \le I \le I_{max}$	0.25	±1.5	±3

Difference between the percentage errors of the meter when loaded with single-phase load and equilibrium multiphase load at base current I_b and sin$j$ = 1 in the case of directly connected meters, shall not be more than 1.5 % for class point1; at rated current I_N and sin$j$= 1 for meters connected through transformers shall not exceed 0.7 % and 1.5 % for meters of Classes 0.5S and 1S respectively.

Annex 25 to Article 401 (1) (1)

Error and phase displacement limits for measuring current transformers with accuracy class 0.1; 0.2; 0.5 and 1

Accuracy class	Limits of error ε [%], at percentage of declared current I_{pr}				Phase bias Δφ, at % of rated current I_{pr}							
					in minutes, [′]				in centi radians, [crad]			
	5% I_{pr}	20% I_{pr}	100% I_{pr}	120% I_{pr}	5% I_{pr}	20% I_{pr}	100% I_{pr}	120% I_{pr}	5% I_{pr}	20% I_{pr}	100% I_{pr}	120% I_{pr}
0.1	±0.4	±0.2	±0.1	±0.1	±15	±8	±5	±5	±0.45	±0.24	±0.15	±0.15
0.2	±0.75	±0.35	±0.2	±0.2	±30	±15	±10	±10	±0.9	±0.45	±0.3	±0.3
0.5	±1.5	±0.75	±0.5	±0.5	±90	±45	±30	±30	±2.7	±1.35	±0.9	±0.9
1	±3	±1.5	±1	±1	±180	±90	±60	±60	±5.4	±2.7	±1.8	±1.8

Error limits for measuring current transformers with accuracy classes 3 and 5

Accuracy class	Limits of error ε [%], % of rated current I_{pr}	
	50% I_{pr}	120% I_{pr}
3	± 3	± 3
5	± 5	± 5

Error and phase displacement limits for measuring current transformers with accuracy classes 0.2 S and 0.5 S

Accuracy class	Limits of error ε [%], % of rated current I_{pr}					Phase bias Δφ, at % of rated current Ipr									
						in minutes, [′]					in centiradians, [crad]				
	1% I_{pr}	5% I_{pr}	20% I_{pr}	100% I_{pr}	120% I_{pr}	1% I_{pr}	5% I_{pr}	20% I_{pr}	100% I_{pr}	120% I_{pr}	1% I_{pr}	5% I_{pr}	20% I_{pr}	100% I_{pr}	120% I_{pr}
0.2S	±0.75	±0.35	±0.2	±0.2	±0.2	±30	±15	±10	±10	±10	0.9	0.45	0.3	0.3	0.3
0.5S	±1.5	±0.75	±0.5	±0.5	±0.5	±90	±45	±30	±30	±30	2.7	1.35	0.9	0.9	0.9

Error and phase shift limits for measuring current transformers – protective windings

Accuracy class	Error limits ε [%], At 100 % of rated current Ipr	Phase bias $\Delta\varphi$, At 100 % of rated current Ipr	
		in minutes, [′]	in centiradians, [crad]
5P and PR	±1	±60	±1.8
10P and 10PR	±3	-	-

Annex 26 to Article 401(1)(2)

Error and phase displacement limits for measuring voltage transformers (measuring coils) at each voltage between 80 % and 120 % of the rated voltage

Accuracy class	Error limits, εu[%]	Phase bias, $\Delta\varphi$	
		in minutes, [′]	in centiradians [crad]
0.1	±0.1	±5	±0.15
0.2	±0.2	±10	±0.3
0.5	±0.5	±20	±0.6
1	±1	±40	±1.2
3	±3	Not defined	Not defined

Error and phase displacement limits for measuring voltage transformers – protective coils, at 2 %, 5 % and 100 % of rated voltage and rated voltage multiplied by the declared voltage coefficient (1.2; 1.5 or 1.9)

Accuracy class	Error limits, εu [%]	Phase bias, $\Delta\varphi$	
		in minutes, [′]	in centiradians, [crad]
3P	± 3	± 120	± 3.5
6P	± 6	± 240	± 7

When testing 2 % of the declared voltage, the error limits and phase displacement are twice as high (i.e. for accuracy class 3P: ± 6 % and ± 240 ′; for accuracy class 6P: ± 12 %)

Annex No 27 to Article 405

Statistical method for initial verification of measuring transformers

The initial verification of a batch of measuring transformers shall be carried out using a statistical method. The size of the batch shall be the number of measurement transformers requested and subject to initial verification. At the point of initial verification, a sample of measuring transformers selected randomly shall be drawn from the lot so that the probability of each lot being or not sampled is the same. The sample of the lot shall be drawn up in agreement between the applicant and the official of the Bulgarian Metrology Institute who carries out the verification. The number of transformers in the lot determines the sample size according to the table:

Batch size, number	Sample, Number
up to 500	50
from 501 to 1,200	80
from 1,201 to 3,200	125
from 3,201 to 10,000	200

Where the sample contains transformers which are visibly defective, it shall be permissible to replace them with non-sampled transformers before the sample check has started. The permissible number of substitutable transformers is determined according to the size of the sample according to the table.

Number of transformers that can be replaced before the start of the inspection

Sample size, number	Number of transformers that can be replaced
50	1
80	3
125	5
200	8

The acceptance number is the highest number of defective measuring instruments found in the sample checked, where, if reached, the sampled portion can still be accepted. The rejection number is the smallest number of defective measuring instruments found in the sample checked which, if reached, leads to the rejection of the sampled portion.

Acceptance number and rejection number

Sample size, number	Acceptance number, number	Rejection number, number
50	1	2
80	1	2
125	3	4
200	5	6

When a batch of transformers is checked using a statistical sampling control method, a report shall be drawn up for each transformer checked in the sample and a common report shall be drawn up for the whole lot, using a template established for the initial verification of measuring transformers.

Annex No 28 to Article 414

Maximum permissible errors of audiometers

Frequency, Hz	Maximum error by frequency,%	Maximum error by level, dB
125	± 3	± 3
250	± 3	± 3
500	± 3	± 3
750	± 3	± 3
1000	± 3	± 3

1500	± 3	± 3
2000	± 3	± 3
3000	± 3	± 3
4000	± 3	± 3
6000	± 3	± 5
8000	± 3	± 5
10000	± 3	± 5

Annex No 29 to Articles 439(2) and 446(3)

Expression of alcohol strength

The concentration of ethyl alcohol in aqueous solution and the concentration of a vapour-air mixture (ethyl alcohol vapour, water vapour and air) corresponding to a given concentration of ethyl alcohol in blood is calculated using Dubovsky's formula (1) and the ratio of ethyl alcohol concentration in air to ethyl alcohol concentration in blood (2).

$$\beta_{(t)} = 0{,}04145 \times 10^{-3} \times \gamma_{(t)} \times e^{(0.06583 \times t)} \qquad (1)$$

whereby:

$\beta_{(t)}$ – mass concentration of ethanol in the test gas at a given temperature t in mg/L;

$0{,}04145 \times 10^{-3}$ and 0.06583 are conventional Dubovski coefficients

$\gamma_{(t)}$ – mass concentration of ethanol in the aqueous solution at a given temperature in mg/L;

t — the temperature of the solution and test gas in ˚C.

For t = 34 ˚C, equation (1) may be simplified by:

$$\beta_{(34)} = 0{,}38866 \times 10^{-3} \times \gamma_{(34)}$$

and

$$\frac{\beta_{\text{air}}}{\beta_{\text{blood}}} = \frac{1}{2100} \qquad (2)$$

whereby:

β_{air} is the concentration of ethyl alcohol in a steam air mixture;
β_{blood} is the concentration of ethyl alcohol in blood.

Annex 30 to Articles 441 and 442

Maximum tolerance errors of breath alcohol analyzers

Mass concentration reference value β	Maximum permissible errors at type approval, initial verification and subsequent verification following	Maximum permissible errors in subsequent verification

	repair	
0 to 0.4 mg/L	0.02 mg/L	0.03 mg/L
> 0.4 mg/L – 2 mg/L	5 % of β	7.5 % of β
> 2 mg/L	$\frac{\beta}{2} - 0{,}9 mg/L$	$\frac{3 \times \beta}{4} - 1{,}35 mg/L$

Annex No 31 to Article 454(1), point (1)

Content of the technical file of the measuring instruments

A. When a type of instrument is approved:

1.1. A description of the design and principle of operation of the measuring instrument;

1.2. A schematic drawing illustrating the principle of operation and, where appropriate, a photograph of the measuring instrument;

1.3. A general diagram and, where appropriate, detailed drawings or diagrams of the main components of the measuring instrument;

1.4. A description of the auxiliary equipment and accessories to the measuring instrument or manufacturer's instructions for their choice;

1.5. A description of the adjustment and setting devices;

1.6. A description of the protective devices to ensure correct operation of the measuring instrument;

1.7. A description of the software of the measuring instrument, if used, and of the measures to protect the software against intentional interference with it. The software documents shall contain:

- a list of all software modules, functions and parts and a statement that they are included in the description;
- software identification – instructions for obtaining it during operation of the measuring instrument;
- a description of software interfaces and the commands and data flows through these interfaces, including a statement of completeness;
- a list of protected parameters and a description of the means of protection;
- description of system configuration and minimum requirements (processor, memory, hard disk, operating system, etc.);
- description of how the operating system is protected (password, etc., if applicable);
- examination of the hardware of the system – topology block diagram, computer type, type of network, etc. and their identification;
-
- a full description of the datasets, storage or transmission;
- description of the accuracy of the algorithms (e.g. results, price calculation, rounding algorithms, etc.);
- description of user interface, menus and dialogues;
- a list of errors detected by the software and, if necessary, a description of how to detect them – algorithms;
- a description of the datasets, storage or transmission;

- test report of the software by another metrological institute or accredited laboratory, if available.

The software documents must not only be provided in a schematic manner, but must be written out in detail.

1.8. Measuring instrument specification – technical and metrological characteristics of the measuring instrument;

1.9. A description of the places intended for the affixing of verification marks and seals, where affixed;

1.10. Instructions for installation of the measuring instrument, if necessary;

1.11. Instructions for operation of the measuring instrument and, if necessary, its adjustment and settings;

1.12. Instructions for maintenance and repair of the measuring instrument, if necessary;

1.13. Instructions for safety when operating the measuring instrument – if necessary.

B. Where a modification or addition to an approved measuring instrument type is approved:

1.1. A description of the modification or addition made to the approved type;

1.2. Schematic drawing of the modification or addition carried out;

1.3. Detailed drawings or diagrams of the new components of the measuring instrument;

1.4. Technical and metrological characteristics of the measuring instrument after modification or addition of the type.

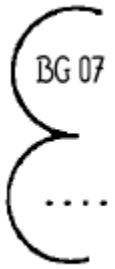
Annex 32 to Article 494, point (1)

Approved type marking

Последните две цифри на година на издаване на удостоверението за одобрен тип	**The last two digits to the year of issue of the type-approval certificate**
Номер в регистъра на одобрените за използване в страната СИ	**Register number of the MI approved for use in the country**

Annex 33 to Article 479(3), Article 486(4) and Article 494, point (2)

EEC type-approval marking

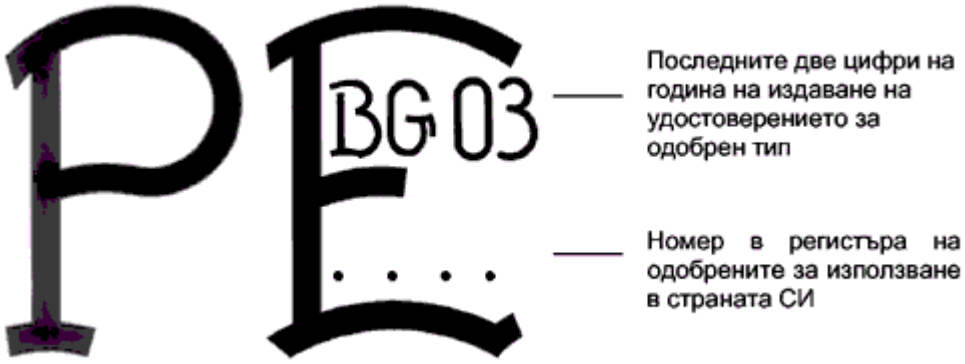


	→	Последните две цифри на годината на издаване на ЕИО сертификата за одобрен тип
	→	Номер в регистъра на одобрените за използване в страната СИ"

Последните две цифри на годината на издаване на ЕИО сертификата за одобрен тип	The last two digits of the year of issue of the EEC type-approval certificate
Номер в регистъра на одобрените за използване в страната СИ"	Reference number in the register of MI approved for use in the country”

Annex 34 to Article 494, point (3)

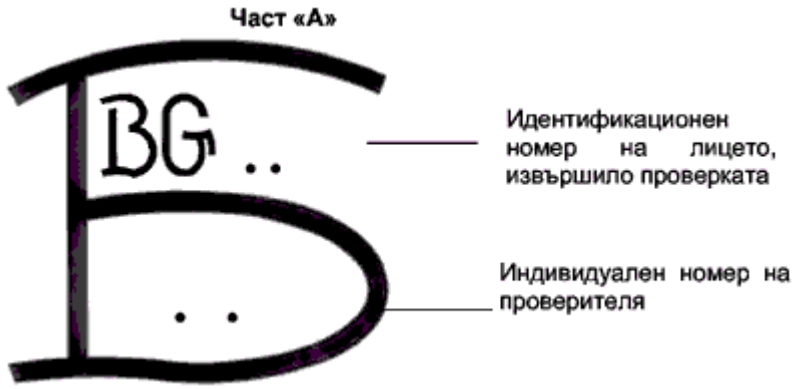
Restricted type-approval marking



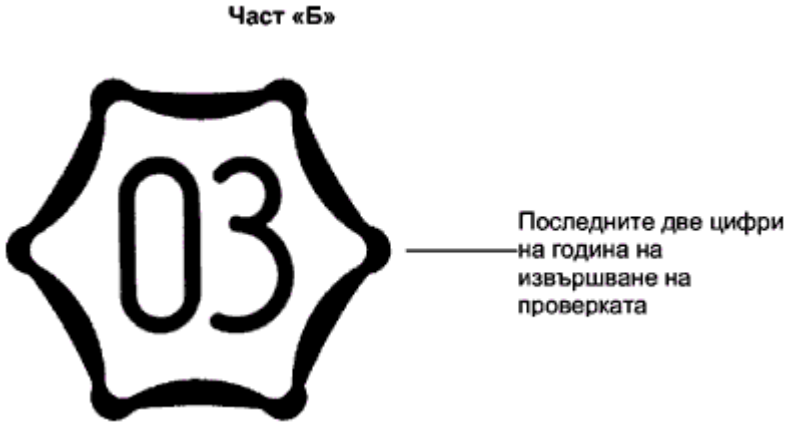
Последните две цифри на година на издаване на удостоверението за одобрен тип	**The last two digits of the year of issue to certificate of type approval**
Номер в регистъра на одобрените за използване в страната СИ	**Reference number in the Register of the MI approved for use in the country**

Annex No 35 to Article 494, point (4) and Article 497(2), and (3)

Markings for initial verification



Част«А»	**Part “A”**
Идентификационен номер на лицето, извършило проверката	**Identification number of the person who carried out the verification**
Индивидуален номер на .проверителя	**Individual number of the examiner**



Част «Б»	**Part “B”**
Последните де е цифри на година на извършване на проверката	**The last two digits of the year of verification**

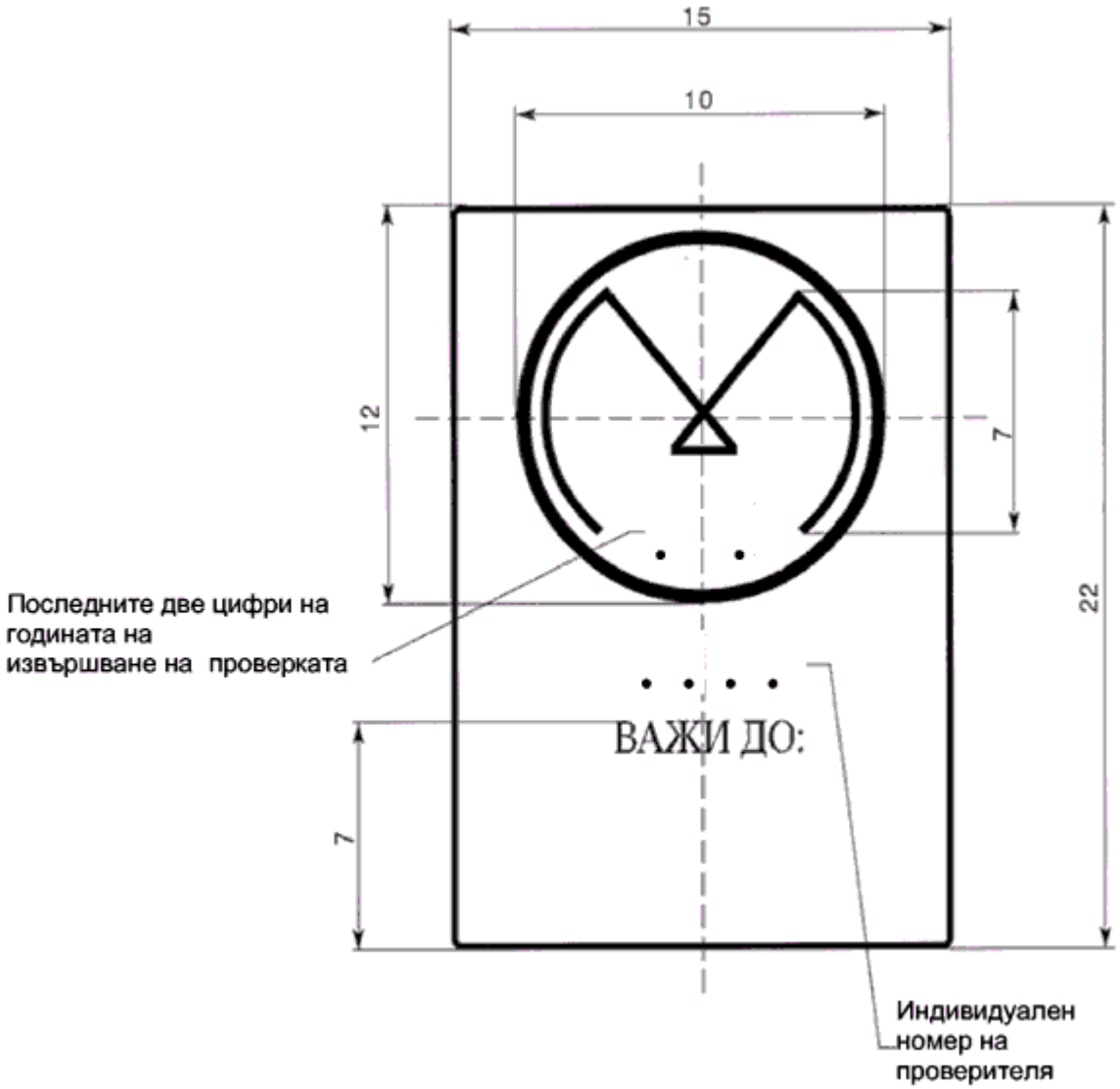
Annex No 4 to Articles 486, point (4) and 494, point (5)

EEC initial verification mark

Част “А”	**Part “A”**
Идентификационен номер на лицето, извършило проверката	Identification number of the person who carried out the verification
Индивидуален номер на проверителя	Individual number of the examiner
Част “Б”	**Part “B”**
Последните две цифри на годината на извършване на ЕИО първоначална проверка"	The last two digits of the year the EEC initial verification was carried out”

Annex No 37 to Article 494, point (6)

A subsequent verification marking



Последните две цифри на годината на извършване на проверката	**The last two digits of the year in which the verification was carried out**
“ВАЖИ ДО:	“VALID UNTIL:
Индивидуален номер на проверителя	**Individual number of the examiner**

NB:

Where the sign carrier is a lead seal, the sign shall be displayed on metal matrices with a diameter of 10 mm. On one side of the seal the individual number of the examiner shall be displayed and on the other the top of the post-clearance verification mark.

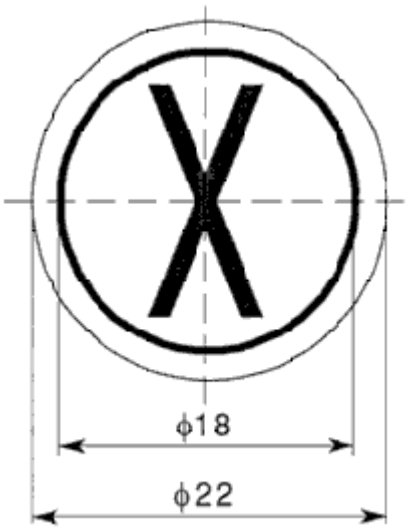
Only the last two digits of the year in which the initial verification was carried out shall be displayed on the holder of the sign.

Where the sign carrier is a stamp, only the individual number of the examiner shall be displayed below the image at the top of the sign.

In the field underneath “VALID UNTIL:” permanently enter the month and last two digits of the year of validity of the check.

Annex No 38 to Article 494, point (7)

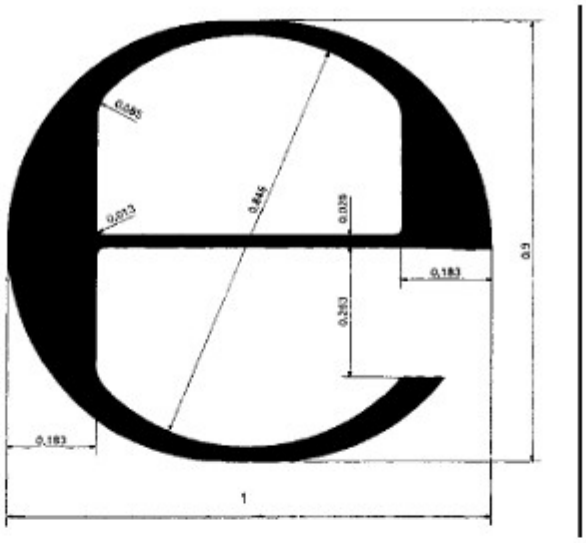
No-use sign



NB: Where the carrier is a swage, the size of the no-use sign shall be 5 mm.

Annex 39 to Article 496(1) and (2)

Alphabetical and numerical designations in the type-approval and initial verification marks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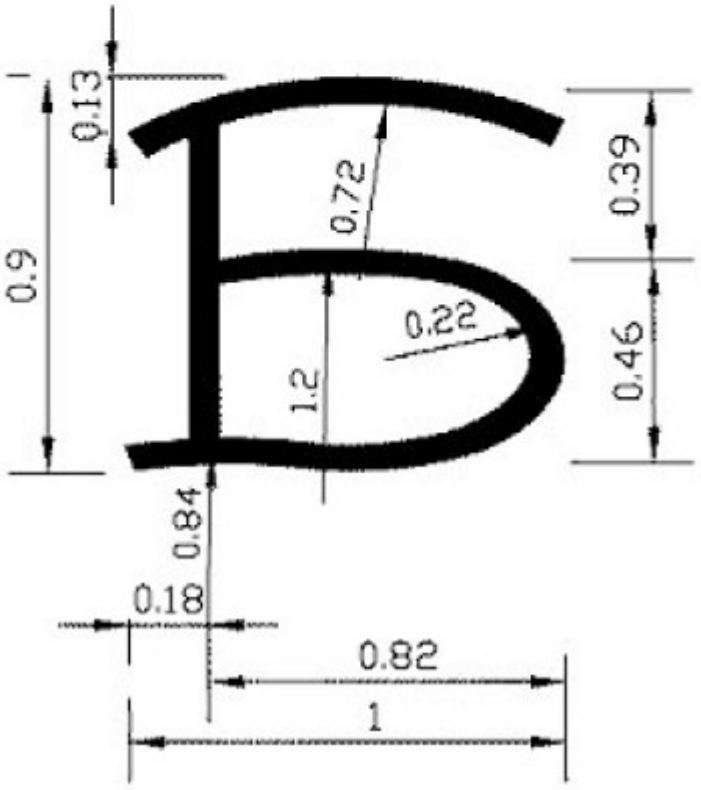
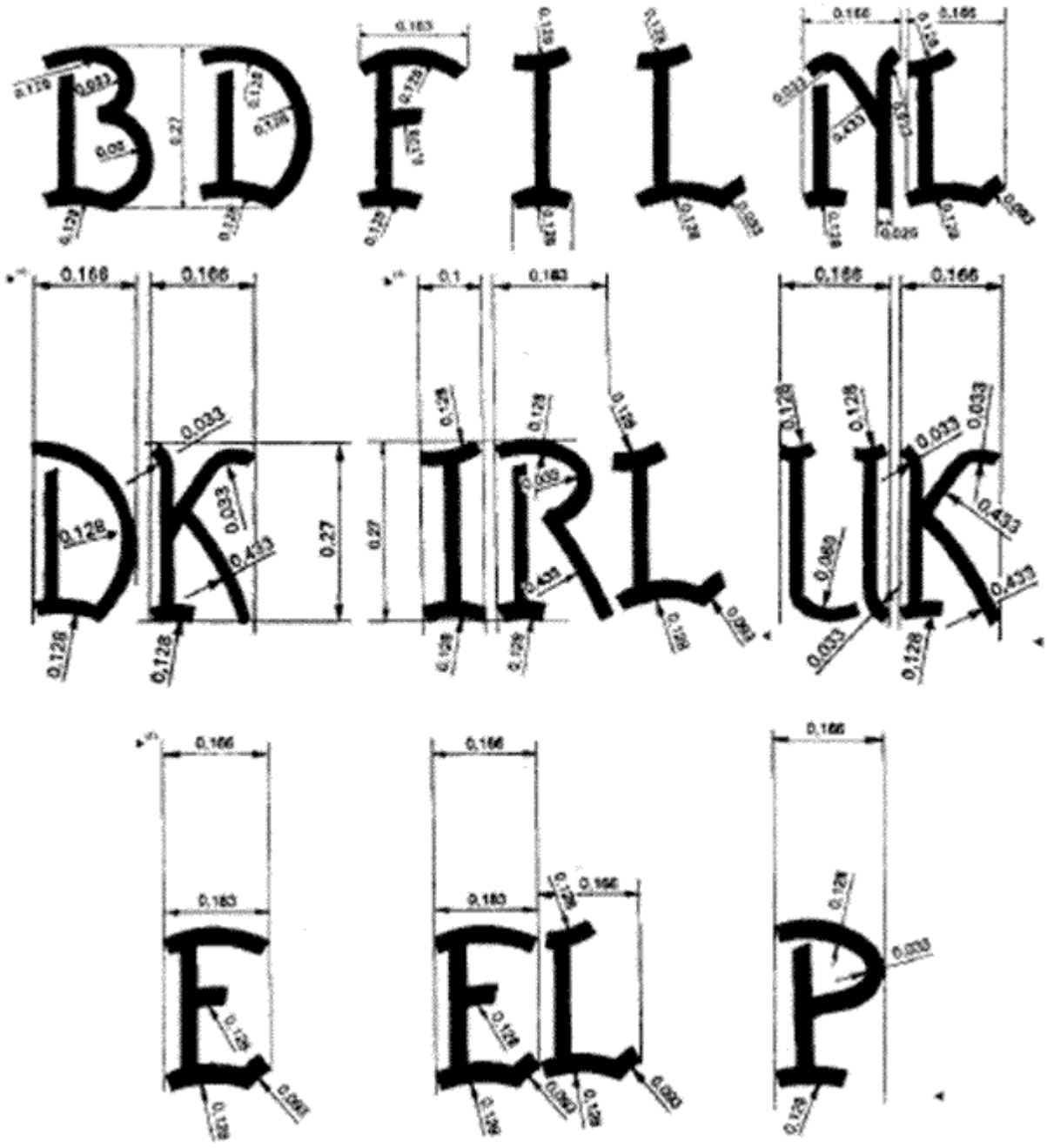
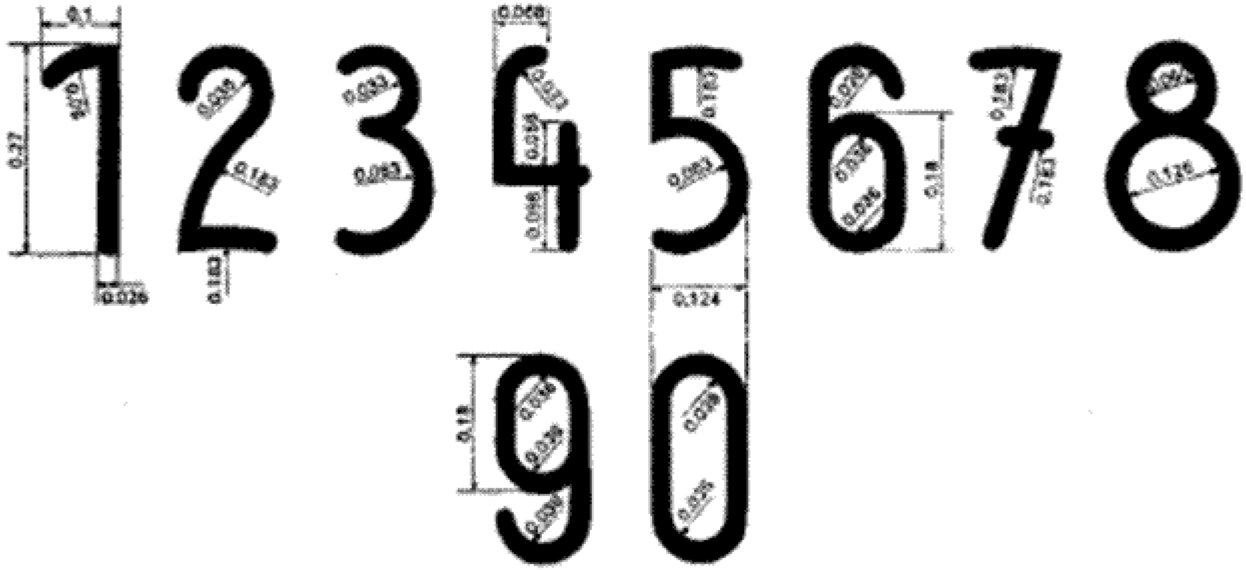
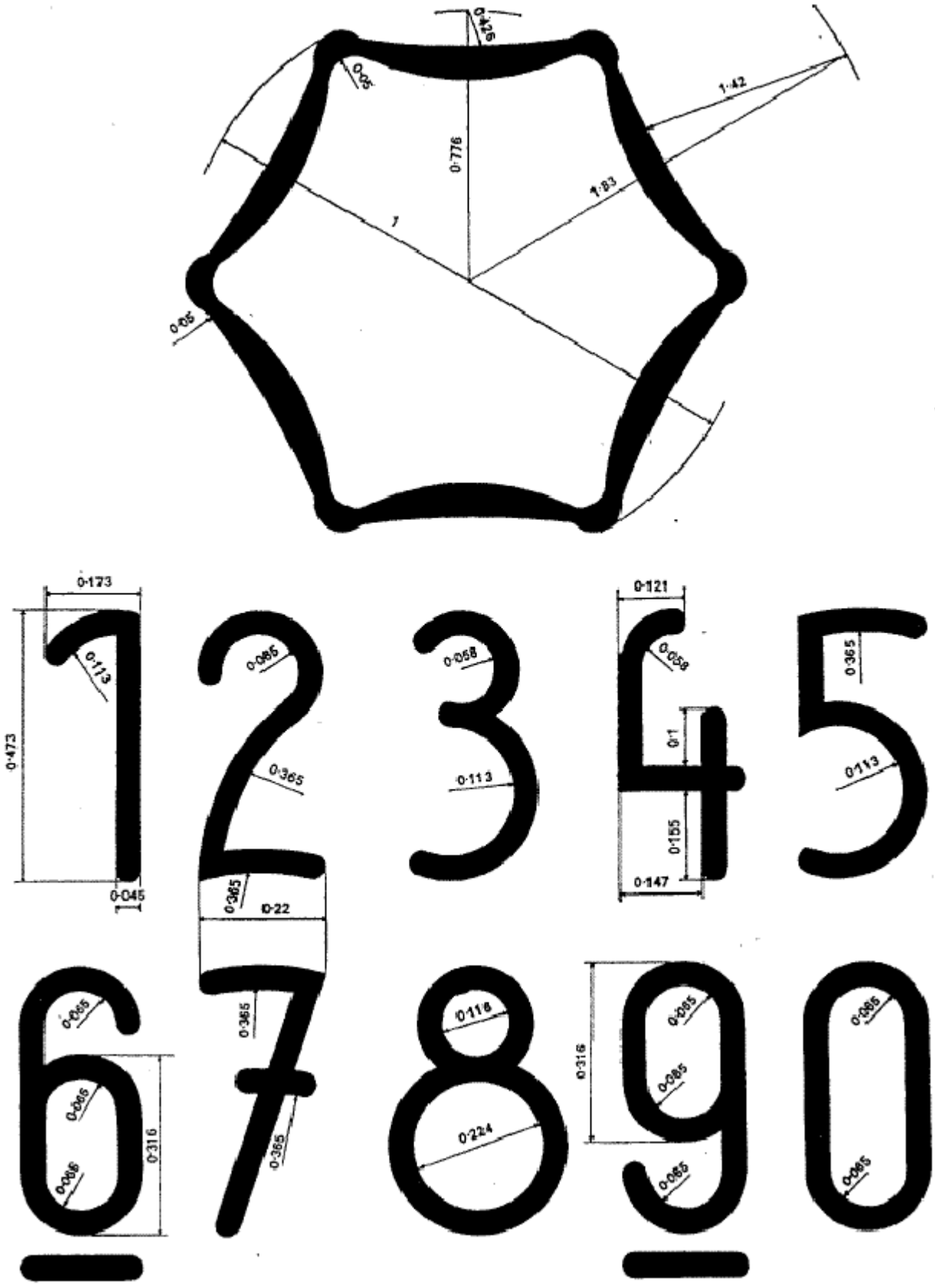
0.013
0.845
0.029
0.9
0.183
0.253
0.183
1


0.13
0.9
0.72
0.39
0.22
1.2
0.46
0.84
0.18
0.82
1


B D F I L N L
D K I R L U K
E E L P


A S F I C Z
E S T C Y L V
L T H M P L
S I S K B G R


1 2 3 4 5 6 7 8
9 0
0,1
0,27
0,026
0,124
0,18



NB: The dimensions are given in parts of the unit, the unit being one of the following dimensions: 12.5 mm, 6.3 mm, 3.2 mm, 1.6 mm.

Annex No 40 to Article 497(1)

A sign certifying that the measuring instrument is not subject to type approval

Annex No 41 to Article 497(4)

A marking certifying that the measuring instrument is not subject to EEC type approval

"

Annex No 42 to Article 497(1)

A marking certifying that the measuring instrument is not subject to initial verification

Последните две цифри па година на издаване на удостоверението за одобрен тип	**The last two digits of the year of issue of the type-approval certificate**
Номер в регистъра на одобрените за използване в	**Register reference number of the MI approved for use**

страната СИ	**in the country**

Annex No 43 to Article 497(4)

A sign certifying that the measuring instrument is not subject to EEC initial verification

→	Последните две цифри на годината на издаване на ЕИО сертификата за одобрен тип
→	Номер в регистъра на одобрените за използване в страната СИ"

Последните две цифри на годината на издаване на ЕИО сертификата за одобрен тип	The last two digits of the year of issue of the EEC type-approval certificate
Номер в регистъра на одобрените за използване в страната СИ"	Register reference number of the MI approved for use in the country”