**Regulation on requirements to automatic gravimetric filling instruments**

Established by the Norwegian Metrology Service 21.12.2007 in accordance with the Units of measurement, measurement and standard time Act of 26 January 2007 no 4 § 35, cf. § 7 and 10, and § 8, § 19, § 20 and § 30 and regulation December 20 th 2007 no. 1723 measuring units and measurements § 3-3, § 3-6, § 5-2 second subsection.

**Chapter 1 – Introductory provisions**

**§ 1. Scope**

The regulations prescribes the requirements which apply to automatic gravimetric filling machines, cf. Regulation December 20, 2007 No. 1723 on measuring units and measurement Chapter 3 and supplementary rules on control and approval during use.

The requirements of this regulation apply when

a) such automatic gravimetric filling machines are sold or offered for sale, cf. regulations on measuring units and measurement § 3-1 and when

b) such automatic gravimetric filling machines are used as a basis for calculating financial settlement, cf. the regulations on measuring units and measuring § 3-4.

This regulation does not prescribe requirements to electromagnetic disturbance. Electromagnetic disturbance is regulated by Regulation October 10th 2017 no. 1598 on electric equipment.

**§ 2 Definitions**

For the purposes of this Regulation:

a) Automatic gravimetric filling machine: An automatic weighing instrument that fills bulk packs with a predetermined and approximately constant mass.

b) Automatic weighing instrument: An instrument that determines the mass of a product without the intervention of an operator, and which follows a predefined program of automatic processes characteristic of the instrument.

c) Measurand: The particular quantity subject to measurement.

d) Influence quantity: A quantity that is not the size of the measurement, but which affects the result of measurement.

e) Specified operating conditions: The values for the measurand and influence quantities making up the normal working conditions of an instrument.

f) Disturbance: An influence quantity having a value within the limits specified in the limits specified in the appropriate requirements, but outside the specified rated operating conditions of the measuring instrument. An influence quantity is a disturbance if for that influence quantity the rated operating conditions are not specified.

g) Critical change value: The value at which the change in the measurement result is considered undesirable.

h) Climatic environments: The conditions in which measuring instruments may be used. A number of temperature limits have been defined to take into account climate differences between the EEA states.

**§ 3. Requirements for automatic gravimetric filling machines**

Automatic gravimetric filling instruments shall as a minimum fulfill the essential requirements established in chapter 2. The maximum permissible errors to automatic gravimetric filling instruments are established in § 30.

Automatic gravimetric filling instruments which have been natinal type examinated during a former legislation, shall in service fulfill the requirements which applied when the automatic gravimetric filling instrument was national type examinated, including the requirements for measurment accuracy in service.

Automatic gravimetric filling instruments which are not lawfully conformity marked or has a valid national type examination and national verification, are not allowed in service.

**§ 4. Control and approval when selling automatic gravimetric filling instruments**

Automatic gravimetric filling instruments sold or offered for sale shall have a valid conformity assessment according to the provisions in regulation on measuring units and measurements chapter 4.

**§ 5 Surveillance of an automatic gravimetric filling instrument in service**

An automatic gravimetric filling instrument is subject to periodic surveillance, with a surveillance period of one year. This does not apply when the weighing instrument is used for measurements in connection with the preparation of prepackages in fish reception and weighing in fish reception, which receives more than 10 tonnes of fish per year (per reception).

The automatic gravimetric filling instrument should normally be tested with the products it is usually used for weighing and under normal operating conditions. During testing, sufficient quantities of test products, handling equipment, qualified personnel and necessary control tools must be available near the weighing instruments.

**Chapter 2 - Requirements for automatic gravimetric filling instruments**

**Section I - General requirements**

**§ 6. Metrological protection and level of quality**

An automatic gravimetric filling instrument shall provide a high level of metrological protection in order that any party affected can have confidence in the result of measurement, and shall be designed and manufactured to a high level of quality in respect of the measurement technology and security of the measurement data.

**§ 7. Intended use and foreseeable misuse**

Consideration shall be given to the intended use of the automatic gravimetric filling instrument as well as the anticipated misuse when selecting solutions used to meet the requirements.

**§ 8. Allowable errors**

Under rated operating conditions and in the absence of a disturbance, the measurement error shall not exceed the maximum permissible measurement error stipulated in section 30.

Unless otherwise specified in Section II, the maximum allowable measurement error expressed as the deviation from the true measurement value is expressed as a two-sided interval.

Under the specified operating conditions and if there is a disturbance, the performance requirement is set out in section II.

If the automatic gravimetric filling instrument is intended to be used in a given permanent continuous electromagnetic field, the measurement result during the experiment with amplitude-modulated electromagnetic field shall be within the maximum permissible measurement error.

**§ 9. Affecting sizes**

The manufacturer shall specify the climatic and electromagnetic environment in which the automatic gravimetric filling instrument is intended to be used, as well as the power supply and other affecting sizes that may affect measurement accuracy, taking into account the requirements set out in section II.

**§ 10. Climatic environment**

The manufacturer shall indicate the upper and lower temperature limits among the values ​​in table 1 and indicate whether the automatic gravimetric filling instrument are designed for condensing or non-condensing moisture and whether the intended location is open or closed.

Tabell 1

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Upper temperature limit | 30 ° C | 40 ° C | 55 ° C | 70 ° C |
| Lower temperature limit | 5 ° C | -10 ° C | -25 ° C | -40 ° C |

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**§ 11. Electromagnetic environment**

The electromagnetic environment is classified in Class E1, E2 or E3 as described below in table 2, unless otherwise specified in section II.

Table 2

|  |  |
| --- | --- |
| E 1 | This class includes measuring tools used in locations with electromagnetic interference similar to those found in buildings used for residential and commercial purposes, and light industrial buildings. |
| E 2 | This class includes measuring tools used in locations with electromagnetic interference similar to those found in other industrial buildings. |
| E 3 | This class includes measuring tools that receive power from the battery of a vehicle. Such measuring equipment shall meet the requirements of E2 and the following additional requirements:  voltage drop caused by charging of the starter circuit in internal combustion engines and voltage transients when disconnecting the discharged battery while the engine is operating. |

The following influencing size must be taken into account in electromagnetic environments:

a) Voltage Interruption

b) Short-term reduced voltage

c) Voltage transients on supply and / or signal lines, electrostatic discharges

d) High frequency electromagnetic field

e) Transmitted high frequency electromagnetic fields on supply lines and / or signal lines

f) Overvoltage on supply lines and / or signal lines.

**§ 12. Other influencing sizes**

The following other influencing sizes shall be taken into account when appropriate:

a) Voltage Variation

b) Variations in grid frequency

c) Network generated magnetic fields

d) Other sizes that can significantly affect the accuracy of the automatic gravimetric filling instrument.

**Section 13. Basic rules for trial and determination of errors**

The basic requirements set out in section 8 shall be checked for each relevant influencing size. Unless otherwise specified in section II, these basic requirements apply when each impacting size is applied and its effect is assessed separately, with all other impacting sizes held relatively constant by their reference values.

Measurement tests shall be performed during and after application of the impacting size, which corresponds to the normal operating status of the automatic gravimetric filling instrument when this impacting size can be assumed to occur.

**§ 14. Humidity**

Depending on the climatic environment the automatic gravimetric filling instrument is intended to be used in, the most appropriate test procedure may be either stationary humid heat (non-condensing) or cyclic humid heat (condensing).

Test cycles with cyclically varying humidity are appropriate if condensation is important, or if vapor permeation will be accelerated by ventilation. In conditions where non-condensing humidity is important, test runs with stationary humid heat are appropriate.

**§ 15. Reproducibility**

If the automatic gravimetric filling instrument is used to measure the same measurement size, but at different locations and by different users, the results of subsequent measurements should be in close agreement. The variation in the measurement results should be small in relation to the maximum allowable measurement error.

**§ 16. Repeatability**

If the measurement size has the same value and the measurement conditions are unchanged, the subsequent measurement results must be in good agreement. The variation in the measurement results should be small in relation to the maximum permissible measurement error.

**§ 17. Resolution and sensitivity**

An automatic gravimetric filling instrument shall be sufficiently sensitive and shall have adequate resolution adapted to the measuring task.

**§ 18. Durability**

An automatic gravimetric filling instrument shall be designed so that its measurement technical characteristics are sufficiently stable for a period determined by the manufacturer, provided that it is installed, maintained and used properly in accordance with the manufacturer's instructions and in the environment for which it is intended.

**§ 19. Reliability**

An automatic gravimetric filling instrument shall be designed so that the effect of a malfunction resulting in an inaccurate measurement result is reduced as far as possible, unless such an error is obvious.

**§ 20. Suitability**

An automatic gravimetric filling machine should be:

a) Suitable for the intended use, taking into account the operating conditions that occur in practice, and no unreasonable requirements shall be imposed on the user to obtain a correct measurement result.

b) Robust and made of materials suitable for the intended operating conditions.

c) Designed so that the measuring function can be checked after the filling machine has been marketed and put into service. If necessary, special equipment or software for this control should be part of the filling machine. The test procedure must be described in the operating instructions.

d) Insensitive to small variations in the value of the measurement size, or it must respond appropriately if the filling machine is designed to measure values ​​of the measurement size that are constant over time.

An automatic gravimetric filling instrument should not be of such a nature that it can easily be used for fraud, and the possibility of accidental misuse should be minimized.

If an automatic gravimetric filling instrument has associated software with functions other than the measurement function, the software of critical importance for the measurement function shall be identifiable and shall not be subject to interfering influence from the associated software functions.

**§ 21. Protection against manipulation**

If an automatic gravimetric filling instrument is connected to another device directly or by remote connection, its measurement technical characteristics shall not be adversely affected by the device.

Components that are of crucial importance to the metrological properties must be designed so that they can be secured. The security measures used shall enable the detection of interventions.

Software that has a decisive importance for the metrological properties must be labeled accordingly and must be secured. Identification of such software should be easily obtained from the filling machine. Any information or indication that an intervention has taken place shall be available for a reasonable period of time.

Measurement data, software that is critical to the measurement properties, and important measurement parameters that are stored or transmitted, must be appropriately protected against intentional or unintended changes.

**§ 22. Information to be applied or followed by the automatic gravimetric filling instrument**

An automatic gravimetric filling instrument shall bear the manufacturer's mark or name and information on the accuracy of the weighing instrument. Where applicable, the following information shall also be applied to the automatic gravimetric filling instrument:

a) relevant information on conditions of use

b) measuring capacity

c) measuring range

d) identity brand

e) EC type-approval certificate or EC design examination certificate

f) Information about optional equipment that gives measurement results complies with the stipulations of stipulated regulations regarding statutory measurement technical control.

Operation information should follow the automatic gravimetric filling instrument unless the weighing instrument is so simple that this is unnecessary. The information shall be easy to understand, and shall include to the appropriate extent:

a) specified operating conditions

b)electromagnetic environment

c) upper and lower temperature limit, whether condensation is acceptable or not, open or closed location

d) instructions for installation, maintenance, repairs and permissible settings

(e) instructions for proper operation and any special conditions of use

f) terms for compatibility with interfaces, sub-assemblies or measuring equipment

All marks and inscriptions must be clear and unambiguous and should not be removed or moved.

**§ 23. Indication of measured value**

Unless otherwise specified in Section II, the minimum division for a measured value shall be in the form 1 × 10 n, 2 × 10 n or 5 × 10 n, where n is an integer or zero. The target unit or its symbol should be displayed close to the numeric value.

Measuring units and symbols shall be used which are in accordance with the provisions of the Measurement Units and Measurement Regulations.

**§ 24. Indication of result**

The result should be shown on a display or as a printout.

All results shall be clear and unambiguous and accompanied by the marks and inscriptions necessary to inform the user of the significance of the result. The result displayed should be easily readable under normal operating conditions. Further information may be provided on the condition that it cannot be confused with the measured technical results.

When printing, the font or registration should be easily legible and not removable.

**§** **25. Further processing of data to conclude the trading transaction**

Automatic gravimetric filling instruments shall permanently record the measurement result along with information identifying the particular transaction, when the measurement cannot be repeated and the filling machine is normally intended to be used when one party to the transaction is absent.

In addition, a durable proof of the measurement result and information for identification of the transaction should be available on request upon completion of the measurement.

**§ 26. Conformity evaluation**

An automatic gravimetric filling instrument shall be designed so as to allow ready evaluation of its conformity with the appropriate requirements of this regulation.

**Section II - Specific requirements**

**§ 27. Specified operating conditions**

The manufacturer shall specify nominal operating conditions for automatic gravimetric filling machines as follows:

a) For the measurement size: The measurement range in the form of largest and smallest load

b) For influential quantities from electricity supply:

1. For AC power supply: Rated AC voltage, or AC voltage limits

2. For DC power supply: Rated and minimum DC voltage, or DC voltage limits

c) For mechanical and climatic impact sizes: Minimum temperature range is 30 ° C. For filling machines used under special mechanical loads, e.g. fillers built into vehicles, the manufacturer shall define the mechanical conditions of use

(d) For other affecting sizes (if applicable):

1. Working speed (s)

2. Characteristics of the product (s) for weighing.

**§ 28. Suitability**

Means shall be available to limit the effects of inclination, load and working speed so that the maximum value for maximum permissible measurement error is not exceeded in normal operation. Appropriate material handling devices and an appropriate reset function shall be provided so that the weight can comply with the maximum permissible measurement error during normal operation.

The interfaces of the controls must be clear and effective. The operator should be able to verify that any indicator is reliable. Results that fall outside the measurement range should be identified as such if printing is possible.

**§ 29. Accuracy classes**

The manufacturer must specify both the reference accuracy class Ref (x) and operational accuracy class (s) X (x).

A measuring tool type is assigned a reference accuracy class, Ref (x), which corresponds to the best possible accuracy for measuring tools of the type. After installation, single implements are denoted by one or more operational accuracy classes, X (x), taking into account the particular products to be weighed. The classification factor (x) must be ≤ 2 and have the form 1 × 10 k, 2 × 10 k or 5 × 10 k, where k is a negative integer or zero.

The reference accuracy class, Ref (x), applies to static loads.

For the operational class X (x), X is a system that compares accuracy with the weight of the load, and (x) is a multiplier for the error limits specified for class X (1) in section 30 third paragraph.

Class X (x) when x ≤ 1 is used when weighing finished products, fish and similar trade transactions. When weighing other products, the accuracy class will be determined by the Justervesenet in each case.

**§ 30. Maximum permissible errors**

For static loads under specified operating conditions, the maximum permissible deviation for the reference accuracy class Ref (x) shall be 0.312 times the maximum permissible deviation for each fill from the mean, as given in Table 3, multiplied by the classification factor (x).

For automatic gravimetric filling machines where filling may be more than one load (eg cumulative or selective combination weights), the maximum permissible static load error shall be the accuracy required for the filling as specified in the third paragraph (ie not the sum of maximum allowable errors for each individual load).

Table 3 shows the maximum permissible deviation from the average filling during sales and Table 4 shows the maximum permissible deviation from the average filling during use. The calculated deviation for each filling from the average can be adjusted to take into account the effect of the particle size of the material.

Table 3

The value of the mass of the filling m

(g) Maximum permissible deviations for each filling

from the average value of Class X (1) on sale

m ≤ 50 7.2%

50 <m ≤ 100 3.6 g

100 <m ≤ 200 3.6%

200 <m ≤ 300 7.2 g

300 <m ≤ 500 2.4%

500 <m ≤ 1 000 12 g

1 000 <m ≤ 10 000 1.2%

10 000 <m ≤ 15 000 120 g

15,000 <m 0.8%

Table 4

The value of the mass of the filling m

(g) Maximum permissible deviations for each filling from

the average value of class X (1) in use

In case of follow-up check In case of ordinary check

m ≤ 50 7.2% 9%

50 <m ≤ 100 3.6 g 4.5 g

100 <m ≤ 200 3.6% 4.5%

200 <m ≤ 300 7.2 g 9 g

300 <m ≤ 500 2.4% 3%

500 <m ≤ 1 000 12 g 15 g

1,000 <m ≤ 10,000 1.2% 1.5%

10 000 <m ≤ 15 000 120 g 150 g

15 000 <m 0.8% 1%

For automatic gravimetric filling machines where it is possible to preset a filling, the maximum difference between the pre-set value and the average mass of the fillings shall not exceed 0.312 of the maximum permissible deviation for each filling from the average, as indicated under the follow-up control column in Table 4.

0 Amended by Regulation Dec 10, 2015 No. 1456 (effective January 1, 2016).

**§ 31. Performance under influencing factors and electromagnetic interference**

The maximum permissible errors due to influencing factors are as specified in § 30, first and second paragraphs.

The critical change value as a result of a disturbance is the change in the static weight indication corresponding to the maximum permissible error specified in section 30 first and second paragraphs calculated for the minimum allowable filling, or a change that would have an effect corresponding to the filling for filling machines where the filling consists of several subsets. The calculated critical change value is rounded to the next higher division of weight (d).

The manufacturer shall specify the minimum allowable filling.

**§ 31 a*. Additional requirements to automatic gravimetric filling instruments used for landing fish***

*Automatic gravimetric filling instruments used for landing fish must have a display or other clear reading option placed in or by the weighing instrument.*

*The measured quantity must be able to read continuously. When the weighing instrument is in use, the weighted quantity must be able to read directly.*

*The weighing instrument must have at least one additional display that repeats the display of the weighing result from the main display. The additional display must not have functions that can affect the weighing result. The additional display must have the same division as the main display.*

**Chapter 3 – Concluding provisions**

**§ 32. Infringement penalty**

Violation of the provisions of this regulation may result in the imposition of a violation fee measured in accordance with the provisions of regulation on measuring units and measurement chapter 7.

**§ 33. Entry into force**

This regulation enters into force on 01.02.2020.