

SCHEDULE 1

Regulations 2(1), 14(1), and 17(2)

ESSENTIAL REQUIREMENTS

1. The essential requirements are the relevant requirements relating to automatic gravimetric filling instruments contained in Annex I and MI-006 set out in this Schedule.

**Definitions**

2. In these Regulations—

“climatic environments” means the conditions in which automatic gravimetric filling instruments may be used;

“critical change value” means the value at which the change in the measurement result is considered undesirable;

“disturbance” means an influence quantity having a value within the limits specified in the appropriate requirement but outside the specified rated operating conditions of the automatic gravimetric filling instrument. An influence quantity is a disturbance if for that influence quantity the rated operating conditions are not specified;

“influence quantity” means a quantity that is not the measurand but that affects the result of measurement;

“measurand” means the particular quantity subject to measurement; and

“rated operating conditions” means the values for the measurand and influence quantities making up the normal working conditions of an automatic gravimetric filling instrument.

**Allowable Errors**

3.—(1) Under rated operating conditions and in the absence of a disturbance, the error of measurement shall not exceed the maximum permissible error (MPE) value as set out in paragraph 17.

(2) Unless stated otherwise, MPE is expressed as a bilateral value of the deviation from the true measurement value.

(3) Under rated operating conditions and in the presence of a disturbance, the performance requirement shall be as set out in paragraph 18(2).

(4) Where the automatic gravimetric filling instrument is intended to be used in a specified permanent continuous electromagnetic field the permitted performance during the radiated electromagnetic field-amplitude modulated test shall be within MPE.

(5) The manufacturer shall specify the climatic and electromagnetic environments in which the automatic gravimetric filling instrument is intended to be used, power supply and other influence quantities likely to affect its accuracy, taking account of the requirements in this Schedule.

(a) Climatic environments—

The manufacturer shall specify the temperature range. The minimum temperature range is 30°C and shall be within the upper temperature limit of 70°C and the lower temperature limit of -40°C. The manufacturer shall indicate whether the automatic gravimetric filling instrument is designed for condensing or non-condensing humidity as well as the intended location for the instrument, i.e. open or closed.

(b) Electromagnetic environments—

(i) Electromagnetic environments are classified into classes E1, E2 or E3 as follows—

*Status: This is the original version (as it was originally made).*

E1 This class applies to automatic gravimetric filling instruments used in locations with electromagnetic disturbances corresponding to those likely to be found in residential, commercial and light industrial buildings.

E2 This class applies to automatic gravimetric filling instruments used in locations with electromagnetic disturbances corresponding to those likely to be found in other industrial buildings.

E3 This class applies to automatic gravimetric filling instruments supplied by the battery of a vehicle. Such instruments shall comply with the requirements of E2 and the following additional requirements—

- (aa) voltage reductions caused by energising the starter-motor circuits of internal combustion engines;
- (bb) load dump transients occurring in the event of a discharged battery being disconnected while the engine is running.

(ii) The following influence quantities shall be considered in relation with electromagnetic environments—

- (aa) voltage interruptions;
- (bb) short voltage reductions;
- (cc) voltage transients on supply lines and/or signal lines;
- (dd) electrostatic discharges;
- (ee) radio frequency electromagnetic fields;
- (ff) conducted radio frequency electromagnetic fields on supply lines and/or signal lines;
- (gg) surges on supply lines and/or signal lines.

(6) Other influence quantities to be considered, where appropriate, are—

- (a) voltage variation;
- (b) mains frequency variation;
- (c) power frequency magnetic fields;
- (d) any other quantity likely to influence in a significant way the accuracy of the automatic gravimetric filling instrument.

(7) When carrying out the tests as envisaged in these Regulations, the following paragraphs apply—

- (a) Basic rules for testing and the determination of errors—
  - (i) Essential requirements specified in sub-paragraphs (1) to (4) shall be verified for each relevant influence quantity. These essential requirements apply when each influence quantity is applied and its effect evaluated separately, all other influence quantities being kept relatively constant at their reference value.
  - (ii) Metrological tests shall be carried out during or after the application of the influence quantity, whichever condition corresponds to the normal operational status of the automatic gravimetric filling instrument when that influence quantity is likely to occur.
- (b) Ambient humidity—
  - (i) According to the climatic operating environment in which the automatic gravimetric filling instrument is intended to be used either the damp heat-steady state (non-condensing) or damp heat cyclic (condensing) test may be appropriate.

- (ii) The damp heat cyclic test is appropriate where condensation is important or when penetration of vapour will be accelerated by the effect of breathing. In conditions where non-condensing humidity is a factor the damp-heat steady state is appropriate.

### **Reproducibility**

4. The application of the same measurand in a different location or by a different user, all other conditions being the same, shall result in the close agreement of successive measurements. The difference between the measurement results shall be small when compared with the MPE.

### **Repeatability**

5. The application of the same measurand under the same conditions of measurement shall result in the close agreement of successive measurements. The difference between the measurement results shall be small when compared with the MPE.

### **Discrimination and Sensitivity**

6. An automatic gravimetric filling instrument shall be sufficiently sensitive and the discrimination threshold shall be sufficiently low for the intended measurement task.

### **Durability**

7. An automatic gravimetric filling instrument shall be designed to maintain an adequate stability of its metrological characteristics over a period of time estimated by the manufacturer, provided that it is properly installed, maintained and used according to the manufacturer's instruction when in the environmental conditions for which it is intended.

### **Reliability**

8. An automatic gravimetric filling instrument shall be designed to reduce as far as possible the effect of a defect that would lead to an inaccurate measurement result, unless the presence of such a defect is obvious.

### **Suitability**

9.—(1) An automatic gravimetric filling instrument shall have no feature likely to facilitate fraudulent use, whereas possibilities for unintentional misuse shall be minimal.

(2) An automatic gravimetric filling instrument shall be suitable for its intended use taking account of the practical working conditions and shall not require unreasonable demands of the user in order to obtain a correct measurement result.

(3) Where an automatic gravimetric filling instrument is designed for the measurement of values of the measurand that are constant over time, the instrument shall be insensitive to small fluctuations of the value of the measurand, or shall take appropriate action.

(4) An automatic gravimetric filling instrument shall be robust and its materials of construction shall be suitable for the conditions in which it is intended to be used.

(5) An automatic gravimetric filling instrument shall be designed so as to allow the control of the measuring tasks after the instrument has been placed on the market and put into use. If necessary, special equipment or software for this control shall be part of the instrument. The test procedure shall be described in the operation manual.

(6) When an automatic gravimetric filling instrument has associated software which provides other functions besides the measuring function, the software that is critical for the metrological

*Status: This is the original version (as it was originally made).*

characteristics shall be identifiable and shall not be inadmissibly influenced by the associated software.

(7) Means shall be provided to limit the effects of tilt, loading and rate of operation such that MPEs are not exceeded in normal operation.

(8) Adequate material handling facilities shall be provided to enable the automatic gravimetric filling instrument to respect the MPEs during normal operation.

(9) Any operator control interface shall be clear and effective.

(10) The integrity of the display (where present) shall be verifiable by the operator.

(11) Adequate zero setting capability shall be provided to enable the automatic gravimetric filling instrument to respect the MPEs during normal operation.

(12) Any result outside the measurement range shall be identified as such, where a printout is possible.

### **Protection against corruption**

**10.**—(1) The metrological characteristics of an automatic gravimetric filling instrument shall not be influenced in any inadmissible way by the connection to it of another device, by any feature of the connected device itself or by any remote device that communicates with the instrument.

(2) A hardware component that is critical for metrological characteristics shall be designed so that it can be secured. Security measures foreseen shall provide for evidence of an intervention.

(3) Software that is critical for metrological characteristics shall be identified as such and shall be secured.

(4) Software identification shall be easily provided by the automatic gravimetric filling instrument.

(5) Evidence of a software intervention shall be available for a reasonable period of time.

(6) Measurement data, software that is critical for measurement characteristics and metrologically important parameters stored or transmitted shall be adequately protected against accidental or intentional corruption.

### **Information to be borne by and to accompany the automatic gravimetric filling instrument**

**11.**—(1) An automatic gravimetric filling instrument shall bear the following inscriptions—

- (a) manufacturer's mark or name;
- (b) information in respect of its accuracy,

plus, when applicable:

- (c) information in respect of the conditions of use;
- (d) measuring capacity;
- (e) measuring range;
- (f) identity marking;
- (g) number of the EC-type examination certificate or the EC design examination certificate;
- (h) information whether or not additional devices providing metrological results comply with these Regulations.

(2) The automatic gravimetric filling instrument shall be accompanied by information on its operation, unless the simplicity of the instrument makes this unnecessary. Information shall be easily understandable and shall include where relevant—

- (a) rated operating conditions;

- (b) electromagnetic environment classes;
  - (c) the upper and lower temperature limit, whether condensation is possible or not, open or closed location;
  - (d) instructions for installation, maintenance, repairs, permissible adjustments;
  - (e) instructions for correct operation and any special conditions of use; and
  - (f) conditions for compatibility with interfaces or measuring instruments.
- (3) Groups of identical automatic gravimetric filling instruments used in the same location do not necessarily require individual instruction manuals.
- (4) The scale interval for a measured value shall be in the form  $1 \times 10^n$ ,  $2 \times 10^n$  or  $5 \times 10^n$ , where  $n$  is any integer or zero. The unit of measurement or its symbol shall be shown close to the numerical value.
- (5) The units of measurement used and their symbols shall be in accordance with the provisions of Community legislation on units of measurement and their symbols.
- (6) All marks and inscriptions required under any requirement shall be clear, non-erasable, unambiguous and non-transferable.

#### **Indication of result**

12.—(1) Indication of the result shall be by means of a display or hard copy.

(2) The indication of any result shall be clear and unambiguous and accompanied by such marks and inscriptions necessary to inform the user of the significance of the result. Easy reading of the presented result shall be permitted under normal conditions of use. Additional indications may be shown provided they cannot be confused with the metrologically controlled indications.

(3) In the case of hard copy the print or record shall also be easily legible and non-erasable.

#### **Further processing of data to conclude the trading transaction**

13.—(1) An automatic gravimetric filling instrument shall record by a durable means the measurement result accompanied by information to identify the particular transaction, when—

- (a) the measurement is non-repeatable; and
- (b) the automatic gravimetric filling instrument is normally intended for use in the absence of one of the trading parties.

(2) Additionally, a durable proof of the measurement result and the information to identify the transaction shall be available on request at the time the measurement is concluded.

#### **Conformity evaluation**

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

#### **Rated Operating Conditions**

15. The manufacturer shall specify the rated operating conditions for the automatic gravimetric filling instrument as follows—

- (a) for the measurand—  
the measuring range in terms of its maximum and minimum capacity.
- (b) for the electrical supply influence quantities—

**Status:** This is the original version (as it was originally made).

- (i) in case of AC voltage supply: the nominal AC voltage supply, or the AC voltage limits;
- (ii) in case of DC voltage supply: the nominal and minimum DC voltage supply, or the DC voltage limits.
- (c) for the mechanical quantities—
  - for automatic gravimetric filling instruments which are used under special mechanical strain, e.g. instruments incorporated into vehicles, the manufacturer shall define the mechanical conditions of use.
- (d) for other influence quantities (if applicable)—
  - (i) the rate(s) of operation;
  - (ii) the characteristics of the product(s) to be weighed.

**Accuracy classes**

**16.—(1)** The manufacturer shall specify both the reference accuracy class Ref(x) and the operational accuracy class(es) X(x).

(2) An automatic gravimetric filling instrument type is designated a reference accuracy class, Ref(x), corresponding to the best possible accuracy for instruments of the type. After installation, individual automatic gravimetric filling instruments are designated for one or more operational accuracy classes, X(x), having taken account of the specific products to be weighed. The class designation factor (x) shall be  $\leq 2$ , and in the form  $1 \times 10^k$ ,  $2 \times 10^k$  or  $5 \times 10^k$  where k is a negative whole number or zero.

(3) The reference accuracy class, Ref(x) is applicable for static loads.

(4) For the operational accuracy class X(x), X is a regime relating accuracy to load weight and (x) is a multiplier for the limits of error specified for class X(1) in paragraph 17(2).

**MPE**

**17.—(1)** Static weighing error

- (a) For static loads under rated operating conditions, the MPE for reference accuracy class Ref(x), shall be 0.312 of the maximum permissible deviation of each fill from the average: as specified in the following Table; multiplied by the class designation factor (x).
- (b) For automatic gravimetric filling instruments where the fill may be made up from more than one load (e.g. cumulative or selective combination weighers) the MPE for static loads shall be the accuracy required for the fill as specified in sub-paragraph (2) (i.e. not the sum of the maximum permissible deviation for the individual loads).

(2) Deviation from average fill

**Table**

<i>Value of the mass of the fills (m) in grams</i>	<i>Maximum permissible deviation of each fill from the average for class X(1)</i>
$m \leq 50$	7.2%
$50 < m \leq 100$	3.6 grams
$100 < m \leq 200$	3.6 %

<i>Value of the mass of the fills (m) in grams</i>	<i>Maximum permissible deviation of each fill from the average for class X(1)</i>
200 < m ≤ 300	7.2 grams
300 < m ≤ 500	2.4 %
500 < m ≤ 1 000	12 grams
1 000 < m ≤ 10 000	1.2 %
10 000 < m ≤ 15 000	120 grams
15 000 < m	0.8 %

Note: The calculated deviation of each fill from the average may be adjusted to take account of the effect of material particle size

(3) Error relative to pre-set value (setting errors)

For automatic gravimetric filling instruments where it is possible to pre-set a fill weight; the maximum difference between the pre-set value and the average mass of the fills shall not exceed 0.312 of the maximum permissible deviation of each fill from the average, as specified in the Table above.

**Performance Under Influence Factor and Electromagnetic Disturbance**

**18.**—(1) The MPE due to influence factors shall be as specified in paragraph 17(1)

(2) The critical change value due to a disturbance is a change of the static weight indication equal to the MPE as specified in paragraph 17(1) calculated for the rated minimum fill, or a change that would give equivalent effect on the fill in the case of automatic gravimetric filling instruments where the fill consists of multiple loads. The calculated critical change value shall be rounded to the next higher scale interval (d).

(3) The manufacturer shall specify the value of the rated minimum fill.