

CT-006-IV, 2014

*Old reference:*  
WELMEC 8.16-3  
Issue 2  
April 2014

# WELMEC

European Cooperation in Legal Metrology

## **Corresponding Tables Discontinuous Totalisers OIML R 107-1 2007 – MID 2004/22/EC MI-006 IV**



# WELMEC

European Cooperation in Legal Metrology

WELMEC is a co-operation between the legal metrology authorities of the Member States of the European Union and EFTA.

This document is one of a number of Guides published by WELMEC to provide guidance to manufacturers of measuring instruments and to Notified Bodies responsible for conformity assessment of their products.

The Guides are purely advisory and do not themselves impose any restrictions or additional technical requirements beyond those contained in relevant EU Directives.

Alternative approaches may be acceptable, but the guidance provided in this document represents the considered view of WELMEC as to the best practice to be followed.

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WELMEC Secretariat

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## Notes

1. The column “Comments” indicates when necessary the relevant text of OIML R 107-1 and related explanations concerning the compliance with the relevant requirements in Directive 2004/22/EC.
2. The column “Conclusion” gives the conclusion on the compliance between OIML R 107-1 and the relevant requirements in Directive 2004/22/EC.

The indication “Covered” means that:

- the requirement of OIML R 107-1 is identical to the one of Directive 2004/22/EC; or
- the requirement of OIML R 107-1 is more severe than the one of Directive 2004/22/EC; or
- all the requirement of OIML R 107-1 fulfils requirements in Directive 2004/22/EC (even when Directive 2004/22/EC allows other alternatives),
- in case the requirement is not fully covered, a short statement explains what is covered.

The indication “Not Covered” means that the requirement in Directive 2004/22/EC is either not compatible with the relevant OIML R 107-1 requirement or not included in OIML R 107-1.

The indication “Not Relevant” means that the requirement in Annex I of Directive 2004/22/EC is not relevant for automatic catchweighing instruments.

The text in *italic* is an extract from the relevant clause of the OIML Recommendation.

Directive 2004/22/EC Essential requirements of Annex 1 and Annex MI-006	OIML R 107-1 (2007)	Comments	Conclusion
<b>ANNEX 1</b>			
1. <b>Allowable Errors</b>		•	
1.1 Under rated operation conditions and in absence of a disturbance, the error of measurement shall not exceed the maximum permissible error (MPE) value as laid down in the appropriate instrument-specific requirements. Unless stated otherwise in the instrument-specific annexes, MPE is expressed as a bilateral value of the deviation from the true measurement value.	2.2 4.1.1	<ul style="list-style-type: none"> <li>• <b>Maximum permissible errors</b> <b>Rated operated conditions</b></li> <li>• <i>Electronic weighing instruments shall be so designed and manufactured that they do not exceed the maximum permissible errors under rated operating conditions.</i></li> </ul>	Covered

Directive 2004/22/EC Essential requirements of Annex 1 and Annex MI-006	OIML R 107-1 (2007)	Comments	Conclusion
<p>1.2 Under rated operating conditions and in presence of a disturbance, the performance requirement shall be as laid down in the appropriate instrument-specific requirements. Where the 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.</p>	<p>4.1.2</p> <p>4.2.1</p> <p>4.2.4</p>	<p><i>Electronic instruments shall be so designed and manufactured that when exposed to disturbances, either:</i></p> <p><i>a) significant faults do not occur, i.e. the difference between the weight value indication due to the disturbance and the indication without the disturbance (intrinsic error) does not exceed 1 e; or</i></p> <p><i>b) significant faults are detected and acted upon. The indication of significant faults in the display should not be confusing with other messages that appear in the display.</i></p> <p><i>When a significant fault has been detected, a visual or audible indication shall be provided and shall continue until the user takes action or the fault disappears. Means shall be provided to retain any totalised load information contained in the instrument when a significant fault occurs.</i></p> <p><i>When an electronic instrument is subjected to the disturbances specified in Annex A, either one of the following shall apply:</i></p> <p><i>a) the fault, i.e the difference between the error of indication when the disturbance is present and the intrinsic error shall not exceed 1 dt</i></p> <p><i>b) the instrument shall detect and react to a significant fault</i></p>	<p>Covered except for permanent continuous electromagnetic field</p>
<p>1.3 The manufacturer shall specify the climatic, mechanical and electromagnetic environments in which the instrument is intended to be used, power supply and other influence quantities likely to affect its accuracy, taking into account of the requirements laid down in the appropriate instrument-specific annexes.</p>	<p>5.1.1</p>	<p><i>The application for type approval shall include documentation comprising:</i></p> <p>...</p>	<p>Covered</p>

<p style="text-align: center;"><b>Directive 2004/22/EC Essential requirements of Annex 1 and Annex MI-006</b></p>	<p style="text-align: center;"><b>OIML R 107-1 (2007)</b></p>	<p style="text-align: center;"><b>Comments</b></p>	<p style="text-align: center;"><b>Conclusion</b></p>																																
<p>1.3.1 Climatic environments The manufacturer shall specify the upper temperature limit and the lower temperature limit from any of the values in Table 1 unless otherwise specified in the Annexes MI-001 to MI-010, and indicate whether the instrument is designed for condensing or non-condensing humidity as well as the intended location for the instrument, i.e. open or closed.</p> <table border="1" data-bbox="239 475 763 745" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="5" style="text-align: center;">Temperature limits:</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Upper temperature limit</td> <td style="text-align: center;">30 °C</td> <td style="text-align: center;">40 °C</td> <td style="text-align: center;">55 °C</td> <td style="text-align: center;">70 °C</td> </tr> <tr> <td style="text-align: center;">Lower temperature limit</td> <td style="text-align: center;">5 °C</td> <td style="text-align: center;">-10 °C</td> <td style="text-align: center;">-25 °C</td> <td style="text-align: center;">-40 °C</td> </tr> </tbody> </table>	Temperature limits:					Upper temperature limit	30 °C	40 °C	55 °C	70 °C	Lower temperature limit	5 °C	-10 °C	-25 °C	-40 °C	<p style="text-align: center;">2.7.1.1</p> <p style="text-align: center;">4.2.3</p>	<p><i>"Instruments shall comply with the appropriate metrological and technical requirements at temperature limits from -10 °C to +40 °C. Depending on local environmental conditions, however, the limits of the temperature range may differ from the above provided that they are specified in the descriptive markings. The limits can be combined using the following limits provided that the ranges within those limits shall be at least equal to 30 °C:</i></p> <table border="1" data-bbox="1081 536 1713 692" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="5" style="text-align: center;"><b>Temperature limits:</b></th> <th style="text-align: center;"><b>Unit</b></th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><i>lower temperature</i></td> <td style="text-align: center;">+5</td> <td style="text-align: center;">-10</td> <td style="text-align: center;">-25</td> <td style="text-align: center;">-40</td> <td rowspan="2" style="text-align: center; vertical-align: middle;">°C</td> </tr> <tr> <td style="text-align: center;"><i>higher temperature</i></td> <td style="text-align: center;">+30</td> <td style="text-align: center;">+40</td> <td style="text-align: center;">+55</td> <td style="text-align: center;">+70</td> </tr> </tbody> </table> <p><i>"</i> <i>An electronic instrument shall comply with the requirements of 2.7 and shall also comply with appropriate metrological and technical requirements at a relative humidity of 85 % at the upper limit of the temperature range.</i></p>	<b>Temperature limits:</b>					<b>Unit</b>	<i>lower temperature</i>	+5	-10	-25	-40	°C	<i>higher temperature</i>	+30	+40	+55	+70	<p>Covered except for condensing humidity or intended location</p>
Temperature limits:																																			
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<p>1.3.2 (a) Mechanical environments are classified into classes M1 to M3 as described below</p>																																			

<p align="center"><b>Directive 2004/22/EC Essential requirements of Annex 1 and Annex MI-006</b></p>	<p align="center"><b>OIML R 107-1 (2007)</b></p>	<p align="center"><b>Comments</b></p>	<p align="center"><b>Conclusion</b></p>
<p>M1: This class applies to instruments used in locations with vibration and shocks of low significance, e.g. for instruments fastened to light structures subject to negligible vibrations and shocks transmitted from local blasting or pile-driving activities, slamming doors, etc.</p> <p>M2: This class applies to instruments used in locations with significant or high levels of vibration and shock, e.g. transmitted from machines and passing vehicles in the vicinity or adjacent to heavy machines, conveyor belts, etc.</p> <p>M3: This class applies to instruments used in locations where the level of vibration and shock is high and very high, e.g. for instruments mounted directly on machines, conveyor belts, etc.</p> <p>(b) The following influence quantities shall be considered in relation with mechanical environments:                      - Vibration                      - Mechanical shock</p>		<p>Not relevant according to MI-006 Chapter 1 §1.3</p> <p>Not relevant according to MI-006 Chapter 1 §1.3</p> <p>Not relevant according to MI-006 Chapter 1 §1.3</p>	<p>Not relevant</p> <p>Not relevant</p> <p>Not relevant</p>
<p>1.3.3 (a) Electromagnetic environments are classified into E1, E2 or E3 as described below, unless otherwise laid down in the appropriate instrument-specific annexes.</p>			
<p>E1: This class applies to instruments used in locations with electromagnetic disturbances corresponding to those likely to be found in residential, commercial and light industrial buildings.</p>		<p>Definition.                      Tests and severity levels in 1.3.3 (b) below shall be applied for E1</p>	

Directive 2004/22/EC Essential requirements of Annex 1 and Annex MI-006	OIML R 107-1 (2007)	Comments	Conclusion
E2: This class applies to instruments used in locations with electromagnetic disturbances corresponding to those likely to be found in other industrial buildings.		Definition. Tests and severity levels in 1.3.3 (b) below shall be applied for E2	
E3: This class applies to instruments supplied by the battery of a vehicle. Such instruments shall comply with the requirements of E2 and the following additional requirements		Definition. Tests and severity levels in 1.3.3 (b) below shall also be applied for E3	
- voltage reductions caused by energizing the starter-motor circuits of internal combustion engines,	A.7.4.6		Covered
- load dump transients occurring in the event of a discharged battery being disconnected while the engine is running.		test pulse 5, test level IV according to ISO 7637-2:2004(E)	Covered on the provision that test pulse 5, test level IV according to ISO 7637-2:2004(E) is used
(b) The following influence quantities shall be considered in relation with electromagnetic environments:  - voltage interruptions	A.7.4.1		Covered
- short voltage reductions	A.7.4.1		Covered



Directive 2004/22/EC Essential requirements of Annex 1 and Annex MI-006	OIML R 107-1 (2007)	Comments	Conclusion
- voltage transients on supply lines and/or signal lines	A.7.4.2	OIML D 11 (13.5). For E2 use severity level 3.  OIML D 11 (12.4). For E2 use severity level 3.	Covered for E1. Covered for E2 on the provision that the relevant severity level specified in OIML D11 (2004) is used
- electrostatic discharges	A.7.4.4		Covered
- radio frequency electromagnetic fields	A.7.4.5.1		Covered
- conducted radio frequency electromagnetic fields on supply lines and/or signal lines	A.7.4.5.2		Covered
- surges on supply lines and/or signal lines	A.7.4.3	OIML D 11 (13.8). For E1 use severity level 2 and for E2 use severity level 3.  OIML D 11 (12.5). For E2 use severity level 3.	Covered for E1. Covered for E2 on the provision that the relevant severity level specified in OIML D11 (2004) is used.
1.3.4 Other influence quantities to be considered, where appropriate, are:  - voltage variation	2.7.2 4.2.8 A.7.3.4 A.7.3.5	An electronic instrument shall comply with the appropriate metrological and technical requirements, if the voltage supply varies from the nominal voltage, $U_{nom}$ (if only one voltage is marked on the instrument), or from the lower and upper limits of the voltage range,	Covered
- mains frequency variation		OIML D 11 (13.3)	Covered

Directive 2004/22/EC Essential requirements of Annex 1 and Annex MI-006	OIML R 107-1 (2007)	Comments	Conclusion
- power frequency magnetic fields		<i>OIML D 11 (12.3). For E1 use severity level 4 and for E2 use severity level 5.</i>	Covered on the provision that the relevant severity level specified in OIML D11 (2004) is used
- any other quantity likely to influence in a significant way the accuracy of the instrument.	4.2.5 A.5.3	4.2.5 Warm-up time During the warm-up time of an electronic instrument, there shall be no indication or transmission of the weighing result and automatic operation shall be inhibited.	Covered
1.4 When carrying out the tests as envisaged in this Directive, the following paragraphs apply:			
1.4.1 <i>Basic rules for testing and the determination of errors</i> Essential requirements specified in 1.1 and 1.2 shall be verified for each relevant influence quantity. Unless otherwise specified in the appropriate instrument-specific annex, 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. 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 instrument when that influence quantity is likely to occur.	A.7.1  Annex A	<i>"When the effect of one influence factor is being evaluated, all other factors are to be held relatively constant, at a value close to normal. After each test the instrument shall be allowed to recover sufficiently before the following test."</i>	Covered
1.4.2 <i>Ambient humidity</i> - According to the climatic operating environment in which the instrument is intended to be used either the damp heat-steady state (non-condensing) or damp heat cyclic (condensing) test may be appropriate. - 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.	A.7.3.3 4.2.3	- Damp heat, steady-state <i>An electronic instrument shall comply with the requirements of 2.7 and shall also comply with appropriate metrological and technical requirements at a relative humidity of 85 % at the upper limit of the temperature range.</i>	Covered except for the damp heat condensing test

Directive 2004/22/EC Essential requirements of Annex 1 and Annex MI-006	OIML R 107-1 (2007)	Comments	Conclusion
2 Reproducibility The application of the same measurand in a different location or by 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.	6.7.3 A.8	Span stability tests  The reproducibility is demonstrated when performing all the tests prescribed in R 107-1.	Covered
3 Repeatability 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.	T.3.9	Repeatability is demonstrated when performing all the tests prescribed in R 107-1	Covered
4 Discrimination and sensitivity A measuring instrument shall be sufficiently sensitive and the discrimination threshold shall be sufficiently low for the intended measurement task.		Discrimination and sensitivity is demonstrated when performing all the tests prescribed in R 107-1	Covered by all other tests
5 Durability A measuring instrument shall be designed to maintain an adequate stability of its metrological characteristics over a period of time estimated by the manufacturer's instruction when in the environmental conditions for which it is intended.	4.1.3 6.7.3 A.8	<i>"The requirements in 4.1.1 and 4.1.2 shall be met durably in accordance with the intended use of the instrument."</i>  4.1.1 Rated operating conditions - 4.1.2 Disturbances	Covered

Directive 2004/22/EC Essential requirements of Annex 1 and Annex MI-006	OIML R 107-1 (2007)	Comments	Conclusion
<p>6 Reliability A measuring 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.</p>	<p>3.2.2 – 3.2.5 3.4.1</p> <p>4.1.2, 4.2.1 &amp; 4.2.4</p>	<p><i>“An instrument shall be so constructed that an accidental breakdown or maladjustment of control elements likely to disturb its correct functioning cannot take place without its effect being evident.”</i></p> <p><i>Reading of the primary indications shall be reliable, easy and unambiguous under normal operating conditions.</i></p> <p><i>Disturbances and Acting upon a significant fault</i></p>	<p>Covered</p>
<p>7 Suitability</p>			

Directive 2004/22/EC Essential requirements of Annex 1 and Annex MI-006	OIML R 107-1 (2007)	Comments	Conclusion
7.1 A measuring instrument shall have no feature likely to facilitate fraudulent use, whereas possibilities for unintentional misuse shall be minimal.	2.6  3.2.1  3.2.2  3.2.3  3.2.9	<p><i>Agreement between multiple indicating devices</i></p> <p><i>For a given load the difference between the indications of multiple indicating devices shall not be greater than the absolute value of the maximum permissible error for automatic weighing for analogue devices, but shall be zero between digital displaying and printing devices.</i></p> <p><i>“An instrument shall have no characteristics likely to facilitate its fraudulent use.”</i></p> <p><i>An instrument shall be so constructed that an accidental breakdown or maladjustment of control elements likely to disturb its correct functioning cannot take place without its effect being evident.</i></p> <p><i>The design of the load receptor and the operation of the instrument shall be such that the weighing results are not adversely affected by any variation in the quantity of the load remaining in the load receptor after discharge during a weighing cycle.</i></p> <p><i>The operation of a dust extractor shall not affect the result of the measurement.</i></p>	Covered

Directive 2004/22/EC Essential requirements of Annex 1 and Annex MI-006	OIML R 107-1 (2007)	Comments	Conclusion
7.2 A measuring 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.	3.1  3.2.4  3.2.5  3.2.7  3.2.11	<i>“An instrument shall be designed to suit the method of operation and the loads for which it is intended. It shall be of adequately robust construction in order that it maintains its metrological characteristics.”</i> <i>The design and the operation of the instrument shall be such that the weighing results are not adversely affected by any load ... due to inconstant or abruptly increasing mass flow during a weighing cycle.</i> <i>An automatic weighing operation shall be interrupted, recording and printing of results shall be prevented or marked with a clear warning, and a warning signal shall be given in the following cases: ...</i> <i>It shall neither be possible to make adjustments nor to reset the indicating devices during an automatic weighing operation, with the exception of the possibility to interrupt the weighing cycle ...</i> <i>Interlocks shall either prevent or indicate the operation of the instrument outside the specified operating conditions.</i>	Covered
7.3 The errors of a utility measuring instrument at flows or currents outside the controlled range shall not be unduly biased.			Not relevant
7.4 Where a measuring instrument is designed for the measurement of values of the measurand that are constant over time, the measuring instrument shall be insensitive to small fluctuations of the value of the measurand, or shall take appropriate action.			Not relevant
7.5 A measuring instrument shall be robust and its materials of construction shall be suitable for the conditions in which it is intended to be used.	3.1	<i>“An instrument shall be designed to suit the method of operation and the loads for which it is intended. It shall be of adequately robust construction in order that it maintains its metrological characteristics.”</i>	Covered

Directive 2004/22/EC Essential requirements of Annex 1 and Annex MI-006	OIML R 107-1 (2007)	Comments	Conclusion
<p>7.6 A measuring 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.</p> <p>When a measuring instrument has associated software which provides other functions besides the measuring function, the software that is critical for the metrological characteristics shall be identifiable and shall not be inadmissibly influenced by the associated software.</p>	<p>3.7</p> <p>5.1.2.2</p> <p>5.2.2</p> <p>3.6.2</p>	<p><i>For instruments with a control indicating device, the load receptor shall have a facility to support a quantity of standard weights ...</i></p> <p><i>In-situ material tests shall be conducted in accordance with ... the integral verification method.</i></p> <p><i>Operational tests</i></p> <ul style="list-style-type: none"> <li>• <i>“Security of legally relevant software</i> <ul style="list-style-type: none"> <li>a) <i>Legally relevant software shall be adequately protected against accidental or intentional changes. The appropriate requirements for securing given in 3.3 and 3.5 apply;</i></li> <li>b) <i>The software shall be assigned appropriate software identification (T.2.7.7.5). This software identification shall be adapted in the case of every software change that may affect the functions and accuracy of the instrument;</i></li> <li>c) <i>Functions performed or initiated via connected interfaces, i.e. transmission of legally relevant software, shall comply with the securing requirements for interfaces in 4.2.6;</i></li> <li>d) <i>National regulations may specify the requirements for securing software controlled instruments. ”</i></li> </ul> </li> </ul>	<p>Covered except for test procedures</p>
<p>8 Protection against corruption</p>			

Directive 2004/22/EC Essential requirements of Annex 1 and Annex MI-006	OIML R 107-1 (2007)	Comments	Conclusion
8.1 The metrological characteristics of a measuring 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 measuring instrument.	4.2.6	<i>“An instrument may be equipped with interfaces (T.2.9) permitting the coupling of the instrument to external equipment and user interfaces (T.2.10) enabling the exchange of information between a human user and the instrument. When an interface is used, the instrument shall continue to function correctly and its metrological functions (including all metrologically relevant parameters and software) shall not be influenced.”</i>	Covered
8.2 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.	3.3	<i>“Components, interfaces and pre-set controls subject to legal requirements that are not intended to be adjusted or removed by the user shall be fitted with a securing means or shall be enclosed. When enclosed, it shall be possible to seal the enclosure. The seals shall, in all cases, be easily accessible... Means of security a) ... f)”</i>	Covered



Directive 2004/22/EC Essential requirements of Annex 1 and Annex MI-006	OIML R 107-1 (2007)	Comments	Conclusion
<p>8.3 Software that is critical for metrological characteristics shall be identified as such and shall be secured. Software identification shall be easily provided by the measuring instrument. Evidence of an intervention shall be available for a reasonable period of time.</p>	3.6	<p><i>“The legally relevant software of an instrument shall be identified by the manufacturer, i.e., the software that is critical for measurement characteristics, measurement data and metrologically important parameters, stored or transmitted, and software programmed to detect system faults (software and hardware), is considered as an essential part of a discontinuous totalizing automatic weighing instrument and shall meet the requirements for securing software specified below.</i></p> <p>”</p> <ul style="list-style-type: none"> <li>• <i>“Security of legally relevant software</i></li> <li>e) <i>Legally relevant software shall be adequately protected against accidental or intentional changes. The appropriate requirements for securing given in 3.3 and 3.5 apply;</i></li> <li>f) <i>The software shall be assigned appropriate software identification (T.2.7.7.5). This software identification shall be adapted in the case of every software change that may affect the functions and accuracy of the instrument;</i></li> <li>g) <i>... ”</i></li> </ul>	Covered
<p>8.4 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.</p>	3.5	<p><i>“Metrological data may be stored in a memory of the instrument or on external storage for subsequent use (e.g. indication, printing, transfer, totalizing, etc.). In this case, the stored data shall be adequately protected against intentional and unintentional changes during the data transmission and/or storage process and shall contain all relevant information necessary to reconstruct an earlier weighing.”</i></p> <p>“... ”</p> <p>g) <i>Functions performed or initiated via connected interfaces, i.e. transmission of legally relevant software, shall comply with the securing requirements for interfaces in 4.2.6;</i></p> <p>... ”</p>	Covered

Directive 2004/22/EC Essential requirements of Annex 1 and Annex MI-006	OIML R 107-1 (2007)	Comments	Conclusion
8.5 For utility measuring instruments the display of the total quantity supplied or the displays from which the total quantity supplied can be derived, whole or partial reference to which is the basis for payment, shall not be able to be reset during use.			Not relevant
9 Information to be borne by and to accompany the instrument			
9.1 A measuring instrument shall bear the following inscriptions: - manufacturer's mark or name - information in respect of its accuracy, plus, when applicable - information in respect of the conditions of use - measuring capacity - measuring range - identity marking - number of EC-type examination certificate or the EC design examination certificate - information whether or not additional devices providing metrological results comply with the provisions of this Directive on legal metrological control.	3.9	<p>“</p> <ul style="list-style-type: none"> <li>▪ <i>identification mark or name of the manufacturer;</i></li> <li>▪ <i>identification mark or name of the importer (if applicable);</i></li> <li>▪ <i>serial number of the instrument;</i></li> <li>▪ <i>product description;</i></li> <li>▪ <i>control scale interval (if applicable)</i></li> <li>▪ <i>electrical supply voltage</i></li> <li>▪ <i>electrical supply frequency (if applicable)</i></li> <li>▪ <i>pneumatic/hydraulic pressure (if applicable)</i></li> <li>▪ <i>software identification (if applicable)</i></li> </ul> <p>”</p> <p>“</p> <ul style="list-style-type: none"> <li>▪ <i>type approval sign in accordance with national requirements;</i></li> <li>▪ <i>accuracy class</i></li> <li>▪ <i>maximum capacity</i></li> <li>▪ <i>minimum capacity</i></li> <li>▪ <i>minimum totalized load</i></li> <li>▪ <i>totalization scale interval</i></li> <li>▪ <i>temperature range (if applicable)</i></li> </ul> <p>“</p>	Covered except for the indication of the presence of additional devices.
9.2 An instrument of dimensions too small or of too sensitive a composition to allow it to bear the relevant information shall have its packaging, if any, and the accompanying documents required by the provisions of this Directive suitably marked.			Not relevant

Directive 2004/22/EC Essential requirements of Annex 1 and Annex MI-006	OIML R 107-1 (2007)	Comments	Conclusion
<p>9.3 The instrument shall be accompanied by information on its operation, unless the simplicity of the measuring instrument makes this unnecessary. Information shall be easily understandable and shall include where relevant:</p> <ul style="list-style-type: none"> <li>- rated operating conditions</li> <li>- mechanical and electromagnetic environment classes</li> <li>- the upper and lower temperature limit, whether condensation is possible or not, open or closed location</li> <li>- instructions for installation, maintenance, repairs, permissible adjustments</li> <li>- instructions for correct operation and any special conditions use</li> <li>- conditions for compatibility with interfaces, sub-assemblies or measuring instruments.</li> </ul>	<p>3.7</p> <p>3.8</p> <p>5.1.1</p>	<p>For instruments with a control indicating device, the load receptor shall have the facility to support a quantity ...</p> <p>Instruments that do not tare-weigh after each discharge shall be provided with a zero-setting device.</p> <p>The application for type evaluation shall include documentation comprising ...</p>	<p>Covered</p>
<p>9.4 Groups of identical measuring instruments used in the same location or used for utility measurements do not necessarily require individual instruction manuals.</p>			<p>Not relevant</p>
<p>9.5 Unless specified otherwise in an instrument-specific annex, the scale interval for a measured value shall be in the form <math>1 \times 10^n</math>, <math>2 \times 10^n</math>, or <math>5 \times 10^n</math>, where n is any integer or zero. The unit of measurement or its symbol shall be shown close to the numerical value.</p>	<p>2.3</p> <p>3.4.2.1</p>	<p><i>“The scale intervals of the indicating devices shall be in the form of <math>1 \times 10^k</math>, <math>2 \times 10^k</math>, or <math>5 \times 10^k</math>, “k” being a positive or negative whole number or zero.”</i></p> <p><i>“Weighing results shall contain the names or symbols of the units of mass in which they are expressed. For any one indication of mass, only one unit of mass may be used. The units of mass shall be indicated in small letters (lower case) as shown in 2.8.”</i></p>	<p>Covered</p>
<p>9.6 A material measure shall be marked with a nominal value or a scale, accompanied by the unit of measurement used.</p>			<p>Not relevant</p>
<p>9.7 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.</p>	<p>2.8</p> <p>3.9</p>	<p><i>“The units of mass to be used on an instrument are the:</i></p> <ul style="list-style-type: none"> <li>▪ <i>gram (g);</i></li> <li>▪ <i>kilogram (kg);</i></li> <li>▪ <i>tonne (t).”</i></li> </ul>	<p>Covered</p>

Directive 2004/22/EC Essential requirements of Annex 1 and Annex MI-006	OIML R 107-1 (2007)	Comments	Conclusion
9.8 All marks and inscriptions required under any requirement shall be clear, non-erasable, unambiguous and non-transferable.	3.9.4  3.10	<p><i>“Descriptive markings shall be indelible and of a size, shape and clarity that permit legibility under normal operating conditions.”</i></p> <p><i>“Instruments shall have a place for the application of verification marks. This place shall:</i></p> <ul style="list-style-type: none"> <li>▪ <i>be such that the part on which it is located cannot be removed from the instrument without damaging the marks;</i></li> <li>▪ <i>allow easy application of the mark without changing the metrological properties of the instrument;</i></li> <li>▪ <i>be visible without the instrument or its protective covers having to be moved when it is in service.</i></li> </ul> <p><i>“</i></p>	Covered
10 Indication of result			
10.1 Indication of the result shall be by means of a display or a hard copy.	2.6 3.4	<ul style="list-style-type: none"> <li>• <i>“Indication (of a measuring instrument): Value of a quantity provided by a measuring instrument [VIM: 1993, 3.2].</i></li> </ul> <p><i>Note: “Indication”, “indicate” or “indicating” include both displaying, and/or printing.”</i></p>	Covered

Directive 2004/22/EC Essential requirements of Annex 1 and Annex MI-006	OIML R 107-1 (2007)	Comments	Conclusion
10.2 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 present result shall be permitted under normal conditions of use. Additional indications may be shown provided they cannot be confused with the metrologically controlled indications.	2.6  3.4.1  3.4.2 3.4.3  3.4.4	<p><i>Agreement between multiple indicating devices</i>  <i>For a given load the difference between the indications of multiple indicating devices shall not be greater than the absolute value of the maximum permissible error for automatic weighing for analogue devices, but shall be zero between digital displaying and printing devices.</i></p> <p><i>“Reading of the primary indications (see T.4.1.1) shall be reliable, easy and unambiguous under normal operating conditions:</i></p> <ul style="list-style-type: none"> <li>▪ ...</li> <li>▪ <i>the figures forming the primary indications shall be of a size, shape and clarity for reading to be easy;</i></li> <li>▪ ...”</li> </ul> <p><i>“Weighing results shall contain the names or symbols of the units of mass in which they are expressed.  For any one indication of mass, only one unit of mass may be used.  The units of mass shall be indicated in small letters (lower case) as shown in 2.8.”</i></p> <p><i>“Two or more types of indicating device may be combined so that the indication required can be displayed on demand provided that it is clearly identified.”</i></p>	Covered
10.3 In the case of hard copy the print or record shall also be easily legible and non-erasable.			Not covered
10.4 A measuring instrument for direct sales trading transactions shall be designed to present the measurement result to both parties in the transaction when installed as intended. When critical in case of direct sales, any ticket provided to the consumer by an ancillary device not complying with the appropriate requirements of this Directive shall bear an			Not relevant

Directive 2004/22/EC Essential requirements of Annex 1 and Annex MI-006	OIML R 107-1 (2007)	Comments	Conclusion
appropriate restrictive information.			
10.5 Whether or not a measuring instrument intended for utility measurement purposes can be remotely read it shall in any case be fitted with a metrologically controlled display accessible without tools to the customer. The reading of this display is the measurement result that serves as the basis for the price to pay.			Not relevant
11 Further processing of data to conclude the trading transaction			
11.1 A measuring instrument other than a utility measuring instrument shall record by a durable means the measurement result accompanied by information to identify the particular transaction, when: - the measurement is non-repeatable - the measuring instrument is normally intended for use in the absence of one of the trading parties.	3.4 3.5	<i>"Instruments shall include ... a recording device. ... Metrological data may be stored in a memory of the instrument or on external storage for subsequent use (e.g. indication, printing, transfer, totalizing, etc.). In this case, the stored data shall be adequately protected against intentional and unintentional changes during the data transmission and/or storage process and shall contain all relevant information necessary to reconstruct an earlier weighing."</i>	Covered
11.2 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.	3.4 3.5	<i>"Instruments shall include ... a recording device. ... Metrological data may be stored in a memory of the instrument or on external storage for subsequent use (e.g. indication, printing, transfer, totalizing, etc.). In this case, the stored data shall be adequately protected against intentional and unintentional changes during the data transmission and/or storage process and shall contain all relevant information necessary to reconstruct an earlier weighing."</i>	Covered
12 Conformity evaluation A measuring instrument shall be designed so as to allow ready evaluation of its conformity with the appropriate requirements of this Directive.	5	All the tests described in OIML R 107-1 have to be performed in order to approve a continuous totaliser.	Covered

Directive 2004/22/EC Essential requirements of Annex 1 and Annex MI-006	OIML R 107-1 (2007)	Comments	Conclusion
<b>Annex MI-006</b>			
<b>Automatic weighing instrument</b> An instrument that determines the mass of a product without the intervention of an operator and follows a predetermined programme of automatic processes characteristic of the instrument.	T.1.2	<ul style="list-style-type: none"> <li>• <i>“Automatic weighing instrument:</i></li> <li>• <i>Instrument that weighs and follows a predetermined program of automatic processes characteristic of the instrument.</i></li> </ul>	Covered
<b>Automatic catchweigher</b> An automatic weighing instrument that determines the mass of pre-assembled discrete loads (for example prepackages) or single loads of loose material.			Not relevant
<b>Automatic checkweigher</b> An automatic catchweigher that subdivides articles of different mass into two or more subgroups according to the value of the difference of their mass and a nominal set-point.			Not relevant
<b>Weight labeller</b> An automatic catchweigher that labels individual articles with the weight value.			Not relevant
<b>Weight/price labeller</b> An automatic catchweigher that labels individual articles with the weight value, and price information.			Not relevant
<b>Automatic gravimetric filling instrument</b> An automatic weighing instrument that fills containers with a predetermined and virtually constant mass of product from bulk.			Not relevant

Directive 2004/22/EC Essential requirements of Annex 1 and Annex MI-006	OIML R 107-1 (2007)	Comments	Conclusion
<p><b>Discontinuous totaliser (totalising hopper weigher)</b> An automatic weighing instrument that determines the mass of a bulk product by dividing it into discrete loads. The mass of each discrete load is determined in sequence and summed. Each discrete load is then delivered to bulk.</p>	T.1.4	<ul style="list-style-type: none"> <li>• <i>“Discontinuous totalizing automatic weighing instrument (totalizing hopper weigher): Automatic weighing instrument that weighs a bulk product by dividing it into discrete loads, determining the mass of each discrete load in sequence, summing the weighing results and delivering the discrete loads to bulk.”</i></li> </ul>	Covered
<p><b>Continuous totaliser</b> An automatic weighing instrument that continuously determines the mass of a bulk product on a conveyor belt, without systematic subdivision of the product and without interrupting the movement of the conveyor belt.</p>			Not relevant
<p><b>Rail-weighbridge</b> An automatic weighing instrument having a load receptor inclusive of rails for conveying railway vehicles.</p>			Not relevant



Chapter I – Requirements common to all types of automatic weighing instruments																					
1	Rated Operating Conditions The manufacturer shall specify the rated operating conditions for the instrument as follows:																				
1.1	For the measurand: The measuring range in terms of its maximum and minimum capacity.	5.1.1			Covered																
1.2	For the electrical supply influence quantities: In case of AC voltage supply: the nominal AC voltage supply, or the AC voltage limits. In case of DC voltage supply: the nominal and minimum DC voltage supply, or the DC voltage limits.	5.1.1			Covered																
1.3	For the mechanical and climatic influence quantities: The minimum temperature range is 30°C unless specified otherwise in the following chapters of this Annex.  The mechanical environment classes according to Annex I, paragraph 1.3.2 are not applicable. For instruments which are used under special mechanical strain, e.g. instruments incorporated into vehicles, the manufacturer shall define the mechanical conditions of use.	2.7.1.1	<p><i>“Instruments shall comply with the appropriate metrological and technical requirements at temperature limits from –10 °C to +40 °C. Depending on local environmental conditions, however, the limits of the temperature range may differ from the above provided that they are specified in the descriptive markings. The limits can be combined using the following limits provided that the ranges within those limits shall be at least equal to 30 °C:</i></p> <table border="1"> <thead> <tr> <th colspan="5">Temperature limits:</th> <th>Unit</th> </tr> </thead> <tbody> <tr> <td>lower temperature</td> <td>+5</td> <td>-10</td> <td>-25</td> <td>-40</td> <td rowspan="2">°C</td> </tr> <tr> <td>higher temperature</td> <td>+30</td> <td>+40</td> <td>+55</td> <td>+70</td> </tr> </tbody> </table> <p><i>”</i></p>	Temperature limits:					Unit	lower temperature	+5	-10	-25	-40	°C	higher temperature	+30	+40	+55	+70	Covered
Temperature limits:					Unit																
lower temperature	+5	-10	-25	-40	°C																
higher temperature	+30	+40	+55	+70																	

1.4	For other influence quantities (if applicable): The rate(s) of operation. The characteristics of the product(s) to be weighed.	5.1.1		Covered
2	Permissible effect of disturbances – Electromagnetic environment The required performance and the critical change value are given in the relevant Chapter of this Annex for each type of instrument.			
3	Suitability			
3.1	Means shall be provided to limit the effects of tilt, loading and rate of operation such that maximum permissible errors (MPEs) are not exceeded in normal operation.	3.1 3.2	<i>Suitability for use</i> <i>Security of operation</i>	Covered
3.2	Adequate material handling facilities shall be provided to enable the instrument to respect the MPEs during normal operation.	3.2.3 3.2.9	<i>“An instrument shall be designed to suit the method of operation and the loads for which it is intended. It shall be of adequately robust construction in order that it maintains its metrological characteristics.”</i>	Covered
3.3	Any operator control interface shall be clear and effective.	3.4.1	<i>“Reading of the primary indications (see T.4.1.1) shall be reliable, easy and unambiguous under normal operating conditions:</i> <ul style="list-style-type: none"> <li>▪ <i>the overall inaccuracy of reading of an analog indicating device shall not exceed 0.2 d<sub>i</sub>;</i></li> <li>▪ <i>the figures forming the primary indications shall be of a size, shape and clarity for reading to be easy; the scales, numbering and printing shall permit the figures which form the results to be read by simple juxtaposition (see T.4.4.1).”</i></li> </ul>	Covered for the indication device

3.4	The integrity of the display (where present) shall be verifiable by the operator.	4.2.2	<i>“Upon switch-on (switch-on of indication), a special procedure shall be performed that shows all relevant signs of the indicator in their active and non-active state sufficiently long to be checked by the operator. This is not applicable for non-segmented displays, on which failures become evident, for example screen-displays, matrix-displays, etc.”</i>	Covered
3.5	Adequate zero setting capability shall be provided to enable the instrument to respect the MPEs during normal operation.	3.8	<i>“Instruments that do not tare-weigh after each discharge shall be provided with a zero-setting device. National regulations shall specify the types and modes of zero-setting required on an instrument.”</i>	Covered
3.6	Any result outside the measurement range shall be identified as such, where a printout is possible.	3.2.5	<ul style="list-style-type: none"> <li>• <i>“An automatic operation shall be interrupted, recording and printing of results shall be prevented or marked with a clear warning, and a warning signal shall be given in the following cases:</i> <ul style="list-style-type: none"> <li>a) <i>if the maximum capacity, Max, in each weighing range has been exceeded by more than 9 d<sub>i</sub>;</i></li> <li>b) <i>if the value of the load to be weighed and discharged to bulk is less than minimum capacity, Min, unless processed as the last discrete load of the transaction.”</i></li> </ul> </li> </ul>	Covered
4	<p>Conformity assessment</p> <p>The conformity assessment procedures referred to in Article 9 that the manufacturer can choose between are:</p> <p>For mechanical systems: B+D or B+E or B+F or D1 or F1 or G or H1.</p> <p>For electromechanical instruments: B+D or B+E or B+F or G or H1.</p> <p>For electronic systems or systems containing software: B+D or B+F or G or H1.</p>			

Chapter IV – Discontinuous Totalisers																															
1	<p><b>Accuracy Classes</b> Instruments are divided into four accuracy classes as follows: 0,2, 0,5, 1, 2.</p>	2.1	<p>“Instruments are divided into four accuracy classes as follows:  <div style="text-align: center;"> <span style="margin-right: 20px;">0.2</span> <span style="margin-right: 20px;">0.5</span> <span style="margin-right: 20px;">1</span> <span>2</span> </div>                     The accuracy classes shall be specified in accordance with the maximum permissible errors in 2.2 and marked on the instrument in accordance with the descriptive markings in 3.9.2.”</p>	Covered																											
2	<p><b>MPEs</b></p> <table border="1" style="width: 100%;"> <thead> <tr> <th>Accuracy class</th> <th>MPE of totalized load</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0.2</td> <td style="text-align: center;">± 0.10 %</td> </tr> <tr> <td style="text-align: center;">0.5</td> <td style="text-align: center;">± 0.25 %</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">± 0.50 %</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">± 1.00 %</td> </tr> </tbody> </table>	Accuracy class	MPE of totalized load	0.2	± 0.10 %	0.5	± 0.25 %	1	± 0.50 %	2	± 1.00 %	2.2.1 Table 1	<table border="1" style="width: 100%;"> <thead> <tr> <th rowspan="2">Accuracy class</th> <th colspan="2">Percentage of the mass of the totalized load</th> </tr> <tr> <th>Initial verification</th> <th>In-service</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0.2</td> <td style="text-align: center;">±0.10 %</td> <td style="text-align: center;">±0.2 %</td> </tr> <tr> <td style="text-align: center;">0.5</td> <td style="text-align: center;">±0.25 %</td> <td style="text-align: center;">±0.5 %</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">±0.5 %</td> <td style="text-align: center;">±1.0 %</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">±1.00 %</td> <td style="text-align: center;">±2.0 %</td> </tr> </tbody> </table>	Accuracy class	Percentage of the mass of the totalized load		Initial verification	In-service	0.2	±0.10 %	±0.2 %	0.5	±0.25 %	±0.5 %	1	±0.5 %	±1.0 %	2	±1.00 %	±2.0 %	Covered
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3	<p><b>Totalisation scale interval</b> The totalisation scale interval (<math>d_t</math>) shall be in the range: 0,01 % Max ≤ <math>d_t</math> ≤ 0,2 % Max</p>	2.4	<p>“Totalization scale interval, <math>d_t</math> The totalization scale interval shall be:                      a) not less than 0.01 % of the maximum capacity,                      and                      b) not greater than 0.2 % of maximum capacity.”</p>	Covered																											
4	<p><b>Minimum Totalised Load (<math>\Sigma_{min}</math>)</b> The minimum totalised load (<math>\Sigma_{min}</math>) shall be not less than the load at which the MPE is equal to the totalisation scale interval (<math>d_t</math>) and not less than the minimum load as specified by the manufacturer.</p>	2.5	<p>“The minimum totalized load shall:                      a) not be less than the value of the load at which the maximum permissible error for automatic weighing on initial verification is equal to the totalization scale interval, <math>d_t</math>, and                      b) not less than the minimum capacity, Min.”</p>	Covered																											

<p>5 <i>Zero Setting</i> Instruments that do not tare weigh after each discharge shall have a zero setting device. Automatic operation shall be inhibited if zero indication varies by: — 1 d<sub>t</sub> on instruments with automatic zero setting device; — 0.5 d<sub>t</sub> on instruments with a semi-automatic, or non-automatic, zero setting device.</p>	<p>3.8  3.8.3</p>	<p><i>“Instruments that do not tare-weigh after each discharge shall be provided with a zero-setting device. National regulations shall specify the types and modes of zero-setting required on an instrument.”</i></p> <p><i>“... An interlock shall be provided to stop an automatic operation: a) if the zero indication varies by or more than: i) 1 d<sub>t</sub> on instruments with an automatic zero-setting device, or ii) 0.5 d<sub>t</sub> on instruments with a semi-automatic or non-automatic zero-setting device. if the instrument is not zeroed automatically following an automatic weighing cycle. ...”</i></p>	<p>Covered</p>
<p>6 <i>Operator Interface</i> Operator adjustments and reset function shall be inhibited during automatic operation.</p>	<p>3.2.7</p>	<p><i>“It shall neither be possible to make operating adjustments nor to reset the indicating devices during an automatic weighing operation, with the exception of the possibility to interrupt the weighing cycle in the case of 3.2.5 and during testing as described in 6.3.”</i></p>	<p>Covered</p>
<p>7 <i>Printout</i> On instruments equipped with a printing device, the reset of the total shall be inhibited until the total is printed. The printout of the total shall occur if automatic operation is interrupted.</p>	<p>3.4.3</p>	<p><i>“... a) In automatic operation it shall not be possible to reset any totalization device to zero; b) It shall not be possible to reset the partial totalization indicating device to zero unless the last total indicated before resetting to zero is automatically recorded when the automatic operation is interrupted; ...”</i></p>	<p>Covered</p>
<p>8 <i>Performance under influence factors and electromagnetic disturbances</i></p>			

<p>8.1 The MPEs due to influence factors shall be as specified in Table 7.</p> <table border="1" data-bbox="168 268 795 418"> <thead> <tr> <th>Load (m) in totalisation scale intervals (dt)</th> <th>MPE</th> </tr> </thead> <tbody> <tr> <td>0 &lt; m ≤ 500</td> <td>± 0,5 d<sub>t</sub></td> </tr> <tr> <td>500 &lt; m ≤ 2 000</td> <td>± 1,0 d<sub>t</sub></td> </tr> <tr> <td>2 000 &lt; m ≤ 10 000</td> <td>± 1,5 d<sub>t</sub></td> </tr> </tbody> </table>	Load (m) in totalisation scale intervals (dt)	MPE	0 < m ≤ 500	± 0,5 d <sub>t</sub>	500 < m ≤ 2 000	± 1,0 d <sub>t</sub>	2 000 < m ≤ 10 000	± 1,5 d <sub>t</sub>	<p>2.2.2 Table 2</p>	<p><i>The maximum permissible errors applied in tests to assess the effect of influence factors shall be as specified in Table 2.</i></p> <table border="1" data-bbox="1131 271 1662 451"> <caption>Table 2</caption> <thead> <tr> <th>Load, m expressed in totalization scale intervals</th> <th>Maximum permissible error</th> </tr> </thead> <tbody> <tr> <td>0 ≤ m ≤ 500</td> <td>±0.5 d<sub>t</sub></td> </tr> <tr> <td>500 &lt; m ≤ 2 000</td> <td>±1.0 d<sub>t</sub></td> </tr> <tr> <td>2 000 &lt; m ≤ 10 000</td> <td>±1.5 d<sub>t</sub></td> </tr> </tbody> </table> <p><i>Digital indications and printed results shall be corrected for the rounding error, and the error shall be determined with an accuracy of at least 0.2 d<sub>t</sub>.</i></p>	Load, m expressed in totalization scale intervals	Maximum permissible error	0 ≤ m ≤ 500	±0.5 d <sub>t</sub>	500 < m ≤ 2 000	±1.0 d <sub>t</sub>	2 000 < m ≤ 10 000	±1.5 d <sub>t</sub>	<p>Covered</p>
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<p>8.2 The critical change value due to a disturbance is one totalisation scale interval for any weight indication and any stored total.</p>	<p>T.4.5.6</p> <p>4.1.2</p> <p>4.2.4.a</p>	<ul style="list-style-type: none"> <li>• <i>“Significant fault Fault greater than 1 d<sub>t</sub>. The following are not considered to be significant faults:</i> <ul style="list-style-type: none"> <li>▪ <i>faults arising from simultaneous and mutually independent causes in the instrument or in its checking facilities (T.3.11);</i></li> <li>▪ <i>faults implying the impossibility to perform any weighing;</i></li> <li>▪ <i>transitory faults, momentary variations in the indications which cannot be interpreted, memorized or transmitted as a weighing result; and faults being so serious that they will inevitably be noticed by all those interested in the weighing result.”</i></li> </ul> </li> </ul> <p><i>“When an electronic instrument is subjected to the disturbances specified in Annex A, either of the following shall apply: the fault, i.e. the difference between error of indication when the disturbance is present and the intrinsic error shall not exceed the value specified in T.4.5.6 (1 d<sub>t</sub>); ...”</i></p>	<p>Covered</p>																