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Corresponding Tables Capacity Serving Measures OIML R 138 2007 – MID 2004/22/EC MI-008 II



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WELMEC

European cooperation in legal metrology

WELMEC is a co-operation between the legal metrology services of the Member States of the European Union and EFTA. This document is the introduction to WELMEC.

WELMEC is publishing a number of Guides 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 EC Directives. Alternative approaches may be acceptable, but the guidance provided in these documents are representing the considered view of WELMEC as to the best practice to be followed.

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Capacity serving measures
Cross Reference Table 2004/22/EC vs. OIML R 138: 2007

Notes:

1. The column “Comments” indicates when necessary the relevant text of OIML R 138 and related explanations concerning the compliance with relevant MID requirement.
2. The column “Conclusion” gives the conclusion on the compliance between MID and OIML R 138 for the relevant requirement.

The indication “Covered” means that:

- the requirement of OIML R 138 is identical to the one of MID; or
- the requirement of OIML R 138 is more severe than the one of MID; or
- All the requirement of OIML R 138 fulfils MID requirements (even when MID 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 MID requirement is either not compatible with the relevant OIML R 138 requirement or not included in OIML R 138.

The indication “Not relevant” means that the MID Annex 1 requirement is not relevant for capacity serving measures.

	Directive 2004/22/EC Essential requirements of Annex I and Annex MI-008 II	OIML R 138 (2007)	Comments	Conclusion
ANNEX 1				
1.1	<p>Allowable Errors</p> <p>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.</p> <p>Unless stated otherwise in the instrument-specific annexes, MPE is expressed as a bilateral value of the deviation from the true measurement value.</p>	5.1		Covered
1.2	<p>Under rated operating conditions and in presence of a disturbance, the performance requirement shall be as laid down in the appropriate instrument-specific requirements.</p> <p>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>			Not relevant
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			Not relevant

	Directive 2004/22/EC Essential requirements of Annex I and Annex MI-008 II					OIML R 138 (2007)	Comments	Conclusion
	its accuracy, taking into account of the requirements laid down in the appropriate instrument-specific annexes.							
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.							Not relevant
	Temperature limits:							
	Upper temperature limit	30 °C	40 °C	55 °C	70 °C			
	Lower temperature limit	5 °C	-10 °C	-25 °C	-40 °C			

	Directive 2004/22/EC Essential requirements of Annex I and Annex MI-008 II	OIML R 138 (2007)	Comments	Conclusion
1.3.2	<p>(a) Mechanical environments are classified into classes M1 to M3 as described below</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>			Not relevant
	<p>(b) The following influence quantities shall be considered in relation with mechanical environments:</p> <ul style="list-style-type: none"> - Vibration - Mechanical shock 			Not relevant

	Directive 2004/22/EC Essential requirements of Annex I and Annex MI-008 II	OIML R 138 (2007)	Comments	Conclusion
1.3.3	<p>(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>E2: This class applies to instruments used in locations with electromagnetic disturbances corresponding to those likely to be found in other industrial buildings.</p> <p>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</p> <ul style="list-style-type: none"> - voltage reductions caused by energising the starter-motor circuits of internal combustion engines, - load dump transients occurring in the event of a discharged battery being disconnected while the engine is running. 			Not relevant

	Directive 2004/22/EC Essential requirements of Annex I and Annex MI-008 II	OIML R 138 (2007)	Comments	Conclusion
	(b) The following influence quantities shall be considered in relation with electromagnetic environments: - voltage interruptions - short voltage reductions - voltage transients on supply lines and/or signal lines - electrostatic discharges - radio frequency electromagnetic fields - conducted radio frequency electromagnetic fields on supply lines and/or signal lines - surges on supply lines and/or signal lines			Not relevant
1.3.4	Other influence quantities to be considered, where appropriate, are: - voltage variation - mains frequency variation - power frequency magnetic fields - any other quantity likely to influence in a significant way the accuracy of the instrument.			Not relevant
1.4	When carrying out the tests as envisaged in this Directive, the following paragraphs apply:			

	Directive 2004/22/EC Essential requirements of Annex I and Annex MI-008 II	OIML R 138 (2007)	Comments	Conclusion
1.4.1	<p><i>Basic rules for testing and the determination of errors</i></p> <p>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.</p> <p>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.</p>			Not relevant
1.4.2	<p><i>Ambient humidity</i></p> <p>- 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.</p> <p>- 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.</p>			Not relevant

	Directive 2004/22/EC Essential requirements of Annex I and Annex MI-008 II	OIML R 138 (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.			Not 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.			Not 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.	4.4	<i>"Vessels with gauge marks shall be so designed that at the nominal capacity, a variation in the contents equal to the maximum permissible error causes a change in the liquid level of at least 2 mm."</i>	Covered
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.	4.2	<i>"The vessels shall be sufficiently robust to withstand normal usage without distortions."</i>	Covered

	Directive 2004/22/EC Essential requirements of Annex I and Annex MI-008 II	OIML R 138 (2007)	Comments	Conclusion
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.			
7	Suitability			
7.1	A measuring instrument shall have no feature likely to facilitate fraudulent use, whereas possibilities for unintentional misuse shall be minimal.			Not covered
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.	4.2	<i>"The vessels shall be sufficiently robust to withstand normal usage without distortions. For capacity serving measures and measuring container bottles, the materials used in construction should be sufficiently tough, rigid, non porous and stable to maintain accuracy during use. Vessels used only once, such as thin plastic or cardboard drinking capacities, must remain accurate during nominal filling, transportation and discharge functions."</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			Not relevant

	Directive 2004/22/EC Essential requirements of Annex I and Annex MI-008 II	OIML R 138 (2007)	Comments	Conclusion
	appropriate action.			
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.	4.2	<i>"The vessels shall be sufficiently robust to withstand normal usage without distortions."</i>	Covered
7.6	<p>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>			Not relevant
8	Protection against corruption			
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.			Not relevant

	Directive 2004/22/EC Essential requirements of Annex I and Annex MI-008 II	OIML R 138 (2007)	Comments	Conclusion
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.			Not relevant
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.			Not relevant
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.			Not relevant
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			

	Directive 2004/22/EC Essential requirements of Annex I and Annex MI-008 II	OIML R 138 (2007)	Comments	Conclusion
9.1	A measuring instrument shall bear the following inscriptions: - manufacturer's mark or name - information in respect of its accuracy, ⁽¹⁾ 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.	5.2.4 5.2.1 5.2.5	<i>Every vessel for commercial transactions shall bear a mark identifying the company responsible for compliance with the metrological specifications applicable to the vessel.</i> <i>Every vessel for commercial transactions shall bear a clearly visible, easily readable and permanent indication of the nominal capacity V_n. Markings shall be in SI units.</i> <i>If the National Metrology Authority decides on a reference temperature other than 20 °C, this temperature must be indicated next to every volume indication affixed to the vessel.⁽²⁾</i> ⁽¹⁾ Not required (see preamble to MI-008 II) ⁽²⁾ 1.1 of MI-008' Chapter II requires a reference temperature of 20 °C	Covered when the reference temperature is 20 °C Covered however see 9.7
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
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: - rated operating conditions - mechanical and electromagnetic			Not relevant

	Directive 2004/22/EC Essential requirements of Annex I and Annex MI-008 II	OIML R 138 (2007)	Comments	Conclusion
	environment classes - the upper and lower temperature limit, whether condensation is possible or not, open or closed location - instructions for installation, maintenance, repairs, permissible adjustments - instructions for correct operation and any special conditions use - conditions for compatibility with interfaces, sub-assemblies or measuring instruments.			
9.4	Groups of identical measuring instruments used in the same location or used for utility measurements do not necessarily require individual instruction manuals.		Capacity serving measures do not need user manual to be utilized.	Not relevant
9.5	Unless specified otherwise in an instrument-specific annex, the scale interval for a measured value shall be in the form 1×10^n , 2×10^n , or 5×10^n , where n is any integer or zero. The unit of measurement or its symbol shall be shown close to the numerical value.		Capacity serving measures do not have scale intervals.	Not relevant
9.6	A material measure shall be marked with a nominal value or a scale, accompanied by the unit of measurement used.	5.2.1	<i>"Every vessel for commercial transactions shall bear a clearly visible, easily readable and permanent indication of the nominal capacity V_n. Markings shall be in SI units."</i>	Covered however see 9.7
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.	3	<i>"The units of measurement shall be the SI units."</i> Imperial units not covered.	Covered when units are SI

	Directive 2004/22/EC Essential requirements of Annex I and Annex MI-008 II	OIML R 138 (2007)	Comments	Conclusion
9.8	All marks and inscriptions required under any requirement shall be clear, non-erasable, unambiguous and non-transferable.	5.2.1	<i>“Every vessel for commercial transactions shall bear a clearly visible, easily readable and permanent indication of the nominal capacity Vn. Markings shall be in SI units.”</i> The Non transferability requirement is not referred to in the OIML R 138. It is considered to be met by the requirement that the indication should be permanent.	Covered however see 9.7
10	Indication of result			
10.1	Indication of the result shall be by means of a display or a hard copy.			Not relevant
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.	5.2.1	<i>“Every vessel for commercial transactions shall bear a clearly visible, easily readable and permanent indication of the nominal capacity Vn. Markings shall be in SI units.”</i>	Covered however see 9.7
10.3	In the case of hard copy the print or record shall also be easily legible and non-erasable.			Not relevant
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			Not relevant

	Directive 2004/22/EC Essential requirements of Annex I and Annex MI-008 II	OIML R 138 (2007)	Comments	Conclusion
	complying with the appropriate requirements of this Directive shall bear an 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.			Not relevant
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.			Not relevant
12	Conformity evaluation A measuring instrument shall be		It is achieved by complying to OIML R 138	Covered

	Directive 2004/22/EC Essential requirements of Annex I and Annex MI-008 II	OIML R 138 (2007)	Comments	Conclusion
	designed so as to allow ready evaluation of its conformity with the appropriate requirements of this Directive.			
ANNEX MI-008 CHAPTER II				
	The relevant essential requirements of Annex I, and the specific requirements and the conformity assessment procedures listed in this chapter, apply to capacity serving measures defined below. However, the requirement for the supply of a copy of declarations of conformity may be interpreted as applying to a batch or consignment rather than each individual instrument. Also, the requirement for the instrument to bear information in respect of its accuracy shall not apply			
	Definitions			
	Capacity serving measure A capacity measure (such as a drinking glass, jug or thimble measure) designed to determine a specified volume of a liquid (other than a pharmaceutical product) which is sold for immediate consumption.	2.2	<i>“Measures which are filled as required and used for the retail sale of drinks sold by volume. They are divided into two categories: transfer measures used solely for decanting specific volumes of beverages and drinking measures used also for the consumption of specific volumes of beverages.”</i>	Covered

	Directive 2004/22/EC Essential requirements of Annex I and Annex MI-008 II	OIML R 138 (2007)	Comments	Conclusion
	Line measure A capacity serving measure marked with a line to indicate nominal capacity.	2.9	<i>"Gauge mark Mark, generally a line that indicates the nominal capacity"</i>	Covered when gauge mark in a line
	Brim measure A capacity serving measure for which the internal volume is equal to the nominal capacity.	2.7	<i>"Brim capacity, V_r Volume that the vessel is meant to contain when filled to the brim."</i>	Covered
	Transfer measure A capacity serving measure from which it is intended that the liquid is decanted prior to consumption.	2.2	<i>"Measures which are filled as required and used for the retail sale of drinks sold by volume. They are divided into two categories: transfer measures used solely for decanting specific volumes of beverages and drinking measures used also for the consumption of specific volumes of beverages."</i>	Covered
	Capacity The capacity is the internal volume for brim measures or internal volume to a filling mark for line measures.	2.5 2.7 2.9 4.6.1	<i>"Nominal capacity, V_n Volume indicated on the vessel." "Brim capacity, V_r Volume that the vessel is meant to contain when filled to the brim." "Gauge mark Mark, generally a line that indicates the nominal capacity" Vessels with gauge marks "Filled to the gauge mark" is when the lowest part of the meniscus formed by the liquid is tangential to the upper edge of the gauge mark.</i>	Covered
1	Reference Conditions			

	Directive 2004/22/EC Essential requirements of Annex I and Annex MI-008 II			OIML R 138 (2007)	Comments	Conclusion
1.1	Temperature: the reference temperature for measurement of capacity is 20 °C.			5.2.5	“Reference temperature If the national authority for metrology decides on a reference temperature other than 20 °C, this temperature must be indicated next to every volume indication affixed on the vessel.”	Covered when the reference temperature is 20 °C
1.2	Position for correct indication: free standing on a level surface.			4.5	“Vertical position Vessels with gauge marks and measuring container bottles shall have a base wide enough to allow a vertical, stable position when resting on a flat horizontal surface. If not, the holder must be provided with the vessel..”	Covered
2	MPEs			5.1.1/4.1.1	Exactly the same MPE. Nominal capacity limited by formula. Note: For brim measures the ‘+’ sign indicates that the measure contains at least the brim capacity, Vr up to a maximum of Vr + MPE.	Covered
	Table 1					
	Capacity	Line	Brim			
	Transfer measures					
	< 100 ml	± 2 ml	– 0 + 4 ml			
	≥100 ml	± 3 %	– 0 + 6 %			
	Serving measures					
	< 200 ml	± 5 %	– 0 + 10 %			
	≥200 ml	± (5 ml+ 2,5 %)	– 0 + 10 ml + 5 %			
3	Materials Capacity serving measures shall be made of material which is sufficiently rigid and dimensionally stable to maintain capacity within the MPE.			4.2	“The vessels shall be sufficiently robust to withstand normal usage without distortions. For capacity serving measures and measuring container bottles, the materials used in construction should be sufficiently tough, rigid, non porous and stable to maintain accuracy during use.”	Covered
4	Shape					

	Directive 2004/22/EC Essential requirements of Annex I and Annex MI-008 II	OIML R 138 (2007)	Comments	Conclusion
4.1	Transfer measures shall be designed so that a change of contents equal to the MPE causes a change in level of at least 2 mm at the brim or filling mark.	4.4	<i>"Vessels with gauge marks shall be so designed that at the nominal capacity, a variation in the contents equal to the maximum permissible error, causes a change in the liquid level of at least 2 mm."</i> Brim are not considered in OIML R 138	Covered
4.2	Transfer measures shall be designed so that the complete discharge of the liquid being measured will not be impeded.		No such requirement in OIML R 138	Not covered
5	Marking			
5.1	The nominal capacity declared shall be clearly and indelibly marked on the measure.	5.2.1	<i>"Nominal capacity Every vessel for commercial transactions shall bear a clearly visible, easily readable and permanent indication of the nominal capacity V_n. Markings shall be in SI units."</i>	Covered however see 9.7 (Annex I)
5.2	Capacity serving measures may also be marked with up to three clearly distinguishable capacities, none of which shall lead to confusion one to the other.	5.2.2	<i>"In addition to the requirements of 7.2.1, capacity serving measures shall bear at least one filling mark."</i> OIML R 138 does not limit the number of mark to 3 (<i>at least one...</i>).	Covered when there are no more than 3 capacities marked
5.3	All filling marks shall be sufficiently clear and durable to ensure that MPEs are not exceeded in use.	4.2 5.2.2	<i>"The vessels shall be sufficiently robust to withstand normal usage without distortions. For capacity serving measures and measuring container bottles, the materials used in construction should be sufficiently tough, rigid, non porous and stable to maintain accuracy during use."</i> <i>"All filling marks shall be clearly visible and permanently marked."</i>	Covered