Australian Government
National Measurement Institute

NMI R 129

Multi-dimensional Measuring Instruments

(OIML R 129:2000(E), IDT)

The English version of international standard OIML R 129:2000 *Multi-dimensional Measuring Instruments* is adopted as the identical Commission national standard with the reference number NMI R 129

First edition — December 2000 (NSC R 129)
First edition, first revision — July 2004 (renamed NMI R 129)

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1. SCOPE

NMI R 129 specifies the metrological and technical requirements for the pattern approval of multi-dimensional measuring instruments used to determine the dimensions and and/or volume of an object for the purpose of calculating charges for postage, freight or storage.

NMI R 129 also specifies the tests required for verification/certification and reverification.

2. CONTENTS

NMI R 129 is comprised of, and therefore identical with, OIML R 129:2000, *Multi-dimensional Measuring Instruments* published by the International Organisation of Legal Metrology (OIML).

3. VARIATIONS AND INTERPRETATIONS

OIML R 76 is equivalent to NMI R 76-1 and OIML R 51 is equivalent to NMI R 51.

INTERNATIONAL RECOMMENDATION

OIML R 129

Edition 2000 (E)

Multi-dimensional measuring instruments

Instruments de mesure multidimensionnels

OIML R 129 Edition 2000 (E)

ORGANISATION INTERNATIONALE DE MÉTROLOGIE LÉGALE

INTERNATIONAL ORGANIZATION OF LEGAL METROLOGY

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Foreword

The International Organization of Legal Metrology (OIML) is a worldwide, intergovernmental organization whose primary aim is to harmonize the regulations and metrological controls applied by the national metrological services, or related organizations, of its Member States.

The two main categories of OIML publications are:

- **International Recommendations (OIML R)**, which are model regulations that establish the metrological characteristics required of certain measuring instruments and which specify methods and equipment for checking their conformity; the OIML Member States shall implement these Recommendations to the greatest possible extent;
- **International Documents (OIML D)**, which are informative in nature and intended to improve the work of the metrological services.

OIML Draft Recommendations and Documents are developed by technical committees or subcommittees which are formed by the Member States. Certain international and regional institutions also participate on a consultation basis.

Cooperative agreements are established between OIML and certain institutions, such as ISO and IEC, with the objective of avoiding contradictory requirements; consequently, manufacturers and users of measuring instruments, test laboratories, etc. may apply simultaneously OIML publications and those of other institutions.

International Recommendations and International Documents are published in French (F) and English (E) and are subject to periodic revision.

This publication - reference OIML R 129 edition 2000 - was developed by the Subcommittee TC 7/SC 5 *Dimensional Measuring Instruments*. It was approved for final publication by the International Committee of Legal Metrology in 2000 and will be submitted to the International Conference of Legal Metrology in 2000 for formal sanction.

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Multi-dimensional measuring instruments

SECTION I GENERAL

1 Scope

This Recommendation specifies the metrological and technical requirements for the pattern approval of multi-dimensional measuring instruments used to determine the dimensions and/or volume of an object for the purpose of calculating charges for postage, freight or storage.

The instruments may be used in conjunction with a weighing instrument also used in the determination of charges in which case the procedure is usually for the volume to be calculated, a conversion factor applied and the resulting dimensional weight of the object compared to its weight to establish which quantity (the largest) will be used to determine the charges. In some cases dimensions other than volume (for example length plus girth) are used for determining charges. The Recommendation also includes pattern approval procedures, verification procedures and test procedures.

The requirements of this Recommendation apply to automatic and semi-automatic instruments, but they do not apply (for example) to simple linear measures such as tape measures. The instruments measure the length, width and height of a rectangular box and in some cases determine the volume of that box. If the object is not in the form of a rectangular box, the volume of the smallest rectangular box which fully encloses the object is determined (see 2.10).

The instrument may measure the object whilst there is relative motion between the instrument and the object.

If the dimensional measuring instrument is associated with a weighing instrument, which is also used for determining the charges, the requirements for the weighing instrument are included in other OIML Recommendations:

(a) OIML R 76 *Nonautomatic weighing instruments* for nonautomatic weighing instruments; and
(b) OIML R 51 *Automatic catchweighing instruments* for automatic weighing instruments.

The requirements of this Recommendation may also be used, where applicable, for pattern approval and verification of other instruments which measure the dimensions and/or the volume of objects for applications other than for determining postage, freight or storage charges.

2 Terminology

The following terminology includes terms applicable to those instruments covered by this Recommendation and some general terms included in the *International Vocabulary of Basic and General Terms in Metrology* (VIM, 1993, second edition). For an alphabetical cross-reference to these terms, see page 89.

General terms

2.1 Multi-dimensional measuring instrument

A measuring instrument which measures the length (L), width (W) and height (H) of a rectangular parallelepiped (a rectangular box), and in some cases determines the volume of that box. If the object is not of the form of a rectangular box, the smallest rectangular box which fully encloses the object is determined.

2.2 Device

A part of an instrument that is usually manufactured as a separate unit and is capable of being independently tested.

2.3 Measuring device

A device which measures the dimensions of an object and provides a signal to the processor from which the associated quantities are calculated.

2.4 Processor

A device which contains all the necessary information and receives all the necessary signals from the measuring

device to enable it to calculate the volume or other associated quantities. It may also store information, provide checking facilities for the information and communicate with auxiliary devices.

2.5 Indicator

A device which displays the dimensions measured and the associated quantities calculated by the processor. It may or may not be associated with the processor.

2.6 Auxiliary devices

Devices such as indicators that repeat the indication, ticket printers, card readers, data input terminals etc.

2.7 Semi-automatic instrument

An instrument which requires the intervention of an operator to carry out the measurements but automatically determines the results.

2.8 Automatic instrument

An instrument which does not require the intervention of an operator.

2.9 Multi-interval instrument

Instruments having one dimensional measuring range for each axis which is divided into partial measuring ranges each with different scale intervals, with the measuring range determined automatically according to the dimension being measured.

Measurement terms

2.10 Rectangular box (rectangular parallelepiped)

A polyhedron having six faces that are parallel in pairs; each face is a parallelogram and adjacent edges are perpendicular.

2.11 Irregular shaped object

Any object other than a rectangular box.

2.12 Measured dimensions

The length (*L*), width (*W*) or height (*H*), measured by the instrument, of the smallest rectangular box which fully encloses the object.

2.13 Volume (vol)

For this Recommendation, the volume of the smallest rectangular box which fully encloses the object, that is the product of the indicated values of length (*L*), width (*W*) and height (*H*).

2.14 Weight (Wt)

For this Recommendation, the weight of the object measured on a weighing instrument.

2.15 Maximum dimension (max)

The maximum measurable dimension for each axis as specified by the manufacturer for the measuring instrument.

2.16 Minimum dimension (min)

Value of the dimension for each axis below which the measuring result may be subject to an excessive relative error.

2.17 Dimensional weight (Dim Wt or DW)

A calculated value deemed to be a weight value obtained by applying a conversion factor to the object's volume (see 2.13) or dimensions (see 2.12).

2.18 Conversion factor (F)

The factor applied to the volume or dimensions of an object to determine its dimensional weight.

2.19 Scale interval (d)

The difference between two consecutive indicated values of the dimensions for each range in each axis [adapted from VIM 4.22].

Electronic terms

2.20 Electronic multi-dimensional measuring instrument

A multi-dimensional measuring instrument equipped with electronic devices.

2.21 Electronic device

A device employing electronic sub-assemblies and performing a specific function. An electronic device is usually manufactured as a separate unit and is capable of being independently tested.

Note: An electronic device as defined above, may be a complete measuring instrument or part of a measuring instrument.

2.22 Electronic sub-assembly

Part of an electronic device employing electronic components and having a recognizable function of its own.

Performance terms

2.23 Error of indication

The indication of a measuring instrument minus the true value of the corresponding input quantity [VIM 5.20].

2.24 Intrinsic error

The error of a measuring instrument determined under reference conditions [VIM 5.24].

2.25 Initial intrinsic error

The intrinsic error of a measuring instrument as determined prior to performance tests.

2.26 Maximum permissible errors (mpe)

The extreme values (positive and negative) of the error of indication permitted by specifications, Recommendations, regulations etc. The absolute value of the mpe is the same value without sign [adapted from VIM 5.21].

2.27 Fault

The difference between the error of indication and the intrinsic error of a measuring instrument.

Note: Principally a fault is the result of an undesired change of data contained in, or flowing through, an electronic measuring instrument.

2.28 Significant fault

A fault greater than one scale interval (d).

The following faults are not considered to be significant, even when they exceed the value defined above:

(a) faults arising from simultaneous and mutually independent causes in the measuring instrument itself;

(b) faults implying the impossibility to perform any measurement;

(c) transitory faults being momentary variations in the indication, which cannot be interpreted, memorized or transmitted as a measurement result; and

(d) faults giving rise to variations in the measurement result so serious that they are bound to be noticed by all those interested in the result of the measurement.

2.29 Influence quantity

A quantity that is not the measurand but that affects the result of the measurement [VIM 2.7].

2.29.1 Influence factor

An influence quantity having a value within the rated operating conditions of the measuring instrument, specified in this Recommendation.

2.29.2 Disturbance

An influence quantity having a value within the limits specified in this Recommendation, but outside the specified rated operating conditions of the measuring instrument.

Note: An influence quantity is a disturbance if for that influence quantity the rated operating conditions are not specified.

2.30 Rated operating conditions

Conditions of use giving the range of values of influence quantities for which the metrological characteristics are intended to lie within the specified maximum permissible errors.

2.31 Reference conditions

A set of specified values of influence factors fixed to ensure valid intercomparison of results of measurements [adapted from VIM 5.7].

2.32 Performance

The ability of the measuring instrument to accomplish its intended functions.

Testing terms

2.33 Test

A series of operations intended to verify the compliance of the EUT with certain requirements.

2.33.1 Test procedure

A detailed description of the tests.

2.33.2 Test program

A description of a series of tests for a certain type of equipment.

2.33.3 Performance test

A test intended to verify whether the EUT is able to accomplish its intended functions.

2.33.4 Test object

An object whose dimensions are verified by appropriate reference standards and intended to verify the compliance of the EUT with certain metrological requirements.

SECTION II METROLOGICAL REQUIREMENTS

3 Units of measurement

The following units of measurement and their symbols shall be used:

	Unit	Symbol
Length:	metre	m
	centimetre	cm
	millimetre	mm
Volume:	cubic metre	m^3
	cubic decimetre	dm^3
	cubic centimetre	cm^3

4 Maximum permissible errors and minimum dimensions

4.1 Scale intervals, minimum dimension

The lower limit of the minimum dimension for all values of the scale interval is given in Table 1.

Table 1 Scale intervals and minimum dimension

Scale interval (d)	Minimum dimension (min) (lower limit)
d ≤ 2 cm	10 d
2 cm < d ≤ 10 cm	20 d
10 cm < d	50 d

4.2 Value of mpe

The mpe applicable to the measurement by the instrument of any of the three dimensions for initial and subsequent verification is ± 1 d.

4.3 Maximum permissible variation between indicators

There shall be no difference between the indications of the same quantity on different digital indicators.

4.4 Multi-interval instruments

For multi-interval instruments with scale intervals of d_1, d_2 ... d_r the mpes are ± 1 d_1, ± 1 d_2 ... ± 1 d_r for the applicable range and axis.

4.5 Calculated quantities

For all calculated quantities included in the transaction, the indicated quantity shall equal the quantity obtained by using the indicated values included in the calculation together with any rounding applied. If the indicated, calculated quantity is rounded, it shall be rounded to ± 0.5 scale interval.

4.6 Rules for the determination of errors

The rules for the determination of errors are as follows:

(a) When a test is conducted, the expanded uncertainty (coverage factor k = 2) of the determination of the errors on indications of dimensions shall not be greater than one-third of the mpe specified (see GUM).

(b) The mpes apply to all instruments irrespective of their principles of operation. Limitations of use as marked on the instrument may apply, for example with respect to the position, shape and material of the object.

(c) The mpe specification in 4.2 to 4.5 is applicable to all indications included in the transaction as appropriate.

(d) The initial intrinsic error is found at reference conditions of 20 °C ± 5 °C, atmospheric ambient pressure, nominal voltage and 50 % ± 15 % relative humidity.

5 Influence factors, disturbances and humidity

5.1 Rated operating conditions for influence factors

Instruments shall be designed and manufactured such that they do not exceed the mpes when tested over the following ranges of influence factors:

(a) mains power voltage variations: – 15 % to + 10 % of nominal voltage; and

(b) air temperature variations if no temperature limits are stated in the descriptive markings: – 10 °C to + 40 °C.

A battery operated electronic instrument shall either continue to function correctly or not indicate any quantity when the voltage is below the manufacturer's specified nominal voltage.

If special temperature limits are stated in the descriptive markings, the range shall be at least 30 °C.

5.2 Humidity

All electronic measuring instruments shall be subjected to the damp heat steady state test described in A.2.2.

The indication for the same input shall remain within the mpes when applied at reference conditions before and after the test (see 4.6(d)) and when applied at the test conditions specified in A.2.2 after 48 h at these conditions.

5.3 Disturbances

5.3.1 Disturbance applied to instrument

An electronic instrument shall be designed and manufactured such that, when exposed to disturbances, either:

(a) significant faults do not occur; or

(b) significant faults are detected and acted upon.

Note: A fault equal to, or smaller than, d is allowed during the disturbance irrespective of the value of the error of indication prior to the disturbance.

5.3.2 Disturbance applied separately

The requirement in 5.3.1 may be applied separately:

(a) to each individual cause of significant fault; and/or

(b) to each part of the electronic instrument.

The choice whether (a) or (b) is applied is left to the manufacturer.

5.3.3 Tests for disturbances; severity levels

Instruments shall be tested for the appropriate disturbances as listed in Table A.1. The severity levels of the disturbances are given in A.3.

5.4 Light and acoustic effects

All electronic instruments with measuring devices which are based on light or acoustic techniques shall remain within the mpes when subjected to the applicable tests described in A.4.

5.5 Tests

A pattern of an instrument is presumed to comply with the requirements of clause 5 if it has passed the examination and tests specified in Annex A.

SECTION III TECHNICAL REQUIREMENTS

The following technical requirements ensure that the instrument is constructed so that it complies with the metrological requirements and will thus be suitable for legal use.

6 Operational requirements

6.1 Fraudulent use

Instruments shall not facilitate fraudulent use, either by accidental or by deliberate means when using the instrument in the normal manner.

6.2 Suitability of construction

Instruments shall be constructed so that all controls, indicators, etc. are suitable for service under normal conditions of use.

6.3 Suitability for verification

Instruments shall be constructed so that the performance requirements of this Recommendation can be applied.

If in normal operation the instrument indicates the volume and not the dimensions, a test mode shall be provided to display or print out the dimensions.

6.4 Zero or ready adjustment

Instruments shall be provided with facilities to set the instrument to, and maintain it at, zero or ready condition. This shall only be possible without an object in the measurement area and shall be indicated by a zero indication, a ready light or a similar display. Either this condition is met automatically for each measurement or the instrument is automatically inhibited.

6.5 Tare device

(a) The tare function shall only operate negatively with respect to the zero or ready condition.

(b) The value of the tare scale interval shall be the same as the scale interval of the respective axis and range.

(c) Operation of tare shall be indicated.

6.6 Warm-up

As soon as the instrument indicates or transmits the measurement results after the warm-up period after switch-on, the indications shall be within mpes.

7 Indicators and printing devices

7.1 General

(a) An instrument shall have at least one indicator or printer which displays or prints out the measurement on which the transaction is made, namely dimensions or volume.

(b) In the case of an instrument used for direct sales to the public, all indications shall be available to the customer.

(c) The indication shall be automatically displayed or printed out following each step in the process or be readily available by a simple action of the operator, for example by pressing a key.

(d) Other indications such as dimensional weight, weight conversion factors etc. may be displayed or printed out. Indications may either be automatically displayed or printed out following an appropriate step in the process, or be readily available by a simple action of the operator.

(e) The previous displayed indications shall not persist for longer than 1 s after a change in the object in the measurement area.

(f) When an instrument is fitted with an extended indication device, displaying the indication with a scale interval smaller than d shall be possible only:

- while pressing a key; or
- for a period not exceeding 5 s after a manual command by the operator.

In any case printing out of extended indication shall not be possible.

Instruments used for direct sales to the public shall not have any extended indicating device.

(g) All indications shall be identified either by the full name or by abbreviations (see 7.9).

7.2 Clarity of indications

Printed and displayed indications shall be reliable, clear and unambiguous and printing shall be indelible. Figures forming the results shall be of a size, shape and clarity for reading to be easy.

Digital indications shall be stable around the changeover point. All digits on displays and tickets shall be oriented in the normal viewing position and shall permit reading by simple juxtaposition.

7.3 Units of measurement

All printed and displayed indications shall include the name or symbol of the unit of measurement. On tickets, the name or symbol may be printed out by the printer or preprinted on the ticket.

For any one indication of a quantity only one unit of measurement for that quantity shall be used, for example cm only, not m and cm.

7.4 Value of the scale interval

The value of all scale intervals shall be in the form 1, 2 or 5×10^n where n is a positive or negative whole number or zero.

The value of the scale interval shall be:

(a) the same for each axis; or

(b) different for one axis from the other two provided that instructions are marked on the instrument specifying any limitations of use; alternatively indication of incorrect use shall be given; or

(c) variable (for example multi-interval) on one or more axes provided that:

- if all three axes are multi-interval, then $d_{x1} = d_{y1} = d_{z1}$, $d_{x2} = d_{y2} = d_{z2}$, ... , $d_{xr} = d_{yr} = d_{zr}$;
- if two axes are multi-interval, for example x and y, and z is fixed, then $d_{x1} = d_{y1}$, $d_{x2} = d_{y2}$, ... , $d_{xr} = d_{yr}$, and instrument limitations such as object size, placement, etc. are clearly marked to define how to operate the instrument; and
- if only one axis is multi-interval, for example x, and y and z are fixed, then $d_y = d_z$ and instrument limitations such as object size, placement, etc. are clearly marked to define how to operate the instrument.

7.5 Decimal numbers

If the indication is expressed in a decimal form, there shall be at least one zero preceding the decimal mark for values less than one.

The decimal mark on tickets shall be printed out with the measured value by the printer.

One or more fixed zeros may be used to the right of the variable numbers for values greater than one.

Printed numbers and symbols shall be at least 2 mm high.

7.6 Limits of indication

Indications or printing of a dimension above the maximum dimension + 9 d shall either:

(a) be blank; or

(b) be identified by an obvious difference in the display.

7.7 Multi-interval instruments

For each partial measuring range, the following apply:

(a) scale intervals $d_1 < d_2 < d_3 \ldots < d_r$; and

(b) $\min = \min_1$, $\max = \max_r$, $\max_1 = \min_2$, etc.

7.8 Multi-instrument system

A number of measuring devices may be connected to one indicating device to form a multi-instrument system. The following requirements apply.

If the indicator is not within adequate proximity to each measuring device to allow easy testing, a mobile test indicator shall be provided. It shall be possible for the test indicator to be readily connected to each measuring device without affecting the performance of that device. The test indicator shall agree exactly with the common indicator in regard to the indications being tested.

The indication from each measuring device shall be clearly identified with the device on the common indicator.

7.9 Printed and displayed information

7.9.1 Any printed ticket or displayed indication shall include sufficient information to identify the transaction, for example:

(a) dimensions: length (*L*), width (*W*) and height (*H*);

(b) volume (vol);

(c) weight (Wt) if the instrument includes a weighing instrument;

(d) dimensional weight (Dim Wt ... kg or DW ... kg);

(e) dimensional tare (DT ... kg);

(f) conversion factor (F);

(g) quantity for charging, for example dimensions, vol or DW ... kg;

(h) price rate and price; and

(i) date, transaction number or other identification of the object.

Note 1: Icons may be used to identify indications.

Note 2: When the customer is not present during the measurement process the above information need not be displayed or printed out at the time but shall be available on request.

Note 3: The price interval and the price rate shall comply with the national regulations applicable for trade.

7.9.2 A printed ticket shall also contain the following printed or preprinted information:

(a) that the dimensions and/or volume shown are those of the smallest rectangular box that fully encloses the object; and

(b) that the dimensional weight is a calculated value deemed to be a weight value obtained by applying a conversion factor to the object's volume or dimensions.

7.10 Stability

Printing or storage of indications for subsequent indication, data transfer, totalizing, etc., shall be inhibited when the equilibrium is not stable. Stable equilibrium is considered to be achieved when, over a period of 5 s after printout or data storage, no more than two adjacent values are indicated, one of which is the printed or stored value.

8 Markings

8.1 Nameplate

Instruments shall be clearly and permanently marked on a permanently attached nameplate in the vicinity of the indicating device with the following information:

(a) manufacturer's name or mark;

(b) model designation;

(c) serial number of instrument and year of manufacture;

(d) pattern approval mark;

(e) the maximum and minimum dimensions for each axis in the form max = ... min = ... ;

(f) if measurements are affected by means of relative movement between the object and the instrument the maximum and minimum measuring speeds for which the instrument will measure correctly in the form V_{max} = ... m/s, V_{min} = ... m/s;

(g) scale interval(s) for each axis and range (multi-interval) in the form d = ... ; and

(h) temperature limits (if other than – 10 °C to + 40 °C).

8.2 Notices

Any special notice or limitation of use relating to the instrument or the objects being measured shall be clearly marked on a notice visible to the operator or in an operator's manual, for example:

(a) special application if used for a purpose other than determining postage, freight or storage charges;

(b) minimum spacing between successive objects;

(c) if the instrument can measure only rectangular boxes;

(d) if the box has to be located in a particular position;

(e) any limitation of the surface characteristics of the objects being measured;

(f) that the dimensions and/or volume shown are those of the smallest rectangular box that fully encloses the object; and

(g) that the dimensional weight is a calculated value deemed to be a weight value obtained by applying a conversion factor to the object's volume or dimensions.

9 Verification mark and sealing

9.1 Verification mark

Provision shall be made for the application of a verification mark either on a nameplate, a stamping plug or on an adhesive label. The following requirements apply:

(a) the mark shall be easily affixed without affecting the metrological properties of the instrument;

(b) the mark shall be visible without moving or dismantling the instrument when in use;

(c) the part on which the mark is located shall not be removable from the instrument without damaging the mark; and

(d) the size of the space shall be sufficient to contain the marks applied by the verifying authority: for example an area of at least 200 mm^2.

9.2 Sealing

Provision shall be made for sealing those devices and parameters that have a metrologically significant effect and that determine the measurement result. This may include devices and parameters which affect the configuration of the instrument as well as those which affect the calibration.

Sealing may be by mechanical or electronic means. Mechanical means include those where access to an electronic means of changing the parameters (for example via a keyboard) is prohibited by a mechanical seal.

The requirements for applying a mark to a mechanical seal are the same as those for 9.1.

The requirements for electronic seals are as follows:

(a) Access by authorized persons shall be protected by some form of physical key or a password or access code (for example a four digit code).

(b) Any access to alter protected parameters shall be automatically recorded (for example by means of a counter which automatically increments when access is initiated).

(c) The record shall be readily accessible by a simple action (for example by display of the counter when a button identified as being for this purpose is pressed, or during the indication check).

(d) The record shall be readily identifiable as such and shall not be easily confused with other indications of the instrument.

(e) A reference record in the same form as the incremental record shall be permanently marked on the instrument to indicate that the parameters have been accessed since the last verification (for example the reference record could be associated with the verification mark).

(f) The record shall not repeat in a sequence of less than 999 alterations. It shall also persist reliably for a period of a least two years (unless it is overwritten by a further alteration). The record shall persist through tests for influence factors and disturbances specified in this Recommendation.

10 Construction requirements for electronic measuring instruments

10.1 General

Electronic measuring instruments shall be constructed so that they comply with the following metrological and technical requirements.

10.1.1 Influence factors

Influence factors specified in clause 5 and corresponding test procedures specified in Annex A.

10.1.2 Disturbances

Disturbances specified in clause 5 and corresponding test procedures specified in Annex A.

10.2 Acting upon significant faults

When a significant fault has been detected, the instrument shall either be made inoperative automatically or a visual or audible indication shall be provided automatically and shall continue until such time as the user takes action or the fault disappears. For automatic instruments the instrument shall be made inoperative automatically.

10.3 Indication check

If the failure of an indicator display element can cause a false indication, then the instrument shall have a display test facility which on demand, shows all relevant elements

of the indication display in both active and non-active states, for sufficient time to allow the operator to check them.

10.4 Auxiliary devices interface

An electronic instrument may be equipped with interfaces permitting the coupling of any auxiliary devices or other instruments.

An interface shall not allow the metrological functions of the instrument and its measurement data to be affected by the operation of the auxiliary devices or connected instruments or by disturbances acting on the interface.

If instructions or data can be introduced through the interface into the measuring instrument which alter the parameters that determine the measurement result, the interface shall be sealed as described in 9.2.

SECTION IV METROLOGICAL CONTROLS

11 General

The metrological control of measuring instruments consists of pattern approval, initial verification and subsequent verification.

11.1 Pattern approval

11.1.1 Documentation

Submission of an instrument to a national metrology service for pattern approval shall be accompanied by sufficient technical information including drawings, specifications, photographs and descriptions to ensure complete understanding of the construction and method of operation of the instrument.

Details of the measurement data contained in the memory and calculation methods shall also be provided.

For electronic measuring instruments the documentation shall include a list of electronic sub-assemblies with their essential characteristics, and a description of the electronic devices with drawings, diagrams and general software information explaining their construction and operation.

11.1.2 Instruments submitted for testing

Examination shall be carried out on one or more sample instruments submitted for laboratory tests. If all tests cannot be completed in the laboratory, an examination of a sample instrument on site shall also be carried out.

11.1.3 Laboratory examination

The instrument shall be examined in conjunction with the submitted documentation to ensure that it complies with the metrological and technical requirements of Sections II and III.

11.1.4 Laboratory tests

11.1.4.1 General

Laboratory tests shall be performed in accordance with any limitations of use marked on the instrument or included in any documentation accompanying the instrument.

Test procedures are detailed in Annex A (mandatory). Guidelines on object limitations are given in Annex B (informative).

11.1.4.2 Test objects

The test shall be carried out using appropriate test objects of various sizes and of stable dimensions. The test objects shall be opaque, rigid and with flat faces and well defined straight edges. Test objects may consist of rectangular boxes with dimensions which are known to an expanded uncertainty (coverage factor k = 2) of not more than one-fifth of the mpe. The dimensions shall also be checked to

the same uncertainty when used at the extreme values of the influence factors. The dimensions of these objects shall lie within the range of values bounded by the minimum and maximum dimensions measurable by the instrument. All adjacent faces and edges shall be perpendicular to each other.

The dimensions of the test object shall be $N \cdot d$ where N is a whole number and d is the value of the scale interval. For the different scale intervals, namely 1, 2 or 5×10^n, N = 10, 20, etc. would be suitable as a test object for all. This is applicable for pattern approval and verification tests.

11.1.4.3 Acceptable indications

For compliance with the mpes, indications of $N \cdot d$ and $(N \pm 1)d$ are acceptable whereas indications of $(N \pm [\geq 2])d$ are not acceptable.

For compliance with the significant fault, a difference of 1 d between indications with and without the disturbance applied is acceptable whereas a difference of more than 1 d is not acceptable.

11.1.4.4 Tests for influence factors, disturbances and light and acoustic effects

Before a test is conducted and without a test object on the instrument, the instrument shall be in a zero or ready condition. The test object shall be placed in accordance with the manufacturer's instructions. Instruments tested under laboratory conditions shall comply with the mpes (4.2) for influence factors (5.1) and humidity effects (5.2), and comply with the significant fault requirements for disturbances (5.3). Instruments based on light or acoustic techniques shall comply with the mpes (4.2) for light and acoustic effects (5.4).

11.1.4.5 Tests for irregular shaped objects

For irregular shaped test objects at least one angle shall be obtuse and the smallest dimension for an axis shall be equal to, or greater than, the minimum dimension for that axis. However it must be possible to determine the dimensions of the object to such an accuracy that the smallest rectangular box which fully encloses the object can be calculated within the required uncertainty.

If the instrument is marked with a minimum protrusion to be measured, a test object with that size protrusion shall be used to verify the marked limit.

11.1.4.6 Tests for different orientations and positions

If the instrument does not depend on a particular orientation of the object, several different orientations shall be tested. Also if the instrument does not depend on the object being placed in a particular position on the measuring plane, several different positions shall be tested.

11.1.4.7 Tests for automatic instruments

For automatic instruments, tests at the maximum and minimum speeds of relative movement shall be carried out.

11.1.4.8 Tests for multi-interval instruments

For multi-interval instruments, tests shall be performed for all values of the scale interval, i.e. d_1, d_2, ..., d_r.

11.1.4.9 Tests for different surfaces

Instruments shall be tested with objects of varying surface characteristics to check the limits of such characteristics marked on the instrument or included in the users manual. Annex B gives guidelines on known surface characteristics to be checked such as color (uniform and non-uniform), contrast of color with measurement plane, reflectivity and absorption of sound and light, transparency, roughness or other.

11.1.4.10 Tests for interface

If the instrument is provided with an interface through which auxiliary devices or other instruments can be connected, the tests shall be carried out with a sample device connected and tests applicable to the interface applied (see 10.4). The electromagnetic susceptibility test (see A.3.4) may be carried out on an instrument with only an unterminated cable, 3 m long, connected to the interface.

11.2 Initial verification

11.2.1 Verification conditions

Initial verification of instruments is normally carried out after installation and under the intended conditions of use. The installation and conditions of use shall be appropriate for the design of the instrument as described in the pattern approval certificate and shall allow the specified performance requirements to be achieved.

11.2.2 Conformity

An instrument shall conform to the pattern approval certificate with respect to its construction and metrological functions.

Devices such as zero adjustment, indicators, printers, etc. shall be checked for correct functioning.

The nameplate shall contain the required information including the pattern approval mark.

Any notices including notices of limitations of use required by the certificate shall be checked to ensure that they are readily available to the operator and processes are in place to ensure that they are adhered to.

11.2.3 Test objects

Test objects shall be available and comply with the requirements of 11.1.4.2.

11.2.4 Accuracy tests

Accuracy tests shall be carried out in accordance with test A.1.1 at the operating conditions in effect at the time of verification. Acceptable indications for compliance with the mpes specified in 4.2 are given in 11.1.4.3.

11.2.5 Other tests

Other tests as appropriate shall be carried out in accordance with the corresponding tests described in 11.1.4. These tests may include:

(a) tests for irregular shaped objects (11.1.4.5);

(b) tests for different orientations and positions (11.1.4.6);

(c) tests for automatic instruments (11.1.4.7);

(d) tests for multi-interval instruments (11.1.4.8); and

(e) tests for different surfaces (11.1.4.9).

11.3 Subsequent verification

Unless national regulations specify otherwise, subsequent verification tests shall be carried out in accordance with accuracy tests specified in 11.2.4 using test objects specified in 11.1.4.2.

Annex A - Performance tests

(Mandatory)

A.1 General

Performance tests carried out under the influence factors, disturbances and humidity effects specified in clause 5, ensure that measuring instruments perform over a range of environmental conditions likely to be met in normal use.

The instrument shall be switched on for a period of time equal to, or greater than, the warm-up time specified by the manufacturer. Power is to be "on" for the duration of each test.

The instrument shall be correct (within the mpes) as soon as the values of the dimensions are displayed (6.6). This shall be checked by carrying out a warm-up time test at reference conditions (4.6(d)). Two test objects shall be used, one near minimum dimensions and one near maximum dimensions. One test shall be carried out for each test object at 0, 5, 15 and 30 min after the dimensions are first displayed after switch-on. The results at each dimension for each object shall be compared with the mpes (4.2).

The following tests apply to the various types of electronic instruments using the following principles of operation.

A.1.1 Tests for influence factors

Before tests are conducted, and without a test object in the measurement area, the instrument shall be in zero or ready condition. Test objects shall be used such that at least three measurements of at least five dimensions approximately equally spaced between and including at or near minimum and maximum dimensions, shall be carried out for each axis (for example *L*, *W* and *H*). The tests shall first be carried out under reference conditions (4.6(d)) and then at each of the extreme conditions of the influence factors specified in 5.1.

Table A.1 Applicable tests

	Test	Mechanical measuring device	Optical measuring device	Acoustic measuring device	Battery operated
A.2.1	Static temperatures	×	×	×	×
A.2.2	Damp heat	×	×	×	×
A.2.3	AC power variation	×	×	×	
A.2.4	Battery voltage variation				×
A.3.1	Short time power reduction	×	×	×	
A.3.2	Electrical bursts	×	×	×	
A.3.3	Electrostatic discharge	×	×	×	×
A.3.4	Electromagnetic susceptibility	×	×	×	×
A.4.1	Ambient light effects		×		
A.4.2	Acoustic effects			×	

Note: Table A.1 is not all-inclusive, but illustrates the test selection criteria.

When the effect of one influence factor is being evaluated, all other factors shall be held relatively constant at a value close to the reference conditions specified in 4.6(d).

The three test results at each dimension and each condition shall be compared with the mpes (4.2). If applicable the variation between indicators shall be checked against the permissible difference (4.3). Any calculated quantities shall be checked for correct multiplication and rounding (4.5).

The effect of influence factors on any interfaces (10.4) or electronic sealing provisions (9.2) shall also be checked.

A.1.2 Tests for disturbances

Tests for disturbances shall be carried out on all electronic instruments.

Tests using at least one test object shall be carried out, firstly at reference conditions (see 4.6(d)) and no disturbance, and then with the applications of each disturbance specified in 5.3. Only one disturbance at a time shall be applied. The disturbances shall be applied during the display mode of the three dimensions (*L*, *W* and *H*). The difference between the tests with and without the disturbance shall be compared with the significant fault (2.28). All indicators shall be checked.

The effect of disturbances on any interfaces (10.4) or electronic sealing provisions (9.2) shall also be checked.

A.1.3 Tests for humidity effects

Before the test is conducted and without a test object on the instrument, the instrument shall be in zero or ready condition.

For the damp heat, steady state test, at least three measurements of at least five approximately equally spaced, dimensions between and including at or near minimum and maximum dimensions shall be carried out at the reference conditions (4.6(d)) before and after the application of the damp heat and at the specified damp heat (A.2.2) after 48 h at these conditions.

The three test results at each dimension and at each condition shall be compared with the mpes (4.2).

A.1.4 Tests for light and acoustic effects

The tests shall be carried out as specified in A.1.1 under the variation of light and acoustic effects given in A.4.

The three test results at each dimension and at each condition shall be compared with the mpes (4.2).

A.1.5 Tests for other effects

Tests for irregularly shaped objects, for different orientations of the object, for the range of relative motion, for multi-interval instruments, for different surfaces and for interfaces if applicable (see 11.1.4.5 to 11.1.4.10) shall be carried out under reference conditions (see 4.6(d)). The tests as specified in A.1.1 shall be used, except that at least three measurements of at least three dimensions shall be carried out for each axis. All results shall be compared with the mpes (4.2).

A.2 Test procedures for influence factors

Additional information for carrying out the test procedures for influence factors is given below. The instrument being tested is referred to as the equipment under test (EUT).

A.2.1 Static temperatures test

Test procedure in brief

The EUT shall be exposed to constant temperatures within the range specified in 5.1, under "free air" conditions for 2 h at least after the temperature of the EUT has stabilized.

Test severity

The EUT shall be tested as specified in A.1.1:

(a) at a temperature of 20 °C following conditioning;
(b) at the specified high temperature;
(c) at the specified low temperature; and
(d) again at 20 °C following conditioning.

The rate of change of temperature during the transition period between test temperatures shall not exceed 1 °C/min and the humidity of the test environment shall not exceed 20 g/m^3.

Maximum allowable variations

All functions shall operate as designed. The test results shall comply with the mpes specified in 4.2.

References

IEC 60068-2-1 (1990), IEC 60068-2-2 (1974) and IEC 60068-3-1 (1974).

A.2.2 Damp heat, steady state test

Test procedure in brief

The EUT shall be exposed to the specified high temperature and a relative humidity of 85 % for a period of 48 h. The handling of the EUT shall be such that no condensation of water occurs on the EUT.

Test severity

The EUT shall be tested as specified in A.1.3:

(a) at the reference conditions of 20 °C and 50 % relative humidity;

(b) at the specified high temperature (40 °C or other) and 85 % relative humidity after 48 h; and

(c) again at 20 °C and 50 % relative humidity.

Maximum allowable variations

All functions shall operate as designed. The test results shall comply with the mpes specified in 4.2.

References

IEC 60068-2-3 (1969), IEC 60068-2-28 (1990) and IEC 60068-2-56 (1988).

A.2.3 AC power variation test

Test procedure in brief

The EUT shall be subjected to AC mains power variations specified in 5.1 under constant environmental conditions.

Test severity

The EUT shall be tested as specified in A.1.1:

(a) at nominal voltage;

(b) at an upper limit of 110 % of nominal voltage; and

(c) at a lower limit of 85 % of nominal voltage.

The nominal voltage being that marked on the instrument.

Maximum allowable variations

All functions shall operate as designed. The test results shall comply with the mpes specified in 4.2.

Reference

IEC 61000-4-11 (1994).

A.2.4 Battery voltage variation test

Test procedure in brief

The EUT shall be subjected to DC power supply variations specified in 5.1 under constant environmental conditions.

Test severity

The EUT shall be tested as specified in A.1.1:

(a) at nominal battery voltage; and

(b) at various reduced voltages below nominal battery voltage.

The nominal voltage is that specified by the battery manufacturer and marked on the battery.

Maximum allowable variations

All functions shall operate as designed. The test results shall comply with the mpes specified in 4.2 or alternatively the indication shall be blank.

A.3 Test procedures for disturbances

A.3.1 Short time power reduction test

Test procedure in brief

The EUT shall be subjected to short time power reductions by reducing the AC mains voltage. The test shall be conducted under constant environmental conditions.

A test generator suitable for reducing the amplitude of the AC mains voltage shall be used. The test generator shall be adjusted before connecting the EUT.

Test severity

Each test shall be repeated ten times with an interval of at least 10 s. The EUT shall be tested as specified in A.1.2 with the following reductions:

(a) 100 % reduction in 8 to 10 ms; and

(b) 50 % reduction in 16 to 20 ms.

Maximum allowable variations

If the instrument does not detect and react to a significant fault occurring as a consequence of the short time power reduction, then the fault shall not exceed the value defined in 2.28.

Reference

IEC 61000-4-11 (1994).

A.3.2 Electrical bursts test

Test procedure in brief

The EUT shall be subjected to electrical bursts of voltage spikes. The test shall be conducted under constant environmental conditions.

The transient generator shall have an output impedance of 50 Ω and shall be adjusted before connecting the EUT. At least ten positive and ten negative randomly phased bursts of voltage spikes with a double exponential waveform shall be applied. Each spike shall have a rise time of 5 ns and a half amplitude duration of 50 ns. The burst length shall be 15 ms, the burst period (repetition time interval) shall be 300 ms.

Test severity

The EUT shall be tested as specified in A.1.2 at the following amplitudes (peak values):

(a) 1 kV for power supply lines; and

(b) 0.5 kV for input/output control circuits and communication lines; with a repetition frequency of the impulses of 5 kHz ± 20 %.

Maximum allowable variations

If the instrument does not detect and react to a significant fault occurring as a consequence of the electrical bursts, then the fault shall not exceed the value defined in 2.28.

Reference

IEC 61000-4-4 (1995).

A.3.3 Electrostatic discharge test

Test procedure in brief

The EUT shall be subjected to both direct and indirect electrostatic discharges under constant environmental conditions.

A capacitor of 150 pF shall be charged using a suitable DC voltage source. The capacitor shall then be discharged through the EUT via 330 Ω to surfaces which are normally accessible to the operator. At least ten discharges shall be applied. The time interval between successive discharges shall be at least 10 s. The EUT shall be placed on a grounded plate which projects beyond the EUT by at least 0.1 m on all sides. The ground connection to the capacitor shall be as short as possible.

In the contact discharge mode, to be carried out on conductive surfaces, the electrode shall be in contact with the EUT and the discharge shall be actuated by the discharge switch of the generator.

In the air discharge mode, on insulating surfaces, the electrode shall be brought up to the EUT and the discharge occurs by spark.

Test severity

The EUT shall be tested as specified in A.1.2 at a test voltage up to and including 6 kV for the contact mode and 8 kV for the air mode.

Maximum allowable variations

If the instrument does not detect and react to a significant fault occurring as a consequence of the electrostatic discharge, then the fault shall not exceed the value defined in 2.28.

Reference

IEC 61000-4-2 (1999).

A.3.4 Electromagnetic susceptibility test

Test procedure in brief

The EUT shall be exposed to electromagnetic radiation under constant environmental conditions. The field strength can be generated using the following methods:

(a) the strip line is used at low frequencies (below 30 MHz or in some cases below 150 MHz) for small EUTs;

(b) the long wire is used at low frequencies (below 30 MHz) for larger EUTs; or

(c) dipole antennas, antennas with circular polarization or other antennas placed at least 1 m from the EUT for high frequencies.

The specified field strength shall be established prior to the actual testing without the EUT in the field. The field

shall be generated in two orthogonal polarizations and the frequency range shall be scanned slowly. If antennas with circular polarization, for example logspiral or helical, are used to generate the electromagnetic field a change in the position of the antennas is not required.

When the test is carried out in a shielded enclosure to comply with international laws prohibiting interference to radio communications, the effect of reflected radiation from the shield shall be negated by such means as anechoic shielding.

Test severity

The EUT shall be tested as specified in A.1.2 at a field strength of 3 V/m, 80 % AM, 1 kHz sine wave over a frequency range of 26 MHz to 1 000 MHz.

Maximum allowable variations

If the instrument does not detect and react to a significant fault occurring as a consequence of the electromagnetic susceptibility of the instrument, then the fault shall not exceed the value defined in 2.28.

Reference

IEC 61000-4-3 (1998).

A.4 Tests for light and acoustic effects

A.4.1 Ambient light test

Test procedure in brief

The EUT shall be subjected to ambient light variations under constant environmental conditions. The EUT shall be tested as specified in A.1.1 at the following levels of illuminance using a normal industrial white light source (for example halogen incandescent lights in a room such as an environmental chamber where the illumination can be controlled).

Test severity

(a) 200 lx to 500 lx (reference);

(b) 100 lx; and

(c) 1 000 lx to 1 500 lx.

In addition, tests (a) and (c) shall be repeated with uneven illumination.

Test conditions and equipment

(a) The reference light intensity is considered to be 200 lx to 500 lx.

(b) The levels apply where the object to be measured is normally placed. The illuminance can be measured with a photographic light meter (photometer) with the light detecting surface pointing towards the light source.

(c) The light source for test (a) can be the normal room lighting suitably dimmed.

(d) The light source for tests (b) and (c) can be a photographic slide projector with a halogen projection lamp. The angle of projection should be at approximately 45° to the axis of the light measurement transducer of the instrument. The specified levels of illuminance can be achieved by placing the projector at different distances from the instrument. Other light sources can be used.

(e) Uneven light can be achieved by using a masked slide in the slide projector so that light and dark areas cover the test object.

(f) If the manufacturer specifies special uses for the instrument outside the severity levels given, tests at those levels shall be carried out (for example at 15 000 lx for sunlight).

Maximum allowable variations

All functions shall operate as designed. The test results shall comply with the mpes specified in 4.2.

Alternative operations may be provided if the instrument can only perform correctly over a limited range of light intensity, for example:

(a) the instrument is either made inoperative automatically or a visual or audible indication is provided automatically when outside the limits; or

(b) the instrument is provided with a light source to ensure the limited range is maintained. If the light source fails (a) above applies.

A.4.2 Acoustic tests

Test procedure in brief

The EUT shall be subjected to acoustic noise vibrations under constant environmental conditions.

Test severity

The EUT shall be tested as specified in A.1.1 at a sound intensity level of 100 dB at the nominal center frequency (resonant frequency) of the ultrasonic transducer(s) employed on the instrument. The noise source shall be operated for three bursts of 10 s duration.

Test conditions and equipment

The noise source shall be positioned no closer than 1.5 m from any ultrasonic transducer on the instrument and in no case shall cause damage to the instrument or impede the normal use of the instrument as specified by the manufacturer.

The test equipment shall include:

(a) acoustic chamber;

(b) function generator;

(c) amplifier;

(d) ultrasonic transducer; and

(e) sound level meter.

Note: Several test transducers may be needed to cover the center frequencies of the transducers used in the instruments being tested.

Maximum allowable variations

All functions shall operate as designed. The test results shall comply with the mpes specified in 4.2.

Annex B - Guidelines on object limitations (Informative)

B.1 General

Multi-dimensional measuring instruments use a number of technologies to measure the dimensions of an object and thereby determine the volume of the smallest rectangular box which would fully enclose the object. All technologies have a limited ability to measure all objects correctly. These limitations have to be recognized and instruments have to be marked accordingly and/or have appropriate instructions in the user's manual for the operator to follow. The following guidelines give information on known limitations associated with the objects to be measured.

Characteristics of the object which can affect the measurement are:

(a) shape;

(b) surface characteristics such as color (uniform and non-uniform), contrast of surface color with the background color of the measuring plane, reflectivity and absorption of sound and light, transparency, roughness and protrusions;

(c) uniformity of density; and

(d) orientation and position in the measuring instrument.

Instruments are tested with test objects to determine if they measure within the mpes specified. Test objects have to be of a known shape and size and constructed from a suitable material so that there is a high probability that any errors found are due to the instrument and not to the test objects. It is essential that the dimensions of the test objects are traceable to national measurement standards.

However in practice not all objects are of ideal shape or material, or have dimensions which are easily traceable to national standards. Therefore there may be errors of measurement due to the non-ideal characteristics of the object as well as errors due to the instrument.

This Recommendation requires that the instrument be marked with any limitations of use (or instructions included in a user's manual) and it is therefore necessary for tests to be carried out to justify these limitations. Reliance is also placed on the operator of the instrument to ensure that the limitations are adhered to.

It must be recognized, however, that it is highly improbable that all these precautions will totally eliminate the measurement of unsuitable objects. Features can be built into the instrument to guard against some of the more obvious misuses but it is also essential to train operators and establish good work practices.

Clauses B.2 to B.4 list the known limitations of objects and Table B.1 specifies which limitations apply to the different technologies used for measuring the object.

B.2 Shape of the object

Some instruments can only measure a rectangular box while others can measure irregular shaped objects and determine the dimensions of the smallest rectangular box which fully encloses the object. Instruments which only measure rectangular boxes shall be so marked.

If an instrument can measure irregular shapes in some, but not all, of the dimensions, the instrument shall be marked that it is only to be used for measuring rectangular boxes.

B.3 Surface characteristics

B.3.1 Uniform color

The surface color of an object only affects instruments which use light as the principle of measurement. Light colored objects are more easily measured than dark objects due to better reflectivity or contrast. Suitable test objects with surfaces varying from shiny white to matt black can be used to determine if the specified limits marked on the instrument are correct.

B.3.2 Non-uniform color

The non-uniformity of surface color of an object means that different intensities of light are reflected from

Table B.1 Applicable object limitations

Applicable clause in Annex B	Principle of operation			
	Reflection of sound (1)	Reflection of light (2)	Cutting a light beam (3)	Mechanical (4)
B.2 Shape	√	√	√	√
B.3.1 Uniform surface color		√		
B.3.2 Non-uniform surface color		√		
B.3.3 Contrast of surface color with background color		√		
B.3.4 Surface reflectivity and absorption of sound	√			
B.3.5 Surface reflectivity and absorption of light		√		
B.3.6 Uniformity of density	√			
B.3.7 Transparency		√	√	
B.3.8 Surface roughness	√	√	√	√
B.3.9 Protrusions on the surface	√	√	√	√
B.4 Orientation and position	√	√	√	√

Examples:

(1) Ultrasonic unit that transmits and receives sound waves which are reflected from an object.

(2) LED unit that transmits and receives light waves which are reflected from an object.

(3) LED unit that transmits a light beam, and an opposing light sensor that detects when the beam is cut by an object.

(4) A mechanical wheel device that rolls a wheel along the surface of the object.

different parts of the object, for example if black tape is wrapped around a white box, or if a shiny plastic invoice sleeve is fixed to a low light reflective surface. Suitable test objects of non-uniform color can be used to determine if the instrument is affected by such variations.

B.3.3 Contrast of surface color with the background color

Some instruments measure by contrasting the surface color of the object against the background color of the measuring plane. The contrast may be a light color against a dark color or a shiny surface against a matt surface. The surface of the background plane has to be chosen to accommodate most objects to be measured. Test objects of varying contrasting color to the color of the measuring plane can be used to determine limits of contrast.

B.3.4 Reflectivity and absorption of sound

Some instruments use sound to measure objects. The sound reflective qualities of an object relate to its density and smoothness. The more dense and smooth the object is, the better reflector it is. The following examples are arranged in order of best to worse reflective properties:

(a) smooth, flat steel;

(b) smooth, flat plywood;

(c) smooth, flat, corrugated cardboard; and

(d) polystyrene foam.

Test objects of polystyrene foam can be used to test the instrument.

B.3.5 Reflectivity and absorption of light

For instruments which use light waves to measure objects, a shiny, smooth, white surface reflects better than

a rough, matt, black surface. Also instruments may not perform as well if there is a mixture of surfaces, for example if shiny sealing tape is wrapped around a matt surface or if there is a plastic cover over documents attached to the surface. Additionally, a mixture of light and shadow on the surface may degrade performance. Suitable test objects and light conditions can be used to determine if the instrument is affected by these characteristics.

B.3.6 Uniformity of density

The object being measured may not be uniformly dense. For example if a metal container is inside a polystyrene foam box, sound waves may be absorbed by the foam and reflected from the metal. A test object can be constructed to check this feature.

B.3.7 Transparency

Solid objects wrapped in a transparent material such as "bubble plastic" may not be measured correctly by instruments which use light as the measuring technology. A suitable test object can be prepared to check this feature.

B.3.8 Roughness

An object with a rough surface may degrade the measuring performance of an instrument using any of the technologies for the measurement. A test object with rough surfaces can be used to check this characteristic.

B.3.9 Protrusions

Instruments which only measure rectangular boxes are not able to measure protrusions on the surface. Instruments which measure irregular shaped objects measure protrusions but only above a minimum size. Labels, handles or similar small protrusions on rectangular boxes need not be measured by either type of instrument.

Larger protrusions which could occur on irregular shaped objects need to be measured and included in the determination of the smallest rectangular box which fully encloses the object. Therefore the smallest specified protrusion which can be measured by the instrument needs to be tested with a suitable test object.

B.4 Orientation and position of the object on the measuring instrument

Any limitations on the orientation or placement of the object on the measuring plane need to be determined and precautions should be taken to ensure that the limitations are adhered to. For example physical or displayed guides can be used to control the limits. In some cases two sets of guides may be needed for the smallest and largest sizes, for example if the object must always be placed in the center of the measuring plane.

Annex C - Test report format

(Mandatory for application within the *OIML Certificate System for Measuring Instruments*)

Explanatory notes to the test report format

i) General

This *Test report format*, which is informative with regard to the implementation of OIML Recommendation R 129 in national regulations, presents a standardized format for the results of the various tests and examinations to which a pattern of a multi-dimensional measuring instrument shall be submitted with a view to its approval. The tests are listed in Annex A of this International Recommendation.

It is recommended that all metrology services or laboratories evaluating patterns of multi-dimensional measuring instruments according to OIML R 129 or to national or regional regulations based on OIML R 129 use this *Test report format*, directly or after translation into a language other than English or French.

It is also recommended that this *Test report format* in English or in French (or in both languages) be transmitted by the country performing these tests to the relevant authorities of another country, under bi- or multi-lateral cooperation agreements.

In the framework of the *OIML Certificate System for Measuring Instruments*, use of the *Test report format* is mandatory.

ii) Page numbering

In addition to the sequential numbering at the bottom of each page, a space has been left at the top of each page (starting on page 27) for numbering the pages of reports established following this model. In particular, each test is reported individually on a separate page following the relevant format.

Where required, these forms can be copied and used several times in cases where the test in question has to be repeated under varying conditions.

For a given report, it is advisable to complete the sequential numbering of each page by indicating the total number of pages in the report.

MULTI-DIMENSIONAL MEASURING INSTRUMENTS

OIML R 129 (Edition 2000)

PATTERN EVALUATION TEST REPORT

Application

Report number: _____
Application number: _____

Instrument tested

Manufacturer: _____
Make & model: _____
Serial number: _____

Applicant

Organization name: _____
Address: _____

_____

_____

Phone: _____
E-mail: _____

Testing Authority

Organization name: _____
Address: _____

_____

_____

Phone: _____
E-mail: _____

Test period

Date testing begun: _____
Date testing completed: _____

EXPLANATORY NOTES TO THE TEST REPORT

Meaning of symbols used in this report

L = Indicated length
W = Indicated width
H = Indicated height
L_T = Length of the test object
ΔL = Error, $L - L_T$
W_T = Width of the test object
ΔW = Error, $W - W_T$
H_T = Height of the test object
ΔH = Error, $H - H_T$
MPE = Maximum permissible error
V = The volume indicated on the instrument
Vcalc = L x W x H
F = Conversion factor
DW = The dimensional weight indicated on the instrument
DWcalc = V x F
SF = Significant fault

How to read and fill out the test report

For each test the "SUMMARY OF PATTERN EVALUATION" and the "CHECKLIST" shall be completed according to this example:

	PASSED	FAILED	Remarks
When instrument has passed the test:	X		
When instrument has failed the test:		X	
When the test is not applicable:	/	/	

The blank spaces in the headings of the report shall always be filled in according to the following example (where applicable):

	At start	At end	
Temp			°C
RH			%
Time			
Sound			dB
Light			lx

Where: Temp = Temperature (in °C)
RH = Relative humidity (in %)
Sound = Sound (in decibels)
Light = Luminous flux (in lx)

"Date" in the test report refers to the date on which the test was performed.

Numbers in brackets refer to the corresponding clauses/subclauses of OIML R 129.

The name(s) or symbol(s) of the unit(s) used to express test results shall be specified in each form.

"ID" refers to the identity of the test object used (e.g. unique identifying number) and is entered into: ID

GENERAL INFORMATION CONCERNING THE PATTERN

Report number: _____
Application number: _____
Manufacturer: _____
Make & model: _____
Serial number: _____
Date: _____
Observer(s): _____
Scale interval (d): _____
Conversion Factor (F): _____

1. List the modules the instrument is comprised of, including any auxiliary devices.

2. List the reference standards and/or measuring instruments used during testing.

3. Record any additional remarks and/or information.

SUMMARY OF PATTERN EVALUATION

Report No.: _____
Application No.: _____
Manufacturer: _____
Make & model: _____
Serial No.: _____
Date: _____
Observer(s): _____
Scale interval (d): _____
Conversion Factor (F): _____

SECTION	TEST	REPORT PAGE	PASSED	FAILED	Remarks
1	Warm-up time test (A.1)				
2	Static temperature test (A.2.1)				
2.1	Initial reference temperature ..... °C				
2.2	High temperature ..... °C				
2.3	Low temperature ..... °C				
2.4	Reference temperature ..... °C				
3	Damp heat steady state test (A.2.2)				
3.1	Reference temperature and 50 % relative humidity				
3.2	High temperature and 85 % relative humidity				
3.3	Reference temperature and 50 % relative humidity				
4	AC power variation test (A.2.3)				
4.1	Nominal voltage				
4.2	Nominal voltage + 10 %				
4.3	Nominal voltage – 15 %				
5	Battery voltage variation test (A.2.4)				
5.1	Nominal voltage				
5.2	Low voltage				
6	Short time power reduction test (A.3.1)				
7	Electrical bursts test (A.3.2)				
7.1	Power supply lines				
7.2	Input/output control circuits and communication lines				
8	Electrostatic discharge test (A.3.3)				
8.1	Direct application				
8.2	Indirect application				
9	Electromagnetic susceptibility test (A.3.4)				
10	Ambient light test (A.4.1)				
10.1	200 lx to 500 lx (reference)				
10.2	100 lx				
10.3	1000 lx to 1500 lx				
10.4	 lx				
11	Acoustic test (A.4.2)				
11.1	Reference sound level (..... dB)				
11.2	Sound level 100 dB				
12	Shape of object test (A.1.5, 11.1.4.5, B.2)				
13	Uniform surface color test (A.1.5, 11.1.4.9, B.3.1)				
14	Non-uniform surface color test (A.1.5, 11.1.4.9, B.3.2)				
15	Contrast of color with background color test (A.1.5, 11.1.4.9, B.3.3)				
16	Surface reflectivity and absorption of sound test (A.1.5, 11.1.4.9, B.3.4)				
17	Surface reflectivity and absorption of light test (A.1.5, 11.1.4.9, B.3.5)				
18	Uniformity of density test (A.1.5, 11.1.4.9, B.3.6)				
19	Transparency test (A.1.5, 11.1.4.9, B.3.7)				
20	Surface roughness test (A.1.5, 11.1.4.9, B.3.8)				
21	Protrusions on the surface test (A.1.5, 11.1.4.5, B.3.9)				
22	Orientation and position test (A.1.5, 11.1.4.6, B.4)				
23	Speed of relative movement test (A.1.5, 11.1.4.7)				
23.1	Minimum speed				
23.2	Maximum speed				
24	Examination of the construction of the instrument (6.2)				
25	Checklist				
	OVERALL RESULT:				

1 WARM-UP TIME TEST (A.1)

Report No.: _____
Application No.: _____
Manufacturer: _____
Make & model: _____
Serial No.: _____
Date: _____
Observer(s): _____
Scale interval (d): _____
Conversion Factor (F): _____

	At start	At end	
Temp			°C
RH			%
Time			

TEST APPLICABLE (Y/N)? ☐

Auxiliary device: Connected: ☐ Not present but connectable: ☐ No connection: ☐
Correct indication of auxiliary device (Y/N)?: ☐

Conveyor speed (m/min): min.: ☐ max.: ☐ other: ☐

1st test object, close to minimum dimensions ID: ☐
Length = ☐ unit = ☐ Width = ☐ unit = ☐ Height = ☐ unit = ☐

2nd test object, close to maximum dimensions ID: ☐
Length = ☐ unit = ☐ Width = ☐ unit = ☐ Height = ☐ unit = ☐

Time = 0 minutes

Initial zeroing: ☐ yes
(Ready condition) ☐ no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1st test object, (close to minimum)								
2nd test object, (close to maximum)								

Time = 5 minutes

Initial zeroing: ☐ yes
(Ready condition) ☐ no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1st test object, (close to minimum)								
2nd test object, (close to maximum)								

Time = 15 minutes

Initial zeroing: ☐ yes
(Ready condition) ☐ no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1st test object, (close to minimum)								
2nd test object, (close to maximum)								

Time = 30 minutes

Initial zeroing: ☐ yes
(Ready condition) ☐ no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1st test object, (close to minimum)								
2nd test object, (close to maximum)								

Remarks: _____

RESULT: PASS ☐ **FAIL** ☐

2.1 STATIC TEMPERATURE TEST, Initial reference temperature (A.2.1)

Report No.: ____________
Application No.: ____________
Manufacturer: ____________
Make & model: ____________
Serial No.: ____________
Date: ____________
Observer(s): ____________
Scale interval (d): ____________
Conversion Factor (F): ____________

	At start	At end	
Temp			°C
RH			%
Time			

TEST APPLICABLE (Y/N)? [ ]

Auxiliary device: Connected: [ ] Not present but connectable: [ ] No connection: [ ]

Correct indication of auxiliary device (Y/N)?: [ ]

Conveyor speed (m/min): min.: [ ] max.: [ ] other: [ ]

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: [ ] yes (Ready condition) [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: [ ] yes (Ready condition) [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: [ ] yes (Ready condition) [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: [ ] yes (Ready condition) [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: [ ] yes (Ready condition) [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

Remarks:

RESULT: PASS [ ] **FAIL** [ ]

2.2 STATIC TEMPERATURE TEST, High temperature (A.2.1)

Report No.: ____________
Application No.: ____________
Manufacturer: ____________
Make & model: ____________
Serial No.: ____________
Date: ____________
Observer(s): ____________
Scale interval (d): ____________
Conversion Factor (F): ____________

	At start	At end	
Temp			°C
RH			%
Time			

TEST APPLICABLE (Y/N)? [ ]

Auxiliary device: Connected: [ ] Not present but connectable: [ ] No connection: [ ]

Correct indication of auxiliary device (Y/N)?: [ ]

Conveyor speed (m/min): min.: [ ] max.: [ ] other: [ ]

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

Remarks:

____

____

____

RESULT: PASS [ ]   **FAIL** [ ]

2.3 STATIC TEMPERATURE TEST, Low temperature (A.2.1)

Report No.: ______________
Application No.: ______________
Manufacturer: ______________
Make & model: ______________
Serial No.: ______________
Date: ______________
Observer(s): ______________
Scale interval (d): ______________
Conversion Factor (F): ______________

	At start	At end	
Temp			°C
RH			%
Time			

TEST APPLICABLE (Y/N)? ☐

Auxiliary device: Connected: ☐ Not present but connectable: ☐ No connection: ☐

Correct indication of auxiliary device (Y/N)?: ☐

Conveyor speed (m/min): min.: ☐ max.: ☐ other: ☐

ID: ☐ Length = ☐ unit = ☐ Width = ☐ unit = ☐ Height = ☐ unit = ☐ Initial zeroing: (Ready condition) ☐ yes ☐ no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: ☐ Length = ☐ unit = ☐ Width = ☐ unit = ☐ Height = ☐ unit = ☐ Initial zeroing: (Ready condition) ☐ yes ☐ no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: ☐ Length = ☐ unit = ☐ Width = ☐ unit = ☐ Height = ☐ unit = ☐ Initial zeroing: (Ready condition) ☐ yes ☐ no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: ☐ Length = ☐ unit = ☐ Width = ☐ unit = ☐ Height = ☐ unit = ☐ Initial zeroing: (Ready condition) ☐ yes ☐ no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: ☐ Length = ☐ unit = ☐ Width = ☐ unit = ☐ Height = ☐ unit = ☐ Initial zeroing: (Ready condition) ☐ yes ☐ no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

Remarks:

____
____
____

RESULT: PASS ☐ **FAIL** ☐

2.4 STATIC TEMPERATURE TEST, Reference temperature (A.2.1)

Report No.: ____________________
Application No.: ____________________
Manufacturer: ____________________
Make & model: ____________________
Serial No.: ____________________
Date: ____________________
Observer(s): ____________________
Scale interval (d): ____________________
Conversion Factor (F): ____________________

	At start	At end	
Temp			°C
RH			%
Time			

TEST APPLICABLE (Y/N)? [ ]

Auxiliary device: Connected: [ ] Not present but connectable: [ ] No connection: [ ]
Correct indication of auxiliary device (Y/N)?: [ ]

Conveyor speed (m/min): min.: [ ] max.: [ ] other: [ ]

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

Remarks:

____
____
____

RESULT: PASS [ ]   **FAIL** [ ]

3.1 DAMP HEAT STEADY STATE TEST, Reference temperature (A.2.2)

Report No.: ____________
Application No.: ____________
Manufacturer: ____________
Make & model: ____________
Serial No.: ____________
Date: ____________
Observer(s): ____________
Scale interval (d): ____________
Conversion Factor (F): ____________

	At start	At end	
Temp			°C
RH			%
Time			

TEST APPLICABLE (Y/N)?

Auxiliary device: Connected: Not present but connectable: No connection:

Correct indication of auxiliary device (Y/N)?:

Conveyor speed (m/min): min.: max.: other:

ID: Length = unit = Width = unit = Height = unit = Initial zeroing: (Ready condition) yes no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: Length = unit = Width = unit = Height = unit = Initial zeroing: (Ready condition) yes no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: Length = unit = Width = unit = Height = unit = Initial zeroing: (Ready condition) yes no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: Length = unit = Width = unit = Height = unit = Initial zeroing: (Ready condition) yes no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: Length = unit = Width = unit = Height = unit = Initial zeroing: (Ready condition) yes no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

Remarks:

RESULT: PASS ☐ **FAIL** ☐

3.2 DAMP HEAT STEADY STATE TEST, High temperature (A.2.2)

Report No.: ______________________
Application No.: ______________________
Manufacturer: ______________________
Make & model: ______________________
Serial No.: ______________________
Date: ______________________
Observer(s): ______________________
Scale interval (d): ______________________
Conversion Factor (F): ______________________

	At start	At end	
Temp			°C
RH			%
Time			

TEST APPLICABLE (Y/N)? [ ]

Auxiliary device: Connected: [ ] Not present but connectable: [ ] No connection: [ ]

Correct indication of auxiliary device (Y/N)?: [ ]

Conveyor speed (m/min): min.: [ ] max.: [ ] other: [ ]

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

Remarks:

____
____
____

RESULT: PASS [ ] **FAIL** [ ]

3.3 DAMP HEAT STEADY STATE TEST, Reference temperature (A.2.2)

Report No.: ____________
Application No.: ____________
Manufacturer: ____________
Make & model: ____________
Serial No.: ____________
Date: ____________
Observer(s): ____________
Scale interval (d): ____________
Conversion Factor (F): ____________

	At start	At end	
Temp			°C
RH			%
Time			

TEST APPLICABLE (Y/N)? [ ]

Auxiliary device: Connected: [ ] Not present but connectable: [ ] No connection: [ ]
Correct indication of auxiliary device (Y/N)?: [ ]

Conveyor speed (m/min): min.: [ ] max.: [ ] other: [ ]

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zoring: [ ] yes (Ready condition) [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: [ ] yes (Ready condition) [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: [ ] yes (Ready condition) [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: [ ] yes (Ready condition) [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: [ ] yes (Ready condition) [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

Remarks:

____

____

____

RESULT: PASS [ ] **FAIL** [ ]

4.1 AC POWER VARIATION TEST, Nominal voltage (A.2.3)

Report No.: ____________
Application No.: ____________
Manufacturer: ____________
Make & model: ____________
Serial No.: ____________
Date: ____________
Observer(s): ____________
Scale interval (d): ____________
Conversion Factor (F): ____________

	At start	At end	
Temp			°C
RH			%
Time			

TEST APPLICABLE (Y/N)? [ ]

Marked nominal voltage: [ ] V

Auxiliary device: Connected: [ ] Not present but connectable: [ ] No connection: [ ]

Correct indication of auxiliary device (Y/N)?: [ ]

Conveyor speed (m/min): min.: [ ] max.: [ ] other: [ ]

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

Remarks:

RESULT: PASS [ ] **FAIL** [ ]

4.2 AC POWER VARIATION TEST, Nominal voltage + 10 % (A.2.3)

Report No.: ____________________
Application No.: ____________________
Manufacturer: ____________________
Make & model: ____________________
Serial No.: ____________________
Date: ____________________
Observer(s): ____________________
Scale interval (d): ____________________
Conversion Factor (F): ____________________

	At start	At end	
Temp			°C
RH			%
Time			

TEST APPLICABLE (Y/N)? [ ]
Marked nominal voltage + 10 %: [ ] V

Auxiliary device: Connected: [ ] Not present but connectable: [ ] No connection: [ ]
Correct indication of auxiliary device (Y/N)?: [ ]

Conveyor speed (m/min): min.: [ ] max.: [ ] other: [ ]

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

Remarks:

RESULT: PASS [ ] **FAIL** [ ]

4.3 AC POWER VARIATION TEST, Nominal voltage – 15 % (A.2.3)

Report No.: ____________
Application No.: ____________
Manufacturer: ____________
Make & model: ____________
Serial No.: ____________
Date: ____________
Observer(s): ____________
Scale interval (d): ____________
Conversion Factor (F): ____________

	At start	At end	
Temp			°C
RH			%
Time			

TEST APPLICABLE (Y/N)? [ ]
Marked nominal voltage – 15 %: [ ] V

Auxiliary device: Connected: [ ] Not present but connectable: [ ] No connection: [ ]
Correct indication of auxiliary device (Y/N)?: [ ]

Conveyor speed (m/min): min.: [ ] max.: [ ] other: [ ]

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

Remarks:

RESULT: PASS [ ] **FAIL** [ ]

5.1 BATTERY VOLTAGE VARIATION TEST, Nominal voltage (A.2.4)

Report No.: ____________
Application No.: ____________
Manufacturer: ____________
Make & model: ____________
Serial No.: ____________
Date: ____________
Observer(s): ____________
Scale interval (d): ____________
Conversion Factor (F): ____________

	At start	At end	
Temp			°C
RH			%
Time			

TEST APPLICABLE (Y/N)? ☐
Marked nominal voltage: ☐ V

Auxiliary device: Connected: ☐ Not present but connectable: ☐ No connection: ☐
Correct indication of auxiliary device (Y/N)?: ☐

Conveyor speed (m/min): min.: ☐ max.: ☐ other: ☐

ID: ☐ Length = ☐ unit = ☐ Width = ☐ unit = ☐ Height = ☐ unit = ☐ Initial zeroing: ☐ yes (Ready condition) ☐ no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: ☐ Length = ☐ unit = ☐ Width = ☐ unit = ☐ Height = ☐ unit = ☐ Initial zeroing: ☐ yes (Ready condition) ☐ no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: ☐ Length = ☐ unit = ☐ Width = ☐ unit = ☐ Height = ☐ unit = ☐ Initial zeroing: ☐ yes (Ready condition) ☐ no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: ☐ Length = ☐ unit = ☐ Width = ☐ unit = ☐ Height = ☐ unit = ☐ Initial zeroing: ☐ yes (Ready condition) ☐ no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: ☐ Length = ☐ unit = ☐ Width = ☐ unit = ☐ Height = ☐ unit = ☐ Initial zeroing: ☐ yes (Ready condition) ☐ no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

Remarks:

RESULT: PASS ☐ **FAIL** ☐

5.2 BATTERY VOLTAGE VARIATION TEST, Low voltage (A.2.4)

Report No.: ____________
Application No.: ____________
Manufacturer: ____________
Make & model: ____________
Serial No.: ____________
Date: ____________
Observer(s): ____________
Scale interval (d): ____________
Conversion Factor (F): ____________

	At start	At end	
Temp			°C
RH			%
Time			

TEST APPLICABLE (Y/N)? [ ]
Low voltage: [ ] V

Auxiliary device: Connected: [ ]   Not present but connectable: [ ]   No connection: [ ]
Correct indication of auxiliary device (Y/N)?: [ ]

Conveyor speed (m/min): min.: [ ]   max.: [ ]   other: [ ]

ID: [ ]   Length = [ ] unit = [ ]   Width = [ ] unit = [ ]   Height = [ ] unit = [ ]   Initial zeroing: [ ] yes (Ready condition) [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ]   Length = [ ] unit = [ ]   Width = [ ] unit = [ ]   Height = [ ] unit = [ ]   Initial zeroing: [ ] yes (Ready condition) [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ]   Length = [ ] unit = [ ]   Width = [ ] unit = [ ]   Height = [ ] unit = [ ]   Initial zeroing: [ ] yes (Ready condition) [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ]   Length = [ ] unit = [ ]   Width = [ ] unit = [ ]   Height = [ ] unit = [ ]   Initial zeroing: [ ] yes (Ready condition) [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ]   Length = [ ] unit = [ ]   Width = [ ] unit = [ ]   Height = [ ] unit = [ ]   Initial zeroing: [ ] yes (Ready condition) [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

Remarks:

____
____
____

RESULT: PASS [ ]   **FAIL** [ ]

6 SHORT TIME POWER REDUCTION TEST (A.3.1)

Report No.:
Application No.:
Manufacturer:
Make & model:
Serial No.:
Date:
Observer(s):
Scale interval (d):
Conversion Factor (F):

	At start	At end	
Temp			°C
RH			%
Time			

Marked nominal voltage: V

TEST APPLICABLE (Y/N)?

Auxiliary device: Connected: Not present but connectable: No connection:

Conveyor speed (m/min): min.: max.: other:

Test object: ID: Length = unit = Width = unit = Height = unit = Initial zeroing: yes (Ready condition) no

Instrument

Disturbance				Indication							Comment
Reduction in amplitude* (as % of	Duration (in cycles)	Number of disturbances	Time between disturbances	L	W	H	SF > d	SF*	Result	
units							Y/N	Y/N	PASS/FAIL	-
0	0	0	-							
100	0.5	10	10 sec							
0	0	0	-							
50	1	10	10 sec							

Auxiliary device

Disturbance				Indication							Comment
Reduction in amplitude* (as % of	Duration (in cycles)	Number of disturbances	Time between disturbances	L	W	H	SF > d	SF*	Result	
units							Y/N	Y/N	PASS/FAIL	-
0	0	0	-							
100	0.5	10	10 sec							
0	0	0	-							
50	1	10	10 sec							

Notes: 1) SF* = Significant fault detected and acted upon.
2) amplitude* = In case a voltage range is marked, use the average value as the marked voltage.

Remarks:

RESULT: **PASS** **FAIL**

7.1 ELECTRICAL BURSTS (A.3.2), Power supply lines

Report No.:
Application No.:
Manufacturer:
Make & model:
Serial No.:
Date:
Observer(s):
Scale interval (d):
Conversion Factor (F):

	At start	At end	
Temp			°C
RH			%
Time			

TEST APPLICABLE (Y/N)?

Auxiliary device: Connected: Not present but connectable: No connection:

Correct indication of auxiliary device (Y/N)?:

Conveyor speed (m/min): min.: max.: other:

Test object: Length = Width = Height = Initial zeroing: yes
ID: unit = unit = unit = (Ready condition) no

Instrument

Connection			Polarity	Results						
L	N	PE		Indication						
				L	W	H	SF > d	SF*	Result	Comment
ground	ground	ground					Y/N	Y/N	PASS/FAIL	-
without disturbance										
X			pos							
			neg							
without disturbance										
	X		pos							
			neg							
without disturbance										
		X	pos							
			neg							

Note: SF* = Significant fault detected and acted upon.

Auxiliary device

Connection			Polarity	Results						
L	N	PE		Indication						
				L	W	H	SF > d	SF*	Result	Comment
ground	ground	ground					Y/N	Y/N	PASS/FAIL	-
without disturbance										
X			pos							
			neg							
without disturbance										
	X		pos							
			neg							
without disturbance										
		X	pos							
			neg							

Note: SF* = Significant fault detected and acted upon.
L = phase, N = Neutral, PE = Protective earth

Remarks:

RESULT: **PASS** **FAIL**

7.2 ELECTRICAL BURSTS (A.3.2), **Input / output circuits and communication lines**

Report No.: _____

Application No.: _____

Manufacturer: _____

Make & model: _____

Serial No.: _____

Date: _____

Observer(s): _____

Scale interval (d): _____

Conversion Factor (F): _____

	At start	At end	
Temp			°C
RH			%
Time			

TEST APPLICABLE (Y/N)? ____

Auxiliary device: Connected: ____ Not present but connectable: ____ No connection: ____

Correct indication of auxiliary device (Y/N)?: ____

Conveyor speed (m/min): min.: ____ max.: ____ other: ____

Test object: Length = ____ Width = ____ Height = ____ Initial zeroing: ____ yes

ID: ____ unit = ____ unit = ____ unit = ____ (Ready condition) ____ no

Connection	Polarity	Results						
		Indication						
Cable / Interface		**L**	**W**	**H**	**SF > d**	**SF***	**Result**	**Comment**
					Y/N	Y/N	PASS/FAIL	-
without disturbance								
	pos							
	neg							
without disturbance								
	pos							
	neg							
without disturbance								
	pos							
	neg							
without disturbance								
	pos							
	neg							
without disturbance								
	pos							
	neg							
without disturbance								
	pos							
	neg							

Note: SF* = Significant fault detected and acted upon.

Remarks:

(Explain or make a sketch indicating where the clamp is located on the cable.)

RESULT: **PASS** ____ **FAIL** ____

8.1 ELECTROSTATIC DISCHARGE TEST, Direct application (A.3.3)

Report No.:
Application No.:
Manufacturer:
Make & model:
Serial No.:
Date:
Observer(s):
Scale interval (d):
Conversion Factor (F):

	At start	At end	
Temp			°C
RH			%
Time			

TEST APPLICABLE (Y/N)?

Auxiliary device: Connected: Not present but connectable: No connection:

Correct indication of auxiliary device (Y/N)?:

Conveyor speed (m/min): min.: max.: other:

Contact discharges: Air discharges: Paint penetration:

Polarity (**): positive negative

Test object: Length = Width = Height = Initial zeroing: yes
ID: unit = unit = unit = (Ready condition) no

Instrument

Disturbance			Results						
Test voltage (kV)	No. of discharges	Rep. int. (sec)	**Indication** L	W	H	**SF > d**	**SF***	**Result**	**Comment**
						Y/N	Y/N	PASS/FAIL	-
without disturbance									
2									
4									
6									
*8									

Note: SF* = Significant fault detected and acted upon.

Auxiliary device

Disturbance			Results						
Test voltage (kV)	No. of discharges	Rep. int. (sec)	**Indication** L	W	H	**SF > d**	**SF***	**Result**	**Comment**
						Y/N	Y/N	PASS/FAIL	-
without disturbance									
2									
4									
6									
*8									

Note: SF* = Significant fault detected and acted upon.

Remarks:

Notes: 1) * = air discharges. **RESULT:** **PASS** **FAIL**
2) If the EUT fails, record the test point(s) at which this occurs.
3) ** = Test shall be conducted at the most sensitive polarity.

8.2 ELECTROSTATIC DISCHARGE TEST, Indirect application (A.3.3)

Report No.:
Application No.:
Manufacturer:
Make & model:
Serial No.:
Location:
Date:
Observer(s):
Scale interval (d):
Conversion Factor (F):

	At start	At end	
Temp			°C
RH			%
Time			

TEST APPLICABLE (Y/N)?

Auxiliary device: Connected: Not present but connectable: No connection:
Correct indication of auxiliary device (Y/N)?:
Conveyor speed (m/min): min.: max.: other:

Contact discharges: Air discharges: Paint penetration:

Polarity (**): positive negative

Test object: Length = Width = Height = Initial zeroing: yes
ID: unit = unit = unit = (Ready condition) no

Horizontal coupling plane

Disturbance			Results						
Test voltage (kV)	No. of discharges	Rep. int. (sec)	**Indication** L	W	H	SF > d	SF*	Result	Comment
						Y/N	Y/N	PASS/FAIL	-
without disturbance									
2									
4									
6									
*8									

Note: SF* = Significant fault detected and acted upon.

Vertical coupling plane

Disturbance			Results						
Test voltage (kV)	No. of discharges	Rep. int. (sec)	**Indication** L	W	H	SF > d	SF*	Result	Comment
						Y/N	Y/N	PASS/FAIL	-
without disturbance									
2									
4									
6									
*8									

Note: SF* = Significant fault detected and acted upon.

Remarks:

Notes: 1) *8 = air discharges. **RESULT:** **PASS** **FAIL**
2) If the EUT fails, record the test point(s) at which this occurs.
3) ** = Test shall be conducted at the most sensitive polarity.

8.3 ELECTROSTATIC DISCHARGE TEST (A.3.3)

Specifications of test points of EUT (direct application), e.g. by photos or sketches

a) Direct application

Contact discharges:

Air discharges:

b) Indirect application

Contact discharges:

Air discharges:

9 ELECTROMAGNETIC SUSCEPTIBILITY TEST (A.3.4)

Report No.:
Application No.:
Manufacturer:
Make & model:
Serial No.:
Date:
Observer(s):
Scale interval (d):
Conversion Factor (F):

	At start	At end	
Temp			°C
RH			%
Time			

TEST APPLICABLE (Y/N)?

Auxiliary device: Connected: Not present but connectable: No connection:

Correct indication of auxiliary device (Y/N)?:

Conveyor speed (m/min): min.: max.: other:

Rate of sweep:

Test object: Length = Width = Height = Initial zeroing: yes
ID: unit = unit = unit = (Ready condition) no

Disturbance				Results						
				Indication						
Antenna	Freq. range	Polar.	Facing EUT	**L**	**W**	**H**	**SF > d**	**SF***	**Result**	**Comment**
							Y/N	Y/N	PASS/FAIL	-
without disturbance										
		Vertical	front							
			right							
			left							
			rear							
without disturbance										
		Horiz.	front							
			right							
			left							
			rear							

Note: SF* = Significant fault detected and acted upon at frequency:

Frequency range: 26 MHz -1 000 MHz
Field strength: 3 V/m
Modulation: 80 % AM, 1 KHz sine wave

Remarks:

RESULT: **PASS** **FAIL**

Note: If the EUT fails, record the frequency(s) at which this occurs.

9 ELECTROMAGNETIC SUSCEPTIBILITY TEST (A.3.4), cont.

Description of the setup of the EUT, e.g. by photos, sketches, etc.:

10.1 AMBIENT LIGHT TEST, 200 lx to 500 lx (reference) (A.4.1)

Report No.: ______________________

Application No.: ______________________

Manufacturer: ______________________

Make & model: ______________________

Serial No.: ______________________

Date: ______________________

Observer(s): ______________________

Scale interval (d): ______________

Conversion Factor (F): ______________

	At start	At end	
Temp			°C
RH			%
Light			lx
Time			

TEST APPLICABLE (Y/N)? [ ]

Auxiliary device: Connected: [ ] Not present but connectable: [ ] No connection: [ ]

Correct indication of auxiliary device (Y/N)?: [ ]

Conveyor speed (m/min): min.: [ ] max.: [ ] other: [ ]

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: [ ] yes (Ready condition) [ ] no

RUN	L	DL	W	DW	H	DH	MPE	PASS /
units								**FAIL**
1								
2								
3								

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: [ ] yes (Ready condition) [ ] no

RUN	L	DL	W	DW	H	DH	MPE	PASS /
units								**FAIL**
1								
2								
3								

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: [ ] yes (Ready condition) [ ] no

RUN	L	DL	W	DW	H	DH	MPE	PASS /
units								**FAIL**
1								
2								
3								

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: [ ] yes (Ready condition) [ ] no

RUN	L	DL	W	DW	H	DH	MPE	PASS /
units								**FAIL**
1								
2								
3								

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: [ ] yes (Ready condition) [ ] no

RUN	L	DL	W	DW	H	DH	MPE	PASS /
units								**FAIL**
1								
2								
3								

Remarks:

____

____

____

RESULT: PASS [ ] **FAIL** [ ]

10.2 AMBIENT LIGHT TEST, 100 lx (A.4.1)

Report No.: ______________
Application No.: ______________
Manufacturer: ______________
Make & model: ______________
Serial No.: ______________
Date: ______________
Observer(s): ______________
Scale interval (d): ______________
Conversion Factor (F): ______________

	At start	At end	
Temp			°C
RH			%
Light			lx
Time			

TEST APPLICABLE (Y/N)? [ ]

Auxiliary device: Connected: [ ] Not present but connectable: [ ] No connection: [ ]

Correct indication of auxiliary device (Y/N)?: [ ]

Conveyor speed (m/min): min.: [ ] max.: [ ] other: [ ]

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: [ ] yes (Ready condition) [ ] no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: [ ] yes (Ready condition) [ ] no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: [ ] yes (Ready condition) [ ] no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: [ ] yes (Ready condition) [ ] no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: [ ] yes (Ready condition) [ ] no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

Remarks:

____
____
____

RESULT: PASS [ ]   **FAIL** [ ]

10.3 AMBIENT LIGHT TEST, 1 000 lx to 1 500 lx (A.4.1)

Report No.: ______
Application No.: ______
Manufacturer: ______
Make & model: ______
Serial No.: ______
Date: ______
Observer(s): ______
Scale interval (d): ______
Conversion Factor (F): ______

	At start	At end	
Temp			°C
RH			%
Light			lx
Time			

TEST APPLICABLE (Y/N)? ☐

Auxiliary device: Connected: ☐ Not present but connectable: ☐ No connection: ☐

Correct indication of auxiliary device (Y/N)?: ☐

Conveyor speed (m/min): min.: ☐ max.: ☐ other: ☐

ID: ☐ Length = ☐ unit = ☐ Width = ☐ unit = ☐ Height = ☐ unit = ☐ Initial zeroing: ☐ yes (Ready condition) ☐ no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

ID: ☐ Length = ☐ unit = ☐ Width = ☐ unit = ☐ Height = ☐ unit = ☐ Initial zeroing: ☐ yes (Ready condition) ☐ no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

ID: ☐ Length = ☐ unit = ☐ Width = ☐ unit = ☐ Height = ☐ unit = ☐ Initial zeroing: ☐ yes (Ready condition) ☐ no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

ID: ☐ Length = ☐ unit = ☐ Width = ☐ unit = ☐ Height = ☐ unit = ☐ Initial zeroing: ☐ yes (Ready condition) ☐ no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

ID: ☐ Length = ☐ unit = ☐ Width = ☐ unit = ☐ Height = ☐ unit = ☐ Initial zeroing: ☐ yes (Ready condition) ☐ no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

Remarks:

______
______
______

RESULT: PASS ☐ **FAIL** ☐

10.4 AMBIENT LIGHT TEST, ……….. lx (A.4.1)

Report No.: ______________
Application No.: ______________
Manufacturer: ______________
Make & model: ______________
Serial No.: ______________
Date: ______________
Observer(s): ______________
Scale interval (d): ______________
Conversion Factor (F): ______________

	At start	At end	
Temp			°C
RH			%
Light			lx
Time			

TEST APPLICABLE (Y/N)? [ ]

Auxiliary device: Connected: [ ] Not present but connectable: [ ] No connection: [ ]

Correct indication of auxiliary device (Y/N)?: [ ]

Conveyor speed (m/min): min.: [ ] max.: [ ] other: [ ]

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

Remarks:

RESULT: PASS [ ] **FAIL** [ ]

10.5 AMBIENT LIGHT TEST (A.4.1)

Description of the setup of the EUT, e.g. by photos, sketches, etc.:

11.1 ACOUSTIC TEST, Reference sound level (A.4.2)

Report No.: ____________________
Application No.: ____________________
Manufacturer: ____________________
Make & model: ____________________
Serial No.: ____________________
Date: ____________________
Observer(s): ____________________
Scale interval (d): ____________________
Conversion Factor (F): ____________________

	At start	At end	
Temp			°C
RH			%
Sound			dB
Time			

TEST APPLICABLE (Y/N)? [ ]

Auxiliary device: Connected: [ ] Not present but connectable: [ ] No connection: [ ]

Correct indication of auxiliary device (Y/N)?: [ ]

Conveyor speed (m/min): min.: [ ] max.: [ ] other: [ ]

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

Remarks:

RESULT: PASS [ ] **FAIL** [ ]

11.2 ACOUSTIC TEST, 100 dB sound level (A.4.2)

Report No.: ______________
Application No.: ______________
Manufacturer: ______________
Make & model: ______________
Serial No.: ______________
Date: ______________
Observer(s): ______________
Scale interval (d): ______________
Conversion Factor (F): ______________

	At start	At end	
Temp			°C
RH			%
Sound			dB
Time			

TEST APPLICABLE (Y/N)? [ ]

Auxiliary device: Connected: [ ] Not present but connectable: [ ] No connection: [ ]

Correct indication of auxiliary device (Y/N)?: [ ] Test frequency: [ ] Hz

Conveyor speed (m/min): min.: [ ] max.: [ ] other: [ ]

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

Remarks:

RESULT: PASS [ ] **FAIL** [ ]

11.3 ACOUSTIC TEST (A.4.2)

Description of the setup of the EUT, e.g. by photos, sketches, etc.:

12 SHAPE OF OBJECT TEST (A.1.5, 11.1.4.5, B.2)

Report No.:
Application No.:
Manufacturer:
Make & model:
Serial No.:
Date:
Observer(s):
Scale interval (d):
Conversion Factor (F):

	At start	At end	
Temp			°C
RH			%
Time			

TEST APPLICABLE (Y/N)?

Auxiliary device: Connected: Not present but connectable: No connection:

Correct indication of auxiliary device (Y/N)?:

Conveyor speed (m/min): min.: max.: other:

Length = unit = Width = unit = Height = unit = Initial zeroing: (Ready condition) yes no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

Description of 1st test object:

Length = unit = Width = unit = Height = unit = Initial zeroing: (Ready condition) yes no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

Description of 2nd test object:

Length = unit = Width = unit = Height = unit = Initial zeroing: (Ready condition) yes no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

Description of 3rd test object:

RESULT: PASS **FAIL**

12 SHAPE OF OBJECT TEST (A.1.5, 11.1.4.5, B.2), cont.

Include any remarks or further information required to describe the test objects (e.g. sketches or photographs), below:

13 UNIFORM SURFACE COLOR TEST (A.1.5, 11.1.4.9, B.3.1)

Report No.: _____
Application No.: _____
Manufacturer: _____
Make & model: _____
Serial No.: _____
Date: _____
Observer(s): _____
Scale interval (d): _____
Conversion Factor (F): _____

	At start	At end	
Temp			°C
RH			%
Time			

TEST APPLICABLE (Y/N)? ____

Auxiliary device: Connected: ____ Not present but connectable: ____ No connection: ____

Correct indication of auxiliary device (Y/N)?: ____

Conveyor speed (m/min): min.: ____ max.: ____ other: ____

Length = ____ unit = ____ Width = ____ unit = ____ Height = ____ unit = ____ Initial zeroing: ____ yes (Ready condition) ____ no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

Description of 1st test object:

Length = ____ unit = ____ Width = ____ unit = ____ Height = ____ unit = ____ Initial zeroing: ____ yes (Ready condition) ____ no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

Description of 2nd test object:

Length = ____ unit = ____ Width = ____ unit = ____ Height = ____ unit = ____ Initial zeroing: ____ yes (Ready condition) ____ no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

Description of 3rd test object:

RESULT: PASS ____ **FAIL** ____

13 UNIFORM SURFACE COLOR TEST (A.1.5, 11.1.4.9, B.3.1), cont.

Include any remarks or further information required to describe the test objects (e.g. sketches or photographs), below:

14 NON-UNIFORM SURFACE COLOR TEST (A.1.5, 11.1.4.9, B.3.2)

Report No.: _____
Application No.: _____
Manufacturer: _____
Make & model: _____
Serial No.: _____
Date: _____
Observer(s): _____
Scale interval (d): _____
Conversion Factor (F): _____

	At start	At end	
Temp			°C
RH			%
Time			

TEST APPLICABLE (Y/N)? ☐

Auxiliary device: Connected: ☐ Not present but connectable: ☐ No connection: ☐

Correct indication of auxiliary device (Y/N)?: ☐

Conveyor speed (m/min): min.: ☐ max.: ☐ other: ☐

Length = ☐ unit = ☐ Width = ☐ unit = ☐ Height = ☐ unit = ☐ Initial zeroing: ☐ yes (Ready condition) ☐ no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

Description of 1st test object: _____

Length = ☐ unit = ☐ Width = ☐ unit = ☐ Height = ☐ unit = ☐ Initial zeroing: ☐ yes (Ready condition) ☐ no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

Description of 2nd test object: _____

Length = ☐ unit = ☐ Width = ☐ unit = ☐ Height = ☐ unit = ☐ Initial zeroing: ☐ yes (Ready condition) ☐ no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

Description of 3rd test object: _____

RESULT: PASS ☐ **FAIL** ☐

14 NON-UNIFORM SURFACE COLOR TEST (A.1.5, 11.1.4.9, B.3.2), cont.

Include any remarks or further information required to describe the test objects (e.g. sketches or photographs), below:

15 CONTRAST OF COLOR WITH BACKGROUND COLOR TEST (A.1.5, 11.1.4.9, B.3.3)

Report No.: _____
Application No.: _____
Manufacturer: _____
Make & model: _____
Serial No.: _____
Date: _____
Observer(s): _____
Scale interval (d): _____
Conversion Factor (F): _____

	At start	At end	
Temp			°C
RH			%
Time			

TEST APPLICABLE (Y/N)? ☐

Auxiliary device: Connected: ☐ Not present but connectable: ☐ No connection: ☐

Correct indication of auxiliary device (Y/N)?: ☐

Conveyor speed (m/min): min.: ☐ max.: ☐ other: ☐

Length = ☐ unit = ☐ Width = ☐ unit = ☐ Height = ☐ unit = ☐ Initial zeroing: ☐ yes (Ready condition) ☐ no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

Description of 1st test object:

Length = ☐ unit = ☐ Width = ☐ unit = ☐ Height = ☐ unit = ☐ Initial zeroing: ☐ yes (Ready condition) ☐ no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

Description of 2nd test object:

Length = ☐ unit = ☐ Width = ☐ unit = ☐ Height = ☐ unit = ☐ Initial zeroing: ☐ yes (Ready condition) ☐ no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

Description of 3rd test object:

RESULT: PASS ☐ **FAIL** ☐

15 CONTRAST OF COLOR WITH BACKGROUND COLOR TEST (A.1.5, 11.1.4.9, B.3.3), cont.

Include any remarks or further information required to describe the test objects (e.g. sketches or photographs), below:

16 SURFACE REFLECTIVITY AND ABSORPTION OF SOUND TEST (A.1.5, 11.1.4.9, B.3.4)

Report No.: _____
Application No.: _____
Manufacturer: _____
Make & model: _____
Serial No.: _____
Date: _____
Observer(s): _____
Scale interval (d): _____
Conversion Factor (F): _____

	At start	At end	
Temp			°C
RH			%
Time			

TEST APPLICABLE (Y/N)? ____

Auxiliary device: Connected: ____ Not present but connectable: ____ No connection: ____

Correct indication of auxiliary device (Y/N)?: ____

Conveyor speed (m/min): min.: ____ max.: ____ other: ____

Length = ____ unit = ____ Width = ____ unit = ____ Height = ____ unit = ____ Initial zeroing: ____ yes (Ready condition) ____ no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

Description of 1st test object: _____

Length = ____ unit = ____ Width = ____ unit = ____ Height = ____ unit = ____ Initial zeroing: ____ yes (Ready condition) ____ no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

Description of 2nd test object: _____

Length = ____ unit = ____ Width = ____ unit = ____ Height = ____ unit = ____ Initial zeroing: ____ yes (Ready condition) ____ no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

Description of 3rd test object: _____

RESULT: PASS ____ **FAIL** ____

16 SURFACE REFLECTIVITY AND ABSORPTION OF SOUND TEST (A.1.5, 11.1.4.9, B.3.4), cont.

Include any remarks or further information required to describe the test objects (e.g. sketches or photographs), below:

17 SURFACE REFLECTIVITY AND ABSORPTION OF LIGHT TEST (A.1.5, 11.1.4.9, B.3.5)

Report No.: _____
Application No.: _____
Manufacturer: _____
Make & model: _____
Serial No.: _____
Date: _____
Observer(s): _____
Scale interval (d): _____
Conversion Factor (F): _____

	At start	At end	
Temp			°C
RH			%
Time			

TEST APPLICABLE (Y/N)? ☐

Auxiliary device: Connected: ☐ Not present but connectable: ☐ No connection: ☐

Correct indication of auxiliary device (Y/N)?: ☐

Conveyor speed (m/min): min.: ☐ max.: ☐ other: ☐

Length = ☐ unit = ☐ Width = ☐ unit = ☐ Height = ☐ unit = ☐ Initial zeroing: ☐ yes (Ready condition) ☐ no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

Description of 1st test object:

Length = ☐ unit = ☐ Width = ☐ unit = ☐ Height = ☐ unit = ☐ Initial zeroing: ☐ yes (Ready condition) ☐ no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

Description of 2nd test object:

Length = ☐ unit = ☐ Width = ☐ unit = ☐ Height = ☐ unit = ☐ Initial zeroing: ☐ yes (Ready condition) ☐ no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

Description of 3rd test object:

RESULT: PASS ☐ **FAIL** ☐

17 SURFACE REFLECTIVITY AND ABSORPTION OF LIGHT TEST (A.1.5, 11.1.4.9, B.3.5), cont.

Include any remarks or further information required to describe the test objects (e.g. sketches or photographs), below:

18 UNIFORMITY OF DENSITY TEST (A.1.5, 11.1.4.9, B.3.6)

Report No.: _____
Application No.: _____
Manufacturer: _____
Make & model: _____
Serial No.: _____
Date: _____
Observer(s): _____
Scale interval (d): _____
Conversion Factor (F): _____

	At start	At end	
Temp			°C
RH			%
Time			

TEST APPLICABLE (Y/N)? ____

Auxiliary device: Connected: ____ Not present but connectable: ____ No connection: ____

Correct indication of auxiliary device (Y/N)?: ____

Conveyor speed (m/min): min.: ____ max.: ____ other: ____

Length = ____ unit = ____ Width = ____ unit = ____ Height = ____ unit = ____ Initial zeroing: ____ yes (Ready condition) ____ no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

Description of 1st test object:

Length = ____ unit = ____ Width = ____ unit = ____ Height = ____ unit = ____ Initial zeroing: ____ yes (Ready condition) ____ no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

Description of 2nd test object:

Length = ____ unit = ____ Width = ____ unit = ____ Height = ____ unit = ____ Initial zeroing: ____ yes (Ready condition) ____ no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

Description of 3rd test object:

RESULT: PASS ____ **FAIL** ____

18 UNIFORMITY OF DENSITY TEST (A.1.5, 11.1.4.9, B.3.6), cont.

Include any remarks or further information required to describe the test objects (e.g. sketches or photographs), below:

19 TRANSPARENCY TEST (A.1.5, 11.1.4.9, B.3.7)

Report No.:
Application No.:
Manufacturer:
Make & model:
Serial No.:
Date:
Observer(s):
Scale interval (d):
Conversion Factor (F):

	At start	At end	
Temp			°C
RH			%
Time			

TEST APPLICABLE (Y/N)?

Auxiliary device: Connected: Not present but connectable: No connection:

Correct indication of auxiliary device (Y/N)?:

Conveyor speed (m/min): min.: max.: other:

Length = unit = Width = unit = Height = unit = Initial zeroing: (Ready condition) yes no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

Description of 1st test object:

Length = unit = Width = unit = Height = unit = Initial zeroing: (Ready condition) yes no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

Description of 2nd test object:

Length = unit = Width = unit = Height = unit = Initial zeroing: (Ready condition) yes no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

Description of 3rd test object:

RESULT: PASS **FAIL**

19 TRANSPARENCY TEST (A.1.5, 11.1.4.9, B.3.7), cont.

Include any remarks or further information required to describe the test objects (e.g. sketches or photographs), below:

20 SURFACE ROUGHNESS TEST (A.1.5, 11.1.4.9, B.3.8)

Report No.: _____
Application No.: _____
Manufacturer: _____
Make & model: _____
Serial No.: _____
Date: _____
Observer(s): _____
Scale interval (d): _____
Conversion Factor (F): _____

	At start	At end	
Temp			°C
RH			%
Time			

TEST APPLICABLE (Y/N)? ____

Auxiliary device: Connected: ____ Not present but connectable: ____ No connection: ____

Correct indication of auxiliary device (Y/N)?: ____

Conveyor speed (m/min): min.: ____ max.: ____ other: ____

Length = ____ unit = ____ Width = ____ unit = ____ Height = ____ unit = ____ Initial zeroing: ____ yes (Ready condition) ____ no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

Description of 1st test object: _____

Length = ____ unit = ____ Width = ____ unit = ____ Height = ____ unit = ____ Initial zeroing: ____ yes (Ready condition) ____ no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

Description of 2nd test object: _____

Length = ____ unit = ____ Width = ____ unit = ____ Height = ____ unit = ____ Initial zeroing: ____ yes (Ready condition) ____ no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

Description of 3rd test object: _____

RESULT: PASS ____ **FAIL** ____

20 SURFACE ROUGHNESS TEST (A.1.5, 11.1.4.9, B.3.8), cont.

Include any remarks or further information required to describe the test objects (e.g. sketches or photographs), below:

21 PROTRUSIONS ON THE SURFACE TEST (A.1.5, 11.1.4.9, B.3.9)

Report No.:
Application No.:
Manufacturer:
Make & model:
Serial No.:
Date:
Observer(s):
Scale interval (d):
Conversion Factor (F):

	At start	At end	
Temp			°C
RH			%
Time			

TEST APPLICABLE (Y/N)?

Auxiliary device: Connected: Not present but connectable: No connection:

Correct indication of auxiliary device (Y/N)?:

Conveyor speed (m/min): min.: max.: other:

Length = unit = Width = unit = Height = unit = Initial zeroing: (Ready condition) yes no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

Description of 1st test object:

Length = unit = Width = unit = Height = unit = Initial zeroing: (Ready condition) yes no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

Description of 2nd test object:

Length = unit = Width = unit = Height = unit = Initial zeroing: (Ready condition) yes no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

Description of 3rd test object:

RESULT: PASS **FAIL**

21 PROTRUSIONS ON THE SURFACE TEST (A.1.5, 11.1.4.9, B.3.9), cont.

Include any remarks or further information required to describe the test objects (e.g. sketches or photographs), below:

22 ORIENTATION AND POSITION TEST (A.1.5, 11.1.4.6, B.4)

Report No.: _____
Application No.: _____
Manufacturer: _____
Make & model: _____
Serial No.: _____
Date: _____
Observer(s): _____
Scale interval (d): _____
Conversion Factor (F): _____

	At start	At end	
Temp			°C
RH			%
Time			

TEST APPLICABLE (Y/N)? ____

Auxiliary device: Connected: ____ Not present but connectable: ____ No connection: ____

Correct indication of auxiliary device (Y/N)?: ____

Conveyor speed (m/min): min.: ____ max.: ____ other: ____

Length = ____ unit = ____ Width = ____ unit = ____ Height = ____ unit = ____ Initial zeroing: ____ yes (Ready condition) ____ no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

Description of 1st test object:

Length = ____ unit = ____ Width = ____ unit = ____ Height = ____ unit = ____ Initial zeroing: ____ yes (Ready condition) ____ no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

Description of 2nd test object:

Length = ____ unit = ____ Width = ____ unit = ____ Height = ____ unit = ____ Initial zeroing: ____ yes (Ready condition) ____ no

RUN	L	DL	W	DW	H	DH	MPE	PASS / FAIL
units								
1								
2								
3								

Description of 3rd test object:

RESULT: PASS ____ **FAIL** ____

22 ORIENTATION AND POSITION TEST (A.1.5, 11.1.4.6, B.4), cont.

Include any remarks or further information required to describe the orientation or position of the test objects (e.g. sketches or photographs), below:

23.1 TEST FOR MINIMUM SPEED OF RELATIVE MOVEMENT (A.1.5, 11.1.4.7)

Report No.: ____________

Application No.: ____________

Manufacturer: ____________

Make & model: ____________

Serial No.: ____________

Date: ____________

Observer(s): ____________

Scale interval (d): ____________

Conversion Factor (F): ____________

	At start	At end	
Temp			°C
RH			%
Time			

TEST APPLICABLE (Y/N)? [ ]

Auxiliary device: Connected: [ ] Not present but connectable: [ ] No connection: [ ]

Correct indication of auxiliary device (Y/N)?: [ ]

Conveyor speed (m/min): min.: [ ] max.: [ ] other: [ ]

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

Remarks:

____

____

____

RESULT: PASS [ ] **FAIL** [ ]

23.2 TEST FOR MAXIMUM SPEED OF RELATIVE MOVEMENT (A.1.5, 11.1.4.7)

Report No.: ____________
Application No.: ____________
Manufacturer: ____________
Make & model: ____________
Serial No.: ____________
Date: ____________
Observer(s): ____________
Scale interval (d): ____________
Conversion Factor (F): ____________

	At start	At end	
Temp			°C
RH			%
Time			

TEST APPLICABLE (Y/N)? [ ]

Auxiliary device: Connected: [ ] Not present but connectable: [ ] No connection: [ ]

Correct indication of auxiliary device (Y/N)?: [ ]

Conveyor speed (m/min): min.: [ ] max.: [ ] other: [ ]

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

ID: [ ] Length = [ ] unit = [ ] Width = [ ] unit = [ ] Height = [ ] unit = [ ] Initial zeroing: (Ready condition) [ ] yes [ ] no

RUN	L	DL	W	DW	H	DH	MPE	V	Vcalc	DW	DWcalc	PASS / FAIL
units												
1												
2												
3												

Remarks:

____

RESULT: PASS [ ] **FAIL** [ ]

24 EXAMINATION OF THE CONSTRUCTION OF THE INSTRUMENT (6.2)

Use this page to indicate any description or information pertaining to the instrument, additional to that already contained in this report and in the accompanying certificate of approval or OIML certificate of conformity. This may include a picture of the complete instrument, a description of its main components, and any remark which could be useful for initial or subsequent verifications of individual instruments built according to the pattern. It may also include references to the manufacturer's description.

Description:

RESULT : PASS ☐ **FAIL** ☐

25 CHECKLIST

Report No.: _____
Application No.: _____
Manufacturer: _____
Make & model: _____
Serial No.: _____
Date: _____
Observer(s): _____

Requirement		PASSED	FAILED	Remarks
	Units of measurement			
3	Correct units and symbols used			
	Scale intervals, minimum dimension			
4.1	Correct minimum dimensions			
	Range of special temperature limits			
5.1	At least 30 °C			
	Fraudulent use			
6.1	Instrument shall not facilitate fraudulent use			
	Suitability of construction			
6.2	All controls, indicators, etc. are suitable			
	Suitability for verification			
6.3	Constructed so that test of performance requirements can be carried out			
	Test mode provided (only volume indicated in normal position)			
	Zero or ready adjustment			
6.4	Facilities for setting zero or ready condition			
	Can only be set with no object in the measurement area			
	Zero or ready condition indicated			
	Condition set automatically or inhibited if not set correctly			
	Tare device			
6.5 (a)	Only operates negatively with respect to the zero or ready condition			
6.5 (b)	Value of the tare scale interval is the same as that for the respective axis and range			
6.5 (c)	Operation of tare indicated			
	Indicators and printing devices			
7.1 (a)	Instrument has at least one indicator which displays dimensions or volume			
7.1 (b)	For direct sales to the public, indication available to customer			
7.1 (c)	Indications automatically displayed or are readily available			
7.1 (d)	Other indications (e.g. DW, F) are automatically displayed or are readily available			
7.1 (e)	Previously displayed indication does not persist for longer than 1 second			
7.1 (f)	Display of extended indication device:	-	-	
	- while pressing a key; or			
	- limited to 5 seconds			
	No printing of extended indication			
	Extended indication device not fitted to instrument for direct sales to public			
7.1 (g)	All indications are identified (see 7.9)			

25 CHECKLIST, cont.

	Clarity of indications			
7.2	Indications, printing reliable clear and unambiguous, printing indelible			
	Figures easy to read			
	Digital indicator stable at changeover point			
	Digits orientated normally and permit reading by simple juxtaposition			
	Units of measurement			
7.3	All indications include the name/symbol of the unit of measurement			
	On tickets, name or symbol printed by printer or preprinted			
	For any one indication, only one unit of measurement used			
	Value of the scale interval			
7.4	Value of the scale interval in the form of 1, 2 or 5 x 10^n			
	The scale interval shall be:	-	-	
7.4 (a)	- the same for each axis; or			
7.4 (b)	- different for one axis from the other two provided instructions are marked, or indication of incorrect use given; or			
7.4 (c)	- variable, on one or more axes, provided:			
	- all three axes are multi-interval - all the same			
	- two axes are multi-interval and the third is fixed			
	- instrument limitations are clearly marked			
	- one axis is multi-interval and the others are fixed			
	- instrument limitations are clearly marked			
	Decimal numbers			
7.5	At least one zero before the decimal mark for values < 1			
	Decimal mark printed			
	One or more fixed zeros to right of variable numbers for values > 1			
	Printed numbers and symbols at least 2 mm high			
	Limits of indication			
7.6	Dimensions above maximum + 9 d either:	-	-	
7.6 (a)	- blank; or			
7.6 (b)	- be identified by an obvious difference in the display			
	Multi-interval instruments			
7.7	For each partial measuring range:	-	-	
	- $d_1 < d_2 \ldots < d_r$;			
	- min = min_1, max = max_r, max_1 = min_2, etc.			
	Multi-instrument systems			
7.8	Test indicator provided if indicator not near each device			
	Test indicator readily connected to each device without affecting the performance			
	Indications on common indicator and test indicator agree			
	Indication from each device clearly identified on the common indicator			

25 CHECKLIST, cont.

	Printed and displayed information			
7.9.1	Ticket or display includes sufficient information			
	Examples:	-	-	
7.9.1 (a)	- dimensions: length (L), width (W) and height (H)			
7.9.1 (b)	- volume (Vol)			
7.9.1 (c)	- weight (Wt)			
7.9.1 (d)	- dimensional weight (DW … kg)			
7.9.1 (e)	- dimensional tare (DT … kg)			
7.9.1 (f)	- conversion factor (F)			
7.9.1 (g)	- quantity for charging			
7.9.1 (h)	- price rate and price			
7.9.1 (i)	- date, transaction number, etc.			
Note 1	Icons used			
Note 2	Information displayed or available on demand			
Note 3	Price interval and price rate comply with national regulations			
7.9.2	A printed ticket contains printed or preprinted notices stating:	-	-	
7.9.2 (a)	- dimensions and/or volume are those of smallest rectangular box			
7.9.2 (b)	- dimensional weight is a calculated volume			
	Stability			
7.10	Printing or storage inhibited when equilibrium not stable			
	Markings			
8.1	Instrument clearly and permanently marked on nameplate in vicinity of indicating device			
8.1	Nameplate contains the following information:	-	-	
8.1 (a)	- manufacturer's name or mark			
8.1 (b)	- model designation			
8.1 (c)	- serial number and year of manufacture			
8.1 (d)	- pattern approval mark			
8.1 (e)	- minimum and maximum dimensions for each axis			
8.1 (f)	- maximum and minimum measuring speeds			
8.1 (g)	- scale interval(s) in the form of d =			
8.1 (h)	- temperature limits (if other than - 10 °C to + 40 °C)			
	Notices			
8.2	Notice(s) or limitation(s) of use clearly marked and visible to operator, or in operator's manual			
8.2 (a)	Special application			
8.2 (b)	Minimum spacing			
8.2 (c)	Measure only rectangular boxes			
8.2 (d)	Box location			
8.2 (e)	Limitations of surface characteristics			
8.2 (f)	Dimensions / volume are those of smallest rectangular box			
8.2 (g)	Dimensional weight a calculated value			
	Other special notices relating to the instrument			
	Verification mark			
9.1	Provision made for the application of a verification mark			
	The following requirements apply:	-	-	
9.1 (a)	mark easily affixed without affecting the metrological properties			
9.1 (b)	mark visible without moving or dismantling instrument when in use			
9.1 (c)	the part on which the mark is located is not removable from the instrument without damaging the mark			
9.1 (d)	the size of the space sufficient for a mark (e.g. at least 200 mm^2)			

25 CHECKLIST, cont.

	Sealing			
9.2	Provision made for sealing by mechanical or electronic means			
	Mechanical seal applied as in 9.1			
	For electronic seals:	-	-	
9.2 (a)	- access by authorised persons protected by physical key or password			
9.2 (b)	- access to alter protected parameters automatically recorded			
9.2 (c)	- record readily accessible by simple action			
9.2 (d)	- record readily identifiable			
9.2 (e)	- reference record permanently marked on the instrument			
9.2 (f)	- record does not repeat in a sequence of less than 999 alterations			
	- record persists reliably for a period of at least two years			
	- record persists through tests for influence factors and disturbances			
	Acting upon significant faults			
10.2	Instrument made automatically inoperative; or			
	Visible or audible indication until user takes action or fault disappears			
	Automatic instrument made inoperative automatically			
	Indication check			
10.3	Display check needed			
	Display check not needed			
	All elements of the indication are active and non-active long enough to be checked by the operator			
	Auxiliary devices interface			
10.4	Interface does not allow metrological functions to be affected by the operation of the auxiliary devices or connected instruments or disturbances acting on interface			
	Interface sealed if instructions or data affecting the measurement result can be introduced through the interface			
	Documentation			
11.1.1	Submission accompanied by sufficient documentation, to ensure complete understanding of the construction and method of operation of the instrument, including:			
	- drawings			
	- specifications			
	- photographs			
	- descriptions			
	Details of the measurement data contained in the memory and calculation methods provided			
	For electronic instruments, documentation includes:	-	-	
	- list of electronic sub-assemblies with their essential characteristics			
	- description of electronic devices with drawings diagrams and general software information explaining their construction and operation			

RESULT: **PASS** ☐

FAIL ☐

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References

References are given below to publications of the International Electrotechnical Commission (IEC) of which mention is made in some of the tests in Annex A. The GUM is also cited.

IEC 60068-2-1 (1990-05) Environmental testing - Part 2: Tests. Tests A: Cold. Section 3 - Test Ad: Cold for heat-dissipating specimen with gradual change of temperature. Also refer to amendments IEC 60068-2-1-am1 (1993-02) and IEC 60068-2-1-am2 (1994-06).

IEC 60068-2-2 (1974-01) Environmental testing - Part 2: Tests. Tests B: Dry heat. Section 4 - Test Bd: Dry heat for heat-dissipating specimen with gradual change of temperature. Also refer to amendments IEC 60068-2-2-am1 (1993-02) and IEC 60068-2-2-am2 (1994-05).

IEC 60068-2-3 (1969-01) Environmental testing - Part 2: Tests. Test Ca: Damp heat, steady state.

IEC 60068-2-28 (1990-03) Environmental testing - Part 2: Tests. Guidance for damp heat tests.

IEC 60068-2-56 (1988-12) Environmental testing - Part 2: Tests. Test Cb: Damp heat, steady state, primarily for equipment.

IEC 60068-3-1 (1974-01) Environmental testing - Part 3: Background information. Section 1 - Cold and dry heat tests. Also refer to first supplement IEC 60068-3-1A (1978-01).

IEC 61000-4-2 (1999-05) Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 2 - Electrostatic discharge immunity test.

IEC 61000-4-3 (1998-11) Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 3 - Radiated, radio-frequency, electromagnetic field immunity test.

IEC 61000-4-4 (1995-01) Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 4 - Electrical fast transient/burst immunity test.

IEC 61000-4-11 (1994-06) Electromagnetic compatibility (EMC). Part 4: Testing and measurement techniques. Section 11 - Voltage dips, short interruptions and voltage variations immunity tests.

Guide to the expression of uncertainty in measurement (GUM). BIPM, IEC, IFCC, ISO, IUPAC, IUPAP, OIML (ISO, 1993, corrected and reprinted 1995).

Notes