

General introduction to OIML R76

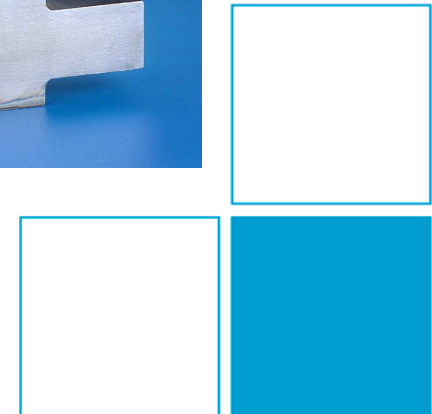
Oliver Mack



OIML Pilot Training Center

Beijing, China, 18-22 July 2016

国际法制计量组织培训中心（示范）





OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification



Organisation Internationale de Métrologie Légale

International Organization of Legal Metrology

Legal metrology...

... as part of the general metrology supplies legal regulations ...
... which make sure that every citizen may have confidence ...
... in supplied measuring results.

Examples:

Commerce and trade (e.g. weighing instruments, petrol pumps)
Official measurements (e.g. radar speedometers)



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification



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“The mission of the OIML is to enable economies to put in place effective legal metrology infrastructures that are mutually compatible and internationally recognized, for all areas for which governments take responsibility, such as those which facilitate trade, establish mutual confidence and harmonize the level of consumer protection worldwide.”

[OIML B 15:2011](#)



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OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

The OIML is an intergovernmental treaty organization

- which develops model regulations, standards and related documents for use by legal metrology authorities and industry,
- provides mutual recognition systems which reduce trade barriers and costs in a global market,
- represents the interests of the legal metrology community within international organizations and forums concerned with metrology, standardization, testing, certification and accreditation,
- promotes and facilitates the exchange of knowledge and competencies within the legal metrology community worldwide,
- cooperates with other metrology bodies to raise awareness of the contribution that a sound legal metrology infrastructure can make to a modern economy.



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OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

The OIML issues several categories of publications:

- International [Recommendations](#), which are intended as model regulations for a number of categories of measuring instruments, and which OIML Member States are morally obliged to implement as far as possible;
- International [Documents](#), which are informative and are intended for guidance purposes;
- and other publications such as [Vocabularies](#), [Guides](#), [Basic Publications](#) and [Expert Reports](#).



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OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

In addition, the OIML has developed the following international certification systems:

- the [*OIML Basic Certificate System for Type Evaluation of Measuring Instruments*](#), in which participants use harmonized methods to assess and certify the conformity of types of measuring instruments with the requirements of OIML Recommendations, on a voluntary basis (40 types of measuring instruments)
- the *Framework for a [Mutual Acceptance Arrangement on OIML Type Evaluations \(MAA\)](#)*, in which participants declare that they intend to accept and utilize type evaluation reports from those participants that are entitled to issue OIML MAA Certificates. (2 types of measuring instruments)



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International Organization of Legal Metrology

OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

MAA Certificates vs. Basic Certificates

- OIML Basic Certificates are issued by Issuing Authorities that demonstrate compliance with ISO/IEC 17065 using the results of testing laboratories that comply with ISO/IEC 17025.
- Within the OIML MAA, confidence in test and examination results is reinforced by a formal and mandatory peer evaluation process. This process verifies the compliance of the Issuing Authorities and the testing laboratories with the respective Standards, and also the capability of the testing laboratories to perform the tests. To prove this compliance, the Issuing Authorities and the testing laboratories must be accredited for the field covered by the respective OIML Recommendations or undergo peer assessment.



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International Organization of Legal Metrology

OIML Member States (61)

<u>ALBANIA</u>	<u>ALGERIA</u>	<u>AUSTRALIA</u>	<u>AUSTRIA</u>	<u>BELARUS</u>
<u>BELGIUM</u>	<u>BRAZIL</u>	<u>BULGARIA</u>	<u>CAMEROON</u>	<u>CANADA</u>
<u>COLOMBIA</u>	<u>CROATIA</u>	<u>CUBA</u>	<u>CYPRUS</u>	<u>CZECH REPUBLIC</u>
<u>DENMARK</u>	<u>EGYPT</u>	<u>FINLAND</u>	<u>FRANCE</u>	<u>GERMANY</u>
<u>GREECE</u>	<u>HUNGARY</u>	<u>INDIA</u>	<u>INDONESIA</u>	<u>IRAN</u>
<u>IRELAND</u>	<u>ISRAEL</u>	<u>ITALY</u>	<u>JAPAN</u>	<u>KAZAKHSTAN</u>
<u>KENYA</u>	<u>KOREA (R.)</u>	<u>MACEDONIA (F.Y.R.)</u>		<u>MONACO</u>
<u>MOROCCO</u>	<u>NETHERLANDS</u>	<u>NEW ZEALAND</u>	<u>NORWAY</u>	<u>P.R. CHINA</u>
<u>PAKISTAN</u>	<u>POLAND</u>	<u>PORTUGAL</u>	<u>ROMANIA</u>	
<u>RUSSIAN FEDERATION</u>		<u>SAUDI ARABIA</u>	<u>SERBIA</u>	<u>SLOVAKIA</u>
<u>SLOVENIA</u>	<u>SOUTH AFRICA</u>	<u>SPAIN</u>	<u>SRI LANKA</u>	<u>SWEDEN</u>
<u>SWITZERLAND</u>	<u>TANZANIA</u>	<u>THAILAND</u>	<u>TUNISIA</u>	<u>TURKEY</u>
<u>UNITED KINGDOM</u>		<u>UNITED STATES</u>	<u>VIET NAM</u>	<u>ZAMBIA</u>



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OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Most import types of measuring instruments:

- Non automatic weighing instruments (R76)
- Automatic weighing (R50, R51, R61, R106, R107)
- Load cells (R60)
- Petrol pumps (R117/R118)
- Gas meters (R31)



Initial Verification



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[illegible]



Scope of the OIML R76



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Essential parts of OIML R76:

1. R76-1:

- Terminology (definitions)
- Metrological requirements (e.g. permissible errors)
- Technical requirements (e.g. zero setting-, tare devices)
- Administrative requirements (e.g. markings)
- Metrological control (e.g. initial verification)
- Annexes (e.g. test procedures and modules)

2. R76-2:

- Forms for OIML test report
- Checklist

INTERNATIONAL
RECOMMENDATION

OIML R 76-1
Edition 2006 (E)

Non-automatic weighing instruments

Part 1: Metrological and technical requirements - Tests

Instruments de pesage à fonctionnement non automatique

Partie 1: Exigences métrologiques et techniques - Essais



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Goal



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

- International harmonization of metrological and technical requirements on NAWIs
- International harmonization of test procedure and test reports
- Reduction of technical trade barriers by mutual acceptance of OIML certificates and OIML test reports

In Europe:

- European Norm EN 45501, nearly identical to OIML R76
- Since 1993 only European type approvals of NAWIs on basis of EN 45501 / OIML R76 (Directive 2014/31/EU)

INTERNATIONAL
RECOMMENDATION

OIML R 76-1

Edition 2006 (E)

Non-automatic weighing instruments

Part 1: Metrological and technical requirements - Tests

Instruments de pesage à fonctionnement non automatique

Partie 1: Exigences métrologiques et techniques - Essais



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OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Definition of a weighing instrument:

(OIML R76, T.1.1)

Measuring instrument that serves to determine the mass of a body by using the action of gravity on this body.

The instrument may also be used to determine other quantities, magnitudes, parameters or characteristics related to the determined mass.

According to its method of operation, a weighing instrument is classified as an automatic weighing instrument or a non-automatic weighing instrument.



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Definition of a non automatic weighing instrument:

(OIML R76. No. 1.2)

Instrument that requires the (intelligent) intervention of an operator during the weighing process to decide that the weighing result is acceptable.

- Examples: Checking of zero and setting to zero, if necessary, operate tare, enter preset tare, correct positioning of the load onto the load receptor
- A non automatic weighing instruments is always equipped with an indicating device for immediate reading of the weighing results
- A printer is not a substitute to an indicating device and is not mandatory (except for some instruments for direct sales to the public)



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Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Definition of an automatic weighing instrument:

(e.g. OIML R50, R51, R61, R106, R107, R134)

Instrument that weighs and follows a pre-determined program of automatic processes characteristic of the instrument without the intervention of an operator.

- Remark: Automatic weighing instruments may either work statically (load in rest) or dynamically (load moving).
Differentiating into statical and dynamical may not be mixed up with differentiating into non automatic and automatic.
- During operation an automatic instrument does not need an indicating device in all cases (yet required for testing puposes and as per MID). However, in some cases instruments dispose of a printer (e.g. price labeller).



Types of weighing instruments



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

- **Graduated instruments** (OIML R76, No.1.2.1)
Instrument allowing the direct reading of the complete or partial weighing result.
- **Non-graduated instrument** (OIML R76, No. T.1.2.2)
Instrument not fitted with a scale numbered in units of mass.
- **Self-indicating instrument** (OIML R76, No. T.1.2.3)
Instrument in which the position of equilibrium is obtained without the intervention of an operator.
- **Semi-self-indicating instrument** (OIML R76, No. T.1.2.4)
Instrument with a self-indicating weighing range, in which the operator intervenes to alter the limits of this range.
- **Non-self-indicating instrument** (OIML R76, No. T.1.2.5)
Instrument in which the position of equilibrium is obtained entirely by the operator.
- **Electronic instrument** (OIML-R76, No. T.1.2.6)
Instrument equipped with electronic devices.



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Types of weighing instruments



- **Instrument with price scales** (OIML R76, No. T.1.2.7)
Instrument that indicates the price to pay by means of price charts or scales related to a range of unit prices.
- **Price-computing instrument** (OIML R76, No. T.1.2.8)
Instrument that calculates the price to pay on the basis of the indicated weight value and the unit price.
- **Price-labeling instrument** (OIML R76, No. T.1.2.9)
Price-computing instrument that prints the weight value, unit price and price to pay for prepackages.
- **Self-service instrument** (OIML R76, No. T.1.2.10)
Instrument that is intended to be operated by the customer.
- **Mobile instrument** (OIML R76, No. T.1.2.11)
Non-automatic weighing instrument mounted on or incorporated into a vehicle (E.g. Garbage weighers, pallet lifters, fork lifters, wheel chair weighers)
- **Portable instrument for weighing road vehicles** (OIML R76, No. T.1.2.12)
Non-automatic weighing instrument which is designed to be moved to other locations.



Types of weighing instruments



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

With NAWIs subject to legal control there are four accuracy classes:
(OIML R76, No. 3.1)

- Class I: Special accuracy scales
- Class II: High accuracy scales
- Class III: Medium accuracy scales
- Class IIII: Ordinary accuracy scales



Types of weighing instruments



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

There is a broad spectrum of different NAWI types, e.g.:
(accuracy classes in parentheses)

- Analysis and laboratory scales (I & II)
- Counter scales and price labellers (III)
- Platform scales for trade and industry
(most of class III, sometimes class II)
- Hopper weighers (III)
- Scales for hanging loads, e.g. crane scales
and overhead track scales (III)



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Additional examples:

- Weighing instruments for determination of mass for the calculation of a transport tariff, e.g. letter scales and baggage scales (III)
- Weighing instruments for road and track vehicles (III)
- Mobile instruments, e.g. pallet weighers and hand pallet trucks (III)
- Scales for medical purposes, e.g. bed and chair scales, baby scales (III)
- Ordinary weighing instruments, e.g. for construction material and scales for weighing garbage (III)
- Scales for determining the axle loads of road vehicles (wheel load weigher, III)

OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

History of weighing instruments



1866 Sliding weight scale



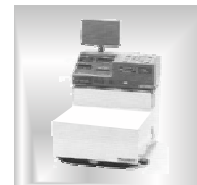
1924 Gradient switch weight scale



1951 First optical price indicative scale OP



1965 First electrical retail scale with ticket printer OP-e



1974 First electronic retail scale E 2000



1981 First compact electronic retail scale CD 8600



1983 First self-service scale CD-E 8500



1986 First systemscale Alphamatic CD-A-S Profitronic (SB)



1988 Multimaster-system CD 8800



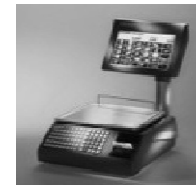
1992 Profibus and Ethernet scales SW



1998 Ethernet and wireless scales SC



1999 First PC-based scale with OS Windows CE SC-CE



2002 PC-based systemscale CE



2007 Double screen and camera scales CE-2S and CE-V



2009 First PC-scale with Atom-CPU 1,6GHz KH



2010 K-flex



2010 Open Systems with ARTS



2011 SC II mit 7 Zoll



2011 First Counter with integrated scale / scales pad



2013 Refresh of the most popular retail scale: the new K-Class



2013 New Generation of PC scales: the new X-Class

© Bizerba

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Scope of
OIML R76

Principle
Design

Characteristics

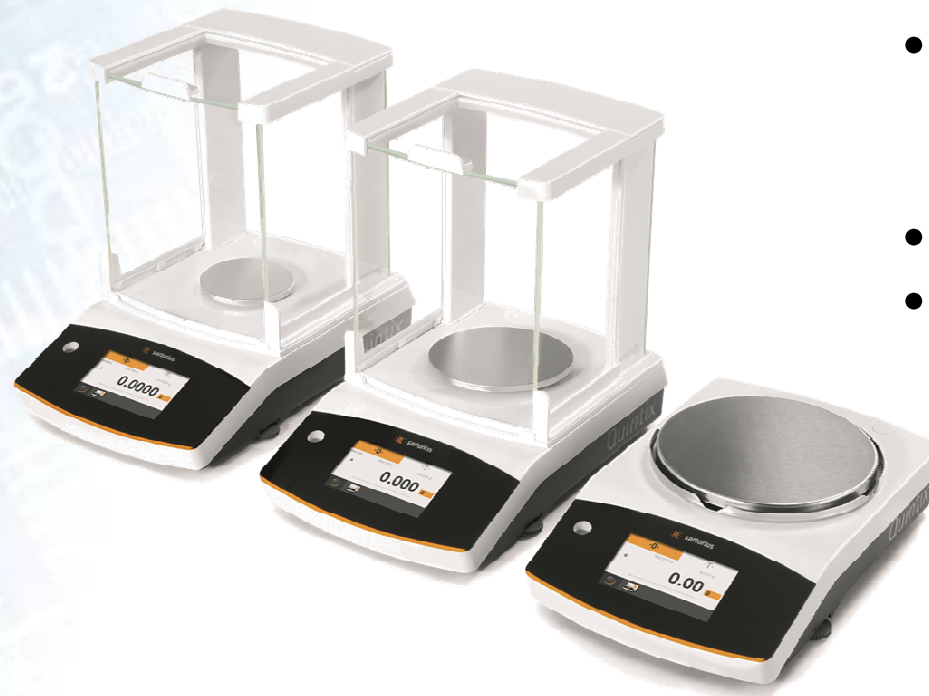
Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Analysis and laboratory scales



© Sartorius AG, Göttingen

Quintix®

- isoCAL automatic internal adjustment feature
- PC-Direct feature
- Intuitive operation

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Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Medical scales



© Seca GmbH & Co. KG, Hamburg

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Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Crane scales



© Kern & Sohn GmbH, Balingen

KERN HTS 10T5IP
Load capacity: up to 10 tonnes



EHP-Digital-Kranwaage KGY 30
Load capacity: up to 30 tonnes

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Scope of
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Principle
Design

Characteristics

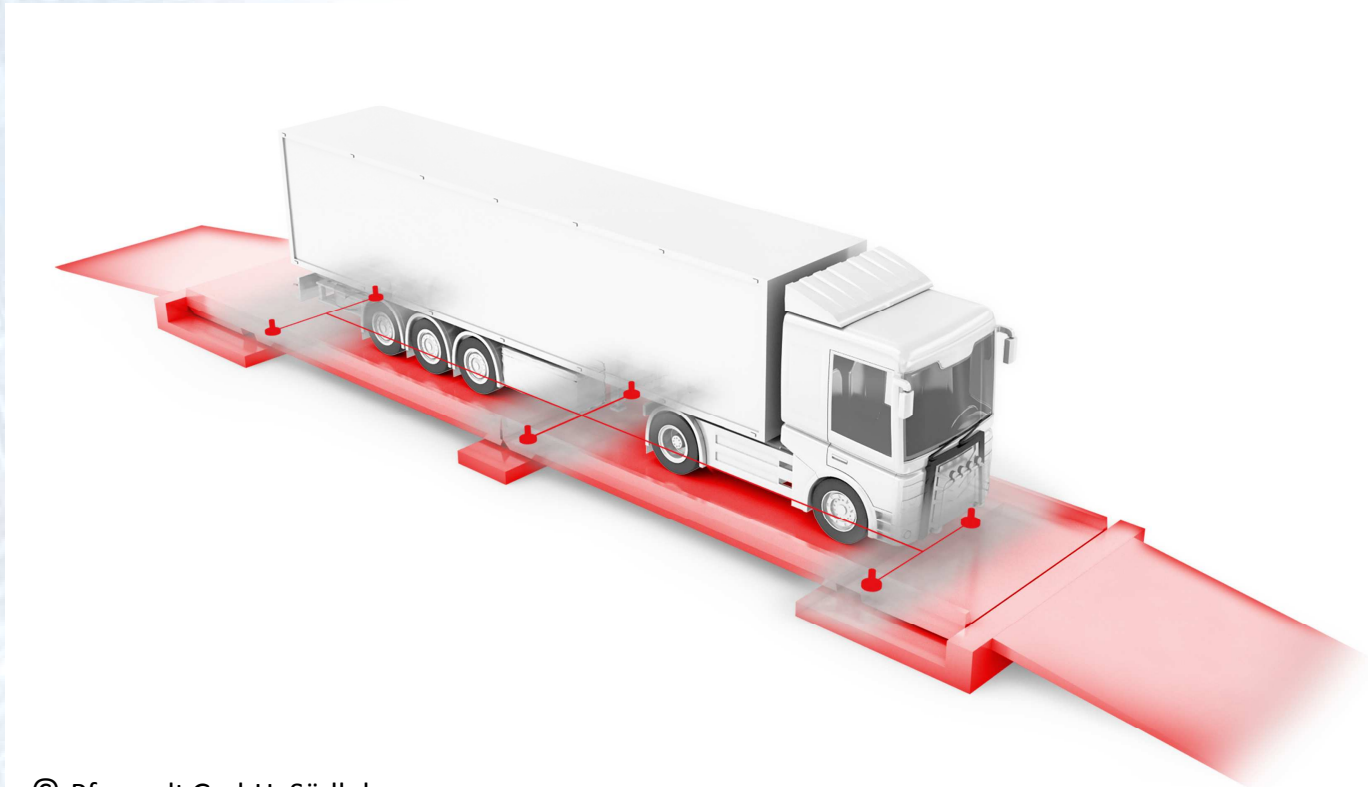
Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Weighbridge for road vehicles



© Pfreundt GmbH, Südlohn

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Scope of
OIML R76

Principle
Design

Characteristics

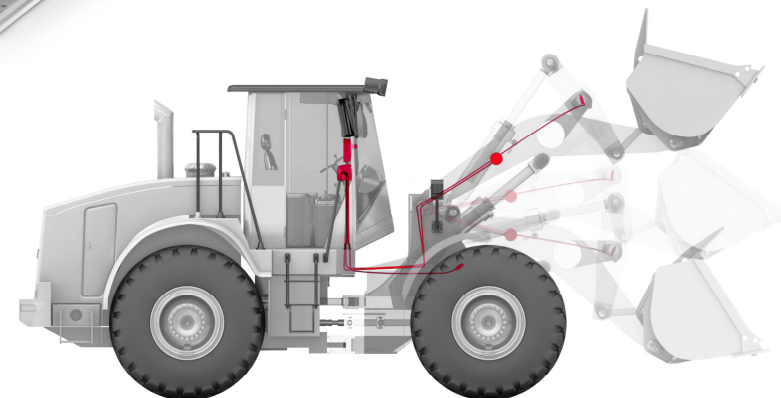
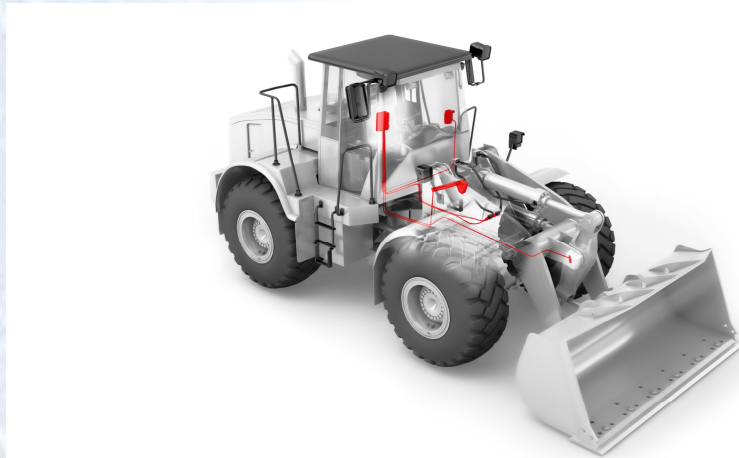
Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Front-end loader equipped with integrated weighing system



© Pfreundt GmbH, Südlohn

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Scope of
OIML R76

Principle
Design

Characteristics

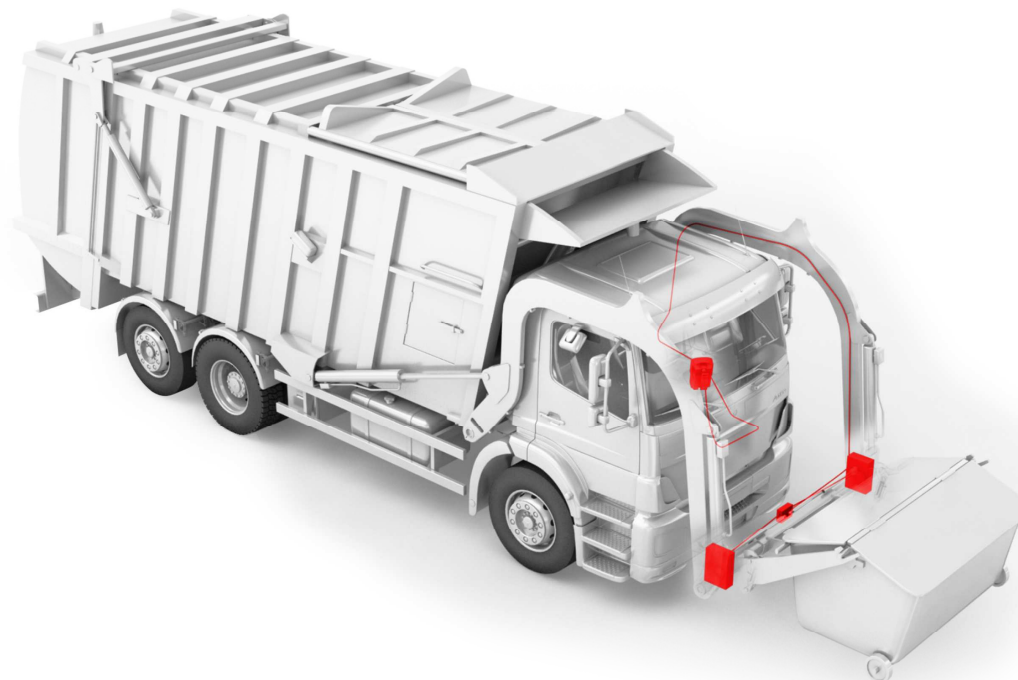
Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Front loader garbage collection truck with integrated weighing system



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Scope of
OIML R76

Principle
Design

Characteristics

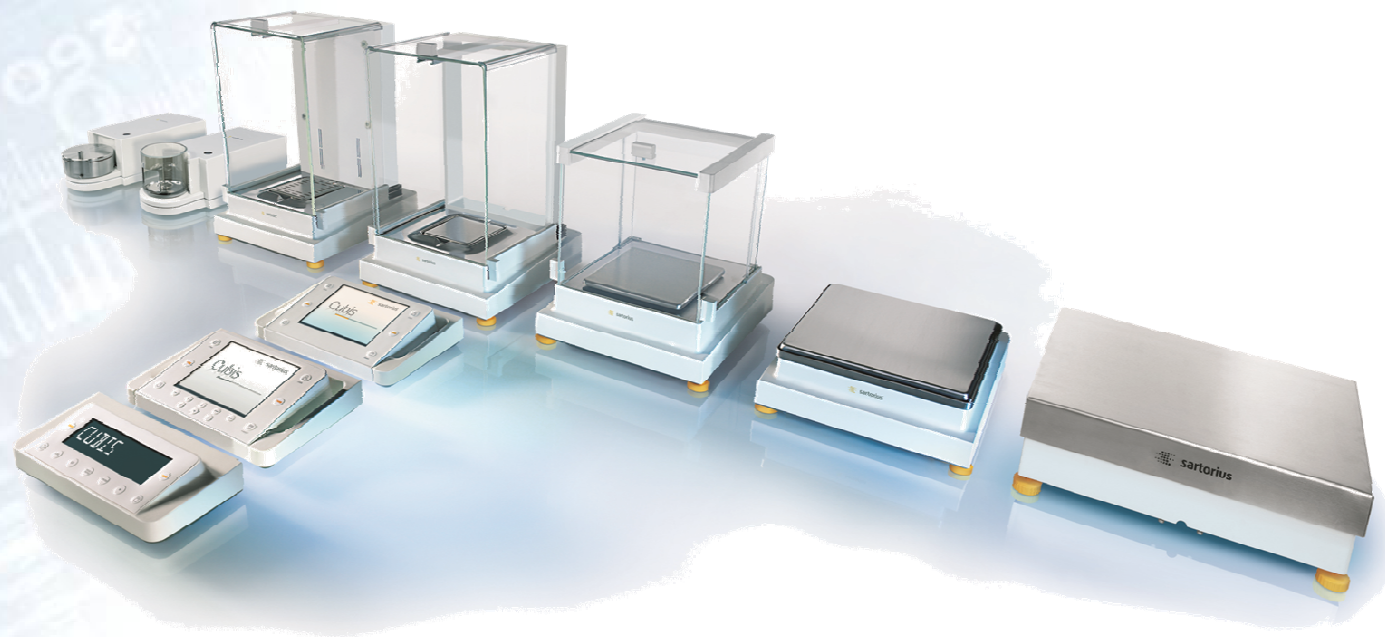
Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Modular design platform scales for trade and industry



© Sartorius AG, Göttingen



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Zero-setting device

(OIML R76, No. T.2.7.2)

Device for setting the indication to zero when there is no load on the load receptor.

- Non-automatic zero-setting device (OIML R76, No. T.2.7.2.1)
→ Device for setting the indication to zero by an operator.
- Semi-automatic zero-setting device (OIML R76, No. T.2.7.2.2)
→ Device for setting the indication to zero automatically following a manual command.
- Automatic zero-setting device (OIML R76, No. T.2.7.2.3)
→ Device for setting the indication to zero automatically without the intervention of an operator.
- Initial zero-setting device (OIML R76, No. T.2.7.2.4)
→ Device for setting the indication to zero automatically at the time the instrument is switched on and before it is ready for use.
- Zero-tracking device (OIML R76, No. T.2.7.3)
→ Device for maintaining the zero indication within certain limits automatically.



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Tare device

(OIML R76, No. T.2.7.4)

Device for setting the indication to zero when a load is on the load receptor:

Additive tare device:

without altering the weighing range for net loads

Subtractive tare device:

reducing the weighing range for net loads.

It may function as:

- A non-automatic tare device
 - Load balanced by an operator
- A semi-automatic tare device
 - Load balanced automatically following a single manual command
- An automatic tare device
 - Load balanced automatically without the intervention of an operator

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Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

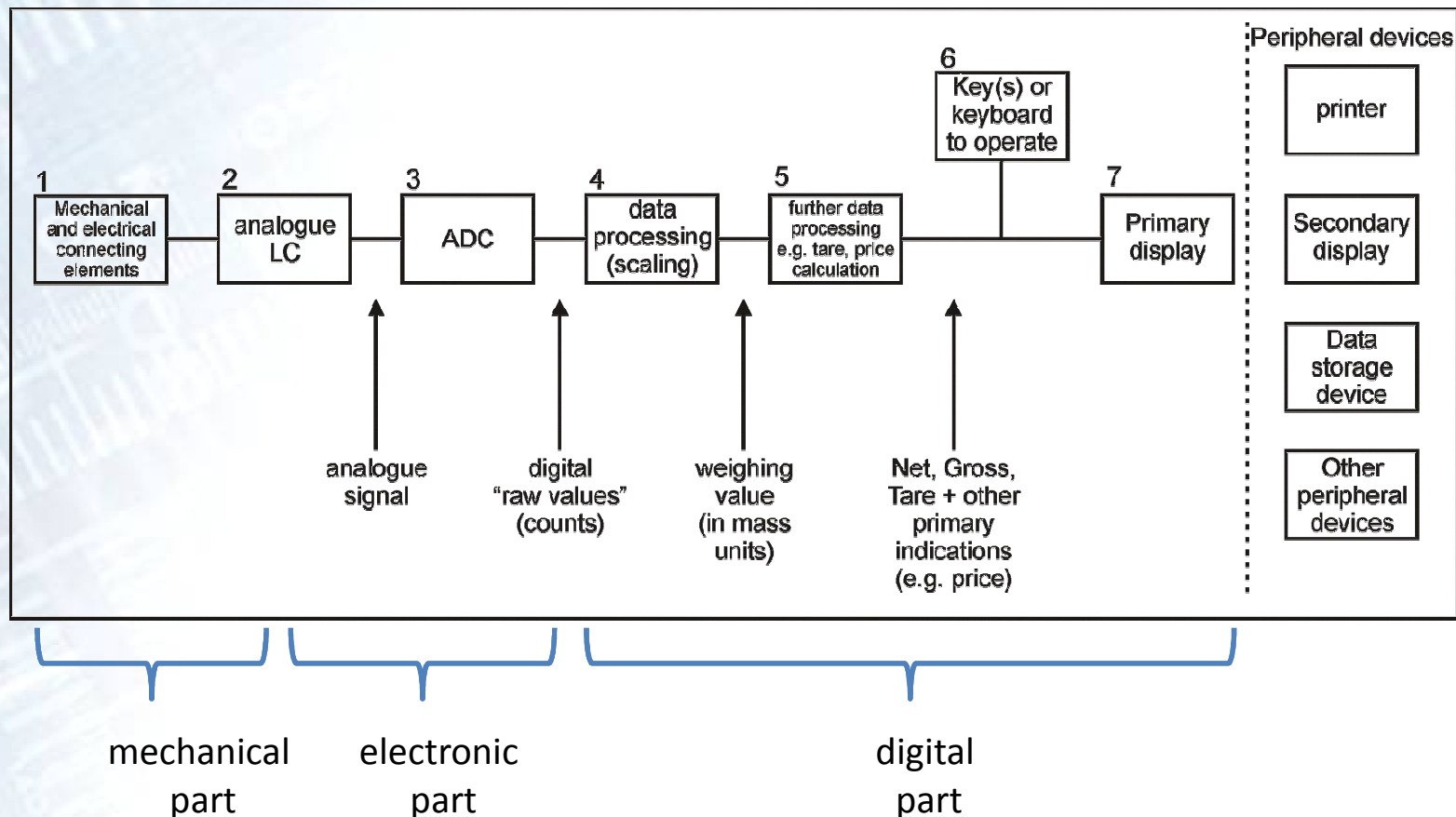
Test
Procedure

Certification

Initial
Verification

Construction of an instrument

(OIML R76, No. T.2)



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Scope of
OIML R76

Principle
Design

Characteristics

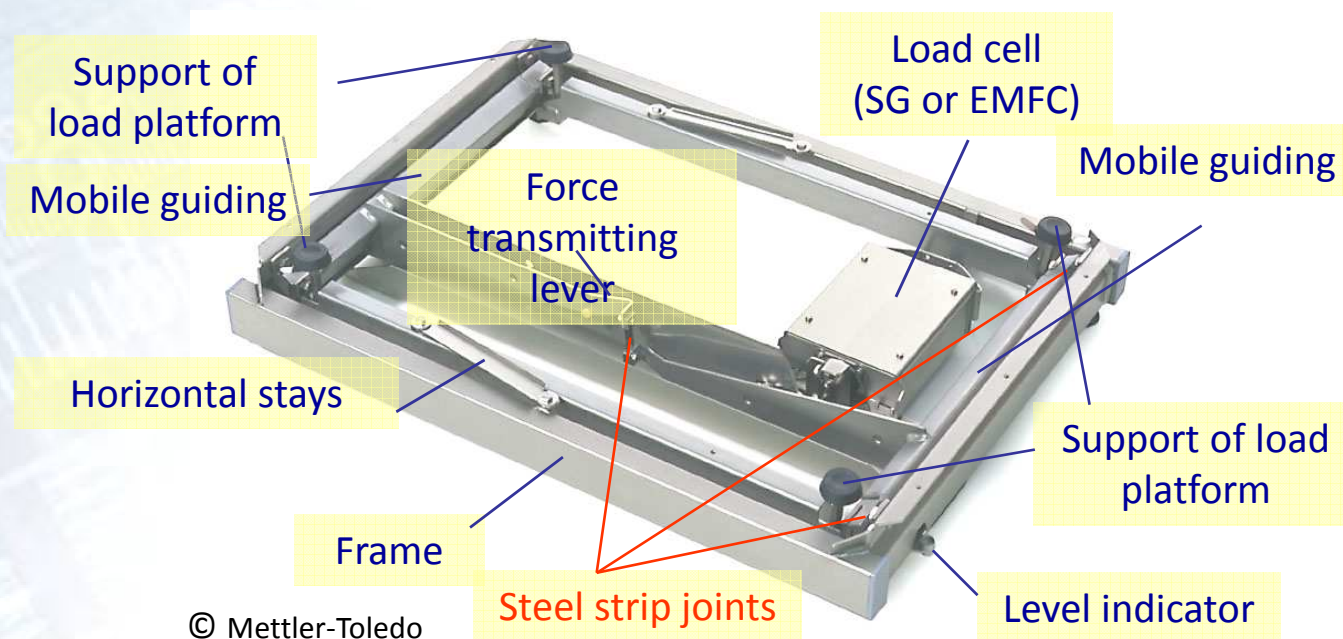
Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Platform scales (class II or III):



© Mettler-Toledo

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Scope of
OIML R76

Principle
Design

Characteristics

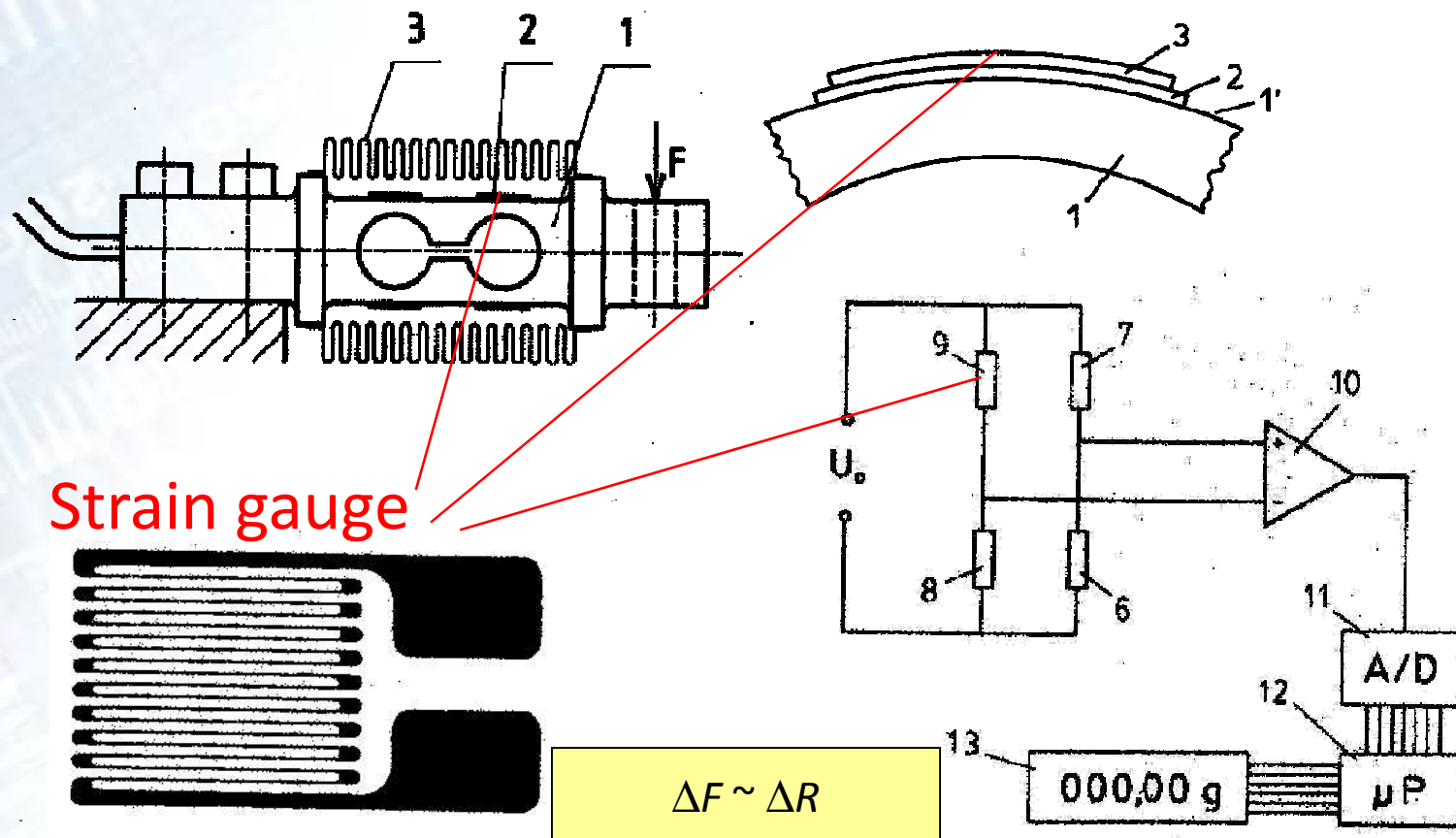
Indication
and Errors

Test
Procedure

Certification

Initial
Verification

1. SG load cell (double bending beam):





Strain gauge load cells



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Scope of
OIML R76

Principle
Design

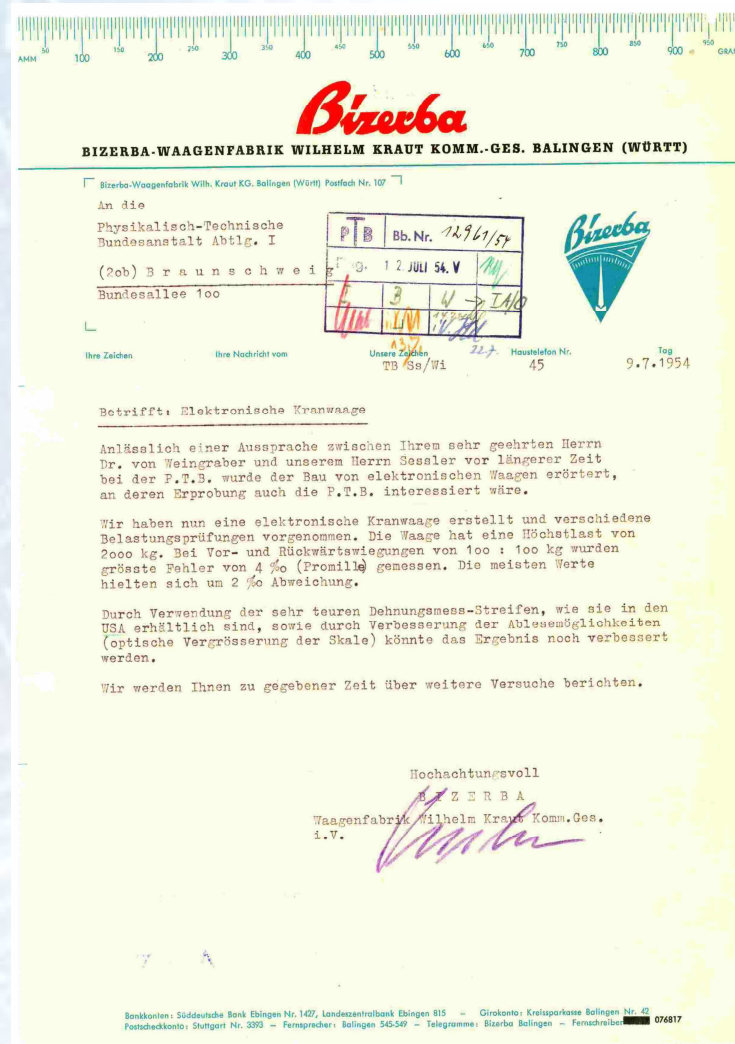
Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification



July 9th, 1954:

The very expensive strain gauge technology, as it is available in the U.S., is of high interest for scientific studies but also considered too expensive for long term for commercial weighing instruments....

Physikalisch-Technische Bundesanstalt - Braunschweig und Berlin

Working Group "Weighing Instruments"
Oliver Mack

OIML Pilot Training Center, Beijing, China, 18–22 July 2016
国际法制计量组织培训中心 (示范)

34 / 105

OIML

Scope of
OIML R76

Principle
Design

Characteristics

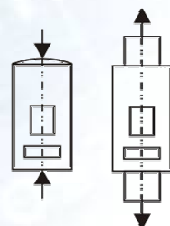
Indication
and Errors

Test
Procedure

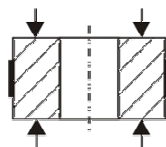
Certification

Initial
Verification

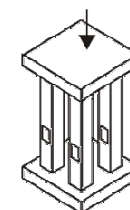
Compression /
Tension



Cylinder

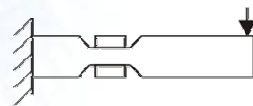


hollow cylinder

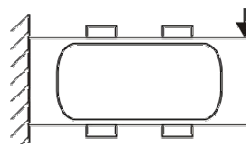


Rod spring body

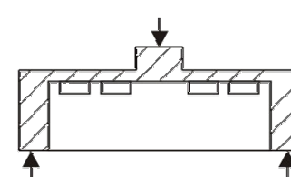
Bending



Single bending
beam

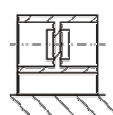
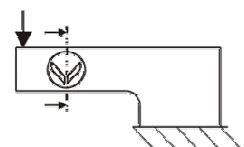


Double bending
beam

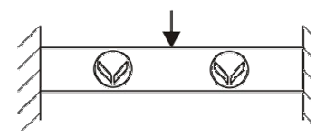


Ring torsion
spring body

Shear Strain



Cut



Membranaceous
spring body

3 categories
of strain gauge
load cell
designs



Strain gauge load cells Compression load cells



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Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification



Self-centering load cell

Flintec, Type RC3N,

$$E_{\max} = 30 \text{ t}$$



Strain gauge load cells

Compression load cells



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification



Compression load cell
under test



without
housing



Strain gauge load cells Bending beam load cells



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

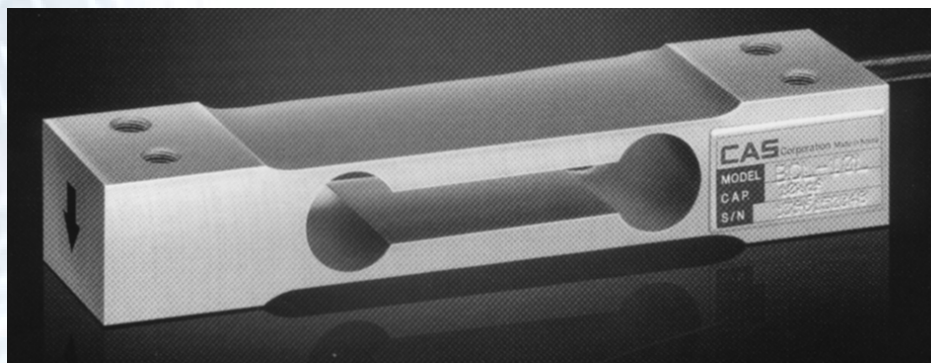
Test
Procedure

Certification

Initial
Verification



HBM, PW2



CAS, BCL

Double-bending beam-LC (ca.10 kg)

Strain gauge with silicon covering

OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification



Single-point load cell (Flintec PC6, 100 kg) with lateral parallel guiding and a centred bending eye made of stainless steel.

The strain gauge application area is encapsulated hermetically.

OIML

Scope of
OIML R76

Principle
Design

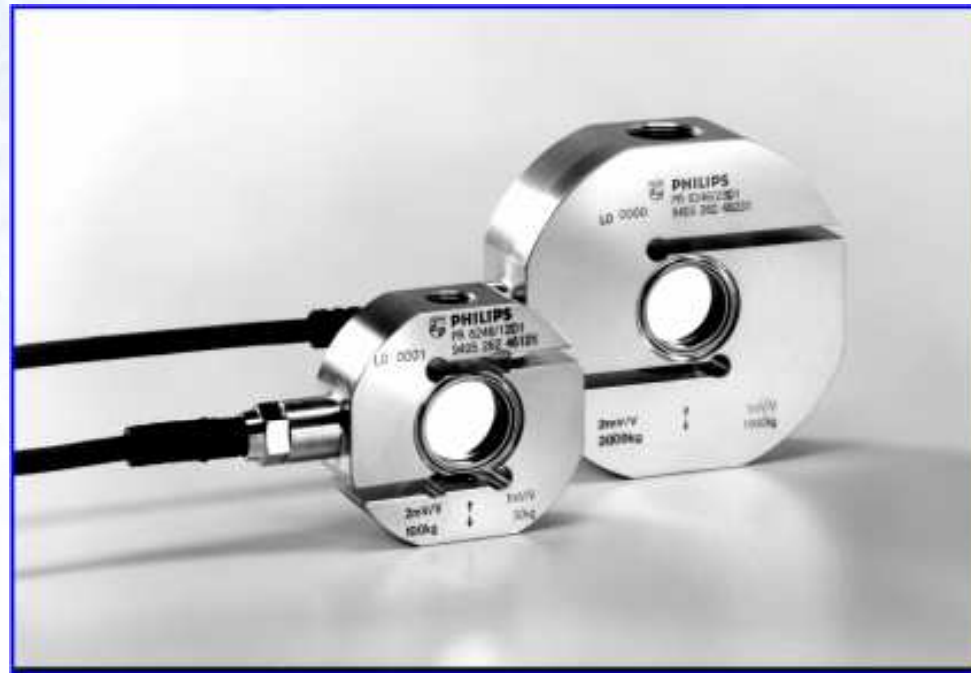
Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification



S-type tension load cells of type PR6246 (100 kg and 2 t) are shear beam load cells with central load supplying bars. The load cells are made of stainless steel, the strain gauge application caves are sealed hermetically



Strain gauge load cells

Ring torsion load cells



OIML

Scope of
OIML R76

Principle
Design

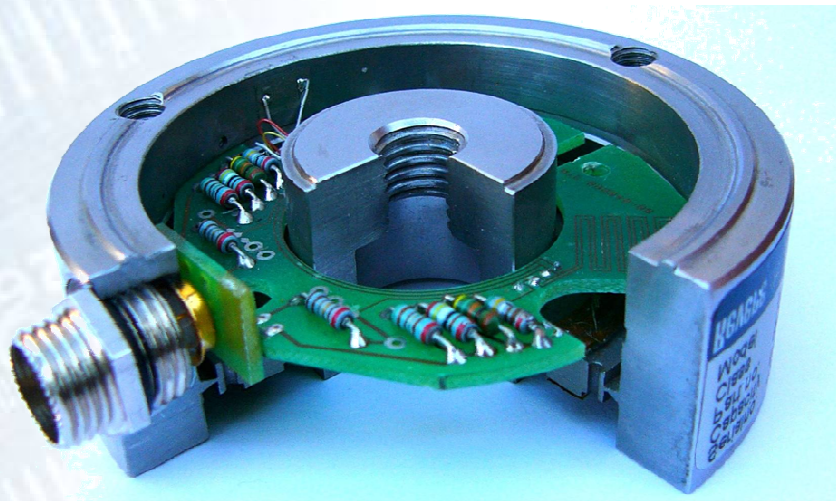
Characteristics

Indication
and Errors

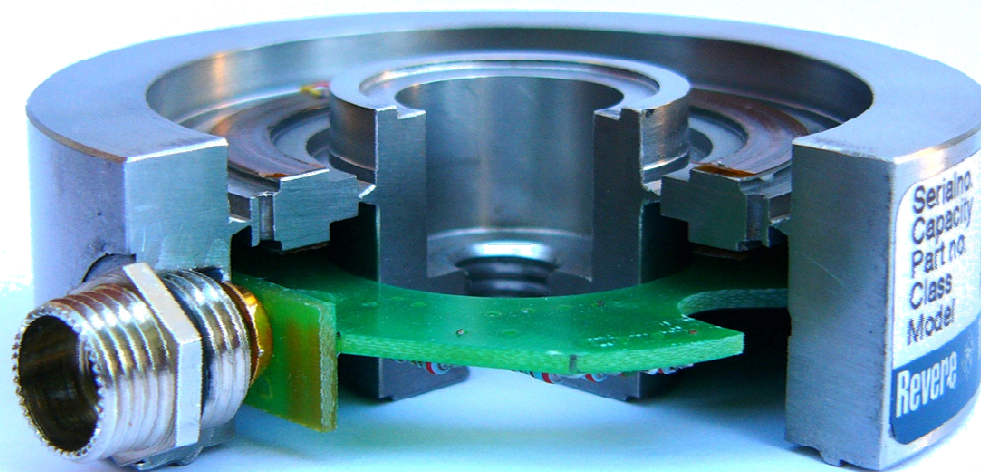
Test
Procedure

Certification

Initial
Verification



Cut view of a
ring torsion load cell



OIML

Scope of
OIML R76

Principle
Design

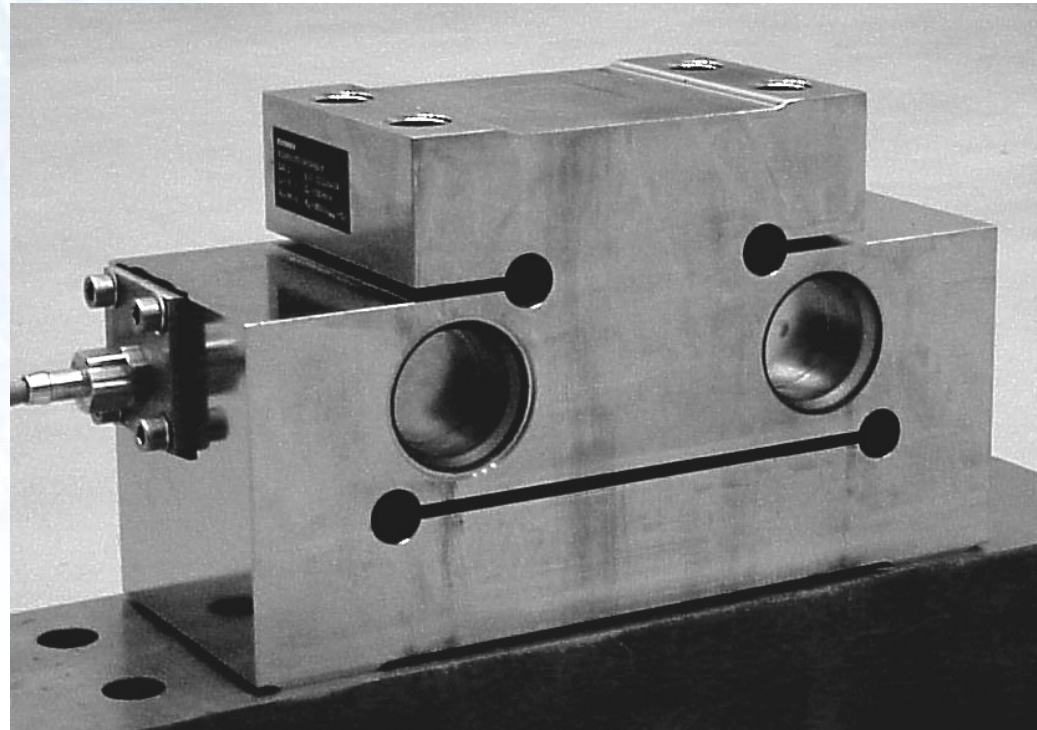
Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification



The weigh beam type DMR is a two end supported shear beam mainly developed for rail road weighing. The load cell is made of stainless steel, hermetically metallic sealed and will be applied between track and sleeper.

OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

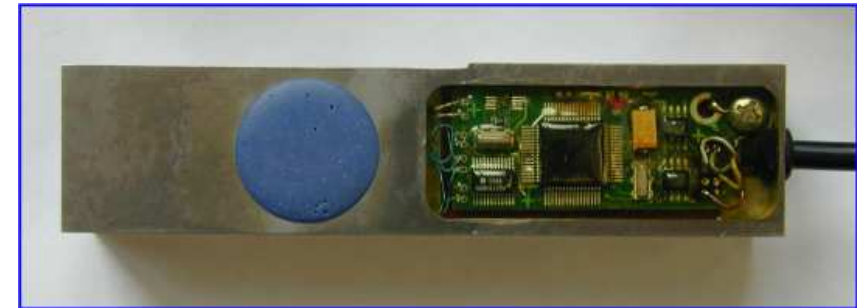
Test
Procedure

Certification

Initial
Verification



digital compression load cell
RTE, Type SCC, $E_{\max} = 10 \text{ t}$ up to 60 t
with open cable connection



digital shear bending beam load cell,
Bizerba, Type WS500 $E_{\max} = 500 \text{ kg}$,
with open cable connection

Strain gauge load cells

Sputtered on thin film load cells

OIML

Scope of
OIML R76

Principle
Design

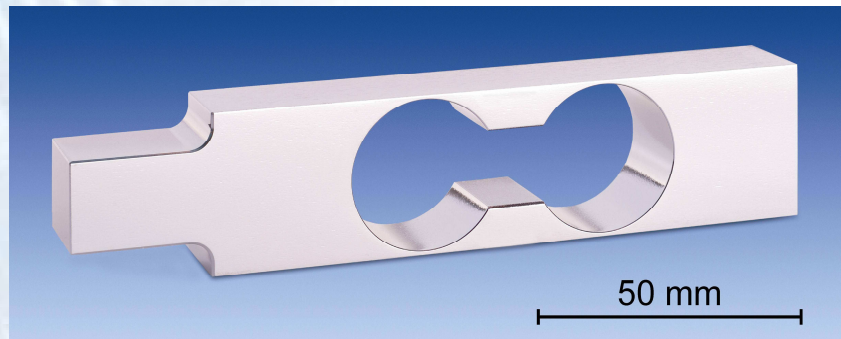
Characteristics

Indication
and Errors

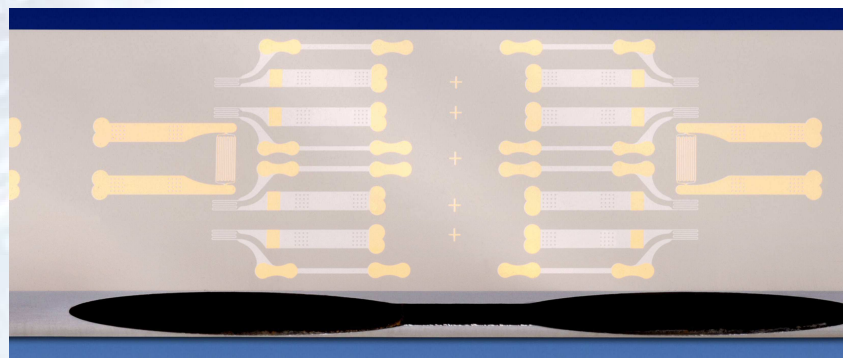
Test
Procedure

Certification

Initial
Verification



Sputtered on thin film strain gauges



Expected characteristics:

- High reproducibility
- Less time depending effects

→ A sensor predestined for digital compensation
→ High potential for improvements

OIML

Scope of
OIML R76

Principle
Design

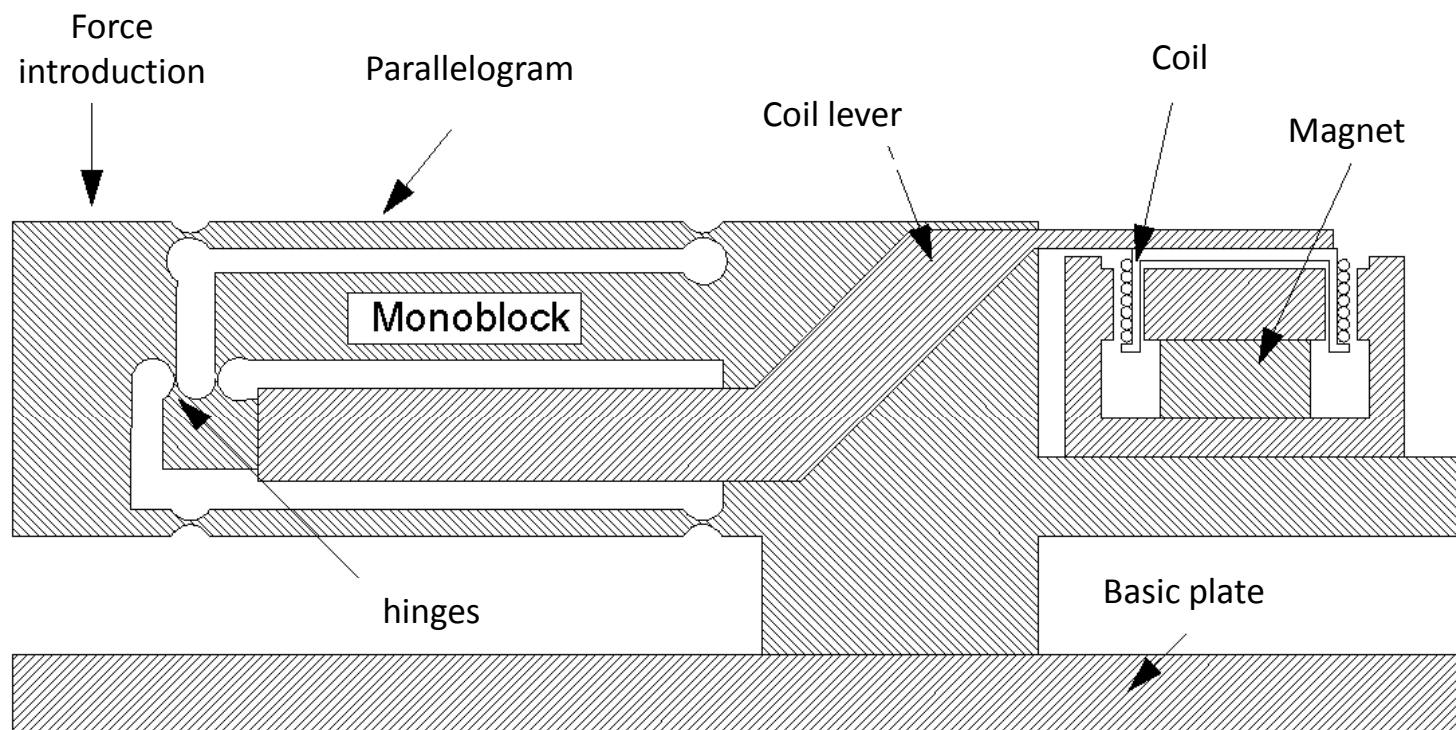
Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification



Schematic drawing of an EFC mono block used in precision weighing instruments of accuracy class I and II



High precision load cells Electromagnetic force compensation (EFC)



OIML

Scope of
OIML R76

Principle
Design

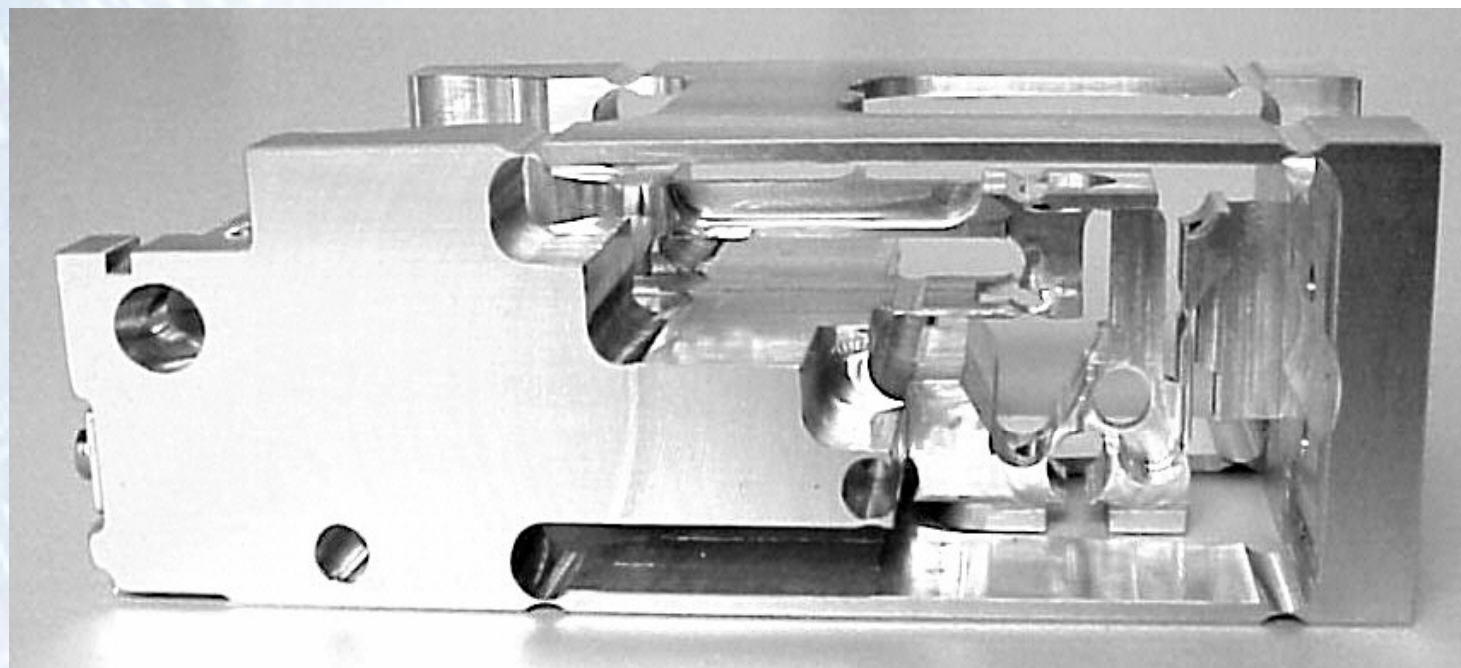
Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification



Picture of a lever system as mono block
used for electromagnetic force compensation in
precision weighing instruments of special class (Sartorius)



High precision load cells Electromagnetic force compensation (EFC)



OIML

Scope of
OIML R76

Principle
Design

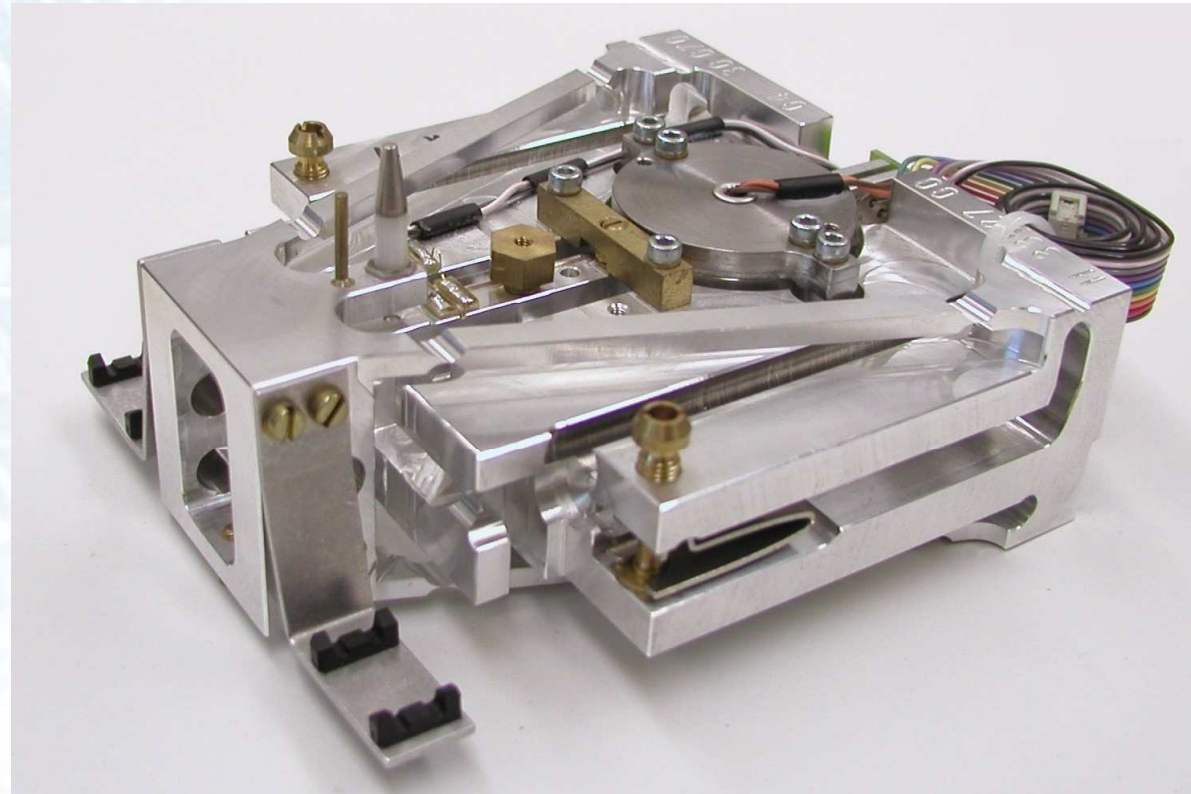
Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification



Picture of a lever system as mono block
used for electromagnetic force compensation in
precision weighing instruments of special class (Sartorius)



High precision load cells Electromagnetic force compensation (EFC)



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification



Picture of an EFC monolithic (solid-state) mechanic (Mettler)
produced with wire-electro discharge machining process

OIML

Scope of
OIML R76

Principle
Design

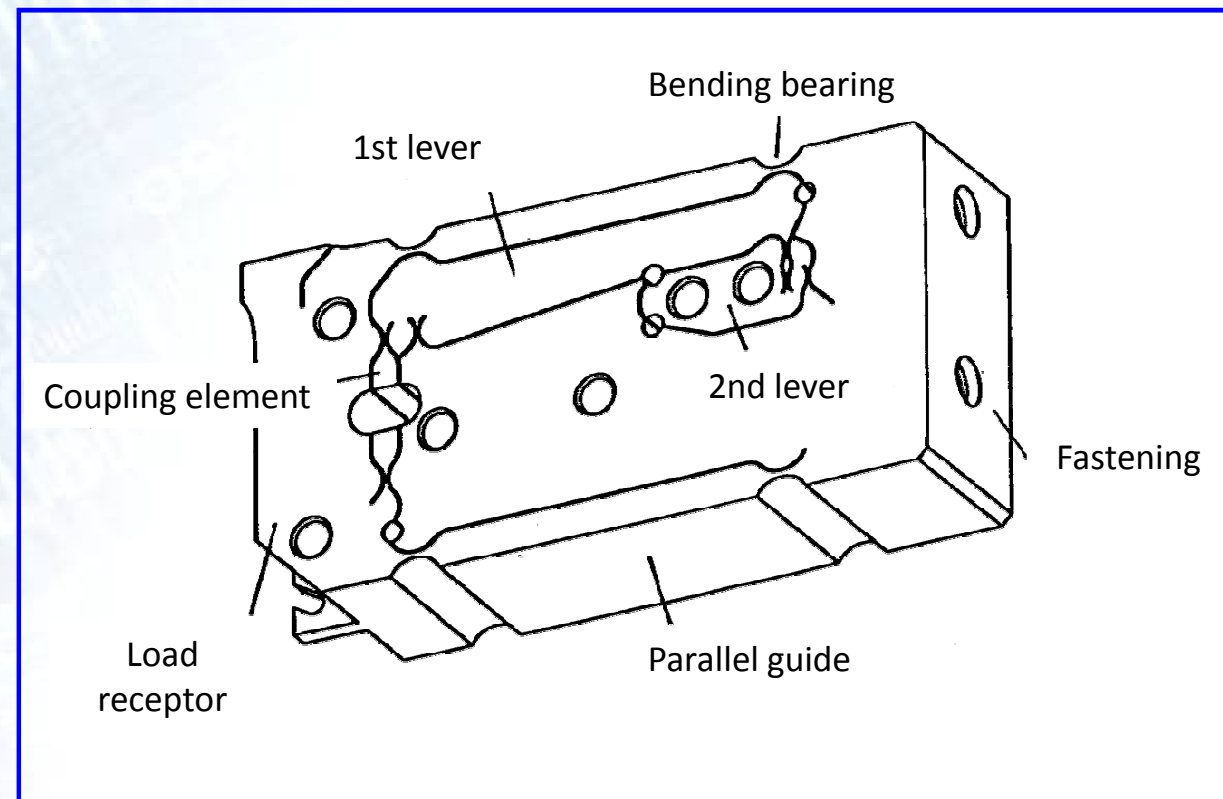
Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification



Schematic drawing of an EFC monolithic (solid-state) mechanic produced with wire-electro discharge machining process

OIML

Scope of
OIML R76

Principle
Design

Characteristics

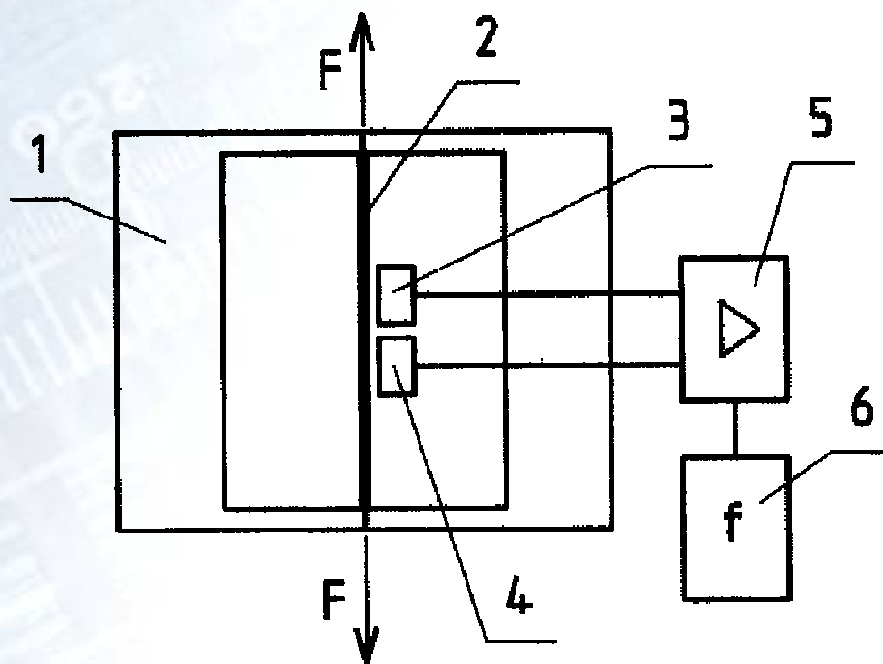
Indication
and Errors

Test
Procedure

Certification

Initial
Verification

3. Vibrating string load cell:



1. Force absorption
2. String
3. Exciter
4. Sensor
5. Resonance amplifier
6. Frequency counter

$$\Delta F \sim \Delta f^2$$



Characteristic data of a NAWI



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Indications of loads:

- Maximum capacity (Max) (OIML R76, No. T.3.1.1)
→ Maximum weighing capacity, not taking into account the additive tare capacity
 - Minimum capacity (Min) (OIML R76, No. T.3.1.2)
→ Value of the load below which the weighing results may be subject to an excessive relative error
 - Maximum safe load (Lim) (OIML R76, No. T.3.1.7)
→ Maximum static load that can be carried by the instrument without permanently altering its metrological qualities
- Maximum tare effect (T+, T-) (OIML R76, No. T.3.1.6)
→ Maximum capacity of the additive tare device or the subtractive tare device



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Scale divisions:

(Value, expressed in units of mass)

- Actual scale interval, d (OIML R76, No. T.3.2.2)
 - the difference between the values corresponding to two consecutive scale marks, for analog indication; or
 - the difference between two consecutive indicated values, for digital indication.
- Verification scale interval, e (OIML R76, No. T.3.2.3)
 - used for the classification and verification of an instrument.



Characteristic data of a NAWI



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Number of verification scale intervals, n: (OIML R76, No. 3.2.5)

Quotient of the maximum capacity and the verification scale interval:

$$n = \text{Max} / e$$

Multi-interval instrument

(OIML R76, No. T.3.2.6)

Instrument having one weighing range which is divided into partial weighing ranges each with different scale intervals, with the partial weighing range determined automatically according to the load applied, both on increasing and decreasing loads.

Multiple range instrument

(OIML R76, No. T.3.2.7)

Instrument having two or more weighing ranges with different maximum capacities and different scale intervals for the same load receptor, each range extending from zero to its maximum capacity.



Accuracy classes of NAWIs



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Accuracy classes and characteristic data:

Accuracy class	Verification scale interval, e	Number of verification scale intervals, $n - \text{Max}/e$		Minimum capacity, Min (Lower limit)
		minimum	maximum	
Special (I)	$0.001 \text{ g} \leq e^*$	50 000**	–	100 e
High (II)	$0.001 \text{ g} \leq e \leq 0.05 \text{ g}$	100	100 000	20 e
	$0.1 \text{ g} \leq e$	5 000	100 000	50 e
Medium (III)	$0.1 \text{ g} \leq e \leq 2 \text{ g}$	100	10 000	20 e
	$5 \text{ g} \leq e$	500	10 000	20 e
Ordinary (III)	$5 \text{ g} \leq e$	100	1 000	10 e

* It is not normally feasible to test and verify an instrument to $e < 1 \text{ mg}$, due to the uncertainty of the test loads.

** See exception in 3.4.4.

OIML

Scope of
OIML R76

Principle
Design

Characteristics

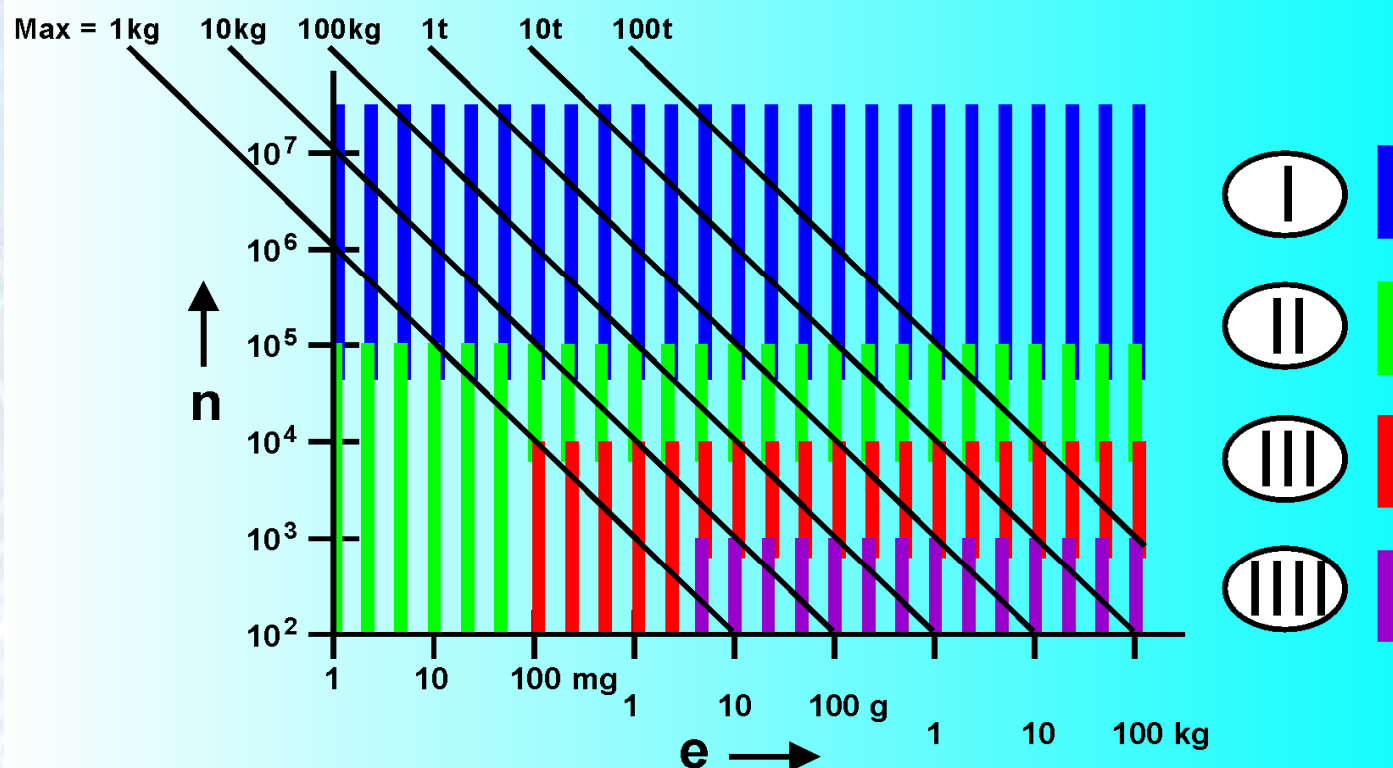
Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Accuracy classes:





Characteristic data of a NAWI



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Example for a descriptive marking:

(OIML R76, No. 7.1)

DE-16-NAWID-PTB001

CE 16

Supermanufacturer Type: Excellent

Serial No.: 123456789

Accuracy class

III

$e = 2 \text{ g}$

Max 6 kg

$d = 1 \text{ g}$

Min 40 g

$T = - 3 \text{ kg}$



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Sensitivity:

(OIML R76, No. T.4.1)

For a given value of the measured mass, the quotient of the change Δl of the observed variable l and the corresponding change Δm of the measured mass m .

$$k = \Delta l / \Delta m$$

Discrimination:

(OIML R76, No. T.4.2)

Ability of an instrument to react to small variations of load.
The discrimination threshold, for a given load, is the value of the smallest additional load that, when gently deposited on or removed from the load receptor, causes a perceptible change in the indication.



Metrological properties of a NAWI



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Repeatability:

(OIML R76, No. T.4.3)

Ability of an instrument to provide results that agree one with the other when the same load is deposited several times and in a practically identical way on the load receptor under reasonably constant test conditions.

Durability:

(OIML R76, No. T.4.4)

Ability of an instrument to maintain its performance characteristics over a period of use.

Warm-up time:

(OIML R76, No. T.4.5)

Time between the moment power is applied to an instrument and the moment at which the instrument is capable of complying with the metrological requirements.



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Methods of indications:

(OIML R76, No. T.5.1)

- **Balancing by weights**
non-self-indicating weighing instruments, value of metrologically controlled weights that balances the load (e.g. taking into account the reduction ratio of the load).
- **Analogue indication**
often semi-self-indicating instruments, e.g. pendulum weighing instrument / counterweight scale, Indication enabling the evaluation of the equilibrium position to a fraction of the scale interval.
- **Digital indication**
mostly self-indicating weighing instruments, e.g. modern high accuracy and medium accuracy instruments



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Weighing results:

(OIML R76, No. T.5.2)

(apply only when the indication has been zero before the load has been applied to the instrument.)

- Gross value (G or B)
Indication of the weight value of a load on an instrument, with no tare or preset tare device in operation.
- Net value (N)
Indication of the weight value of a load placed on an instrument after operation of a tare device.
- Tara value (T)
Weight value of a load, determined by a tare weighing device.



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Other weight values:

(OIML R76, No. T.5.2)

- **Preset tare value (PT)**
Numerical value, representing a weight, that is introduced into the instrument. “Introduced” includes procedures such as: keying in, recalling from a data storage device, or inserting via an interface.
- **Calculated net value**
Value of the difference between a measured weight value (gross or net) and a preset tare value.
- **Calculated weight value**
Calculated sum or difference of more than one measured weight value and/or calculated net value.



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Errors:

(OIML R76, No. T.5.5)

- Error of indication (OIML R76, No. T.5.5.1)
Indication of an instrument minus the (conventional)
true value of the corresponding mass
- Intrinsic error (E) (OIML R76, No. T.5.5.2)
Error of an instrument determined under reference conditions
- Durability error (OIML R76, No. T.5.5.7)
Difference between the intrinsic error over a period of use and
the initial intrinsic error of an instrument.

OIML

Scope of
OIML R76

Principle
Design

Characteristics

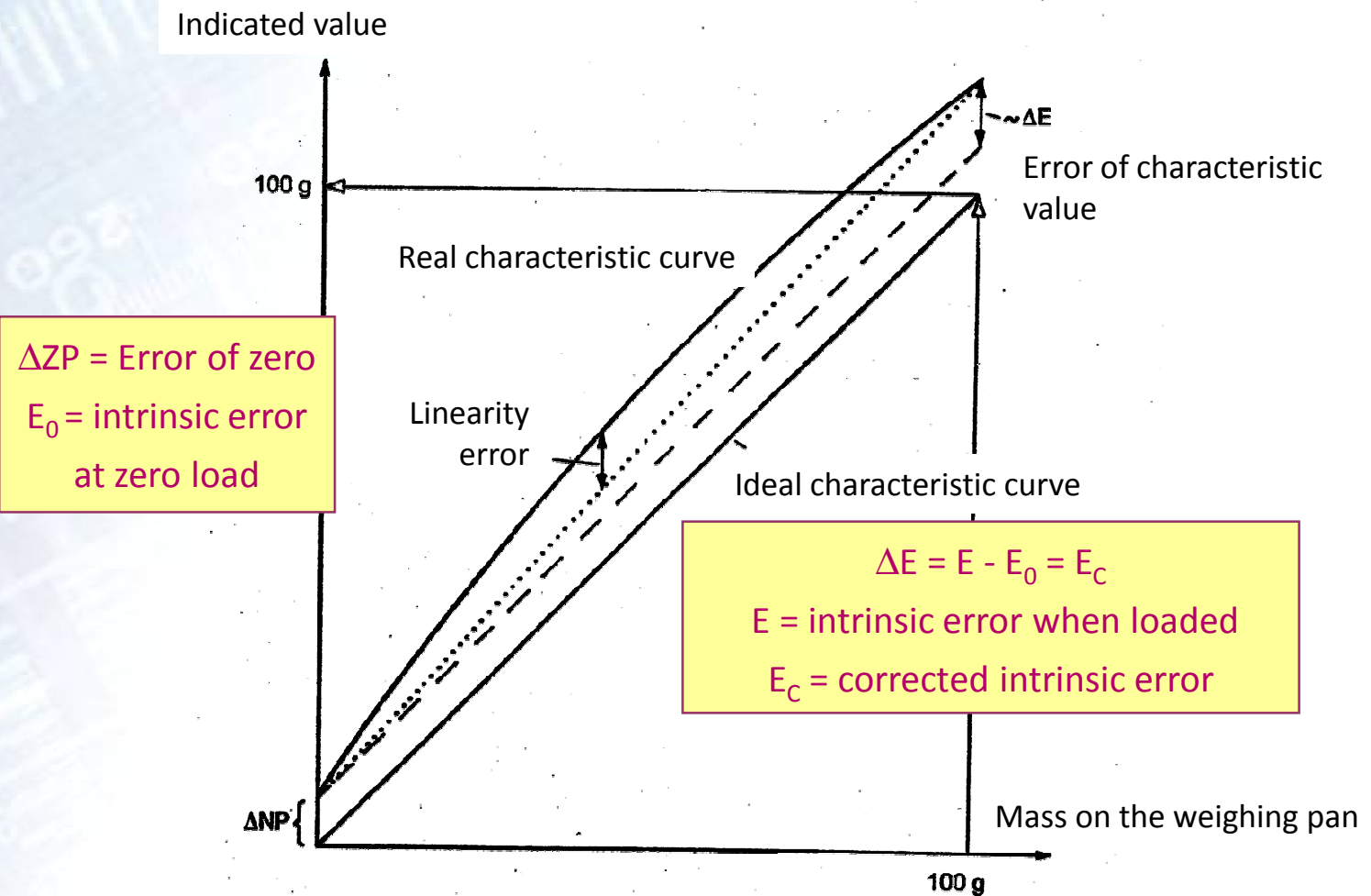
Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Characteristic curve:



OIML

Scope of
OIML R76

Principle
Design

Characteristics

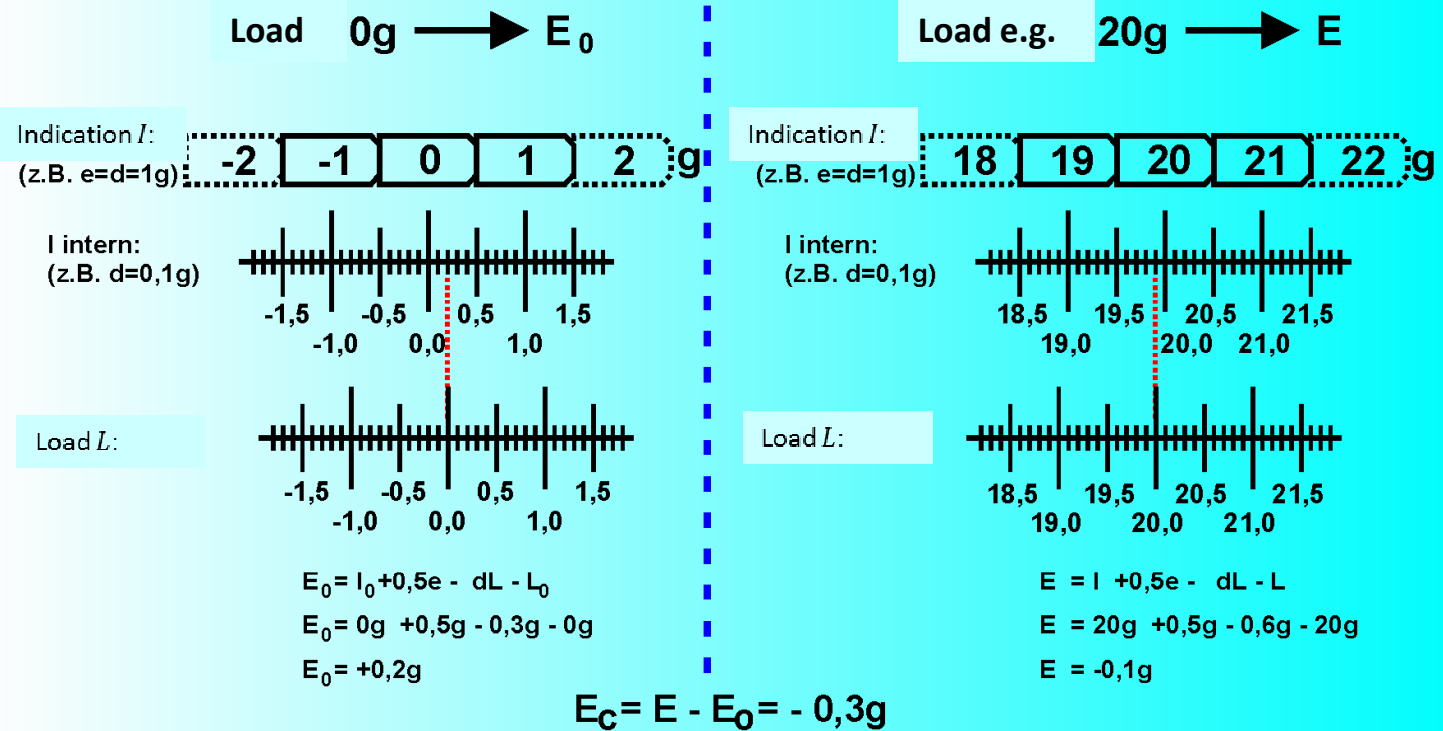
Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Example: Digital Measurement Error





OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Maximum permissible error (mpe)

(OIML R76, No. T.5.5.4)

Maximum difference, positive or negative, allowed by regulation between the indication of an instrument and the corresponding true value, as determined by reference standard masses or standard weights, with the instrument being at zero at no-load, in the reference position.

Fault

(OIML R76, No. T.5.5.5)

Difference between the error of indication and the intrinsic error of an instrument.

Significant fault

(OIML R76, No. T.5.5.6)

Fault greater than e .

The following are not considered to be significant faults, even when they exceed e :
e.g. faults implying the impossibility to perform any measurement or being momentary variations in the indication which cannot be interpreted, memorized or transmitted as a measuring result.



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Technical requirements for electronic instruments (OIML R76, No. 5.1.1)

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

- a) significant faults do not occur; or
- b) significant faults are detected and acted upon. The indication of significant faults in the display should not be confusing with other messages that appear in the display.

Acting upon significant faults (OIML R76, No. 5.2)

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.



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Maximum permissible errors as per R76-1

Maximum permissible errors on initial verification	For loads, m , expressed in verification scale intervals, e			
	Class I	Class II	Class III	Class IIII
$\pm 0.5 e$	$0 \leq m \leq 50\,000$	$0 \leq m \leq 5\,000$	$0 \leq m \leq 500$	$0 \leq m \leq 50$
$\pm 1.0 e$	$50\,000 < m \leq 200\,000$	$5\,000 < m \leq 20\,000$	$500 < m \leq 2\,000$	$50 < m \leq 200$
$\pm 1.5 e$	$200\,000 < m$	$20\,000 < m \leq 100\,000$	$2\,000 < m \leq 10\,000$	$200 < m \leq 1\,000$

OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

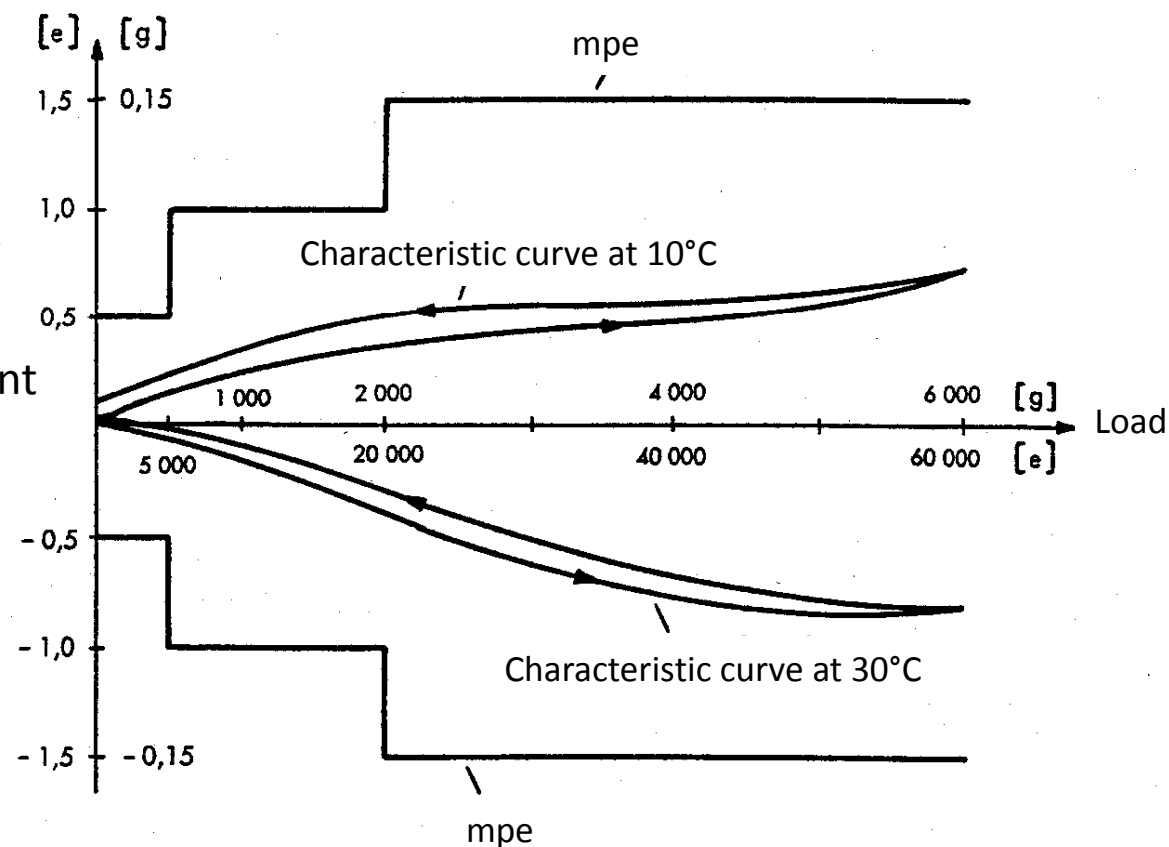
Test
Procedure

Certification

Initial
Verification

Characteristic curves
and error limits
of a class II instrument
as per OIML R76:

Deviation of indicated
value from nominal value





OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Span stability:

(OIML R76, No. 5.5.9)

Capability of an instrument to maintain the difference between the indication at maximum capacity and the indication at zero over a period of use (test normally within 3 weeks) within specified limits.



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Influences and reference conditions

(OIML R76, No. T.6)

T.6.1 Influence quantity

Quantity that is not the subject of the measurement but which influences the values of the measurand or the indication of the instrument.

T.6.1.1 Influence factor

Influence quantity having a value within the specified rated operating conditions of the instrument.

T.6.1.2 Disturbance

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

T.6.3 Reference conditions

Set of specified values of influence factors fixed to ensure valid inter-comparison of the results of measurements.



Tests according to OIML R76



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

1. Metrological tests
 - Weighing performance
2. Technical tests
 - Functionality (e.g. tare functions)
3. Administrative and formal tests
 - Documentation
 - inscriptions



Administrative and formal Tests Documentation



Completeness of documents submitted: fotos, drawings, technical data, circuit diagrams, operating manual
(OIML R76, No. 8.2.1.2)

- OIML
- Scope of OIML R76
- Principle Design
- Characteristics
- Indication and Errors
- Test Procedure
- Certification
- Initial Verification

Item	Documentation required
1	General description of the instrument, description of the function, intended purpose of use, kind of instrument (e.g. platform, plus-minus scale, price labeler).
2	General characteristics (manufacturer; Class, Max, Min, ϵ , n , single-/multi-interval, multiple range, temperature range, voltage, etc.).
3	List of descriptions and characteristic data of all devices and modules of the instrument.
4	Drawings of general arrangement and details of metrological interest including details of any interlocks, safeguards, restrictions, limits, etc.
4.1	Securing components, adjustment devices, controls, etc. (4.1.2), protected access to set-up and adjustment operations (4.1.2.4).
4.2	Place for application of control marks, securing elements, descriptive markings, identification, conformity and/or approval marks (7.1, 7.2).
5	Devices of the instrument.
5.1	Auxiliary, or extended indicating devices (3.4, 4.4.3, 4.13.7).
5.2	Multiple use of indicating devices (4.4.4).
5.3	Printing devices (4.4.5, 4.6.11, 4.7.3, 4.14.4, 4.16).
5.4	Memory storage devices (4.4.6).
5.5	Zero-setting, zero-tracking devices (4.5, 4.6.9, 4.13.2).
5.6	Tare devices (4.6, 4.10, 4.13.3) and preset tare devices (4.7, 4.13.4).
5.7	Leveling device and level indicator, tilt sensor, upper limit of tilting (3.9.1).
5.8	Locking devices (4.8, 4.13.5) and auxiliary verification devices (4.9).



Administrative and formal Tests Documentation



Completeness of documents submitted: fotos, drawings, technical data, circuit diagrams, operating manual
(OIML R76, No. 8.2.1.2)

OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Item	Documentation required
5.9	Selection of weighing ranges on multiple range instruments (4.10).
5.10	Connection of different load receptors (4.11).
5.11	Interfaces (types, intended use, immunity to external influences instructions (5.3.6)).
5.12	Peripheral devices, e.g. printers, secondary displays, for including in the type approval certificate and for connection for the disturbance tests (5.4.2).
5.13	Functions of price-computing instruments (e.g. for direct sales to the public) (4.14), self-service (4.13.11), price labeling (4.16).
5.14	Other devices or functions, e.g. for purposes other than determination of mass (not subject to conformity assessment).
5.15	Detailed description of the stable equilibrium function (4.4.2, A.4.12) of the instrument.
6	Information concerning special cases.
6.1	Subdivision of the instrument in modules - e.g. load cells, mechanical system, indicator, display - indicating the functions of each module and the fractions p_i . For modules that have already been approved, reference to test certificates or type approval certificates (3.10.2), reference to evaluation to R 60 for load cells (Annex F).
6.2	Special operating conditions (3.9.5).
6.3	Reaction of the instrument to significant faults (5.1.1, 5.2, 4.13.9).
6.4	Functioning of the display after switch-on (5.3.1).
7	Technical description, drawings and plans of devices, sub-assemblies, etc. particularly those in 7.1-7.4.



Administrative and formal Tests Documentation



Completeness of documents submitted: fotos, drawings, technical data, circuit diagrams, operating manual
(OIML R76, No. 8.2.1.2)

OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Item	Documentation required
7	Technical description, drawings and plans of devices, sub-assemblies, etc. particularly those in 7.1-7.4.
7.1	Load receptor, lever systems if not according to (6.3.2-6.3.4), force transmitting devices.
7.2	Load cells, if not presented as modules.
7.3	Electrical connection elements, e.g. for connecting load cells to the indicator, including length of signal lines (necessary for surge test, see B.3.3).
7.4	Indicator: block diagram, schematic diagrams, internal processing and data exchange via interface, keyboard with function assigned to any key.
7.5	Declarations of the manufacturer, e.g. for interfaces (5.3.6.1), for protected access to set-up and adjustment (4.1.2.4), for other software based operations.
7.6	Samples of all intended printouts.
8	Results of tests performed by the manufacturer or from other laboratories, on protocols from R 76-2, including proof of competence.
9	Certificates of other type approvals or separate tests, relating to modules or other parts mentioned in the documentation, together with test protocols.
10	For software controlled instruments or modules, additional documents according to 5.5.1 and 5.5.2.2 (Table 11).
11	Drawing or photo of the instrument showing the principle and the location of verification and securing marks are to be applied, which is necessary to be included in the OIML Certificate or Test Report.



Administrative and formal Tests Next Steps



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

- Check of conformity of the pattern with the submitted documents
- Note down metrological characteristics
- Start with technical and metrological tests



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Test under normal environmental (reference) conditions: (Part 1)

- Zero-setting range and accuracy
(OIML R76, No. A.4.2, No. A.4.3)
- Weighing performance test
(OIML R76, No. A.4.4)
- Tare
(OIML R76, No. A.4.6)
- Eccentricity
(OIML R76, No. A.4.7)
- Discrimination
(OIML R76, No. A.4.8)



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Test under normal environmental (reference) conditions (Part 2)

- Sensitivity
(OIML R76, No. A.4.9)
- Repeatability
(OIML R76, No. A.4.10)
- Creep
(OIML R76, No. A.4.11)
- Zero return
(OIML R76, No. A.4.11.2)
- Stability of equilibrium
(OIML R76, No. A.4.12)



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Tests under influence factor, e.g.:

- Tilting
(OIML R76, No. A.5.1)
- Warm-up test
(OIML R76, No. A.5.2)
- Weighing performance at static temperature
(OIML R76, No. A.5.3)
- Voltage variations
(OIML R76, No. A.5.4)
- Damp heat, steady state
(OIML R76, No. B.2)



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

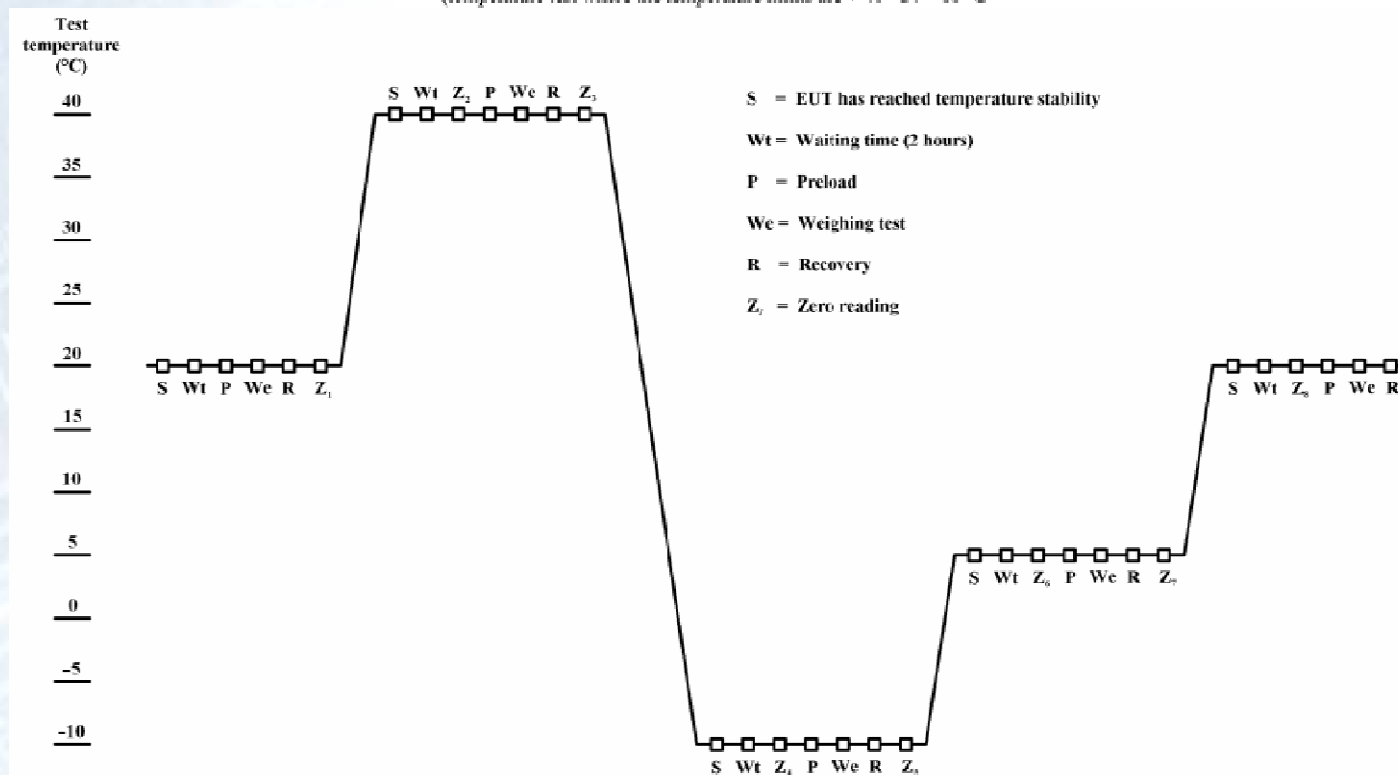
Certification

Initial
Verification

Temperature test, constant temperatures Common procedure

Figure 11

Proposed test sequence for test A.5.3.1 combined with A.5.3.2
(temperature test where the temperature limits are $+40\text{ }^{\circ}\text{C}$ / $-10\text{ }^{\circ}\text{C}$)



OIML

Scope of
OIML R76

Principle
Design

Characteristics

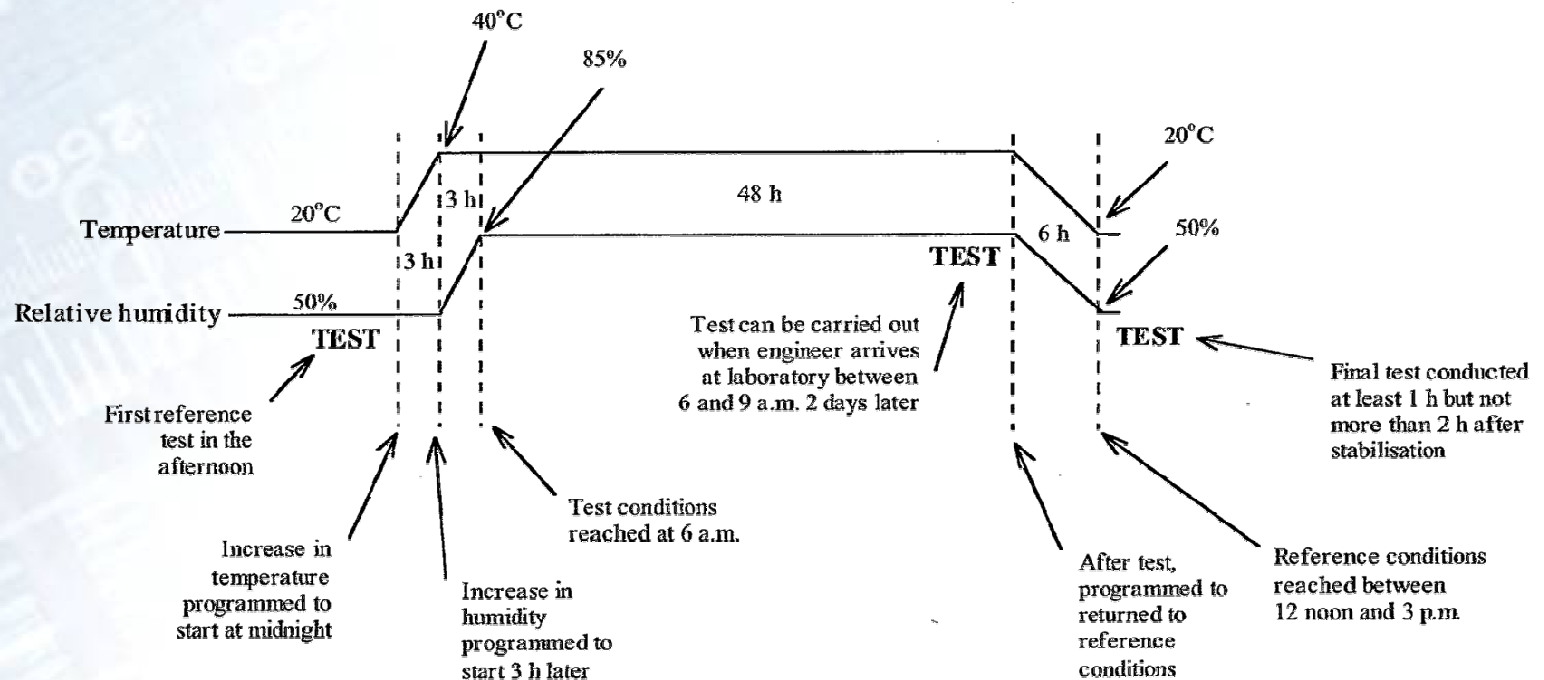
Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Damp heat, static Common Procedure



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Tests under disturbances, e.g.:

- short time power reductions
(OIML R76, No. B.3.1)
→ Temporary reduction of the amplitude of the power supply for a defined number of cycles
- electrical bursts
(OIML R76, No. B.3.2)
→ exposing the EUT to specified bursts of voltage spikes
- Surge
(OIML R76, No. B.3.3)
→ exposing the EUT to surges for which the rise time, pulse width and peak values are defined in the referenced standard.
- electrostatic discharge
(OIML R76, No. B.3.4)
→ The test consists in exposing the EUT to specified direct and indirect electrostatic discharges.



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

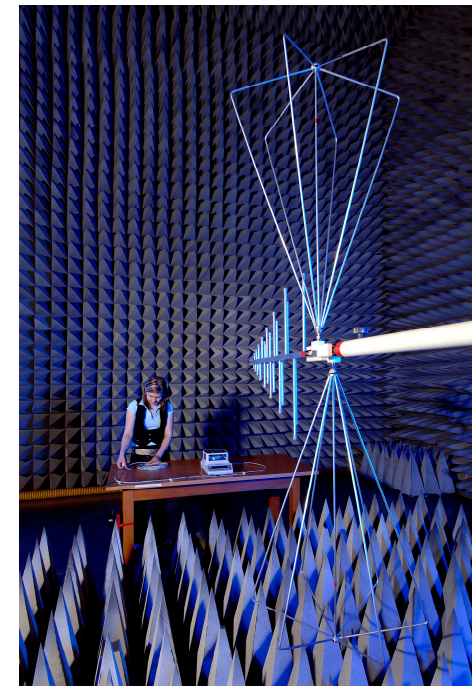
Test
Procedure

Certification

Initial
Verification

Tests under disturbances, e.g.:

- Immunity to radiated electromagnetic fields
(OIML R76, No. B.3.5)
→ The test consists of exposing the EUT to specified electromagnetic fields (field strength 10 V/m, frequency range 80 MHz – 2000 MHz).
- Immunity to conducted radio-frequency fields
(OIML R76, No. B.3.6)
→ The test consists in exposing the EUT to disturbances induced by conducted radio-frequency fields (RF amplitude: 10 V (50 Ω), frequency range 0.15 MHz – 80 MHz)





OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Testing the long-term behaviour:

- **span stability test**

(OIML R76, No. B.4)

The test consists in observing the variations of the error of the EUT under sufficiently constant ambient conditions (reasonably constant conditions in a normal laboratory environment) at various intervals before, during and after the EUT has been subjected to performance tests.

- **endurance test**

(OIML R76, No. A.6)

Under normal conditions of use, the instrument shall be subjected to the repetitive loading and unloading of a load approximately equal to 50 % of Max. The load shall be applied 100 000 times.



Result of the Tests

Test Report according to OIML R76-2



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Report page 3

GENERAL INFORMATION CONCERNING THE TYPE

Application no.:
Type designation:
Manufacturer:
Applicant:
Instrument category: Weighing Instrument
☒ Complete instrument ☐ Module (*) with the error fraction $p_1 = \dots$
Accuracy class: ☐ I ☐ II ☒ III ☐ IIII
☒ Self-indicating ☐ Semi-self-indicating ☐ Non-self-indicating
Min = 0,4 kg
e = 0,05 kg Max = 150 kg d = 0,05 kg n = 3000
e₁ = Max₁ = d₁ = n₁ =
e₂ = Max₂ = d₂ = n₂ =
e₃ = Max₃ = d₃ = n₃ =
T = + T = - Battery, U_{nom} = 7,2 V
U_{nom} = 12 V U_{min} = V U_{max} = V f = Hz
Zero-setting device: ☐ Non-automatic ☐ Semi-automatic ☐ Aut. zero-setting ☒ Initial zero-setting ☒ Zero tracking
Tare device: ☒ Tare balancing ☐ Combined zero/tare device
☐ Tare weighing ☒ Preset tare device ☒ Subtractive tare ☐ Additive tare
Initial zero-setting range: < 20 % of Max Temperature range: 10 to 40 °C
Printer: ☐ Built-in ☐ Connected ☐ Non present but connectable ☒ No connection
Instrument submitted: Loadcell: Single point
Identification N°.: Manufacturer: HBM
Software version: Type: PW10AC4
Connected equipment: Capacity: 1 piece, 300 kg
Number:
Interfaces (number, nature): Classification symbol C4
Remarks:
Evaluation period: 08.03.2013 - 16.04.2013
Date of report: 2013-03-08
Observer: Engberts
(*) The test equipment (simulator or part of a complete instrument) connected to the module shall be defined in the test form(s) used.

R 76-2 page 6

Report page 4

INFORMATION CONCERNING THE TEST EQUIPMENT USED FOR TYPE EVALUATION

Standard weights for static tests traceable to national reference standards:
Accuracy class used: F1

Walk-in temperature and climatic chambers

Equipment:	Climatic chamber Gaul-Bau
Dimensions:	5 m x 3 m x 2,8 m
Temperature range:	-20 °C ... +50 °C
Humidity range:	15% ... 95% rel. H.
Temperature uncertainty:	±1 °C
Humidity uncertainty:	±5 % rel. H.

Voltage Variations

Power supply:	Conrad PS-24030, Prüfmittelr.: 600253
Multimeter:	Voltcraft M-4660M, Prüfmittelr.: 600250

AC mains voltage dips and short interruptions

Dip generator:	(12.1) EM-Test, PFS-503
----------------	----------------------------

Burst

Burst generator:	(12.2) Haefely PEFT Junior
------------------	-------------------------------

Surge

Surge generator:	(12.3) EM-Test, type: UCS-500
------------------	----------------------------------

Electrostatic discharges

ESD Generator:	(12.4) EM-Test, type: dito
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Electromagnetic fields

Shielded room:	(12.5) Semi-anechoic chamber
Signal generator:	Rhodes&Schwarz, SML03
Power amplifier:	PST, 500-1000W, Pöschke
Field probe:	Model 325W150, Amplifier Research
Field strength meas. System:	Holaday type: HI-6005
Antenna:	Amplifier Research type: FM5004
	Horn Antenna, Model 3115 ETS
	Log per antenna 10013 EMCO
	NAP-26 / NRT244

R 76-2 page 8



Result of the Tests

Test Report according to OIML R76-2



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Report page 5

SUMMARY OF TYPE EVALUATION

Application no.: 0
Type designation: 0

TESTS	Report page	Passed	Failed	Remarks
1 Weighing Performance	6	x		
	7	x		
	8	x		
	9	x		
2 Temperature effect on no-load indication	10	x		
3.1 Eccentricity using weights	11	x		
3.2 Eccentricity using a rolling load		-	-	
4.1 Discrimination	12	x		
4.2 Sensitivity of non-self-indicating instrument		-	-	
5 Repeatability	13	x		
6.1 Zero return	14	x		
6.2 Creep	15	x		
7 Stability of equilibrium	16	-	-	
8 Tipping	17	x		
9 Tare (weighing test)	18	x		
10 Warm-up time	19	x		
11 Voltage Variations	20	x		
12.1 AC mains voltage dips and short interruptions	21	x		
12.2 Electrical bursts	22	x		
12.3 Surges	23	x		
12.4 Electrostatic discharges	24	x		
12.5 Immunity to radiated electromagnetic fields	27	x		
12.6 Immunity to conducted radio-frequency fields	29	x		
12.7 Electrical transients on instruments powered from a road vehicle power supply		-	-	
13 Damp heat, steady state	30	x		
14 Span stability	31	x		
15 Endurance	32	x		
17 Checklist	33-38	x		

Remarks:

R 76-2 page 9

Report page 7

1 WEIGHING PERFORMANCE

(A.4.4) (A.5.3.1)

Application no.: 0
Type designation: 0
Date: 2013-03-19
Observer: Engberts
Verification: 32
scale interval e: 0,05 kg
Resolution during test (smaller than e): 0,005 kg
Temp.: 40 At start 40,2 At end °C
Rel. h.: 32 %
Time: 10:35 10:45 10:50
Bar. pr.: - hPa
(Only class I)

Automatic zero-setting and zero-tracking device is: 3
(1. Non existent, 2. Not in operation, 3. Out of working range, 4. In operation)

Initial zero-setting > 20 % of Max: ☐ Yes ☒ No (see R 76-1, A.4.4.2)

$E = 1 + \frac{1}{2} e \cdot \Delta L \cdot L$

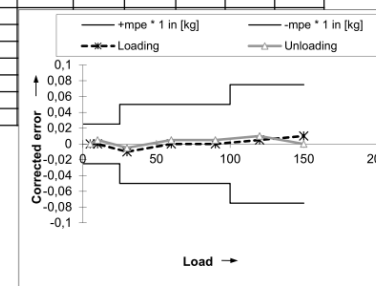
$E_c = E - E_0$ with E_0 error calculated at or near zero")

Load L	Indication I	Add. load ΔL	Error E	Corrected error E_c	[mpe]
kg	kg	kg	kg	kg	kg
(*) 5	5,000	5,000	0,025	0,000	0,000
10	10,000	10,000	0,025	0,000	0,005
30	30,000	30,000	0,035	-0,010	-0,005
60	60,000	60,000	0,025	0,000	0,005
90	90,000	90,000	0,025	0,000	0,005
120	120,000	120,000	0,020	0,005	0,010
150	150,000	150,000	0,015	0,010	0,005

Check if $|E_c| \leq |mpe|$

☒ Passed
☐ Failed

Remarks:



R 76-2 page 10



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Result of the Tests

Test Report according to OIML R76-2



Report page 25

2.4 Electrostatic discharges b) Indirect application (contact discharges only)

(B.3.4)

Application no.: 0
Type designation: 0
Date: 2013-01-17
Observer: Engberts
Verification scale interval e: 0.05 kg
Resolution during test (smaller than e): 0.005 kg

Temp.: 21 °C
Rel. h.: 32 %
Time: 10:00
Bar. pr.: 1031 hPa

Horizontal coupling plane

Load kg	Discharges				Result	
	Test voltage (kV)	Polarity	No of discharges ≥ 10	Repetition interval (s) ≥ 10	Indication I kg	Significant fault (>e) or detection and reaction Yes (remarks, test points)
1	Without disturbance				1,000	
	2	pos.	10	10	1,000	x
	4	pos.	10	10	1,000	x
	6	pos.	10	10	1,000	x
	Without disturbance				1,000	
	2	neg.	10	10	1,000	x
1	Without disturbance				1,000	
	2	neg.	10	10	1,000	x
	4	neg.	10	10	1,000	x
	6	neg.	10	10	1,000	x
	Without disturbance				1,000	
	2	pos.	10	10	1,000	x

Vertical coupling plane

Load kg	Discharges				Result	
	Test voltage (kV)	Polarity	No of discharges ≥ 10	Repetition interval (s) ≥ 10	Indication I kg	Significant fault (>e) or detection and reaction Yes (remarks, test points)
1	Without disturbance				1,000	
	2	pos.	10	10	1,000	x
	4	pos.	10	10	1,000	x
	6	pos.	10	10	1,000	x
	Without disturbance				1,000	
	2	neg.	10	10	1,000	x
1	Without disturbance				1,000	
	2	neg.	10	10	1,000	x
	4	neg.	10	10	1,000	x
	6	neg.	10	10	1,000	x
	Without disturbance				1,000	
	2	pos.	10	10	1,000	x

Check if a significant fault occurred.

☒ Passed
☐ Failed

Note: If EUT fails, the test point at which this occurs shall be recorded.

Remarks:

R 76-2 page 30

Report page 26

12.4 Electrostatic discharges (cont.) Specifications of test points of EUT (direct application). E.g. photos or sketches

a) Direct application

Contact discharges:



Air discharges:



R 76-2 page 31



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Result of the Tests

Test Report according to OIML R76-2



Report page 27

12.5 Immunity to radiated electromagnetic fields

(B.3.5)

Application no.: 0
Type designation: 0
Date: 2013-01-17
Observer: Engberts
Verification scale interval e: 0,05 kg
Resolution during test (smaller than e): 0,005 kg

	At start	At max	At end	°C
Temp.:	21			
Rel. h.:	32			
Time:	11:00			
Bar. pr.:	1031			hPa

- ☐ Frequency range 26 - 2000 MHz if the test acc. to B.3.6 cannot be applied (no mains or I/O ports available)
☒ Frequency range 80 - 2000 MHz if the test acc. to B.3.6 is performed (see form N° 12.6)

Rate of sweep: 1 %

Material of load: plastic

Load kg	Antenna	Disturbance			Result		
		Frequency range (MHz)	Polarization	Facing EUT	Indication I kg	Significant fault (>e) or detection and reaction	
1		80 to 1000	Vertical	Without disturbance		No	Yes (remarks)
				Front	0,98 - 1,02		
				Right	0,98 - 1,02		
				Left	0,98 - 1,00		
				Rear	0,98 - 1,00		
		1000 to 2500	Horizontal	Front	0,98 - 1,02		
				Right	0,98 - 1,02		
				Left	0,98 - 1,00		
				Rear	0,98 - 1,00		
		1000 to 2500	Vertical	Front	0,98 - 1,00		
				Right	1,000		
				Left	1,000		
				Rear	0,98 - 1,00		
		2500 to 8000	Horizontal	Front	0,98 - 1,00		
				Right	1,000		
				Left	1,000		
				Rear	0,98 - 1,00		

Frequency range: 26 MHz - 2000 MHz or 80 MHz - 2000 MHz
Field strength: 10 V/m Modulation: 80 % AM, 1 kHz, sine wave

Check if a significant fault occurred

☒ Passed
☐ Failed

Note: If EUT fails, the test point at which this occurs shall be recorded.

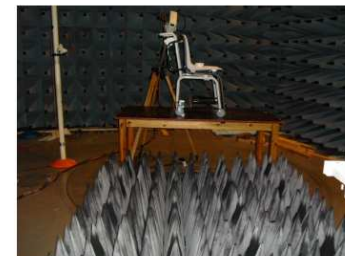
Remarks:

R 76-2 page 32

Report page 28

12.5 Immunity to radiated electromagnetic fields (cont.)

Description of the set-up of EUT. E.g. photos or sketches:



R 76-2 page 33



Result of the Tests

Check List according to OIML R76-2



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

17 CHECKLIST

Application No: 0
Type designation: 0

17.1 All types of weighing instruments except non-self-indicating instruments (6.1-6.9, R 76-1)

R 76-1 Requirement	Testing procedures	Descriptive markings	PASSED	FAILED	Remarks
7.1.1	A.3	Compulsory in all cases: manufacturer's mark or name accuracy class maximum capacity, Max, Max1, Max2, ... minimum capacity, Min verification scale interval, e, e1, e2, ...	x		
(+ 3.3.1)			x		
(+ 3.3.1)			x		
7.1.2	A.3	Compulsory if applicable: name or mark of manufacturer's agent serial number identification marks on separate but associated units type approval mark scale interval d (d < e) maximum tare effect T (subtractive tare only if T ≠ Max) maximum safe load, Lim (if Lim > Max + T) special temperature limits counting ratio ratio between weight platform and load platform range of plus/minus indication	/	/	
7.1.3	A.3	Additional markings: not to be used for direct sales to the public to be used exclusively for: the stamp does not guarantee/guarantees only... to be used only as follows: special applications clearly marked (weighings ranges in Classes I and II or II and III) near display "not to be used for direct sales to the public" (for instruments similar to those used for direct sales to the public)	/	/	
3.2			/	/	
4.15			/	/	
7.1.4	A.3	Presentation of markings: indelible easily readable grouped together in a clearly visible place Max, Min, e and d (d ≠ e) on or near display permanently shown in a clearly visible position possible to seal and apply a control mark/removal will result in destruction Markings B and G additional information shown alternatively on a plate or displayed by a software solution either permanently or accessed by a simple manual command	x		
7.1.4			x		
7.1.1 B			/	/	
7.1.2 G			/	/	
7.1.5.1	A.3	Instruments with several load receptors and load measuring devices: identification mark, Max, Min and e of each load receptor on relating load measuring device (Lim and T = + if applicable)	/	/	

R 76-2 page 50

Report page 40

7.1.5.2	A.3	Separately-built main parts: identification mark repeated in descriptive markings	/	/	
4.1.1.3		Suitability for verification: identification of devices which have been subject to separate type examination	/	/	
7.2	A.3	Verification marks and sealing Verification mark: cannot be removed easy application visibility without the instrument to be moved when it is in service	x		
7.2.2		Verification mark support or space: which ensures conservation of the mark for stamp, stamping area ≥ 1520 mm² for self-adhesive type, Ø ≥ 15 mm	x	/	
4.1.2.4	A.3	Securing of components and pre-set controls: location form	x		
4.1.2.4		Securing with software means legal status of the instrument recognizable	/	/	
4.1.2.4 a		evidence of any intervention	/	/	
4.1.2.4 b		protection against changes of parameters and the reference numbers	/	/	
4.1.2.4 c		facilities for affixing the reference number	/	/	
4.1.2.5		Span adjustment device (automatic and semi-automatic): external influence impossible after securing	Existing <input checked="" type="checkbox"/> Non-existent <input type="checkbox"/>		
4.1.2.6		Gravity compensation: external influence on or access to impossible after securing	Existing <input type="checkbox"/> Non-existent <input checked="" type="checkbox"/>		
8.2.1	A.1	Technical information and data: characteristics of the instrument specifications of modules fractions p1 (modules tested separately) specifications of families specifications of components applicable descriptive documents (acc. To N° 1-11) specific declaration of the manufacturer limiting value of tilting defined by the manufacturer	x	/	
8.2.1.1			x	/	
3.10.2			/	/	
3.10.2.1			/	/	
3.10.4			/	/	
8.2.1.2			x		
5.3.6.1			x		
3.9.1.1			/	/	
8.2.2	A.2	Examination of: documents functions (spotchecks) test reports from other authorities	x		
4.2.1		Indicating device Reading: reliable, easy and unambiguous overall inaccuracy ≤ 0.2 e (analogue indication) size, shape and clarity by simple juxtaposition	x	/	
4.3.1			x	/	
4.2.2.1	A.3	Units of: mass price	x	/	
4.2.2.1		Form of indications: for one indication, one unit of mass scale interval in the form (1/2 or 5) x 10 ⁿ same scale interval for all indicating devices, printing devices and tare weighing devices	x		

R 76-2 page 51



Result of the Tests

Check List according to OIML R76-2



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Report page 41

4.2.2.2	Form of digital indication: at least one figure at right	<input checked="" type="checkbox"/>	
	Decimal sign: shall maintain its position (scale interval changed automatically)	<input checked="" type="checkbox"/>	
	separate at least one figure to the left and all to the right	<input checked="" type="checkbox"/>	
	on one line with the bottom of the figures	<input checked="" type="checkbox"/>	
	Zero: only one non-significant zero to the right	<input checked="" type="checkbox"/>	
	for values with decimal sign, non-significant zero only in third position	<input type="checkbox"/>	<input type="checkbox"/>
4.2.3	Limits: preventing of indication above Max + 9 e	<input checked="" type="checkbox"/>	
	preventing of indication below zero unless a tare device is in operation (-20d is accepted)	<input checked="" type="checkbox"/>	
4.2.4	"Approximate" displaying device: Existing <input type="checkbox"/> Non-existent <input checked="" type="checkbox"/> scale interval > Max/100 without being smaller than 20 e	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4.2.5	Semi-self indicating instruments: extension of self-indication range ≤ self-indication capacity	<input type="checkbox"/>	<input type="checkbox"/>
4.3.1	Analogue indication: thickness and length of scale marks	<input type="checkbox"/>	<input type="checkbox"/>
4.3.2	scale spacing	<input type="checkbox"/>	<input type="checkbox"/>
4.3.3	limit of movement below zero and above capacity of self-indication	<input type="checkbox"/>	<input type="checkbox"/>
4.3.4	damping of oscillations of displaying component	<input type="checkbox"/>	<input type="checkbox"/>
4.4.1	Changing of digital indication: after change in load, previous indication not longer than 1 s	<input checked="" type="checkbox"/>	
4.4.2	Stable equilibrium of digital indication: printed or stored weight values do not deviate more than 1 e from the final weight value	<input type="checkbox"/>	<input type="checkbox"/>
	zero or tare operations are within their accuracy requirements	<input checked="" type="checkbox"/>	
	No printing, data storage, zero-setting or taring during continuous or temporary disturbance of equilibrium	<input checked="" type="checkbox"/>	
4.4.3	Extended digital indication: Existing <input type="checkbox"/> Non-existent <input checked="" type="checkbox"/> not allowed when there is a differentiated scale division	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	displaying a smaller scale interval only during pressing a key	<input type="checkbox"/>	<input type="checkbox"/>
	at most, 5 s after manual command	<input type="checkbox"/>	<input type="checkbox"/>
	prevention of printing while the device is in operation	<input type="checkbox"/>	<input type="checkbox"/>
4.4.4	Digital indications other than primary indications: Existing <input type="checkbox"/> Non-existent <input checked="" type="checkbox"/> additional indications do not lead to any ambiguity to primary indications	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	quantities identified by units or symbols or signs thereof	<input type="checkbox"/>	<input type="checkbox"/>
	weight values (not weighed) shall be clearly identified or	<input type="checkbox"/>	<input type="checkbox"/>
	display only temporarily on manual command and	<input type="checkbox"/>	<input type="checkbox"/>
	shall not be printed	<input type="checkbox"/>	<input type="checkbox"/>
	the inoperative weighing mode is clear and unambiguously recognisable	<input type="checkbox"/>	<input type="checkbox"/>
4.4.5	Digital printing: Existing <input type="checkbox"/> Non-existent <input checked="" type="checkbox"/> clear and permanent	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	figures ≥ 2 mm high	<input type="checkbox"/>	<input type="checkbox"/>
	name or symbol of units above column of values	<input type="checkbox"/>	<input type="checkbox"/>
	behind column of values	<input type="checkbox"/>	<input type="checkbox"/>
	printing impossible when equilibrium not stable	<input type="checkbox"/>	<input type="checkbox"/>
4.4.6	Memory storage: Existing <input type="checkbox"/> Non-existent <input checked="" type="checkbox"/> storage, transfer, totalizing, etc. inhibited when equilibrium not stable	<input type="checkbox"/>	<input checked="" type="checkbox"/>

R 76-2 page 52

Report page 42

3.4.1	Auxiliary indicating device (Classes I and II only; not allowed on multi-interval instruments) Existing <input type="checkbox"/> Non-existent <input checked="" type="checkbox"/> If existent, type: rider <input type="checkbox"/> interpolation <input type="checkbox"/> differentiated scale division <input type="checkbox"/> complementary <input type="checkbox"/>
3.4.2	only to the right of decimal sign $d < e \leq 10 d$, $e = 10^3 \text{ kg}$ or $e = 1 \text{ mg}$ for class I with $d < 1 \text{ mg}$
3.6.3	Differences between results: between multiple indications: ≤ mpe <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> between digital indications and printout: zero <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> between two results: ≤ mpe for same load when method of balancing changed (semi-self-indicating) <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
3.6.4	Level indicator Existing <input checked="" type="checkbox"/> Non-existent <input type="checkbox"/> Tilting of instrument of class II, III, or IIII
3.9.1.1	a marking on the level indicator shows the limiting value of tilting <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> level indicator fixed firmly in a place clearly visible to the user <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> an automatic tilt sensor releases a display switch-off or other appropriate alarm signal <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> and inhibits the printout and data transmission <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
4.5	Zero-setting, -tracking and -indicating Existing <input checked="" type="checkbox"/> Non-existent <input type="checkbox"/> Initial zero-setting <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Automatic zero-setting <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> Semi-automatic zero-setting <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> Nonautomatic zero-setting <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> Zero-tracking <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> Zero-indicating <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>
4.5.1	Effect: shall not alter Max <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> A.4.2.1 Overall effect of: zero-setting <input type="checkbox"/> <input type="checkbox"/> = % zero-tracking <input checked="" type="checkbox"/> <input type="checkbox"/> = 4 % initial zero-setting <input checked="" type="checkbox"/> <input type="checkbox"/> = < 20 %
4.5.2	A.4.2.3 Accuracy: deviation ≤ 0.25 e <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
4.5.3	Multiple range: Existing <input checked="" type="checkbox"/> Non-existent <input type="checkbox"/> effective for greater weighing range (if switching when loaded possible) <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
4.5.4	Control of zero-setting: <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> separate from that of tare weighing device <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> Semi-automatic zero-setting: functions only in stable equilibrium and <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> if it cancels any previous tare operation <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
4.5.5	A.4.2.2 Zero-indicating device (digital indication): shows deviation ≤ 0.25 e <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> not mandatory if auxiliary indicating device or rate of zero-tracking ≥ 0.25 d/s <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
4.5.6	Automatic zero-setting: operates only when equilibrium stable and <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> indication has remained stable below zero at least 5 seconds <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
4.5.7	Zero-tracking: operates only when indication at zero or <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> at negative net value equivalent to gross zero and <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> equilibrium stable <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> corrections ≤ 0.5 d/s <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> when operates after tare, the overall effect may be 4 % of Max <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

R 76-2 page 53



Result of the Tests

Check List according to OIML R76-2



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Report page 43

		Tare devices	Existing	Non-existing
4.6	Tare weighing device	Tare weighing	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		Tare balancing	<input checked="" type="checkbox"/>	<input type="checkbox"/>
		Combined zero-setting and tare balancing	<input checked="" type="checkbox"/>	<input type="checkbox"/>
		Tare indicating	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		Type:	Additive <input type="checkbox"/>	Subtractive <input checked="" type="checkbox"/>
4.6.1		applicable requirements from 4.1 through 4.4 are fulfilled	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4.6.2		Tare weighing device:		
		$d_T = d$	<input type="checkbox"/>	<input type="checkbox"/>
4.6.3	A.4.6.2	Accuracy:		
		$\pm 0.25 e$ (electronic instruments and instruments with analogue indication), $e = e_i$ for multi-interval	<input checked="" type="checkbox"/>	<input type="checkbox"/>
		better than $\pm 0.5 d$ (mechanical instruments with digital indication and instruments with auxiliary indicating device)	<input type="checkbox"/>	<input type="checkbox"/>
4.6.4		Operation range:		
		prevention of operation at		
		- at its zero effect	<input checked="" type="checkbox"/>	<input type="checkbox"/>
		- or below its zero effect	<input checked="" type="checkbox"/>	<input type="checkbox"/>
		prevention of operation above its maximum indicated effect	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4.6.5		Visibility of operation:		
		operation indicated	<input checked="" type="checkbox"/>	<input type="checkbox"/>
		net with sign "NET", "Net", "net" or complete word (digital indication)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
		NET disappears if gross displayed temporarily	<input type="checkbox"/>	<input type="checkbox"/>
		tare value or letter "T" (mechanical additive tare device)	<input type="checkbox"/>	<input type="checkbox"/>
4.6.6		Subtracting tare:		
		prevention of use above Max or indication that capacity is reached	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4.6.7		Multiple range:		
		operation effective in greater weighing ranges if switching when loaded possible	<input checked="" type="checkbox"/>	<input type="checkbox"/>
		tare values are rounded to the scale interval of the actual weighing range which is in operation	<input type="checkbox"/>	<input type="checkbox"/>
4.6.8		Semi-automatic or automatic tare:		
		operation only in stable equilibrium	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4.6.9		Combined zero/tare:		
		accuracy (4.5.2)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
		zero-indicating device (4.5.5)	<input type="checkbox"/>	<input type="checkbox"/>
		zero-tracking (4.5.7)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4.6.10		Consecutive tare operations:		
		indicated or printed tare weight values clearly designated (if tare devices operative at the same time)	<input type="checkbox"/>	<input type="checkbox"/>
4.6.11		Printing net or gross:		
		without designation	<input type="checkbox"/>	<input type="checkbox"/>
		designation:		
		by G or B (gross)	<input type="checkbox"/>	<input type="checkbox"/>
		by N (only net printed)	<input type="checkbox"/>	<input type="checkbox"/>
		designation of net and tare by N and T (if net printed with gross and/or tare)	<input type="checkbox"/>	<input type="checkbox"/>
		instead of G, B, N and T, complete words	<input type="checkbox"/>	<input type="checkbox"/>
		printing separately net and tare with identification (determined by different tare devices)	<input type="checkbox"/>	<input type="checkbox"/>

R 76-2 page 54

Report page 44

		Preset tare	Existing	Non-existing
4.7.1		$d_T = d$ or automatically rounded to d	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		transferred from one range to another one with larger e , shall be rounded to the latter (multiple range)	<input type="checkbox"/>	<input type="checkbox"/>
		tare value $\leq \text{Max}$, for the same net weight value (multi-interval) and calculated net value rounded to the scale interval for the same net weight value	<input type="checkbox"/>	<input type="checkbox"/>
		4.6.10 applies	<input type="checkbox"/>	<input type="checkbox"/>
		cannot be modified/cancelled if tare operated after the preset tare is still in use	<input type="checkbox"/>	<input type="checkbox"/>
4.7.2		operates automatically if clearly identified with load	<input type="checkbox"/>	<input type="checkbox"/>
4.7.3		4.6.5 applies	<input type="checkbox"/>	<input type="checkbox"/>
		possibility to indicate preset tare	<input type="checkbox"/>	<input type="checkbox"/>
		if calculated net printed then preset tare value is printed as well	<input type="checkbox"/>	<input type="checkbox"/>
		4.6.11 applies	<input type="checkbox"/>	<input type="checkbox"/>
		designation of preset tare by PT or complete word	<input type="checkbox"/>	<input type="checkbox"/>
		Locking devices	Existing <input type="checkbox"/>	Non-existing <input type="checkbox"/>
4.8.1		Positions:		
		only two stable positions	<input type="checkbox"/>	<input type="checkbox"/>
		weighing only in "weigh" position	<input type="checkbox"/>	<input type="checkbox"/>
4.8.2		positions clearly shown	<input type="checkbox"/>	<input type="checkbox"/>
		Multiple ranges	Existing <input checked="" type="checkbox"/>	Non-existing <input type="checkbox"/>
4.10		Selection of weighing ranges:		
		range in operation clearly indicated	<input checked="" type="checkbox"/>	<input type="checkbox"/>
		selection from smaller to greater range possible at any load (manual)	<input type="checkbox"/>	<input type="checkbox"/>
		selection from smaller to the following greater range (automatic) possible only for load $\geq \text{Max}$ of smaller range	<input checked="" type="checkbox"/>	<input type="checkbox"/>
		selection from a greater to a smaller range (manually) or to the smallest range (automatically) only	<input type="checkbox"/>	<input type="checkbox"/>
		- at no load when zero or negative net value is indicated	<input type="checkbox"/>	<input type="checkbox"/>
		- tare is cancelled automatically	<input type="checkbox"/>	<input type="checkbox"/>
		- zero is set to $\pm 0.25 e_i$ automatically	<input type="checkbox"/>	<input type="checkbox"/>
		Selection between load receptors, transmitting and measuring devices	Existing <input type="checkbox"/>	Non-existing <input checked="" type="checkbox"/>
4.11.4.11.1		compensation for unequal no-load effect	<input type="checkbox"/>	<input type="checkbox"/>
4.11.2		zero-setting without ambiguity and in accordance with 4.5	<input type="checkbox"/>	<input type="checkbox"/>
4.11.3		weighing impossible while selection	<input type="checkbox"/>	<input type="checkbox"/>
4.11.4		combinations easy identifiable	<input type="checkbox"/>	<input type="checkbox"/>
		"Plus" and "minus" comparator instruments		
4.12.1		Distinction of zones:		
		by "+" and "-" signs (analogue indication)	<input type="checkbox"/>	<input type="checkbox"/>
		by inscription (digital indication)	<input type="checkbox"/>	<input type="checkbox"/>
4.12.2		Scale:		
		with at least one scale division $d = e$ on either side of zero and value of $d = e$ shown at either end	<input type="checkbox"/>	<input type="checkbox"/>
		Mechanical counting instruments with unit weigh receptor		
4.17.1		Scale:		
		with at least one scale division $d = e$ on either side of zero and value of $d = e$ shown on the scale	<input type="checkbox"/>	<input type="checkbox"/>
4.17.2		Counting ratio:		
		shown clearly above each counting platform or each counting scale mark	<input type="checkbox"/>	<input type="checkbox"/>

R 76-2 page 55



Result of the Tests

Check List according to OIML R76-2



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Report page 47

4.13.3.3		Automatic tare: not allowed	/	/	/
4.13.4		Preset tare: indicated on separate display clearly differentiated from weight display reduction of tare value not permitted and cancelling of tare effect only if no load on the receptor impossible to operate if tare device in operation cancelled at the same time as PLU if associated with PLU	/	/	/
4.13.11		Self-service instruments: with one set of scales or displays <input type="checkbox"/> two sets of scales or displays <input type="checkbox"/> instrument has two sets of scales or displays Primary indications shall include the product designation if a ticket is printed	/	/	/
4.14		Price computing instruments and price scales (direct sales to the public)	/	/	/
4.14.1		Requirements of 4.13 for direct sales to the public are met Supplementary primary indications (4.13.6) unit price price to pay if applicable number, unit price and price to pay for non-weighted articles, price totals	/	/	/
4.14.2		Price scales: 4.2 and 4.3.1 through 4.3.3	/	/	/
4.3.1- 4.3.3		error of price scale $ W \times U - P \leq e \times U$	/	/	/
4.14.3		Price computing: multiplication of indicated weight and unit price as indicated rounding to nearest interval of price to pay unit price: price / 100 g or price / kg Indications of weights, unit price and price to pay visible: while load on load receptor and for at least 1 s after stable weight indication or after any introduction of unit price freezing for ≤ 3 s after removing load and not possible to introduce or change unit price (if indication has been stable before and would otherwise be zero) printing weight, unit price and price to pay	/	/	/
		Stored in memory: before printing same data not to be printed twice for customer	/	/	/
4.14.4		Additional functions for trade and management: if all transactions are printed for customer and they shall not lead to confusion	/	/	/
4.14.4.1		Prices-to-pay (positive or negative) of non-weighted articles: weight indication zero or weighing mode inoperative prices shall be shown on price-to-pay display Prices for more than one equal articles: number of articles shown on weight display without being take for a weight price for one article shown on unit price display supplementary display for number of articles and/or article prices	/	/	/

R 76-2 page 58

Report page 48

4.14.4.2		Totalization of transactions on one or several tickets: price total indicating on price-to-pay display and printed accompanied by a special word or symbol and reference to commodities whose prices are totalized if a separate ticket is issued for total all prices-to-pay shall be printed and price total shall be the algebraic sum of these printed prices Totalization of transactions from linked instruments: price-to-pay scale intervals of all connected instruments identical	/	/	/
4.14.4.3		Instrument used by several vendors or the serve more than one customer at the same time: connection between transactions and vendor or customer identified	/	/	/
4.14.4.4		Cancelling previous transactions: transaction is already printed: the price-to-pay cancelled shall be printed with comment transaction not yet printed and displayed to customer: transaction clearly differentiated from normal transactions	/	/	/
4.14.4.5		Printing additional information: clearly correlated to transaction and does not interfere with assignment of weight value to unit symbol	/	/	/
4.16		Price labelling instruments requirements 4.13.6, 4.14.3 (paragraphs 1 and 5), 4.14.4.1 (paragraph 1) and 4.14.4.5 are met Display: for weight possibility to verify values of unit price and preset tare during the use of the instrument Printing: prevention of printing below Min labels with fixed values of weight, unit price and price-to-pay allowed provided weighing mode is inoperative	/	/	/
4.18.1		Mobile instruments used outside means to indicate that the limiting value of tilting has been exceeded and to inhibit printout and data transmission automatic zero-setting or tare balancing operation after each moving of the vehicle indication when instrument is not in the weighing window equipped with an appropriate protection system if the load measuring device is sensitive to moving or driving influences prevention of wrong weighing results if the cardanic suspension system or load receptor comes into contact with the surrounding frame construction	/	/	/
4.18.2		Other mobile instruments not to be used outside with a levelling device and a level indicator the levelling device shall be operated easily without tools appropriate inscription pointing the user to the necessity of levelling after each movement	/	/	/

R 76-2 page 59



Result of the Tests

Check List according to OIML R76-2



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Report page 50

17.4		Software-controlled digital devices and instruments				
R 76-1 Requirement	Testing procedures			PASSED	FAILED	Remarks
Devices with embedded software						
5.5.1	G.1	Declaration of the manufacture that the software				
		- is used in a fixated hardware and software environment, and		x		
		- cannot be modified or uploaded by any means after securing / verification		x		
		The software documentation contains:				
		- description of the legally relevant functions		x		
		- software identification		x		
		- description how to check the actual software identification		x		
		The software identification is				
		- clearly assigned to the legally relevant software and functions		x		
		- provided by the instrument as documented		x		
Personal computers, instruments with pc components, and other instruments, devices, modules, and elements with programmable or loadable legally relevant software						
			Existent	<input checked="" type="checkbox"/>	Non-existent	
5.5.2.2 d	G.2.1	The legally relevant software is				
		- documented with all relevant information		/	/	
5.5.2.2 a		- protected against accidental or intentional changes		/	/	
5.5.2.2 a		Evidence of intervention is available until the next verification / inspection		/	/	
5.5.2.2	G.2.2.1	Operation system / programs not accessible for the user				
		description of all commands via keys or interfaces		/	/	
		declaration of completeness of commands		/	/	
5.5.2.2	G.2.2.2	Operating system / programs accessible for the user				
		checksum or signature generated over the machine code of the legally relevant software		/	/	
		legally relevant software cannot be started if the code is falsified		/	/	
	G.2.2.3	In addition to the cases G.2.2.1 or G.2.2.2				
		device-specific parameters sufficiently protected		/	/	
		audit trail for the protection of the parameters and description		/	/	
		some practical spot checks performed		/	/	
5.5.2.2 b	G.2.3	Software interfaces				
		If there is associated software providing other than measuring functions, the legally relevant software part				
		- is separated from associated software		/	/	
		- identified		/	/	
		- cannot be influenced by the associated software		/	/	
		program modules of legally relevant software are defined and separated from the modules of associated software by a defined protective software interface		/	/	
		protective software interface itself is part of the legally relevant software		/	/	
		software that can be released via the protective software interface		/	/	
		description and definition of parameters that may be exchanged via the protective software interface		/	/	

(1) Checked by verifying the compliance with documents or by simulating faults; this check does not duplicate the disturbance tests 12.1 through 12.7.

R 76-2 page 61

Report page 51

17.4		Software-controlled digital devices and instruments		PASSED	FAILED	Remarks
R 76-1 Requirement	Testing procedures					
5.5.2.2 c	G.2.4	description of the functions and parameters conclusive and complete				
		each documented function and parameter does not contradict to the requirements of this recommendation				
		appropriate instructions for the application programmer concerning the protectiveness of the software interface				
		Software identification				
		the legally relevant software is identified by a software identification				
		the software identification				
		- covers all program modules of the legally relevant software and the type-specific parameters at runtime of the instrument				
		- is easily provided by the instrument				
		- can be compared with the reference identification fixed at type approval				
		spot checks whether the checksums (signatures) are generated and work as documented				
5.5.3	G.3.1	there exists an effective audit trail				
		Data storage devices (DSD)				
		Existing <input type="checkbox"/> Non-existent <input checked="" type="checkbox"/>				
		DSD realised with embedded software (examine software acc. to G.1)				
		Yes <input type="checkbox"/> No <input type="checkbox"/>				
		DSD realised with programmable/loadable software (examine software acc. to G.1)				
		Yes <input type="checkbox"/> No <input type="checkbox"/>				
		documentation with all relevant information				
		sufficient storage capacity for the intended purpose				
		data are stored and given back correctly				
5.5.3.1	G.3.2	sufficient description of measures to prevent data loss				
5.5.3.2	G.3.3	earlier weighing, i.e. gross, net, tare values, decimal signs, units, identifications of the data set, instrument number, load receptor, (if applicable), checksum / signature of the data set stored.				
5.5.3.3	G.3.4	protection of the stored legally relevant data against accidental or intentional changes				
		protection of the stored legally relevant data at least with a parity check during transmission to the storage device				
		parity check of a storage device with embedded software (5.5.1)				
		protection of the stored legally relevant data by an adequate checksum or of a storage device with programmable or loadable software (5.5.2)				
5.5.3.4	G.3.5	identification and indication of the stored legally relevant data with an identification number				
5.5.3.5	G.3.6	record of the identification number on the official transaction medium, i.e. on the print-out				
5.5.3.6	G.3.7	automatic storage of the legally relevant data				
5.5.3.6		a device subject to legal control prints or displays the stored legally relevant data for verifying				

☒ Passed
☐ Failed

R 76-2 page 62



Result of the Tests

OIML Report according to OIML R76-2



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin

REPORT

N° 1.12- [REDACTED]

on the

Type Examination of a
Non-Automatic Weighing Instrument

Type:	[REDACTED]
Manufacturer:	[REDACTED]

The type was tested under the following requirements:
R 76-1, edition 2006 *)

This report belongs to the OIML Certificate N° R76/2006-DE1-13.03 and includes 11 pages.

*) This includes the requirements of the European Directive 2009/23/EC.

Report page 2

CONTENTS

	page
SUMMARY OF THE EXAMINATION	3
GENERAL INFORMATION CONCERNING THE PATTERN	4

Annex 1 TEST REPORT No. 1.12- [REDACTED] /1: TYPE [REDACTED] (RANGE 1: Max 150 kg)
See separate test report (51 pages)

Annex 2 TEST REPORT No. 1.12- [REDACTED] /2: TYPE [REDACTED] (RANGE 2: Max 250 kg)
See separate test report (28 pages)

Annex 3 TEST REPORT No. 1.12- [REDACTED] /3: TYPE [REDACTED] (RANGE 3: Max 300 kg)
See separate test report (28 pages)



Result of the Tests

OIML Report according to OIML R76-2



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Report page 3

Summary of the examination

Subject of the type examination was the non-automatic electromechanical weighing instrument of type [REDACTED]; M with the following specifications:

type designation:	[REDACTED]
maximum capacity:	300 kg
verification scale interval	50 g
number of verification scale intervals	3000 (accuracy class (III))

In addition to the examination of the documents, tests were performed on one weighing instrument, type [REDACTED] (see test report No 1.12-[REDACTED]/1-3).

The type is constructed for medical applications and electronic weighing of sitting persons.

All metrological tests were performed by the PTB. The checklist has been performed by PTB. The EMC-Test were performed by TÜV Nord CERT GmbH, Abteilung EMV Service, EMC-Laboratory.

Result

On the basis of the performance tests and the examination of the instrument mentioned above and the documentation, the weighing instrument is permitted to comprise the functions, devices and characteristic features stated in the "general information concerning the pattern"; they fully meet the requirements of R 76-1 (and thus the requirements of the European Directive 2009/23/EC).

Date of report: 22.07.2013

Signature: _____



Result of the Tests

Annex of the OIML Report



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Report page 4

GENERAL INFORMATION CONCERNING THE PATTERN

1 Design of the instrument

1.1 Design

Non-automatic electromechanical personal scale without lever apparatus for the medical sphere, for use by people in a sitting position, types [REDACTED] (see figure 1 - 4).

1.2 Measuring sensor

1.2.1 Load receptors and force transmitting devices
Load receptor and load cell are mounted on a wheeled frame. The force of the load receptor is directly applied to the load cell.

1.2.2 Load cells

The scale is fitted with a platform load cell.

The following types of load cells may be used: HBM Hottinger Type PW10AC3/C4 or Vishay Precision Group Type 1242 H2

Manufacturer	Type	Max load	Class
HBM Hottinger	PW10AC3/C4	300 kg	C3 / C4
Vishay Precision Group	1242 H2	300 kg	C4

1.3 Measurement value processing

1.3.1 Weighing instrument

PCB consisting of an A/D converter with microcontroller, EEPROM, 5-digit LCD with special display indicators

1.3.2 Software

- The following software version is approved:

Software	Software version	Software identification
CHS-Software	01.yy ¹⁾	CE5C

¹⁾ The wildcard "y" is for modification of software not subject to legal control.

1.4 Indication of the measurement results

See figure 2 and 4

Report page 5

1.5 Permitted functions and devices

	Reference to R76-1	E	F,G,H	I	M
Initial zero-setting device, 20 % of Max	T.2.7.2.4	•	•	•	•
Zero-tracking device, 4 % of Max	T.2.7.3	•	•	•	•
Semi-automatic tare-balancing device, subtractive	T.2.7.4.1	•	•	•	•
Preset tare device (PT)	T.2.7.5	•	•	•	•
Single range instrument		-	•	-	-
Multiple range instrument, indication of the weighing ranges [1], [2] and [3]	T.3.2.7	•	-	•	•
Indication of the GAL-value (Gravitational Acceleration Local)		•	•	•	•
Automatic adjustment of GAL value during initial start-up		•	•	•	•
Indication of software version and check digit		•	•	•	•
Device for displaying the "calibration counter" (see 6.2)		•	•	•	•
Display segment test after switch-on	5.3.1	•	•	•	•

- always available
- optionally available
- not available

1.6 Technical documents

The documents appendant to this certificate are deposited at the notified body in the set of certification documentation No. ZDS-R76/2006-DE1-13.03. The index of the set of certification documentation has been stamped by the notified body and it has been sent to the owner of the certificate.

1.7 Optional devices and functions not subject to legal control

- electronic body length measurement
- Device for indicating the Body-Mass-Index (BMI)
- Manual hold and auto hold setting-up
- 2 in 1 function
- Optional automatic indication switch off at inactivity of the scale

2 Technical Data

2.1 Weighing instruments

Type	[REDACTED]	[REDACTED]	[REDACTED]
	multi range instrument		
Accuracy class	III		
Min (Min ₁ Min ₂ Min ₃)	1 kg 2 kg	1 kg 2 kg	1 kg 2 kg 4 kg
Max (Max ₁ Max ₂ Max ₃)	50 kg 200 kg	150 kg 250 kg	150 kg 250 kg 300 kg
e (e ₁ e ₂ e ₃)	0.05 kg 0.1 kg	0.05 kg 0.1 kg	0.05 kg 0.1 kg 0.2 kg
n (n ₁ n ₂ n ₃)	1000 2000	3000 2500	3000 2500 1500
Tare-balancing range, sub.	Max	Max	Max



Result of the Tests

Annex of the OIML Report



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Report page 6

Type			
	single range instrument		
Accuracy class	III		
Min	2 kg	1 kg	2 kg
Max	300 kg	150 kg	150 kg
e	0.1 kg	0.05 kg	0.1 kg
n	3000	3000	1500
Tare-balancing range, sub.	Max	Max	Max

Environmental conditions and influences:

- Climatic: Temperature range: +10 °C to +40 °C
Humidity: up to 85 % at 40 °C, not condensing
- Mechanical: not applicable
- Electromagnetic: OIML R76 (2006) except B.3.7

3 Interfaces and peripheral devices

3.1 Interfaces

One or several of the following interfaces may be installed:

- Serial ISIS BUS interface für connection of optional modules like calibration und service devices
- UART interface for wireless transmission (SMF) of weight values which are not subject to legal control, optional

3.2 Devices which can be connected

For applications subject to mandatory verification:

- Additional devices, that are mentioned in another OIML-Certificate, as suitable for connection to weighing instruments.
- Simple peripheral devices which only receive data, without reference in another certificate, provided that they
 - comply with IEC 61000-4-1, 61000-4-2, 61000-4-3, 61000-4-4, 61000-4-6, and 61000-4-11,
 - are not capable of transmitting any data or instructions into the weighing instrument other than to release a printout or to check for correct data transmission,
 - print or indicate weighing results and other data as received from the weighing instrument without any modification or further processing and
 - comply with the applicable requirements of R 76:2006, edition 2006, i.e. No. 4.2, 4.4, 4.5, 4.6 and 4.7 may be connected to interfaces that transmit data in accordance with No. 5.3.6.3 of R 76-1, edition 2006.

For applications not subject to mandatory verification, any other additional devices may be connected.

4 Approval conditions and inscriptions

The weighing instrument has to be designed according to chapter 1.

5 Additional information for verification

5.1 Documents for the examination

- Copy of the OIML / type approval certificate including the Annex
- Operating instructions
- If applicable, copies of test certificate, parts- or evaluation certificate

Report page 7

- 5.2 Identification
- Hardware: See No. 1.1 and figures in No. 8
 - Software: See No. 1.3.2

The software version and identification can be checked as follows:

1. Press and hold any button (hold tare, bmi menu or send print) and start the scale with the start button.
2. The display will briefly show the segments, then the content of the calibration counter (i.e. the number of calibrations performed so far) flashes for 24 seconds.
3. During calibration counter display, again press and hold one of the buttons for more than 1.5 seconds (hold tare, bmi menu or send print).
4. After the calibration counter, the software identification and then the checksum are displayed for six seconds each.
5. To display the software identification and the checksum again, please switch off the scale and proceed once more from step 1.

- 5.3 Peripheral devices according to No. 3.2 have to be checked for their proper functioning.

6 Securing measures

6.1 Seals

Calibration stickers and seals should be affixed as shown in figures 1 to 4.

6.2 "Calibration counter"

Scale parameters (calibration) can be changed using the connected display part. At each calibration, a "calibration counter" implemented in the weighing module is always increased by one (up to max. 65000). Calibration counter status can be shown in the display part and compared with the validated specified value above the identification label. The scale is calibrated only if these values match.

To display the calibration counter contents, start the scale whilst simultaneously pressing another operating key. The display will briefly show the content of the calibration counter (i.e. the number of calibrations performed so far), flashing for 18 seconds.

7 Labelling and inscriptions

The positions for the descriptive plate can be found on the rear frame.

OIML

Scope of
OIML R76

Principle
Design

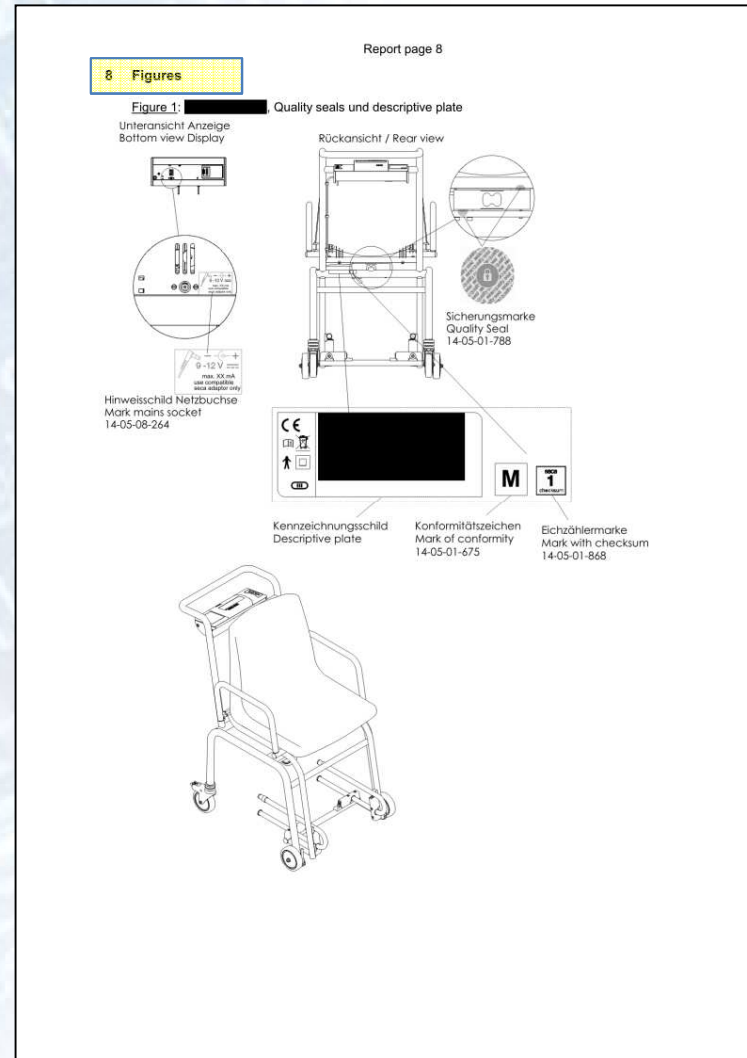
Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification





Result of the Tests

OIML Certificate of Conformity



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

Member State of OIML
Germany



OIML Certificate No.
R76/2006-DE1-13.03

OIML CERTIFICATE OF CONFORMITY

Issuing Authority

Name: Physikalisch-Technische Bundesanstalt
Address: Bundesallee 100, 38116 Braunschweig
Person responsible: Dr. Oliver Mack

Applicant

Name: [REDACTED]
Address: [REDACTED]

Manufacturer of the certified type is the applicant.

Identification of the certified type Non-automatic electromechanical weighing instrument for persons
Further characteristics see page 2

This Certificate attests the conformity of the above identified type (represented by the sample or samples identified in the associated Test Report) with the requirements of the following Recommendation of the International Organization of Legal Metrology (OIML):

R76-1, edition 2006,
for accuracy class III

This Certificate relates only to the metrological and technical characteristics of the type of instrument covered by the relevant OIML Recommendation identified above.

This Certificate does not bestow any form of legal international approval.

R3-0033

Page 1 of 3 pages

Physikalisch-Technische Bundesanstalt

OIML Certificate No.
R76/2006-DE1-13.03

The conformity was established by the results of tests and examinations provided in the associated Test Reports

No. 1.12- [REDACTED] /1 that includes 51 pages
No. 1.12- [REDACTED] /2 that includes 28 pages
No. 1.12- [REDACTED] /3 that includes 28 pages

The Issuing Authority

Dr. O. Mack
Head of Working Group
22.07.2013

The OIML Member

Dr. R. Schwartz
Head of Division
22.07.2013

Technical data:

Type	[REDACTED]	[REDACTED]	[REDACTED]
	multi range instrument		
Accuracy class	III		
Min (Min ₁ Min ₂ Min ₃)	1 kg 2 kg	1 kg 2 kg	1 kg 2 kg 4 kg
Max (Max ₁ Max ₂ Max ₃)	50 kg 200 kg	150 kg 250 kg	150 kg 250 kg 300 kg
e (e ₁ e ₂ e ₃)	0.05 kg 0.1 kg	0.05 kg 0.1 kg	0.05 kg 0.1 kg 0.2 kg
n (n ₁ n ₂ n ₃)	1000 2000	3000 2500	3000 2500 1500
Tare balancing range, subtractive	Max	Max	Max

Page 2 of 3 pages



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Initial Verification

(OIML R76, No. 8.3)

- may be performed by authorized personnel according to national regulations.
- shall not be performed unless conformity of the instrument to the approved type and/or the requirements of this Recommendation is established.
- The instrument shall be tested at the time of installation and ready for use, unless it can be readily shipped and installed after initial verification.
- may be carried out at the manufacturer's facility or at any other location:
 - a) if transport to the location of use does not require dismantling of the instrument;
 - b) if putting the instrument into service at its location of use does not require assembly of the instrument or other technical installation work likely to affect the instrument's performance
 - c) if the gravity value at the location at which the instrument will be put into service is taken into consideration or if the instrument's performance is insensitive to gravity variations.
- In all other cases, the tests shall be carried out at the location where the instrument will be used.



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Initial Verification

(OIML R76, No 8.3)

- If the instrument's performance is sensitive to gravity variations the procedures of verification may be carried out in two stages, where the second stage shall comprise all examinations and tests of which the outcome is gravity-dependent, and the first stage all other examinations and tests.
- The second stage shall be carried out at the location where the instrument will be used.
- Instead of a location of use, a gravity zone or a zone of use may be defined provided that the instrument meets the respective national or regional requirements as regards gravity.



Initial Verification



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Conformity

(OIML R76, No 8.3.1)

A declaration of conformity to the approved type and/this Recommendation shall cover:

- correct operation of all devices, e.g. zero-setting, tare, and calculating devices;
- construction material and design, as far as they are of metrological relevance;
- proof of compatibility of the modules if the modular approach has been chosen
- if appropriate, a list of the tests performed.

Visual inspection

(OIML R76, No. 8.3.2)

Before testing, the instrument shall be visually inspected for:

- metrological characteristics, i.e. accuracy class, Min, Max, e , d
- identification of software if applicable
- identification of modules if applicable
- prescribed inscriptions and positions for verification and control marks.

If the location and conditions of use of the instrument are known, it should be considered whether they are appropriate.



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Tests

(OIML R76, No. 8.3.3)

Tests shall be carried out to verify compliance with the following requirements:

- errors of indication
(refer to OIML R76, No. 3.5.1, 3.5.3.3 , 3.5.3.4 and A.4.4 to A.4.6)
- accuracy of zero-setting and tare devices
(refer to OIML R76, No. 4.5.2 and 4.6.3, A.4.2.3 and A.4.6.2);
- repeatability
(refer to OIML R76, No. 3.6.1 and A.4.10, 3rd paragraph);
- eccentric loading
(refer to OIML R76, No. 3.6.2 and A.4.7);
- Discrimination (not applicable for instruments with digital indication)
(refer to OIML R76, No. 3.8 and A.4.8);
- tilt in case of mobile instruments
(refer to OIML R76, No. 4.18 and A.5.1.3)
- sensitivity of non-self-indicating instruments
(refer to OIML R76, 6.1 and A.4.9).



Initial Verification



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Tests

(OIML R76, No. 8.3.3)

- Other tests may be performed in special cases.
 - e.g. in the case of unusual construction, doubtful results, or as indicated in the respective OIML Certificate)
- The authority responsible may, in special cases, require the applicant to supply
 - test loads,
 - equipment
 - personnel to perform the tests

(OIML R76, No. 3.7)
- For all tests, the error limits to be respected shall be the maximum permissible errors upon initial verification.
- If the instrument is to be shipped to another location after initial verification, the difference in local gravity acceleration between the locations of testing and use shall be considered appropriately.
 - e.g. by a second stage of initial verification after adjustment
 - by taking into consideration the local gravity value of the location of use during initial verification.



OIML

Scope of
OIML R76

Principle
Design

Characteristics

Indication
and Errors

Test
Procedure

Certification

Initial
Verification

Marking and securing

(OIML R76, No. 8.3.4)

- According to national legislation, initial verification may be testified by verification marks.
- These marks may indicate the month or year when initial verification took place, or when reverification is due.
- National legislation may also require securing of components whose dismantling might alter the metrological characteristics of the instrument without the alterations being clearly visible.
- The provisions
 - Securing of components and pre-set controls (OIML R76, 4.1.2.4)
 - Verification marks (OIML R76, 7.2)shall be observed.



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