



## **Verification of non-automatic weighing instruments**

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## General information concerning the type

Application no.: .....  
 Type designation: .....  
 Manufacturer: .....  
 Applicant: .....  
 Instrument category: .....

Complete instrument       Module<sup>1</sup> with error fraction  $p_1 =$

Accuracy class<sup>2</sup>:       I       II       III       IIII

Self-indicating       Semi-self-indicating       Non-self-indicating

Min =

$e =$        Max =        $d =$         $n =$

$e_1 =$ <input type="text"/>	Max <sub>1</sub> = <input type="text"/>	$d_1 =$ <input type="text"/>	$n_1 =$ <input type="text"/>
$e_2 =$ <input type="text"/>	Max <sub>2</sub> = <input type="text"/>	$d_2 =$ <input type="text"/>	$n_2 =$ <input type="text"/>
$e_3 =$ <input type="text"/>	Max <sub>3</sub> = <input type="text"/>	$d_3 =$ <input type="text"/>	$n_3 =$ <input type="text"/>

T = +       T = -

$U_{nom} =$   V       $U_{min} =$   V       $U_{max} =$   V       $f =$   Hz      Battery,  $U_{nom} =$   V

Zero-setting device:

Tare device:

<input type="checkbox"/> Non-automatic	<input type="checkbox"/> Tare balancing	<input type="checkbox"/> Combined zero/tare device
<input type="checkbox"/> Semi-automatic	<input type="checkbox"/> Tare weighing	
<input type="checkbox"/> Automatic zero-setting	<input type="checkbox"/> Preset tare device	
<input type="checkbox"/> Initial zero-setting	<input type="checkbox"/> Subtractive tare	
<input type="checkbox"/> Zero-tracking	<input type="checkbox"/> Additive tare	

Initial zero-setting range =  % of Max      Temperature range:  °C

Printer:       Built-in       Connected       Not present but connectable       No connection

# Important note

For each test, the “SUMMARY OF TYPE EVALUATION” and the “CHECKLIST” shall be completed according to this example:

when the instrument has passed the test:  
 when the instrument has failed the test:  
 when the test is not applicable:

PASSED	FAILED
X	
	X
-	-

/ A slash

- A dash

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

Passed       Failed

Initial zero-setting

A cross

	At start	At max	At end	
Temp.:	20.5		21.2	°C
Rel. h.:				%
Time:				
Bar. pres.:				hPa

# Conformity and Visual Inspection in initial verification

## 8.3.1 Conformity

A declaration of conformity to the approved type and/or 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 according to 3.10.2 has been chosen; and
- if appropriate, a list of the tests performed.

## 8.3.2 Visual inspection

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; and
- 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.

# What is recommended to do?

Type of NAWI (Mechanical, or Digital; Self indicating or others)

Check the describing Marking

Check the securing

Check the lever or tilt sensor or not exist

Check Functions of the zero or tare device and so on



**Seals are used to protect this instrument.**

# Technical requirements

## ◆ 4.2.3 Limits of indication

- ◆ There **shall be no indication above Max + 9 e.**
- ◆ An indication below zero (with minus sign) is possible when a tare device is in operation and the tare load has been removed from the load receptor.
- ◆ It is also possible **that negative values down to -20 d are displayed even if there is no tare device in operation, provided these values cannot be transmitted, printed or used for a price calculation.**

# Zero-setting device

- ◆ 1. Non-automatic zero-setting device
- ◆ 2. Semi-automatic zero-setting device
- ◆ 3. Automatic zero-setting device
- ◆ 4. Initial zero-setting device
- ◆ 5. Zero tracking device

# Tare device

- ◆ Additive tare device
  - ◆ Do not change the weighing range
- ◆ Subtractive tare device
  - ◆ Do change the weighing range
- ◆ Tare balancing
  - ◆ Without the indication of tare value
- ◆ Tare weighing
  - ◆ With the indication of tare value
- ◆ Preset Tare



## Preset Tare

### **T.2.7.5 Preset tare device**

Device for subtracting a preset tare value from a gross or net weight value and indicating the result of the calculation. The weighing range for net loads is reduced accordingly.

Key button(PT) or software button defined by the manufacture

## ◆ 4.7 Preset tare devices

### ◆ 4.7.1 Scale interval

- ◆ Regardless of how a preset tare value is introduced into the device, **its scale interval shall be equal or automatically rounded to the scale interval of the instrument.**
- ◆ On a multiple range instrument a preset tare value may **only be transferred from one weighing range to another one with a larger verification scale interval but shall then be rounded to the latter.**
- ◆ For a multi-interval instrument, the preset tare value shall be rounded to **the smallest verification scale interval,  $e_1$** , of the instrument, and **the maximum preset tare value shall not be greater than  $Max_1$** . The displayed or printed calculated net value shall be rounded to the scale interval of the instrument for the same net weight value.

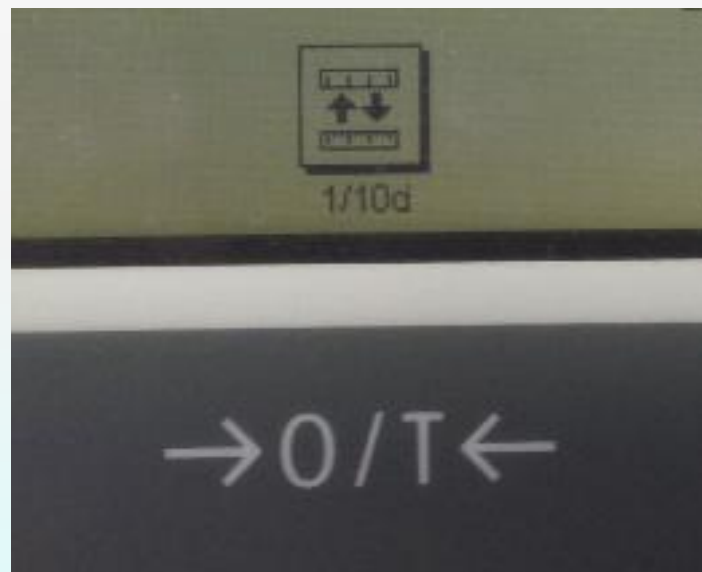
# Combined zero and tare device

## 4.6.9 Combined zero-setting and tare-balancing devices

If the semi-automatic zero-setting device and the semi-automatic tare-balancing device are operated by the same key, 4.5.2, 4.5.5 and if appropriate 4.5.7 apply at any load.



Separated



Combined

- ◆ **4.5 Zero-setting and zero-tracking devices**
  - ◆ An instrument may have one or more zero-setting devices and shall have not more than one zero-tracking device.

#### **4.5.1 Maximum effect**

The effect of any zero-setting device shall not alter the maximum weighing capacity of the instrument.

The overall effect of zero-setting and zero-tracking devices shall be not more than 4 %, and of the initial zero-setting device not more than 20 %, of the maximum capacity. This does not affect an instrument of class III, except if it is used for commercial transactions.

A wider range is possible for the initial zero-setting device if the instrument complies with 3.5, 3.6, 3.8 and 3.9 for any load compensated by this device within the specified range.

#### 4.5.4 Control of the zero-setting device

An instrument - except an instrument according to 4.13 and 4.14 - whether or not equipped with an initial zero-setting device, may have a combined semi-automatic zero-setting and semi-automatic tare-balancing device operated by the same key.

If an instrument has a zero-setting device and a tare-weighing device the control of the zero-setting device shall be separate from that of the tare-weighing device.

A semi-automatic zero-setting device shall function only:

- when the instrument is in stable equilibrium; and
- it cancels any previous tare operation.

# Zero-tracking device

## 4.5.5 Zero indicating devices on an instrument with digital indication

An instrument with digital indication shall have a device that displays a special signal when the deviation from zero is not more than  $\pm 0.25 e$ . This device may also work when zero is indicated after a tare operation.

This device is not mandatory on an instrument that has an auxiliary indicating or a zero-tracking device provided that the rate of zero-tracking is not less than  $0.25 d/\text{second}$ .

## 4.5.7 Zero-tracking devices

A zero-tracking device shall operate only when:

- the indication is at zero, or at a negative net value equivalent to gross zero;
- the equilibrium is stable; and
- the corrections are not more than  $0.5 d/\text{second}$ .

### # 3 Accuracy of zero-setting

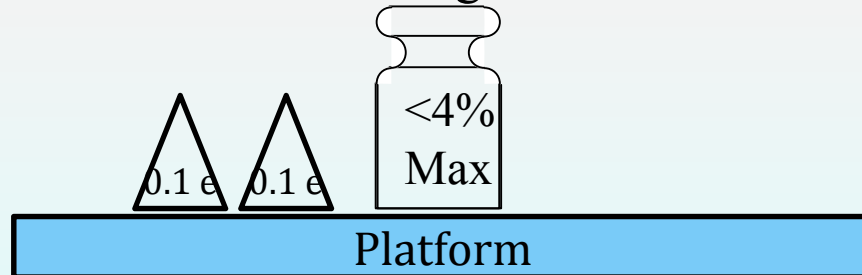
**Clause:** OIML R 76-1 Clauses 4.5.2, 4.6.3, A.4.2.3 and A4.6.2

#### **Procedure:**

For **Non-automatic and semi-automatic zero-setting**

1. Loading the instrument to an indication as close as possible to a changeover point

Add additional weights of  $0.1 e$  until the indication changed from 0 to  $1 e$



**NOTE: As close as possible to changeover point**

### A.4.2.3.1 Non-automatic and semi-automatic zero-setting

1. The accuracy of the zero-setting device is tested by first loading the instrument to **an indication as close as possible to a changeover point**,
2. and then by **initiating the zero-setting device** and **determining the additional load** at which the indication changes from zero to one scale interval above zero.
3. The **error at zero is calculated** according to the description in A.4.4.3.



# Accuracy of zero setting devices and tare devices

- ◆ Should be within  $\pm 0.25e$

In the case of zero-setting or tare balancing:

<b>Zero-setting</b>		$E_0 = I_0 + \frac{1}{2} e - \Delta L - L_0$			
No. *	Zero-load ( $< 4\%$ of Max)	Load, $L_0^{**}$ ( $10 e$ )	Indication, $I_0$ after zero-setting	Add. load, $\Delta L$	Error, $E_0$
1					
2					
3					
4					
5					

<b>Tare balancing</b>		$E_0 = I_0 + \frac{1}{2} e - \Delta L - L_0$			
No. *	Tare load (about $30\%$ of Max)	Load, $L_0^{**}$ ( $10 e$ )	Indication, $I_0$ , after tare balancing	Add. load, $\Delta L$	Error, $E_0$
1					
2					
3					
4					
5					

# Accuracy of tare devices

## ◆ 4.6.3 Accuracy

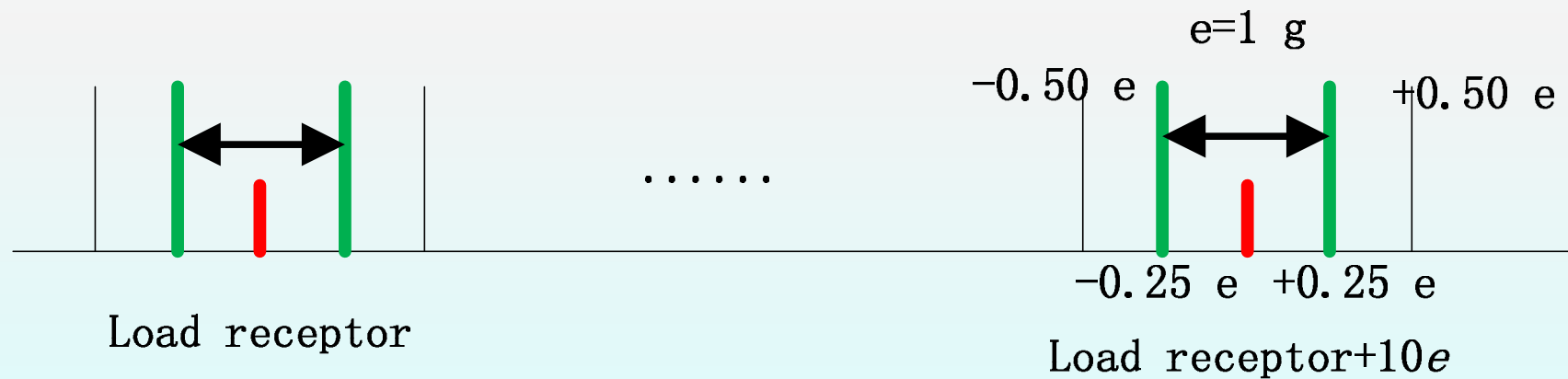
◆ A tare device shall permit setting the indication to zero with an accuracy better than:

- ◆  $\pm 0.25 e$  for electronic instruments and any instrument with analog indication; or
- ◆  $\pm 0.5 d$  for mechanical instruments with digital indication.
- ◆ On a multi-interval instrument  $e$  shall be replaced by  $e_1$ .

- ◆ **A.4.6.2 Accuracy of tare setting (4.6.3)**
- ◆ The test may be combined with A.4.6.1.
  - ◆ The accuracy of the tare device shall be established in a manner similar to the test described in A.4.2.3 **with the indication set to zero using the tare device.**

# Accuracy of zero setting devices and tare devices

- ◆ Combination test
  - ◆ zero-setting range test
  - ◆ Zero-setting accuracy test



# Weighing test

## A.4.4.1 Weighing test

Apply test loads from zero up to and including Max, and similarly remove the test loads back to zero. When determining the initial intrinsic error, at least 10 different test loads shall be selected, and for other weighing tests at least 5 shall be selected. The test loads selected shall include Max and Min (Min only if  $\text{Min} \geq 100 \text{ mg}$ ) and values at or near those at which the maximum permissible error (mpe) changes.

During type examination it should be noted that when loading or unloading weights the load shall be progressively increased or progressively decreased. It is recommended to apply the same procedure as far as possible during initial verification (8.3) and subsequent metrological control (8.4).

If the instrument is provided with an automatic zero-setting or zero-tracking device, it may be in operation during the tests, except for the temperature test. The error at zero point is then determined according to A.4.2.3.2.

- ◆ Before the test , for NAWI with the zero-setting device, it is recommended to zero the instrument first.

# Weighing test

- ◆ The same unit as NAWI indications
- ◆ The same effective digits as NAWI indications



10 g



0.5 g



Load L (g)	Indication I (kg)		Add. Load $\Delta L$ (g)		Error E (g)		Corrected error $E_c$ (g)		mpe ( $\pm$ g)
	↓	↑	↓	↑	↓	↑	↓	↑	
10	(*) 0.010	0.010	0.5	0.5	(*) 0.0	0.0	0.0	0.0	0.5
20	0.020	0.020	0.5	0.5	0.0	0.0	0.0	0.0	0.5
2000	2.000	2.000	0.5	0.5	0.0	0.0	0.0	0.0	1.0
2500	2.500	2.500	0.5	0.5	0.0	0.0	0.0	0.0	1.5
3000	3.000	/	0.5	/	0.0	/	0.0	/	1.5

# Auxiliary and extended indicating devices

## 3.4 Auxiliary indicating devices

### 3.4.1 Type and application

Only instruments of classes I and II may be fitted with an auxiliary indicating device, which shall be:

- a device with a rider;
- a device for interpolation of reading;
- a complementary displaying device (see Figure 4); or
- an indicating device with a differentiated scale division (see Figure 5).

These devices are permitted only to the right of the decimal sign.

A multi-interval instrument shall not be fitted with an auxiliary indicating device.

*Note:* Extended displaying devices (see T.2.6 and 4.4.3) are not regarded as auxiliary indicating devices.

### 4.4.3 Extended indicating devices

An extended indicating device shall not be used on an instrument with a differentiated scale division.

When an instrument is fitted with an extended indicating device, displaying the indication with a scale interval smaller than  $e$  shall be possible only:

- during pressing a key; or
- for a period not exceeding 5 seconds after a manual command.

In any case printing shall not be possible while the extended indicating device is in operation.



## Auxiliary and extended indicating devices

- ◆ Auxiliary, or extended indicating devices (3.4, 4.4.3, 4.13.7).
  - ◆ **4.13 Instruments for direct sales to the public**
  - ◆ 4.13.7 Auxiliary and extended indicating devices
    - ◆ An instrument shall not be fitted with an auxiliary indicating device nor an extended indicating device.

**Thank you very much for your  
attention!**

