

# **SADCMEL**

## **DOCUMENT 2**

### **METROLOGICAL AND TECHNICAL REQUIREMENTS FOR NON-AUTOMATIC, NON-SELF OR SEMI-SELF- INDICATING, UNGRADUATED COUNTER SCALES SUBJECT TO LEGAL METROLOGY CONTROL**

## **FOREWORD**

This document covers metrological and technical requirements for the regulation of non-automatic counter scales by legal metrology authorities within the SADCMEEL region. It is based on applicable requirements contained in OIML R 76-1 and incorporates additional requirements as deemed necessary to address conditions and design of instruments found in the region. It was drafted to give effect to the SADCMEEL aim of harmonising technical regulations within the region in order to eliminate technical barriers to trade.

# **METROLOGICAL AND TECHNICAL REQUIREMENTS FOR NON-AUTOMATIC, NON-SELF OR SEMI-SELF- INDICATING, UNGRADUATED COUNTER SCALES SUBJECT TO LEGAL METROLOGY CONTROL**

## **Scope**

This document specifies the metrological and technical requirements for non-automatic, non self- or semi-self indicating, ungraduated, vibrating counter scales that are subject to metrological control in terms of legal metrology legislation.

## **Definition**

Counter scale means an equal arm weighing instrument with pans above the beam and of a capacity of not more than 50kg.

## **Classes and use**

Counter scales shall be used for the measurement of general merchandise and need not be marked with an accuracy class.

*NOTE: Maximum permissible errors are based on errors allowed for an OIML R76 class III self indicating instrument of similar capacity and having the largest verification division permissible for that capacity.*

## **Construction**

### **1. Instruments with interchangeable parts.**

No measuring instrument shall have any readily interchangeable or reversible parts, unless the interchange or reversal does not affect the accuracy of the instrument.

### **2. Indication of reference position of equilibrium (balance position).**

a) A counter scale of the beranger type shall be fitted with an equilibrium indicating device consisting of two moving indices, the respective position of which indicates the reference position of equilibrium.

b) It is not mandatory for a counter scale of the roberval type with an exposed beam to be fitted with an equilibrium indicating device and equilibrium shall be indicated by the

beam being in the horizontal position. A scale of this type on which the beam is not visible, shall be fitted with an equilibrium indicating component of relative displacement to another indicating component, the two indices shall be of the same thickness and the distance between them shall not exceed this thickness, provided that this distance need not be less than 1mm, if the thickness of the endices is less than this value.

*NOTE: It is recommended that a scale with an exposed beam and fitted with an equilibrium indicating component should comply with this requirement.*

**3. Strength of construction.**

A counter scale shall be of such strength, design and construction that it maintains its metrological qualities and accuracy under normal conditions of use.

**4. Separation of components.**

Any counter scale of which the load transmitting device comprises a lever or levers with knife-edges and bearings shall be so constructed that the various components are not readily separable.

**5. Principle of operation.**

Counter scales shall operate on either the roberval or beranger principle

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**6. Hardness of contact parts.**

Contact parts of knives, bearings, friction plates, interlevers, interlever supports and links shall have a hardness of at least 58 Rockwell C.

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**7. Knives, bearings and friction plates.**

a) Types of connection.

Beams shall be fitted with knives only, these shall be pivoted on bearings. The line contact between knives and bearings shall be a straight line.

b) Knives.

The knives shall be fitted to the beam or levers in such a way that the invariability of the ratios of the beam or lever arms is assured. They shall not be welded or soldered. The edges of the knives of one and the same beam or lever shall be practically parallel and shall be situated in one plane.

## c) Bearings.

The bearings shall not be welded or soldered to their supports or in their mountings.

## d) Friction plates.

The longitudinal play of the knives shall be limited by friction plates. There shall be point contact between knife and friction plates and it shall be situated on the extension of the line(s) of contact between knife and bearing(s).

The friction plate shall form a plane through the point of contact with the knife and its plane shall be perpendicular to the line of contact between knife and bearing. It shall not be welded or soldered to the bearings or their support.

**8. Protective coating.**

A protective coating may be applied to the parts in contact of jointed components, provided that this does not lead to changes of metrological properties.

**9. Tare devices**

Counter scales shall not be fitted with a tare device.

**10. Materials and means of balancing**

Materials for balancing purposes shall be contained in a balance box that is:

- a) securely fixed to the under surface of a fixed scale pan or of the support for the scale pan, and;
- b) capable of containing lead or other similar suitable balancing material of a mass not exceeding 1% of the capacity of the scale, and;
- c) between 25% and 75% full of balancing material at the time of initial verification and after repair.

**Markings****1 Capacity marking**

The capacity of a counter scale shall be engraved, cast or stamped on the beam or on a metal plate permanently secured to some prominent part of the instrument in a manner such as “**capacity.....kg**”.

**2 Manufacturer**

On new counter scales the name or trademark of the manufacturer shall be marked.

## **Test Method**

### **1. General inspection and preparation for testing.**

Visually inspect the scale for compliance with requirements for construction and marking. Ensure that it is on a level base and in and in a position of equilibrium before testing commences.

### **2. Method to determine if the scale is within mpe.**

Should the scale not come to rest in a position of equilibrium when the required test load is applied, place an additional load equal to the applicable mpe for the applied load on the load receptor indicating the lighter load. The scale is considered to be within mpe if it attains or moves past a position of equilibrium. After each accuracy determination remove additional tolerance load before the next test commences.

### **3. Eccentric tests**

- a) Load the counter scale with masspieces of a mass as close as practical to one third of the marked maximum capacity, centrally on each load receptor.
- b) Should the scale not come to rest in a position of equilibrium, determine that it is within half the mpe specified in Table 1 for the applicable maximum capacity.
- c) Move the masspieces on each load receptor to the positions and in the sequence indicated in Diagram 1 (ie. place each set of masspieces at the number 1 position, then number 2 and so on). The masspieces on the goods load receptor shall be centrally situated in the quarter segment of the load receptor irrespective of the shape, unless the receptor has an upturned side intended to place goods against, in which case the masspieces shall be placed against this side. The masspieces on the masspiece load receptor shall be placed at the edges of the load receptor in each quarter segment.

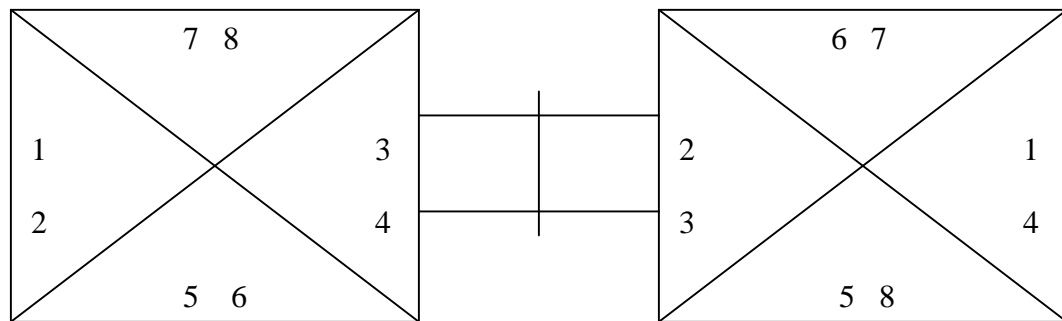


Diagram 1

- d) After each move check that the scale is within the mpe as specified in b).

#### 4. Accuracy tests at half load and Lateral Movement Test

- a) Load the counter scale with masspieces equivalent to half the marked maximum capacity, placed centrally on each load receptor.
- b) Should the scale not come to rest in a position of equilibrium, determine that it is within half the mpe specified in Table 1 for the applicable maximum capacity.
- c) Move the beam so that the knife edges move laterally or backwards and forwards in their bearings, within their limits of movement.
- d) After each movement, if the scale does not indicate equilibrium, determine that it is within the mpe specified in b).

#### 5. Accuracy at maximum capacity

- a) Load the counter scale with masspieces equivalent to the marked maximum capacity, placed centrally on each load receptor.
- b) Should the scale not come to rest in a position of equilibrium, determine that it is within the mpe specified in Table 1 for the applicable maximum capacity.

#### 6. Discrimination test

- a) Load the counter scale with masspieces equivalent to the marked maximum capacity, placed centrally on each load receptor.
- b) Should the scale not come to rest in a position of equilibrium, bring it to equilibrium by adding small masspieces.

- c) Add an additional load of 0,4 times the absolute value of the mpe specified in Table 1 for the applicable maximum capacity.
- d) The scale shall indicate a visible displacement from the equilibrium position.

## **7. Sensitivity test**

- a) Load the counter scale with masspieces equivalent to the marked maximum capacity, placed centrally on each load receptor.
- b) Should the scale not come to rest in a position of equilibrium, bring it to equilibrium by adding small masspieces.
- c) Add an additional load equal to the absolute value of the mpe specified in Table 1 for the applicable maximum capacity. The load shall be placed with a slight impact to eliminate the effects of discrimination threshold.
- d) The equilibrium indicating device or, for instruments not fitted with an equilibrium indicating device, the terminal knife edge of the beam shall be permanently displaced by a distance of at least:
  - 2 mm for a scale with a maximum capacity up to and including 30 kg,
  - 5 mm for a scale with a maximum capacity above 30 kg.
- e) Repeat a) to d) with a load equivalent to half the marked maximum capacity and using an additional load equal to half of the absolute value of the mpe specified in Table 1 for the applicable maximum capacity.

### **Application of verification mark.**

The verification mark shall be applied in one of the following ways:

- a) By means of a stamp on a lead plug inserted in an undercut hole in a conspicuous and easily accessible part of an exposed beam, or;
- b) In the case of an enclosed beam, by means of a stamp on a lead plug inserted in the housing or directly upon the housing in the case of a wooden housing, or;
- c) By means of a sticker applied externally to a conspicuous part of the base. Such sticker shall not be removable without destruction, or;
- d) By means of an imprinted lead seal secured to the base by inserting sealing wire through holes in the base in a conspicuous position that does not interfere with the metrological integrity of the counter scale.

**Maximum permissible errors (mpe)**

100 g up to and including 400 g	± 1 g
above 400 g up to and including 1 kg	± 2 g
above 1 kg up to and including 4 kg	± 5 g
above 4 kg up to and including 9 kg	± 10 g
above 9 kg up to and including 20 kg	± 20 g
above 20 kg up to and including 50 kg	± 50 g

**Table 1**

The above mpes apply to initial and subsequent verification.

The mpes applicable to inspection are twice those specified above.

