

TEST MANUALS FOR WEIGHTS (OTHER THAN CARAT WEIGHTS)

GENERAL

These manuals deal with the following categories of weights:

- (A) Iron weights, parallelepiped, (50kg to 5kg)
- (B) Cylindrical knob type weights, (10kg to 1kg)
- (C) Iron weights, hexagonal, (50kg to 50g)
- (D) Bullion weights, (10kg to 1g)
- (E) Sheet metal weights, (500mg to 1mg)

(A) IRON WEIGHTS, PARALLELEPIPED(RECTANGULAR BAR WEIGHTS), (50kg to 5kg)

1. DENOMINATIONS

Parallelepiped iron weights shall have the following denominations: -
Kilogram series: 50, 20, 10 and 5.

2. SHAPE

The weights shall be integral and in the form of parallelepiped rectangles with corners rounded off and having a rigid handle for ease of handling.

3. MATERIAL

(a) Body:

The body shall be made or manufactured from grey cast iron.

(b) Handles:

Handles shall be made or manufactured from the following materials:-

(i) Type 1 weights - Steel tube without soldering.

(ii) Type 2 weight – Cast along with the body.

(c) Method of Manufacture

The weights shall be made or manufactured by means of any suitable foundry and moulding process.

4.0 LOADING HOLES

- (a) The weights shall be provided with loading holes of either Type 1 or Type 2 indicated below:-

Type 1 loading hole

- (i) The loading hole shall be located within the tube which forms the handle

- (ii) The loading hole shall be closed either with a screwed brass plug or a brass disc. The screwed brass plug shall be provided with a screw-driver slot and the brass disc shall have a central hole to facilitate lifting.
- (iii) The plug or a disc shall be sealed by means of a lead pellet pressed firmly into an internal circular slot or in the threaded part of the tube.

Type 2 loading hole

- (i) The loading hole shall be cast in one of the upper surfaces of the weights and shall open out on the upper surface.
 - (ii) This loading hole shall be closed by a plate cut from mild steel.
 - (iii) The mild steel plate shall be closed by a lead pellet pressed firmly into the conical hole.
- (b) In case of new weights, about two-thirds of the depth of the loading hole shall remain empty after adjustment.

5.0 MARKINGS

- (d) The denomination of the weight and the marker's name or manufacturer's name or trade mark shall be indicated indelibly in the sunken form or in relief, on the upper surface of the central portion of the weight.
- (e) The denomination of the weight shall be indicated in the international form of numerals in an indelible manner with the symbol as illustrated below:
5 kg

6.0 DIMENSIONS

- (a) The dimensions of the two types of weights shall be as specified in Tables 1 and 2; as per sketches.
- (b) The tolerances on dimensions shall be ± 5 per cent.

7.0 FINISH

The weights shall be finished smooth and be free from dross, pits, blow-holes and other defects. They shall be protected against corrosion by applying an appropriate coating which is resistant to normal usage and wear and tear.

8.0 PERMISSIBLE ERROR

The maximum permissible errors shall be as specified below:

<i>Denomination (kg)</i>	<i>Verification (mg)</i>	<i>Inspection (mg)</i>
<i>50</i>	<i>8000</i>	<i>±8000</i>
<i>20</i>	<i>3200</i>	<i>±3200</i>
<i>10</i>	<i>1600</i>	<i>±1600</i>
<i>5</i>	<i>800</i>	<i>±800</i>

9.0 STAMPING

The inspector's seals shall be stamped on the lead pellet within the loading hold.

(B) CYLINDRICAL KNOB TYPE WEIGHTS (10kg to 1g)

1.0 DENOMINATIONS

Cylindrical weights shall have the following denominations:

gram series: 500, 200, 100, 50, 20, 10, 5, 2, and 1

kilogram series: 10, 5, 2 and 1.

2.0 SHAPE

The weights shall be integral and cylindrical in shape and provided with a flattened knob for ease of handling.

3.0 MATERIAL

The weights shall be made or manufactured from brass, gun metal or bronze; grey cast iron may also be used for weights from 10kg to 200g but grey cast iron weights shall not be used for weighing gold, silver, precious metals or their products.

4.0 METHOD OF MANUFACTURE

The weights shall be made or manufactured by any suitable method as may be applicable to the selected material.

5.0 LOADING HOLE

- Weights of denominations 10g to 1g, both inclusive, shall be solid, integral weights without a loading hole.
- Weights of denominations 10kg to 20g both inclusive, shall be provided with a loading hole.
- The loading hole shall be cylindrical and shall pass through the axis of the weight open out on the upper surface of the knob and have wider diameter at

- its upper end.
- (d) The loading hole shall be closed either by means of a threaded brass plug or a flat brass disc.
- NOTE:** (i) the threaded used shall be that commonly known as 'ISO Metric'
- (ii) The threaded plug shall have a slot for adjusting it by means of a screw driver
- (iii) The flat disc shall be provided with a suitable hole in the centre to facilitate handling
- (e) The plug or the flat disc shall be closed by means of lead pellet pressed firmly into the circular groove in the wider part of the loading hole.
- (f) Weights without a loading hole shall be adjusted by machining or grinding.
- (g) Weights with loading hole shall be adjusted with heavy metallic materials such as lead shots.
- (h) In the case of new weights about two-third of the depth of the loading hole shall remain empty after adjustment.

6.0 MARKING

- (a) The denomination of the weight and the maker's or manufacturer's name or Trade mark shall be indicated indelibly, in the sunken form or in relief, on the flat knob.
- (b) The denomination of weights of 10 kilograms to 500grams may also be indicated on the cylindrical body of the weight, provided that the numerals and letters of the symbol shall be larger than those used for indicating them on the knob.
- (c) The denomination of the weight shall be indicated in the international form of numerals in an indelible manner with the symbols illustrated below:
5kg, 100g.

7.0 DIMENSIONS

- (a) The dimensions of cylindrical weights shall be as specified in Tables 3 and 4; as per sketches.
- (b) The tolerances on dimensions shall be:
- (i) for weights 1kg and below ± 10 per cent.
- (ii) for weights above 1kg ± 5 per cent.

8.0 FINISH

The weights shall be polished smooth. They may be protected against corrosion by applying an appropriate coating which is resistant to normal usage and wear and tear.

9.0 PERMISSIBLE ERROR

The maximum permissible errors shall be as specified below:

<i>Denomination</i>	<i>Verification (mg)</i>	<i>Inspection (mg)</i>
<i>10kg</i>	<i>1600</i>	<i>±1600</i>
<i>5kg</i>	<i>800</i>	<i>±800</i>
<i>2kg</i>	<i>400</i>	<i>±400</i>
<i>1kg</i>	<i>200</i>	<i>±200</i>
<i>500g</i>	<i>100</i>	<i>±100</i>
<i>200g</i>	<i>50</i>	<i>±50</i>
<i>100g</i>	<i>30</i>	<i>±30</i>
<i>50g</i>	<i>30</i>	<i>±30</i>
<i>20g</i>	<i>20</i>	<i>±20</i>
<i>10g</i>	<i>20</i>	<i>±20</i>
<i>5g</i>	<i>10</i>	<i>±10</i>
<i>2g</i>	<i>5</i>	<i>±5</i>
<i>1g</i>	<i>5</i>	<i>±5</i>

10.0 STAMPING

- (a) The Inspector's seals shall be stamped on the load potted within the loading hole, where loading hole is provided.
- (b) The Inspector's seals shall be stamped on the bottom of weights which have no loading hole.

C. IRON WEIGHTS, HEXAGONAL (50kg to 50g)

1.0 DENOMINATIONS

Hexagonal iron weights shall have the following denominations:

gram series: 500, 200, 100 and 50.

kilogram series: 50, 20, 10, 5, 2 and 1.

2.0 SHAPE

- (a) The weights shall be integral and hexagonal.
- (b) The weights of denominations of 50kg and down to and including 5kg shall be provided with cast-in handles made of mild steel.
- (c) The weights of denominations 2kg and down to and including 50g shall nest with each other.

3.0 MATERIAL

The weights shall be made or manufactured from grey cast iron.

4.0 METHOD OF MANUFACTURE

The weights shall be made or manufactured by means of any suitable foundry and moulding process.

5.0 LOADING HOLE

The weights must have a loading hole formed at the foundry

- (a) For cast iron or forged mild steel weights with cast-in handles, this hole must be in the shape of a right circular cone located axially and opened into the bottom face of the weight with its smaller diameter.
- (b) For cast iron weights with cast- in handle, this hole must be in the shape of a frustum of a pyramid with rectangular base and opening into the bottom face of the weight with its smaller end.
- (c) In case of new weights about two third of the depth of the loading hole shall remain empty after adjustment.

6.0 MARKING

- (a) The denomination of the weights and the maker's or manufacturer's name or trade mark shall be indicated indelibly in the sunken form or in relief, on the upper surface of the central portion of the weight.
- (b) The denomination of the weight shall be indicated in the international form of numerals in indelible manner with symbols as illustrated below:
2kg, 200g.

7.0 DIMENSIONS

- (a) The dimensions shall be as specified in tables 5 and 5A; as per sketches.
- (b) The tolerances on dimensions shall be:
 - (i) for weights 1kg and below ± 10 per cent
 - (ii) for weights above 1kg ± 5 per cent.

8.0 FINISH

The weight shall be finished smooth and be free from pits, blow-holes and other defects. They shall be protected against corrosion by applying an appropriate coating which is resistant to normal usage of wear and tear.

9.0 PERMISSIBLE ERROR

The maximum permissible errors shall be as specified below:

<i>Denomination</i>	<i>Verification (mg)</i>	<i>Inspection (mg)</i>
<i>50kg</i>	<i>25000</i>	<i>±25000</i>
<i>20kg</i>	<i>10000</i>	<i>±10000</i>
<i>10kg</i>	<i>5000</i>	<i>±5000</i>
<i>5kg</i>	<i>2500</i>	<i>±2500</i>
<i>2kg</i>	<i>1000</i>	<i>±1000</i>
<i>1kg</i>	<i>500</i>	<i>±500</i>
<i>500g</i>	<i>250</i>	<i>±250</i>
<i>200g</i>	<i>100</i>	<i>±100</i>
<i>100g</i>	<i>100</i>	<i>±100</i>
<i>50g</i>	<i>100</i>	<i>±100</i>

10.0 STAMPING

The Inspector's seal shall be stamped on the lead pellet within the loading hole.

(D) BULLION WEIGHTS (10kg to 1g)

1.0 DENOMINATIONS

Bullion weights shall have the following denominations:

gram series: 500, 200, 100, 50, 20, 10, 5, 2 and 1.

kilogram series: 10, 5, 2 and 1.

2.0 SHAPE

Bullion weights shall be of the following two types:

- (i) Cylindrical knob type: Cylindrical knob type weights of denomination 10kg to 1g, both inclusive, shall be of the shape as specified in paragraph B-2 of this part, but shall bear indications, specified in paragraph 6 to indicate that they are bullion weights.
- (ii) Flat cylindrical type: Flat cylindrical type weights of denominations 1kg to 1g both inclusive, shall be flat cylindrical in shape, without a knob and shall nest with each other.

3.0 MATERIAL

Weights shall be made or manufactured from brass gun metal, bronze or the like.

4.0 METHOD OF MANUFACTURE

Weights shall be either cast, pressed or turned from rods, or made or manufactured by any other suitable method as may be applicable to the selected material.

5.0 LOADING HOLES

- (a) Weights of denominations 10kg to 20g, both inclusive, made or manufactured according to requirements specified in paragraph 2,3 and 4 of this part, and shall have loading holes of the type specified for them.
- (b) Weights of denominations 10g to 1g, both inclusive of either type shall be solid integral weights without a loading hole.
- (c) Flat cylindrical weights from 1kg to 20g both inclusive, shall have loading holes, in the shape of a right circular cone located axially and opening into the bottom face of the weight with its smaller diameter.
- (d) In the case of new weights about two thirds of the depth of the loading hole shall remain empty after adjustment.

6.0 MARKINGS

- (a) The denominations and other marking on cylindrical knob type weight shall be as specified in paragraph 1, 2 and 3 of this part.
- (b) Cylindrical knob type weights of denomination 100g to 1g, both inclusive, shall be marked on the body with a 'diamond' and those of denominations 10kg to 200g, both inclusive, shall be marked on the knob with the words 'Bullion' within a 'diamond'
- (c) The denominations of flat cylindrical weights and the maker's or manufacturer's name or trade mark shall be indicated indelibly, in the sunken form or in relief, on the upper surface of the Central portion of the weights.
- (d) Flat cylindrical weights of denominations 10g to 1g, both inclusive, shall be marked with only a 'diamond' and of those of denominations 1kg to 20g, both inclusive, shall be marked with the words 'Bullion' within a 'diamond'
- (e) The denomination of the weight shall be indicated in the international form of numerals in an indelible manner with the symbols as illustrated below:
2kg or 10kg.

7.0 DIMENSIONS

- (a) The dimensions of cylindrical knob type weights shall be as specified in Tables 3 and 4; as per sketches.
- (b) The dimensions of flat cylindrical weight shall be as specified in Table 6; as per sketches
- (c) The tolerances on dimensions for both types of weights shall be:
 - (i) for weights 1kg and below ± 10 per cent.
 - (ii) for weights above 1kg ± 5 per cent.

8.0 FINISH

The finish of the weights shall be polished, smooth and shall not show any porosity to the naked eye.

9.0 PERMISSIBLE ERROR

The maximum permissible errors shall be as specified below:

<i>Denomination</i>	<i>Verification (mg)</i>	<i>Inspection (mg)</i>
<i>10kg</i>	<i>500</i>	<i>±500</i>
<i>5kg</i>	<i>250</i>	<i>±250</i>
<i>2kg</i>	<i>100</i>	<i>±100</i>
<i>1kg</i>	<i>50</i>	<i>±50</i>
<i>500g</i>	<i>25</i>	<i>±25</i>
<i>200g</i>	<i>10</i>	<i>±10</i>
<i>100g</i>	<i>5</i>	<i>±5</i>
<i>50g</i>	<i>3</i>	<i>±3</i>
<i>20g</i>	<i>2.5</i>	<i>±2.5</i>
<i>10g</i>	<i>2.0</i>	<i>±2.0</i>
<i>5g</i>	<i>1.5</i>	<i>±1.5</i>
<i>2g</i>	<i>1.2</i>	<i>±1.2</i>
<i>1g</i>	<i>1.0</i>	<i>±1.0</i>

10.0 STAMPING

- The Inspector's seals shall be stamped on the lead pellet within the loading hole, where loading hole is provided.
- The Inspector's seals shall be stamped on the bottom of weights which have no loading hole.

(E) SHEET METAL WEIGHTS

1.0 DENOMINATIONS

Sheet metal weights shall have the following denominations:
milligram series: 500, 200, 100, 50, 20, 10, 5, 2 & 1.

2.0 SHAPE

- Bullion weights shall be circular in shape and shall have one edge bent for ease of handling.
- Non-bullion weights shall have the following shapes and shall have one edge bent for ease of handling.

<i>Denomination (mg)</i>	<i>Shape after bending along one of the sides</i>
<i>5, 50, 500</i>	<i>Equilateral triangle</i>
<i>2, 20, 200</i>	<i>Square</i>
<i>1, 10, 100</i>	<i>Regular hexagon</i>

3.0 MATERIAL

Sheet metal weights shall be made or manufactured from brass, stainless steel, aluminium, nickel-silver sheets or cupro-nickel.

4.0 METHOD OF MANUFACTURE

Sheet metal weights shall be made or manufactured by pressing or by any other suitable process.

5.0 MARKINGS

- (a) Sheet metal weights shall bear only the denomination and symbol for 'milligram' as indicated below:
500mg
- (b) The maker's or manufacturer's name or Trade mark shall be indicated indelibly on the box containing the sheet metal weights.
- (c) The box shall also bear a serial number to identify it.

6.0 DIMENSIONS

- (a) The dimensions of sheet metal weights shall be as specified in tables 7 and 8; as per sketches.
- (b) The tolerances on dimensions shall be ± 10 per cent.

7.0 FINISH

The sheet metal weights shall be clearly sheared and free from burrs. The stamped markings on sheet metal weights shall be legible and deep enough to ensure indelibility but not so deep as to crack the sheet metal weights.

8.0 PERMISSIBLE ERROR

The maximum permissible errors shall be as specified below:

<i>Denomination</i> (mg)	<i>Verification</i>		<i>Inspection</i>	
	<i>Bullion</i> (mg)	<i>Non-bullion</i> (mg)	<i>Bullion</i> (mg)	<i>Non-bullion</i> (mg)
500	0.8	2.5	± 0.8	± 2.5
200	0.6	2.0	± 0.6	± 2.0
100	0.5	1.5	± 0.5	± 1.5
50	0.4	1.2	± 0.4	± 1.2
20	0.3	1.0	± 0.3	± 1.0
10	0.25	0.8	± 0.25	± 0.8
5	0.20	0.6	± 0.20	± 0.6
2	0.20	0.6	± 0.20	± 0.6
1	0.20	0.6	± 0.20	± 0.6



9.0 STAMPING

- (a) Inspector's seals shall not be affixed on weights of 10mg, 5mg, 2mg and 1mg. These weights shall be authenticated by the issue of a certificate of verification which shall also mention the serial number on the box containing the weights.
- (b) Inspector's seal for year alone shall be stamped on sheet metal weights of 20mg.
- (c) The Inspector's seal (namely; Month, Year, and identification number) shall be stamped on sheet metal weights of denominations 500mg to 50mg, both inclusive.