

**MINISTRY OF CONSUMER AFFAIRS, FOOD AND
PUBLIC DISTRIBUTION**

(DEPARTMENT OF CONSUMER AFFAIRS)

NOTIFICATION

New Delhi, the 7th February 2011

G.S.R. 71(E).— In exercise of the powers conferred by sub-section (1) read with clauses (c), (f), (h), (i) and (s) of sub-section (2) of section 52 of The Legal Metrology Act 2009, (1 of 2010), the Central Government hereby makes the following rules, namely

CHAPTER I

PRELIMINARY

1. Short title and commencement

(1) These rules may be called the Legal Metrology (General) Rules, 2011.

(2) They shall come into force on the 1st day of April, 2011.

2. Definitions

In these rules, unless the context otherwise requires,—

- (a) "Act" means the Legal Metrology Act, 2009 (1 of 2010);
- (b) "Schedule" means a Schedule appended to these rules;
- (c) "Section" means a Section of the Act;
- (d) words and expressions used in these rules and not defined but defined in the Act shall have the meanings respectively assigned to them in the Act.

CHAPTER II

**SPECIFICATIONS OF STANDARDS OF WEIGHTS AND
MEASURES**

3. Reference standards

(1) Every reference standard weight shall conform, as regards denomination, material used in construction, and design, to the specifications laid down in Part I of First Schedule.

(2) The maximum permissible error in respect of any reference standard weight, on verification or re-verification after adjustment, shall be such as is specified in Part I of First Schedule.

(3) Every reference standard metre bar shall conform, as regards material used in construction, and design, to the specifications laid down in Part II of First Schedule.

(4) The maximum permissible error in respect of any reference standard metre bar, on verification or re-verification, shall be such as is specified in Part II of First Schedule.

4. Secondary standards

(1) Every secondary standard weight shall conform, as regards denomination, material used in construction, and design, to the specifications laid down in Part I of Second Schedule.

(2) The maximum permissible error in respect of any secondary standard weight, on verification or re-verification after adjustment, shall be such as is specified in Part I of Second Schedule.

(3) Every secondary standard metre bar shall conform, as regards material used in construction, and design, to the specifications laid down in Part II of Second Schedule.

(4) The maximum permissible error in respect of any secondary standard metre bar, on verification or re-verification, shall be such as is specified in Part II of Second Schedule.

(5) Every secondary standard capacity measure shall conform, as regards denomination, material used in construction, and design, to the specifications laid down in Part III of Second Schedule.

(6) The maximum permissible error in respect of any secondary standard capacity measure, on verification or re-verification after adjustment, shall be such as is specified in Part III of Second Schedule.

5. Working standards

(1) Every working standard weight shall conform, as regards denomination, material used in construction, and design, to the specifications laid down in Part I of Third Schedule.

(2) The maximum permissible error in respect of any working standard weight, on verification or re-verification after adjustment, shall be such as is specified in Part I of Third Schedule.

(3) Every working standard metre bar shall conform, as regards material used in construction, and design, to the specifications laid down in Part II of Third Schedule.

(4) The maximum permissible error in respect of any working standard metre bar, on verification or re-verification, shall be such as is specified in Part II of Third Schedule.

(5) Every working standard capacity measure shall conform, as regards denomination, material used in construction, and design, to the specifications laid down in Part III of Third Schedule.

(6) The maximum permissible error in respect of any working standard capacity measure, on verification or re-verification after adjustment, shall be such as is specified in Part III of Third Schedule.

6. Power to specify any other reference, secondary or working standard

(1) Any other reference standard, or secondary standard, or working standard shall conform as regards the denomination, material used in construction, and design, to such specifications as the Central Government may, from time to time, by notification, specify.

(2) The maximum permissible error in relation to such other reference standard, or secondary standard, or working standard shall be such as the Central Government may, from time to time, by notification, specify and different maximum permissible errors may be specified in relation to different types of reference standards, or secondary standards, or working standards.

CHAPTER III

SPECIFICATIONS OF STANDARD EQUIPMENT

7. Reference standard balances

(1) A set of reference standard balances shall be maintained at every place where the reference standard weights are kept for the purpose of verification of secondary standards.

(2) The number, types and specifications of such balances shall be as are specified in Part I of Fourth Schedule.

(3) Every reference standard balance shall be verified at least once in six months and shall be adjusted, if necessary, to make it correct within the limits of sensitivity and other metrological qualities as are specified in Part I of Fourth Schedule.

8. Secondary standard balances

(1) A set of secondary standard balances shall be maintained at every place where secondary standard weights are kept for the purpose of verification of working standards.

(2) The number, types and specifications of such balances shall be as are specified in Part II of Fourth Schedule.

(3) Every secondary standard balance shall be verified at least once in one year and shall be adjusted, if necessary, to make it correct within the limits of sensitivity and other metrological qualities as are specified in Part II of Fourth Schedule.

9. Working standard balances

(1) A set of working standard balances shall be maintained at every place where working standard

weights are kept for the purpose of verification of weights intended to be used for transaction or protection.

(2) The number, types and specifications of such balances shall be as are laid down in Part III of Fourth Schedule.

(3) Every working standard balance shall be verified at least once in a year and shall be adjusted, if necessary, to make it correct within the limits of sensitivity and other metrological qualities as are specified in Part III of Fourth Schedule.

10. Power to specify the standard equipment

The Central Government may, by notification, specify such other standard equipment as it may think necessary to carry out the provisions of the Act and every such standard equipment shall conform, as regards the metrological qualities, to such specifications as the Central Government may, in the same notification or subsequent notification, specify.

CHAPTER IV

WEIGHTS OR MEASURES AND WEIGHING AND MEASURING INSTRUMENTS

11. Weights

(1) Save as otherwise provided in these rules, every weight used or intended to be used—

- (a) in any transaction, or
- (b) for protection,

shall conform, as regards physical characteristics, configuration, constructional details, materials, performance, tolerances and such other details, to the corresponding specifications laid down for such weight in Fifth Schedule.

(2) The maximum permissible error in respect of such weight shall be such as is specified in Fifth Schedule.

(3) Nothing in this rule shall apply to the product of an industry which is required, by or under any law for the time being in force, to conform to any other specifications with regard to the matters specified in sub-rule (1) or sub-rule (2), if, under such law, the product is required to conform to the specifications laid down by the International Organisation of Legal Metrology with regard to the matters aforesaid.

12. Measures (other than measuring instruments)

(1) Every measure used or intended to be used for—

- (a) any transaction, or
- (b) protection,

shall conform, as regards physical characteristics, configuration, constructional details, materials, performance, tolerances and such other details, to the corresponding specifications laid down for such measure in Sixth Schedule.

(2) The maximum permissible error in such measure shall be such as is specified in the corresponding specifications laid down for such measure in Sixth Schedule.

13. Weighing and measuring instruments

(1) Every weighing instrument used or intended to be used—

- (a) in any transaction, or
- (b) for protection,

shall conform, as regards physical characteristics, configuration, constructional details, materials, performance, tolerances and such other details, to the corresponding specifications laid down for such weighing instrument in Seventh Schedule:

(2) Every measuring instrument used or intended to be used—

- (a) in any transaction, or
- (b) for protection,

shall conform, as regards physical characteristics, configuration, constructional details, materials, performance, tolerances and such other details, to the corresponding specifications laid down for such measuring instrument in Eighth Schedule.

(3) The maximum permissible error on such weighing or measuring instrument shall be such as is specified in the corresponding specifications laid down for such weighing or measuring instrument in Seventh Schedule or as the case may be in Eighth Schedule.

14. Procedure for carrying out calibration of vehicle tanks, etc.

The procedure for carrying out calibration of vehicle tanks, etc. shall be as is specified in Ninth Schedule.

CHAPTER V

IMPORT OF WEIGHTS AND MEASURES

15. Registration of Importer

(1) Every manufacturer or dealer of weight or measure who intends to import any weight or measure shall apply to the Director, through the Controller of the State in which he carries on such business, for registration of his name as importer in the form specified in Tenth Schedule.

(2) Every application received by the Controller under sub-rule (1) shall be forwarded by him to the Director with a report as to the antecedents and technical capabilities of the applicant.

(3) Nothing in this rule shall take away or abridge the right of any person referred to in sub-rule (2) to carry on the business of importing of any weight or measure until he has been informed by the Director in writing that he cannot be registered as an importer, and on receipt of such letter he shall stop forthwith the import of any weight or measure:

PROVIDED that registration of a person carrying on, at the commencement of these rules, the business of importing weights or measures shall not be refused except after giving him a reasonable opportunity of showing cause against the proposed action.

(4) Every application for the registration of an importer shall be submitted to the Director, in the manner aforesaid, together with the fee specified in Twelfth Schedule, at least one month before the date on which import is proposed to be made.

(5) The registration of a person as an importer shall remain effective for a period of five years from the date of such registration.

(6) On the expiry of the period of registration as an importer, the Director may, on the application of the registered importer and on payment of the prescribed fee, renew registration for a like period.

(7) The registration or renewal of the registration of a person as an importer may be suspended or revoked before the expiry of the period of validity thereof, if the Director is satisfied after an inquiry, and after giving to the person concerned a reasonable opportunity of being heard, that any statement made by such person in the application for registration or renewal of registration was false or incorrect in material particulars or that such person has contravened any provision of the Act or rules made there under or any term or condition of such registration.

16. Conditions, etc. for manufacture of a weight or measure exclusively for export

(1) The provisions of this rule shall apply to weights or measures which are made or manufactured exclusively for the purpose of export.

(2) No non-standard weight or measure shall be made or manufactured by any person unless he has obtained the previous permission from the Central Government.

(3) Every person intending to manufacture any non-standard weight or measure for the purpose of export shall make an application for permission to the Central Government on payment of a fee of rupees five hundred for such permission authorising him to manufacture such weight or measure and shall in such application indicate—

- (a) his name and full address;
- (b) location of the factory in which such weight or measure is proposed to be manufactured;
- (c) description of weight or measure proposed to be manufactured;
- (d) documentary or other evidence indicating the existence of a firm contract for the export aforesaid or where there is no such firm contract for export, documentary or other evidence indicating that there is likely to be a demand for the export of non-standard weight or measure.

(4) The Central Government shall, if it is satisfied from the documentary or other evidence produced by the applicant or otherwise that the applicant intends to manufacture non-standard weight or measure for export, grant the permission authorising him to manufacture such weight or measure:

Provided that the Central Government may, if it is satisfied that the applicant has contravened any of terms and conditions of the permission or that weights or measures manufactured by the applicant have found their way into the Indian market or that the applicant had made any statement in his application for the permission which is false in material particulars or he had concealed some material particulars, cancel the permission:

Provided Further that no permission shall be cancelled except after giving to the applicant a reasonable opportunity of showing cause against the proposed action.

(5) Every permission granted under sub-rule (4) shall remain valid for a period of one year and shall be renewed for a like period on payment of a like fee unless the Central Government is satisfied that the applicant has made any statement in his application which is false in material particulars or that he had concealed some material particulars or had contravened any provision of the Act or any rule made there under:

Provided that no order for the refusal to renew a licence shall be made by the Central Government except after giving the applicant a reasonable opportunity of showing cause against the proposed action.

(6) Every person who is granted permission under this rule shall submit to the Central Government, at the end of the calendar year, a statement as to the quantity of the non-standard weights and measures exported by him and the particulars of the person to whom such export has been made.

17. Prohibition on sale of non-standard weight or measure within the country

No non-standard weight or measure made or manufactured exclusively for export shall be sold or otherwise distributed within the territory of India.

18. Maintenance of record in relation to non-standard weight or measure

Every person who makes or manufactures any non-standard weight or measure for export shall maintain a monthly record of the number of such non-standard weights or measures manufactured by him, number of weights or measures already exported by him, and number of weights or measures in stock or under production. The record so maintained shall be open to inspection by any officer authorised by the Central Government in this behalf.

19. Sample checking of weight and measure

(1) Standard weights or measures which are intended for export shall not ordinarily require any verification and stamping, but if the party to whom the export is to be made so requires, a sample checking of such weight or measure shall be made by such agency as the Central Government may specify in this behalf, and thereupon the agency so specified shall, after checking the weight or measure, issue a certificate indicating whether or not such weight or measure conforms to the requirements of the Act and the rules made there under.

(2) The weight or measure to be checked as sample under this rule shall be selected at random and proper records shall be maintained with regard to the sample checking so made.

(3) The Central Government shall, while specifying the agency for checking the weight or measure, ensure that the agency completes the checking well in time so that the export of the weight or measure is not delayed by reason of such checking.

20. Checking of non-standard weights and measures sample which are to be exported

(1) Non-standard weight or measure, which is made or manufactured exclusively for export, shall not ordinarily require any verification and stamping, but if the party to whom the export is to be made so requires, a sample checking of such weight or measure shall be made by such agency as the Central Government may specify in this behalf; and thereupon the agency so specified shall, after checking the weight or measure, issue a certificate indicating whether or not such weight or measure conforms to the specifications given by the party to whom the export is to be made or, where the party aforesaid has not given any specification, whether the weight or measure conforms to the specifications laid down by the manufacturer.

(2) The weight or measure to be checked as sample under this rule shall be selected at random and proper records shall be maintained with regard to the sample checking so made.

(3) The fee for checking of any non-standard weight or measure shall be—

- (i) if it is similar to any standard weight or measure, equal to the fee leviable for the verification and stamping of such standard weight or measure; and
- (ii) where such non-standard weight or measure is not similar to any standard weight or measure, the Central Government may specify such amount as fees as is commensurate with the labour involved in checking the non-standard weight or measure.

(4) The Central Government shall, while specifying the agency for checking the non-standard weight or measure, ensure that the agency completes the checking well in time so that the export of such weight or measure is not delayed by reason of such checking.

CHAPTER VI

NON-STANDARD WEIGHT OR MEASURE TO BE USED FOR SCIENTIFIC INVESTIGATION OR RESEARCH

21. Permission to get manufactured non-standard weight or measure for scientific investigation or research

Where the manufacture of any non-standard weight or measure is needed exclusively for the purpose of scientific investigation or research, the person needing such non-standard weight or measure shall make an application to the Central Government for permission to get such non-standard weight or measure manufactured and on receipt of such application, if the Central Government is satisfied that the manufacture of such non-standard weight or measure is needed for the purpose aforesaid, it may authorise the applicant to get the non-standard weight or measure needed by him manufactured by such manufacturer as he may think fit, and thereupon, it shall be lawful for such manufacturer to manufacture the said non-standard weight or measure in accordance with the specifications given by the applicant.

Explanation: For the purpose of this rule, a non-standard weight or measure means a weight or measure which is, or is proposed to be, manufactured in accordance with any unit of weight or measure, other than standard unit of weight of measure specified by or under the Act.

CHAPTER VII

MISCELLANEOUS

22. The manner of disposal of goods seized under this Act/rule

(1) Where any goods seized under sub-section (3) of Section 15 are subject to speedy or natural decay, the Director or any person authorised by him or Controller and other Legal Metrology Officers in this behalf shall have the goods weighed or measured on a verified weighing or measuring instrument available with him or near the place of seizure and enter the actual weight or measure of the goods in a form specified by the Director for this purpose and shall obtain the signature of the trader or his agent or such other person who has committed the offence. The goods in question shall, after such weighing or measuring is returned to the trader or the purchaser as the case may be:

PROVIDED that if the trader or his agent or the other person (who has committed the offence) refuses to sign the form, the Director or the person authorised by him in this behalf shall obtain the signature of not less than two persons present at the time of such refusal by the trader or his agent or other person.

(2) Where the goods seized under sub-section (1) are contained in a package and the package is false or does not conform to the provisions of the Act or any rules made there under and the goods in such package are subject to speedy or natural decay, the Director or any person authorised by him or Controller and other Legal Metrology Officers in this behalf, so far as may be, may dispose of the goods in such package in accordance with the provisions of sub-rule (1).

(3) Where the goods seized under sub-rule (1) are not subject to speedy or natural decay, the Director or any person authorised by him or Controller and other Legal Metrology Officers in this behalf may retain the package for the purpose of prosecution under this Act after giving the trader or his agent or the other person (who has committed the offence) a notice of such seizure.

23. Time within which unverified weight and measure to be verified and stamped

No unverified weight or measure, seized under sub-section (3) of Section 15, shall be forfeited if the person, from whom such weight or measure was seized, agrees to get the same verified and stamped within a period of ten days or such extended period from the date of such seizure; and for this purpose, the person making the seizure of such weight or measure shall afford a reasonable opportunity by

returning such weight or measure exclusively for the verification and stamping.

24. Register and reports to be maintained by persons referred to in Section 17 of the Act

(1) Every person referred to in sub-section (1) of Section 17 shall maintain a register in the appropriate form set out in Eleventh Schedule.

(2) Notwithstanding anything contained in sub-rule (1), if the Director is of the opinion that having regard to the nature or volume of the business carried on by any maker, manufacturer, dealer or repairer, it is necessary to do so, he may, by order, exempt any such maker, manufacturer, dealer or repairer from the operation of that sub-rule.

25. Scale of fee

The scale of fees to be collected for the service specified in column (2) of Twelfth Schedule shall be at the rate specified in column 3 of the said Schedule.

26. Use of regional languages

Any legend or denomination specified in any Schedule to these rules, which is required to be indicated on any weight or measure in English, or in Devanagari script, may also be indicated (in addition to English or Devanagari) on such weight or measure in such regional language as the manufacturer may consider to be practicable.

27. Periodical verification of weights or measures—

(1) Every weight or measure used or intended to be used in any transaction or for protection of living beings or things in clause (k) of Section 2 shall be verified and stamped by the Legal Metrology Officer in the State in which such weight or measure is put to use and shall be re-verified and stamped at periodical intervals.

(2) The re-verification shall be carried out on the completion of a period of,—

- (a) twenty four months for all weights, capacity measures, length measures, tape, beam scale and counter machine,
- (b) sixty months for storage tanks, and
- (c) twelve months for all weight or measure including tank lorry other than that mentioned in clauses (a) & (b).

(3) Notwithstanding anything contained in sub-rule (2) every weight or measure which has been verified and stamped in situ shall, if it is dismantled and re-installed before the date on which the verification falls due shall be duly re-verified and stamped, before being put into use.

(4) Notwithstanding anything contained in sub-rule (1) every weight or measure which has been verified and stamped shall, if it is repaired before the date on which the verification falls due shall be duly re-verified and stamped before being put into use.

28. Qualifications of Legal Metrology Officer

(1) No person shall be appointed as Legal Metrology Officer unless he —

- (a) is a graduate of a recognized university in Science (with physics as one of the subjects), technology or engineering or holds a recognized diploma in engineering with three years professional experience; and
- (b) is able to speak, read and write the regional language of the State.

(2) Nothing in sub-rule (1) shall apply to officials who have been working as Legal Metrology Officer and are also eligible for promotion to the next higher grade of Legal Metrology Officer on the date of commencement of these rules.

(3) The person appointed to the post of Legal Metrology Officer shall have to successfully complete the basic training course at the Indian Institute of Legal Metrology, Ranchi before his posting.

(4) The Central Government may, in consideration of the practical difficulties faced by the State Government and on its recommendation, relax the qualification specified in sub-rule (1) for the post of legal Metrology Officers for that State.

29. Nomination of Director by a Company under the Act

Every company shall inform the Director (Legal Metrology) or the concerned Controller or his authorized officer, by notice in duplicate, in the format specified in Thirteenth Schedule containing the name and address of its Director after obtaining his consent in writing, who has been nominated by the company under sub-section (2) of Section 49 to be in-charge of and be responsible for the conduct of business of the company or any establishment, branch or unit thereof.

30. Repeal and savings

(1) The Standards of Weights and Measures (General) Rules, 1987 (herein under referred to as the said rules) are hereby repealed.

Provided that such repeal shall not affect:

- (a) the previous operations of the said rules or anything done or omitted to be done or suffered therein; or
- (b) any right, privilege, obligation or liability acquired, accrued or incurred under the said rules; or

(c) any penalty, forfeiture or punishment incurred in respect of any offence committed against the said rules; or

(d) any investigation, legal proceedings or remedy in respect of any such right, privilege, obligation, liability, penalty, forfeiture or punishment as aforesaid.

And any such investigation, legal proceedings or remedy may be instituted, continued or enforced and any such penalty, forfeiture or punishment may be imposed as if the said rules had not been rescinded.

(2) Notwithstanding such repeal anything done or any action taken or purported to have been done or taken including approval of letter, exemption granted, fees collected, any adjudication, enquiry or investigation commenced, license and registration of manufacturers, dealers, importers of weights and measures, non-standard weights and measures or show cause notice, decision, determination, approval, authorisation issued, given or done under the said rules shall if in force at the commencement of the said rules continue to be in force and have effect as if issued, given or done under the corresponding provisions of these rules.

(3) The provisions of these rules shall apply to any application made to the Central Government or as the case may be the State Government under the said rules for licence, registration of manufacturers, importers, dealers, repairers of weights and measures pending at the commencement of these rules and to any proceedings consequent thereon and to any registration granted in pursuance thereof.

(4) Any legal proceeding pending in any court under the said rules at the commencement of these rules may be continued in that court as if these rules had not been framed.

(5) Any appeal preferred to the Central Government or as the case may be the State Government under the said rules and pending shall be deemed to have been made under the corresponding provisions of these rules.

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[See Rule 3]

PART I REFERENCE STANDARD WEIGHTS**1. Denominations**

Kilogram series	Gram series	Milligram series
(1)	(2)	(3)
5	500	500
2	200	200
2	200	200
1	100	100
	50	50
	20	20

2. Materials

- Weights of 5 kg to 1g shall be made from admiralty bronze (88 Cu, 10 Sn, 2 Zn), nickel chromium alloy (80 Ni, 20 Cr) or austenitic stainless steel (25 Ni, 20 Cr) or (20 Ni, 25 Cr).
- Weights of 500 mg to 10 mg shall be made from wire of either pure platinum, nickel chromium alloy (80 Ni, 20 Cr) or austenitic stainless steel (25 Ni, 20 Cr) or (20 Ni, 25 Cr).
- Weights of 5 mg to 1 mg shall be made of aluminium wire. Copper, silicon and zinc contained as impurities in aluminium shall not exceed 0.3 per cent in the aggregate.

Note: The material used for all the weights shall be non-magnetic and it shall be ensured that the finished weights are also practically non-magnetic.

3. Shape and finish

- For kilogram and gram series—
Integral cylindrical body with knob rounded at top.
- For milligram series—
The weights shall be made from the wire having five segments for 500, 50, 5 mg weights, two segments for 200, 20, 2 mg weights and one segment for 100, 10, and 1 mg weights. One end of the wire shall be bent at right angles for the purposes of lifting it with a pair of forceps.
- The denominations shall be marked only on kilogram and gram series weights.
- The entire surface of the weights, including their base and corners shall be free from any roughness and the surface of the weights when inspected visually shall not show any porosity and shall have a mirror finish.

4. Maximum permissible errors

Denomination	Permissible error \pm mg
(1)	(2)
5 kg	7.5
2 kg	3.0
1 kg	1.5

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(1)	(2)
500 g	0.75
200 g	0.30
100 g	0.15
50 g	0.10
20 g	0.080
10 g	0.060
5 g	0.050
2 g	0.040
1 g	0.030
500 mg	0.025
200 mg	0.020
100 mg	0.015
50 mg	0.012
20 mg	0.010
10 mg	0.008
5 mg	0.006
2 mg	0.006
1 mg	0.006

5. Protective and carrying case

- These weights shall be stored in their boxes made from teakwood or any other suitable non-corrosive material with proper housing lined with chemically neutral velvet, chamois leather or soft plastic material. Wood used in such boxes shall be reasonably free from resins and volatile materials. Glue shall not be used for fixing velvet or such other material. The weights shall be housed in such a manner so as to avoid their movement during transit.
- Each milligram weight shall be provided with a separate housing. A covering glass or a sheet of any other transparent and non-reactive and non-corrosive material shall be provided so as to ensure that these weights are not dislocated during transit.
- A suitable device for lifting the kilogram and gram weights covered with chamois leather or other suitable material shall be provided. A pair of forceps capable of lifting easily milligram weights shall also be provided.

6. Inscription

The boxes containing the weights shall have the following inscriptions:

- The words 'Reference Standards Weights'
- The identification number of such boxes,
- The name of the manufacturer,

- The material used for weights,
 - kilogram and gram series,
 - milligram series,
- The year of manufacture,
- The verification mark of the NPL.

PART II- REFERENCE STANDARD METRE BAR

1. Material

The Reference Standard Metre Bar (hereafter called metre bar) shall be manufactured from 58 per cent nickel-steel.

2. Shape and dimensions

- The metre bar shall be of H-section, approximately 25 mm x 25 mm (as per Figure 1)
- The overall length of the metre bar shall be 1030 ± 1 mm and the graduated length shall be 1008 mm.
- Ungraduated space of 11 mm shall be left after the last graduation mark.

3. Finish

The graduated surface shall be bright highly polished, and free from surface irregularities in the neighbourhood of the graduation marks.

4. Graduations

- The main scale shall be situated on the neutral plane and shall be graduated in millimetres throughout from 0 to 1000 mm.
- The main scale shall also have one additional mm mark before 0 and another after 1000 mm mark.
- An additional fine scale shall also be provided at each end of the main scale for calibrating a micrometre microscope. This fine scale shall consist of ten 0.1 mm graduations (1 mm sub-divided into 10 parts) and shall be situated before the first graduation mark after leaving a blank space of 2 mm and also after the last mark with the same blank spacing.
- The graduation marks shall be well-defined, of symmetrical section and have clean edges.
- The width of graduation marks shall be between 8 and 10 micrometres. This width shall be constant to within ten per cent over the length of each mark between the longitudinal setting lines.
- The graduation marks shall not differ in width one from another by more than $\pm 10\%$ of the average width of all the marks.

- (g) The graduation marks shall be parallel to one another to within one micrometre between the longitudinal setting lines.
- (h) The graduation marks shall be square to the scale axis to within ten minutes of arc.
- (i) The length of graduation marks shall be as follows :—
 - 2 mm for half cm marks.
 - 1 mm for mm marks.
 The marks shall be disposed equally on either side of an imaginary centre line.
- (j) The lengths of the graduation marks on the two fine scales referred to in 4(c) shall be as follows :—
 - 3 mm for first and last mark.
 - 2 mm for 0.5 mm marks.
 - 1 mm for 0.1 mm marks.
- (k) The Bessel points shall be indicated by two vertical lines marked on either external side of the metre bar. The Bessel points shall be 571 mm apart, and shall be disposed equally on either side of the 50 mm mark.
- (l) No figures or numerals shall be marked on the surface of the main scale.
- (m) When supported at the marked Bessel points, the graduated surface shall be flat to within 0.05 mm, i.e. all points on the surface shall be between two parallel planes 0.05 mm apart.

5. Auxiliary scale

- (a) An auxiliary scale shall be marked on one of the top edges of the metre bar.

- (b) The auxiliary scale shall consist of 1000 marks corresponding to the marks of the main scale.
- (c) The marks of the auxiliary scale shall be collinear (i.e., passing through the same vertical planes) with the graduation marks of the main scale to within ± 0.1 mm.
- (d) The width of graduation marks shall be not more than 100 micrometres and shall be clearly visible to the naked eyes having normal vision.
- (e) The length of the graduation marks shall be :
 - 2.5 mm for cm marks.
 - 2.0 mm for half cm marks.
 - 1.5 mm for mm marks.
 One of the ends of all the marks shall lie on a straight line.
- (f) The centimetre graduation marks shall be numbered in the increasing order of numeration.
- (g) The height of the numerals and the letters shall be approximately 3 mm.

6. Setting lines

- (a) A pair of longitudinal setting lines shall transverse the graduation marks and shall be parallel to the scale axis to within one minute of arc.
- (b) The two longitudinal lines shall be disposed symmetrically on either side of the centre of the graduation marks.

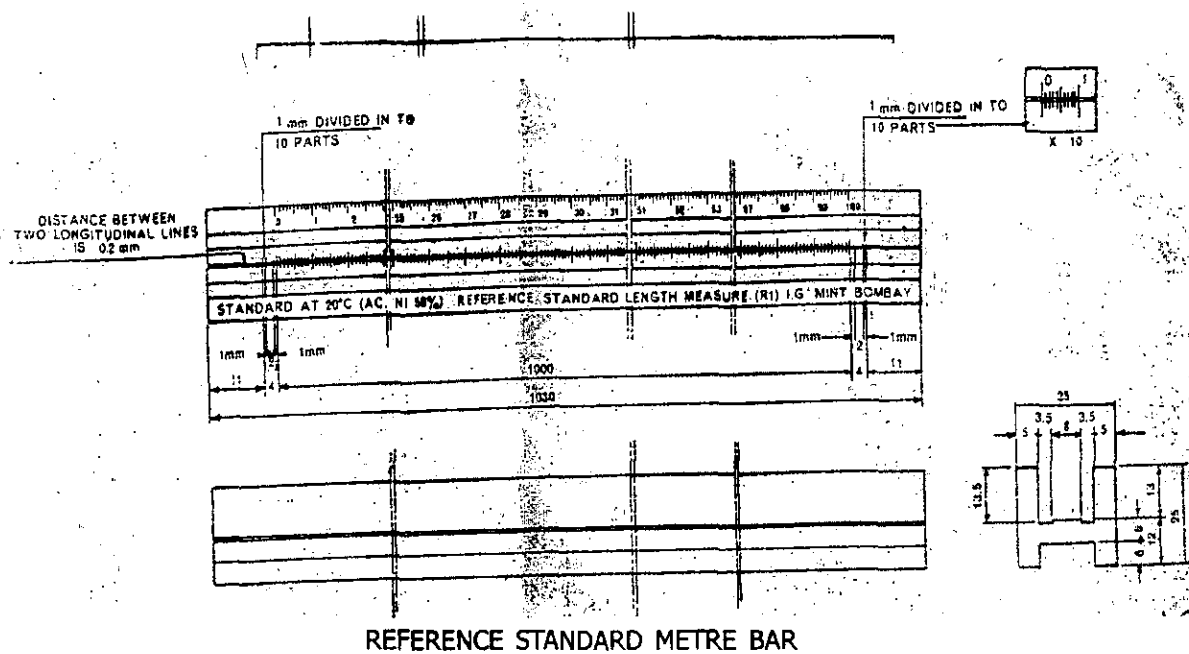


Figure-1

- (c) The separation of the longitudinal setting lines shall be 0.2 mm and their width shall be in between 8 and 10 micrometres.
- (d) Each longitudinal setting line shall be straight to within 30 micrometres.
- (e) The longitudinal setting lines shall be parallel to each other to within 50 micrometres.

7. Maximum permissible error

- (a) When the metre bar is supported on its marked Bessel points, the errors in length between any two graduation marks of the main scale at the temperature of 20°C, shall not exceed 0.010 mm.
- (b) In the case of the fine scales, the error between any two 0.1 mm marks shall not exceed 0.005 mm.

8. Inscription

The metre bar shall bear the following inscription :

- (a) the words "REFERENCE STANDARD METRE BAR",
- (b) the identification number of the metre bar,
- (c) the verification mark of the NPL, after the first calibration and marks of subsequent verification to be made on the plate of the carrying case of the metre bar,
- (d) the name of the manufacturers,
- (e) the material of the metre bar,
- (f) the words, figures and letter "STANDARD AT 20°C",
- (g) the year of manufacture.

9. Protective and carrying case

- (a) The standard metre bar shall be housed in a case made from suitable material and provided with a handle, lined internally with velvet, a plastic material or any other material and in such a way that the metre bar is not likely to be damaged, particularly by shocks or corrosion.
- (b) The case shall have affixed on it a plate bearing the inscription "REFERENCE STANDARD METRE BAR" and the identification number.

SECOND SCHEDULE

DENOMINATIONS, MATERIALS, SHAPE AND PERMISSIBLE ERRORS

IN RESPECT OF SECONDARY STANDARDS

[See Rule 4

PART I—SECONDARY STANDARD WEIGHTS

1. Denominations

Kilogram series	Gram series	Milligram series
(1)	(2)	(3)
10	500	500
5	200	200
2	200	200

(1)	(2)	(3)
2	100	100
1	50	50
	20	20
	20	20
	10	10
	5	5
	2	2
	2	2
	1	1

2. Materials

- (a) Weights of 10 kg to 1 g shall be made from admiralty bronze (88 Cu, 10 Sn, 2 Zn), or nickel-chromium alloy (80 Ni, 20 Cr) or austenitic stainless steel (20 Ni, 25 Cr) or (25 Ni, 20 Cr).
- (b) Weights of 500 mg to 50 mg shall be made from cupro-nickel (75 Cu, 25 Ni), or nickel chromium alloy (80 Ni, 20 Cr), or austenitic stainless steel (20 Ni, 25 Cr), or (25 Ni, 20 Cr).
- (c) Weights of 20 mg to 1 mg shall be made of aluminium sheets. Copper, silicon and zinc contained as impurities in aluminium shall not exceed 0.3 per cent in the aggregate.

3. Shape and finish

- (a) For kilogram and gram series—Integral cylindrical body with knob flattened at the top. Weights of 10 kilogram to 100 gram (both inclusive) shall have adjusting devices.
- (b) For milligram series—the weights shall be in the form of square sheets, one of the corners being bent at right angle.
- (c) The denominations shall be marked only on kilogram and gram series weights.
- (d) The entire surface of the weights, including their base and corners shall be free from any roughness and the surface of the weights, when inspected visually, shall not show any porosity and shall have a mirror polish appearance.

4. Maximum permissible error

Denomination	Permissible error \pm mg
10 kg	50
5 kg	25
2 kg	10
1 kg	5
500 g	2.5
200 g	1.0
100 g	0.5
50 g	0.30

(1)	(2)	(3)
20 g		0.25
10 g		0.20
5 g		0.15
2 g		0.12
1 g		0.10
500 mg		0.08
200 mg		0.06
100 mg		0.05
50 mg		0.04
20 mg		0.03
10 mg		0.02
5 mg		0.02
2 mg		0.02
1 mg		0.02

5. Protective and carrying case

- These weights shall be stored in their boxes made from teakwood or any other suitable non-corrosive material with proper housing lined with chemically neutral velvet, chamois leather or soft plastic material. Wood used in such boxes shall be reasonably free from resins and volatile materials. Glue shall not be used for fixing velvet or such other material. The weights shall be housed in such a manner so as to avoid their movement during transit.
- Each milligram weight shall be provided with a separate housing. A covering glass or a sheet of any other transparent, non-reactive and non-corrosive material shall be provided so as to ensure that these weights are not dislocated during transit.
- A suitable device for lifting the kilogram and gram weights, covered with chamois leather or other suitable material, shall be provided. A pair of forceps capable of lifting easily milligram weights shall also be provided.

6. Inscription

The boxes containing the weights shall have the following inscriptions:—

- the words 'SECONDARY STANDARD WEIGHTS',
- the identification number of the secondary standard weights,
- the name of the manufacturer,
- the material used for weights—
 - kilogram & gram series
 - milligram series,
- the year of manufacture,
- the mark of verification.

PART II- SECONDARY STANDARD METRE BAR

1. Material

The secondary standard metre bar (hereafter called metre bar) shall be manufactured from 58 per cent nickel-steel.

2. Shape and dimensions

- The metre bar shall have a rectangular cross-section with dimensions 30mm x 15mm approximately.
- The top surface shall have two rectangular grooves along its length (as per Figure 2).
- The overall length of the measure shall be 1030 \pm 1 mm and the graduated length shall be 1010 mm.
- Ungraduated space of 10 mm shall be left after the last graduation mark.

3. Finish

The graduated surface shall be bright, highly polished and free from surface irregularities in the neighbourhood of the graduation mark.

4. Graduations

- The metre bar shall be graduated in millimetres throughout from 0 to 1000 mm.
- A length of 10 mm before the zero graduation mark shall also be graduated in millimetres.
- The scale shall be regular. The width of the graduation marks shall be between thirty and fifty micrometres.
- The width of the graduation marks shall be uniform to within \pm ten per cent of the average width of all the marks.
- Each graduation marks shall be straight to within ten micrometres over its length.
- The graduation marks shall be parallel to one another to within ten micrometres.
- The graduation marks shall be square to the scale axis to within twenty minutes of arc.
- The graduation marks representing centimetres shall be longer than those representing half centimetres and the graduation marks representing half centimetres shall be longer than those representing millimetres.
- The length of the graduation marks shall be not less than:
 - 2 mm for mm marks.
 - 3 mm for half cm marks.
 - 4 mm for cm marks.

These marks shall be disposed equally on either side of an imaginary centre line defined by the two setting lines.

- (j) There shall be two short longitudinal setting lines each of 5 mm in length which shall be drawn leaving a blank space of 2 mm, the one before the first and the other after the last graduation mark. The longitudinal lines shall be on a straight line which represent the imaginary central line and the departure from the central line shall be not more than 0.1 mm.
- (k) When supported on the Bessel points or on a flat surface the graduated surface shall be flat to within 0.05 mm, i.e. all the points on the surface shall be between two parallel planes 0.05 mm apart.

5. Auxiliary scale

- (a) Auxiliary scale shall be marked on one of the top edges of the metre bar.
- (b) The auxiliary scale shall consist of centimetre and half centimetre marks corresponding to the marks of the main scale.
- (c) The marks of the auxiliary scale shall be collinear (passing through the same vertical planes) with the graduations of main scale to within ± 0.1 mm.
- (d) The width of the graduation marks shall be not more than one hundred micrometres.
- (e) The graduation marks representing centimetres shall be longer than those representing half centimetres.

- (f) The length of the graduation marks shall be not less than:

3 mm for cm marks, and

2 mm for half cm marks.

One of the ends of the marks shall lie on a straight line.

- (g) The centimetre graduation marks shall be numbered in the increasing order of numeration.
- (h) The height of the numerals and the letters shall be approximately 3 mm.

6. Maximum permissible error

The error on the length between any two graduation marks on the secondary standard metre bar, at the standard temperature of 20°C, shall not exceed the value "e" calculated according to the following formula:

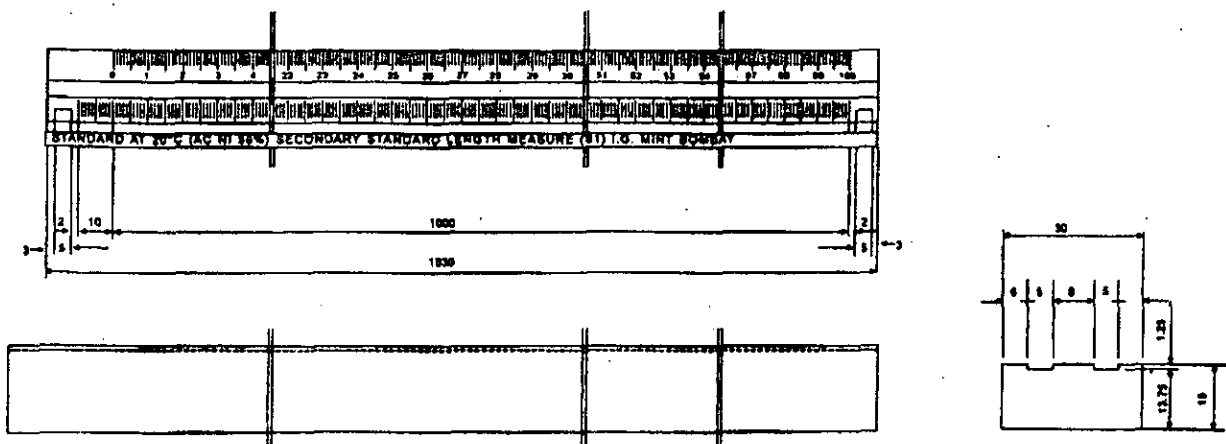
$$e = \pm (25 + L/40) \text{ micrometres}$$

Where L is the nominal length in millimetres of that part of the metre bar between the two graduation marks, the error on which is being determined. The calculated value of "e" shall be rounded to the nearest integer.

7. Inscription

The metre bar shall bear the following inscriptions:

- (a) the words "SECONDARY STANDARD METRE BAR",
- (b) an identification number of the secondary standard metre bar,
- (c) the name of the manufacturer,



SECONDARY STANDARD METRE BAR
FIGURE - 2

- (d) the material of the metre bar,
- (e) the words, figures and letter "STANDARD AT 20°C",
- (f) the year of manufacture,
- (g) the mark of verification on the plate of the carrying case of the metre bar.

8. Protective and carrying case

- (a) The metre bar shall be housed in a case made from suitable material and provided with a handle, lined internally with velvet, a plastic material or any other material, and in such a way that the measure is not likely to be damaged, particularly by shocks or corrosion.
- (b) The case shall have affixed on it a plate bearing the inscription "SECONDARY STANDARD METRE BAR" and the identification number.

Note: The existing secondary standard metre bars may differ in minor details in regard to setting lines and inscriptions, etc.

PART III-SECONDARY STANDARD CAPACITY MEASURES

1. Denominations

Litre series (l)	Millilitre series (ml)
5	500
2	200
1	100
	50
	20

Note: 1 litre = 1 dm³ = 0.001 m³; 1 ml = 1 cm³

2. Material

Secondary standard capacity measures shall be cast out of admiralty bronze of the same composition as is employed in the case of secondary standard weight.

3. Shape

- (a) The secondary standard capacity measure of five litre shall be cylindrical and have its inside diameter equal to the height of the measure. This shall have two handles attached securely to its sides.
- (b) The measure of 2 l and below shall be of the same shape as above but shall not have any handles.
- (c) The denominations of the secondary standard capacity measures shall be engraved on the outside surface.
- (d) Each secondary standard capacity measure shall be provided with a specially selected striking glass on the measures and glasses shall be securely packed in velvet lined teakwood boxes.

4. Maximum permissible error

Denomination	Permissible error \pm ml
5 l	2
2 l	1
1 l	0.8
500 ml	0.5
200 ml	0.4
100 ml	0.3
50 ml	0.2
20 ml	0.1

5. Protective and carrying cases

These capacity measures shall be stored in their boxes made from teakwood or any other suitable non-corrosive material with proper housing lined with velvet, chamols leather or soft plastic material. Wood used in such boxes shall be reasonably free from resins and volatile materials. Glue may not be used for fixing velvet or such other materials. Each capacity measure shall be housed in such a manner so as to avoid their excessive movement during transit.

Each striking glass of the capacity measure shall be securely housed in proper grooves so as to protect them from breakage during transit.

6. Inscriptions

The boxes containing these capacity measures shall have the following inscriptions:—

- (a) the inscription SECONDARY STANDARD CAPACITY MEASURES;
- (b) the identification number of secondary standard capacity measures;
- (c) the name of the manufacturer;
- (d) the year of manufacture;
- (e) the mark of verification of proper verification authority.

THIRD SCHEDULE

DENOMINATIONS, MATERIAL, SHAPE AND PERMISSIBLE ERRORS IN RESPECT OF WORKING STANDARDS

[See Rule 5]

PART I-WORKING STANDARD WEIGHTS

1. Denominations

Kilogram series	Gram series	Milligram series
(1)	(2)	(3)
20	500	500
10	200	200
10	200	200
5	100	100
2	50	50
2	20	20
1	10	10

(2)	(2)	(3)
	5	5
	2	2
	2	2
	1	1

2. Material

- (a) Weights of 20 kg to 1 g shall be cast from admiralty bronze (88 Cu, 10 Sn, 2 Zn) or made from cupro-nickel (75 Cu, 25 Ni) or nickel chromium alloy (80 Ni, 20 Cr) or austenitic stainless steel (25 Ni, 20 Cr) or (20 Ni, 25 Cr).
- (b) Weights of 500 mg to 100 mg shall be made from admiralty bronze (rolled) (88 Cu, 10 Zn, 2 Sn) sheets or from the sheets of nickel chromium alloy (80 Ni 20 Cr) or austenitic stainless steel (25 Ni, 20 Cr) or (20 Ni, 25 Cr).
- (c) Weights of 50 mg to 1 mg shall be made of aluminium sheets. Copper, silicon and iron contained as impurities in the aluminium shall not exceed 0.3 per cent in the aggregate.

3. Shape and finish

- (a) Weights of 20 kg and 10 kg shall be cylindrical in shape and shall be cast in two parts, the top part being screwed snugly into the bottom part. The top part shall be cast in the form of a handle for lifting purposes. The two parts after assembly shall be locked by means of a set screw over which the seal of the verifying authority shall be affixed.
- (b) Weights of 5 kg to 200 gm (inclusive) shall be cast in two parts, the top part being screwed snugly into the bottom part. The top part shall be cast in the form of a knob for lifting purposes. The two parts, after assembly, shall be locked by means of a set screw, over which the seal of the verifying authority shall be affixed.
- (c) Weights of 100 g to 10 g (inclusive) shall be as in (b) above except that there shall be no locking arrangement.
- (d) Weights of 5 g to 1 g (inclusive) shall be integral weights with knob.
- (e) Weights of 500 mg to 1 mg (inclusive) shall be of square shape with the one of the sides bent at right angles to the flat surface for ease of handling.
- (f) The denominations shall be marked on the weights.

- (g) The entire surface of the weights, including their base and corners shall be free from roughness.

The surface of the weights, when inspected visually, shall not show any porosity and shall have a mirror polish appearance.

4. Maximum permissible error

The permissible errors in excess and in deficiency shall be as follows:—

Denomination	Permissible error \pm mg
20 kg	300
10 kg	150
5 kg	75
2 kg	30
1 kg	15
500 g	7.5
200 g	3.0
100 g	1.5
50 g	1.0
20 g	0.8
10 g	0.6
5 g	0.6
2 g	0.4
1 g	0.3
500 mg	0.25
200 mg	0.20
100 mg	0.15
50 mg	0.12
20 mg	0.10
10 mg	0.08
5 mg	0.06
2 mg	0.06
1 mg	0.06

5. Protective and carrying case

- (a) These weights shall be stored in their boxes made from teakwood or any other suitable non-corrosive material with proper housing lined with chemically neutral velvet, chamois leather or soft plastic material. Wood used in such boxes shall be reasonably free from resins and volatile materials. Glue shall not be used for fixing velvet or such other material. The weights shall be housed in such a manner so as to avoid their movement during transit.
- (b) Each milligram weight shall be provided with a separate housing. A covering glass or a sheet of any other transparent, non-reactive

and non-corrosive material shall be provided so as to ensure that these weights are not dislocated during transit.

- (c) A suitable device for lifting the kilogram and gram weights, covered with chamois leather or other suitable material, shall be provided. A pair of forceps capable of lifting easily milligram weights shall also be provided.

6. Inscription

The boxes containing the weights shall have the following inscriptions :—

- (a) the words 'WORKING STANDARD WEIGHTS',
 (b) the identification number of the working standard weights,
 (c) the name of the manufacturer,
 (d) the year of manufacture,
 (e) the marks of verification.

PART II—WORKING STANDARD METRE BAR

1. Material

The working standard metre bar (hereinafter called metre bar) shall be manufactured from 58 per cent nickel-steel, or austenitic stainless steel, or stainless steel with 13 per cent chromium or pure nickel (minimum purity 99 per cent).

2. Shape and dimensions

- (a) The metre bar shall have a rectangular cross section of minimum dimensions 20 mm x 10 mm. The existing cross-section with dimensions 30 mm x 15 mm shall be preferred.
 (b) The overall length of the metre bar shall be 1030 ± 1 mm and the graduated length shall be 1010 mm.
 (c) Ungraduated length of 10 mm shall be left after the last graduated marks.

3. Finish

The graduated surface shall be bright, nicely polished and free from surface irregularities in the neighbourhood of the graduation marks.

4. Graduations

- (a) The metre bar shall be graduated in millimetre throughout from 0 to 1000 mm on the wider upper surface.
 (b) A length of 10 mm before the zero graduation mark shall also be graduated in millimetres.
 (c) The scale shall be regular. The thickness of the graduation marks shall be uniform and shall lie between 30 and 80 micrometres.
 (d) The width of the graduation marks shall be uniform to within \pm fifteen per cent of the average width of all the marks.

- (e) The graduation marks representing centimetres shall be longer than those representing half centimetres and the graduation marks representing half centimetres shall be longer than those representing millimetres.
 (f) Each graduation mark shall be straight to within ten micrometres over its length.
 (g) The graduation marks shall be parallel to one another to within ten micrometres.
 (h) The length of the graduation marks shall be not less than—
 3 mm for mm marks.
 5 mm for half cm marks.
 8 mm for cm marks.
 (i) The centimetres graduation marks shall be numbered in the increasing order of numeration.
 (j) The height of the numerals and the letters (symbols) shall be approximately 3 mm.
 (k) The graduation marks shall be square to the scale axis to within 30 minutes of arc.

5. Cursor

- (a) The errors on the length measure under verification shall be determined by means of a scale marked on a plate, made from transparent material, which is carried by a cursor capable of moving along the length of the metre bar. The plate shall have appropriate and constant dimensions and thickness.
 (b) The scale on the plate shall :
 (i) either be a length of 9 mm divided into 10 parts thus forming a Vernier scale to read the errors to the nearest of 0.1 mm; or
 (ii) one millimetre divided into 10 parts for reading the errors directly to the nearest of 0.1 mm.
 (c) The thickness of the graduation marks on the scale shall be less than that of the graduation marks on the metre bar.
 (d) The graduation marks on the scale shall be inscribed on the surface facing the graduation marks on the metre bar.
 (e) The readings shall be taken by means of a magnifying glass, the magnification of which shall be not less than 5X if the scale is graduated in 0.1 mm and not less than 3X if the scale is of Vernier type.

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- (f) The cursor shall be such that it would be possible to move it smoothly without jerks, along a straight line from one end of the measure to the other.
- (g) A mechanism to raise, lower and laterally move the measure under verification, within a view to putting its graduated surface at a proper level and aligning its zero mark with that of the metre bar shall be provided.
- (h) For facilitating the verification of end measures, two vertical stops bearing reference lines shall be provided. The first stop shall be such that its reference line can be aligned with the zero mark of the metre bar. The second stop shall be capable of moving along the entire length of the metre bar.

6. Maximum permissible errors

- (a) The error on the length between any two graduation marks on the working standard length measure, at the standard temperature of 20°C, shall not exceed the value "e" calculated according to the following formula :

$$e = (50 + L/20) \text{ micrometres}$$

where L is the nominal length in millimetres of that part of the metre bar between the two graduation marks, the error on which is being determined. The calculated value of "e" shall be rounded to the nearest integer.

- (b) The errors on the length between any two graduation lines on the plate shall not exceed ± 20 micrometres.

7. Inscription

The metre bar shall bear the following inscription:

- (a) the words "WORKING STANDARD METRE BAR",
- (b) identification number of the metre bar,
- (c) the name of the manufacturer,
- (d) the material of the metre bar,
- (e) the words, figures and letter "STANDARD AT 20°C",
- (f) the year of manufacture.

8. Protective and carrying case

- (a) The standard metre bar shall be housed in a case made from suitable material and provided with a handle, lined internally with velvet, a plastic material or any other material and in such a way that the metre bar is not likely to be damaged, particularly by shocks or corrosion.
- (b) The case shall have affixed on it a plate bearing the inscription "WORKING

STANDARD METRE BAR" and the identification number.

Note : The existing working standard length measure (metre bars) may differ in minor details in regard to inscriptions, etc. on it.

PART III—WORKING STANDARD CAPACITY MEASURES

1. Denomination

Litre series (l)	Millilitre series (ml)
10	500
5	200
2	100
1	50
	20

2. Material

Working standard capacity measures shall be pressed out of oxygen free, deoxidized annealed copper sheets of deep drawing quality.

3. Shape

- (a) Working standard capacity measure of 10 litres shall be cylindrical and have its inside diameter approximately equal to the height of the measure. This shall have two handles attached securely to its sides.
- (b) Working standard capacity measures of 5 litres and below shall be of the same shape as above but shall not have any handles.
- (c) The outside of the body of the working standard capacity measures shall be oxidized to give a smooth dull black surface and the inside shall be tinned.
- (d) The denominations of the working standard measures shall be engraved on the outside surface.
- (e) Each working standard capacity measure shall be provided with specially selected striking glass and the measures and glasses shall be securely packed in velvet lined teakwood boxes.

4. Maximum permissible error

Denomination	Permissible error in ml \pm ml
10 litres	8
5 litres	4
2 litres	2
1 litre	1.5
500 ml	1.0
200 ml	0.8
100 ml	0.6
50 ml	0.4
20 ml	0.2

5. Pipette measures

Pipettes of the following description may also be used as working standard measures :

- (a) One mark pipettes of capacities 10 ml and 5 ml.
- (b) Graduated pipettes of capacities 5 ml graduated at every tenth of ml.

6. Delivery time and maximum permissible errors of pipette measures

Denomination ml	Delivery time In seconds		Permissible error (+ ml)
	Minimum	Maximum	
10	15	25	0.04
5	10	20	0.03
5	10	40	0.05

(Graduated)

7. Protective and carrying cases

These capacity measures shall be stored in their boxes made from teakwood or any other suitable non-corrosive material with proper housing lined with velvet, chamois leather or soft plastic material. Wood used in such boxes shall be reasonably free from resins and volatile materials. Glue may not be used for fixing velvet or such other materials. Each capacity measure shall be housed in such a manner so as to avoid their excessive movement during transit.

Each striking glass of the capacity measure shall be securely housed in proper grooves so as to protect them from breakage during transit.

8. Inscriptions

The boxes containing these capacity measures shall have the following inscriptions :

- (a) the words "WORKING STANDARD CAPACITY MEASURES",
- (b) the identification number of the capacity measures,
- (c) the name of the manufacturer,
- (d) the year of manufacture,
- (e) the mark(s) of verification of proper verification authority.

FOURTH SCHEDULE**SPECIFICATIONS FOR STANDARD EQUIPMENT**

[See Rules 7, 8 and 9]

PART I—REFERENCE STANDARD BALANCES

1. Every reference standard balance shall be of such robust construction and have such metrological qualities so as to ensure the continued good performance, as indicated in paragraph 2.

2. Sensitivity figure/readability and precision of measurement of every reference standard balance shall be such as to give overall precision of measurement of 1 part in one million for weights from 10 kg to 10 g and ± 0.01 mg for weights from 5 g to 1 mg.

PART II—SECONDARY STANDARD BALANCES

1. Every secondary standard balance shall conform as regards capacity, sensitivity figure in mg per division, minimum scale division, variation in sensitivity figure with respect to load and overall accuracy of measurement, to the specifications as indicated below :

Capacity	Sensitivity figure mg/div.	Min. scale division	Maximum variation in sensitivity figure with respect to load	Minimum overall accuracy of measurement
1	2	3	4	5
20 kg	25	1.5 mm	10 per cent	25 mg in 10 kg
5 kg	7.5	1.0 mm	10 per cent	7.5 mg in 2 kg
1 kg	1.5	1.0 mm	10 per cent	1.5 mg in 500 g
200 g	0.5	1.0 mm	10 per cent	0.5 mg in 50 g
20 g	0.1	1.0 mm	10 per cent	0.01 mg in 1 mg
2 g	0.02	0.75 mm	10 per cent	0.02 mg in 1 mg

2. the standard deviation of the 10 consecutive rest points for every secondary standard balance shall not be more than one scale division.

3. The deviation in arm ratio from unity, for every secondary standard equi-arm balance shall not be more than a fraction equal to sensitivity figure divided by full load (both being taken in the same unit).

4. The variation in time periods at different loads for every secondary standard balance shall not be more than 20 per cent.

5. Every secondary standard balance shall be provided with a device so that the contact between the knife-edges and their respective planes is broken when the balance is in arrested position.

6. The secondary standard balance shall, ordinarily, be used for indoor work in laboratories.

7. Every secondary standard balance of digital type shall conform as regards value of verification scale

interval as given below:—

Capacity	Maximum value of verification scale interval	Type of weights to be verified
20 kg	1 mg	20 kg to 500 g
200 g	0.01 mg	200 g to 1 mg

PART III- WORKING STANDARD BALANCES

1. Working standard balances may be of the following two types:—

- Equi-arm types balances;
- Digital type balances.

2. Every working standard balance of equi-arm type shall conform, as regards capacity, sensitivity figure, maximum variation in sensitivity figure with respect to load and maximum overall inaccuracy of measurement to the specification as indicated below—

Capacity	Max. Sensitivity figure/division	Maximum variation in sensitivity figure	Minimum overall accuracy of measurement
50 kg	100 mg	20 per cent	100 mg in 10 kg
5 kg	10 mg	20 per cent	10 mg in 500 g
200 g	1 mg	20 per cent	1 mg in 100 g
50 g	0.4 mg	20 per cent	0.4 mg in 5 g
2 g	0.05 mg	20 per cent	0.05 mg in 1 mg

2.1 The standard deviation of ten consecutive rest points for every working standard balance shall not be more than one scale division.

2.2 The deviation in arm ratio from unity, for every working standard equi-arm balance shall not be more than the fraction equal to sensitivity figure divided by the full load (both being taken in the same unit).

3. Every working standard digital type balance shall conform, as regards value of verification scale interval as given below:—

Capacity	Max. value of verification scale interval	Type of weights to be verified
50 kg	1 g	Non-bullion : 50 kg and 20 kg
20 kg	0.1 g	Bullion : 10 kg, 5 kg; Non-bullion : 20 kg to 2 kg
2 kg	10 mg	Bullion : 2 kg to 500 g; Non-bullion : 2 kg to 200 g
200 g	0.1 mg	Bullion : 200 g and below; Non-bullion : 200 g and below

4. The standard deviation of the 10 consecutive rest points for every working standard balance shall not be more than one scale division.

5. The deviation in arm ratio from unity, for every working standard equi-arm balance shall not be more than a fraction equal to sensitivity figure divided by full load (both being taken in the same unit).

6. The variation in time periods at different load for every working standard balance shall not be more than 20 per cent.

7. Every indoor type working standard balance shall be provided with a device so that the contact between the knife-edges and their respective planes is broken when the balance is in arrested position.

Note: For verification of bullion or carat weights, only indoor type working standard balances shall be used.

FIFTH SCHEDULE

[See Rule 11]

PART—I

Weights (Other than Carat Weights)

General

This Part deals with the following categories of weights:—

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

A.—IRON WEIGHTS PARALLELOIPIED (50 kg to 5 kg)

1. Denominations

Paralleloiped iron weights shall have the following denominations:—

Kilogram series : 50, 20, 10 and 5.

2. Shape

- (a) The weights shall be integral and in the form of paralleloiped rectangles with corners rounded off and having a rigid handle for ease of handling.
 (b) The shapes shall be as shown either in Figure 3 or in Figure 4.

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 weights—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. 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 (See Figure 3).
 (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 (See Figure 4).
 (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-third of the depth of the loading hole shall remain empty after adjustment.

5. Markings

- (a) The denomination of the weight and the marker'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. (See Figure 3 and Figure 4.)
 (b) The denomination of the weight shall be indicated in the international form of Indian numerals in an indelible manner with the symbols as illustrated below:

किलो or किय्रा 5 kg

Note: The abbreviation किलो or किय्रा, may be indicated in the regional script.

6. Dimensions

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

TABLE 1

Paralleloiped Weights Dimensions for Type 1 Weights

(In millimetres)

Denomination	A	A'	B	B'	H	C	D	E	F	G/G'
5 kg	150	152	75	77	84	36	30	6	66	12/20
10 kg	190	193	95	97	109	46	38	8	84	12/20
20 kg	230	234	115	117	139	61	52	12	109	24/32
50 kg	310	314	155	157	192	83	74	16	152	24/32

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