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भाग 8 इस्पातकार्य व लौहकार्य

(चौथा पुनरीक्षण)

Indian Standard

METHODS OF MEASUREMENT OF
BUILDING AND CIVIL ENGINEERING WORKS

PART 8 STEELWORK AND IRONWORK

(Fourth Revision)

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FOREWORD

This Indian Standard (Part 8) (Fourth Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Methods of Measurement of Works of Civil Engineering (Excluding River Valley Projects) Sectional Committee had been approved by the Civil Engineering Division Council.

Measurement occupies a very important place in planning and execution of any civil engineering work from the time of first estimates to final completion and settlement of payments of the project. The methods followed for measurement are not uniform and considerable differences exist between practices followed by one construction agency and another and also between various Central and State Government departments. While it is recognized that each system of measurement has to be specifically related to the administrative and financial organizations within the department responsible for work, a unification of the various systems at technical level has been accepted as very desirable, specially as it permits a wider circle of operation for civil engineering contractors and eliminates ambiguities and misunderstandings arising out of inadequate understanding of various systems followed.

Among the various civil engineering items, measurement of buildings had been first to be taken up for standardization and this standard having provisions relating to all building works, was first published in 1958 and was subsequently revised in 1964. In its second revision, the standard was issued in different parts corresponding to different trades in building and civil engineering works. As a result, the second revision of this standard (Part 8) was published in 1967 which was then revised in 1974.

This fourth revision has been brought out to incorporate the changes found necessary in the light of usage of this standard and suggestions made by various bodies implementing it.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Indian Standard***METHODS OF MEASUREMENT OF
BUILDING AND CIVIL ENGINEERING WORKS****PART 8 STEELWORK AND IRONWORK***(Fourth Revision)***1 SCOPE**

This standard (Part 8) covers the method of measurement of steelwork and ironwork in buildings and civil engineering works.

NOTE — The method of measurement for roof covering; pipe lines, etc for water supply and sewerage; and pipe lines, etc for gas and oil are covered in IS 1200 (Part 9): 1973, IS 1200 (Part 16): 1979 and IS 1200 (Part 20): 1981 respectively.

2 REFERENCES

The following Indian Standards are necessary adjuncts to this standard:

<i>IS No.</i>	<i>Title</i>
1200 (Part 9) : 1973	Method of measurement of building and civil engineering works : Part 9 Roof covering (including cladding) (<i>second revision</i>)
1200 (Part 16) : 1979	Method of measurement of building and civil engineering works : Part 16 Laying of water and sewer lines including appurtenant structures (<i>third revision</i>)
1200 (Part 20) : 1981	Method of measurement of building and civil engineering works : Part 20 Laying of gas and oil pipe lines (<i>third revision</i>)
1239 (Part 1) : 1979	Mild steel tubes, tubulars and other wrought steel fittings : Part 1 Mild steel tubes (<i>fourth revision</i>)

3 GENERAL RULES**3.1 Clubbing of Items**

Items may be clubbed together provided that break-up of clubbed items is agreed to be on the basis of detailed description of items, stated in this standard.

3.2 Booking of Dimensions

In booking dimensions, order shall be consistent and generally in sequence of length, width and height or depth or thickness.

3.3 Description of Items

The description of each item, which covers both fabrication and erection, shall include conveyance and delivery, handling, unloading, storing, hoisting and all labour for finishing to required shape and size. Alternatively, in each item of work fabrication or erection shall be described and measured separately.

3.4 Bill of Quantities

Items of work shall fully describe the materials and truly represent the work to be executed.

3.5 Dimensions

Unless otherwise stated all works shall be measured net in decimal system, as fixed in its place, as given in 3.5.1 and 3.5.2.

3.5.1 Cross-sections and thicknesses shall be taken from relevant Indian Standards. Length and breadth shall be measured to nearest 0.001 m except for reinforcement which shall be measured to nearest 0.005 m.

3.5.2 Areas shall be worked out to nearest 0.001 m².

3.6 The priming coat shall be described and included in item of fabrication.

3.7 The mass of steel sheet, plate and strip; rolled steel sections, steel rods, steel reinforcements, and steel strips; forged steel, steel castings and steel tubes shall be taken from relevant Indian Standards.

3.7.1 The final mass of individual categories/sections calculated based on dimensions arrived at in 3.5.1 and 3.5.2 and mass arrived at as per 3.7, shall be worked out to nearest 1 kg.

3.8 Unless otherwise specified an addition of 2.5 percent of the mass of structure shall be made for shop and site rivet heads in riveted steel structures.

3.9 Unless otherwise specified, in the case of welded steel structures no allowance shall be made for the weld metal.

3.10 Wedging-up, under stanchion bases or steel grillages shall be described and enumerated.

4 STEELWORK

4.1 Various items of steelwork shall be classified and measured separately under following categories. Work in each classification shall be described. Bolted, riveted and welded structures shall be described as such and measured separately:

- a) Rolled sections (joist, channel, angle or tee) fixed independently without connecting plates;
- b) Rolled sections fixed with connecting plate or angle cleats as in main and cross-beams, hip and jack rafters, purlins connected to common rafters and the like.
- c) Rolled joists, with or without stiffeners in grillages (the weight of stiffeners shall be added to the mass of joists);
- d) Compound girders;
- e) Plate girders (stating type and overall height of girder);
- f) Lattice girders, aerial masts, tank staging and like (stating details of members and overall height of structure);
- g) Single stanchions composed of rolled joists or channels with caps, bases, splices, angle brackets, etc;
- h) Compound stanchions with caps, bases, splices, angle brackets, etc;
- j) Trusses and trussed purlins (stating spans and overall heights);
- k) Framing of cladding and glazing;
- m) Crane gantry rails including fastenings;
- n) Staircases including stringers, treads, landings, handrails, etc;
- p) Plates (plain or chequered), square cut or notched, holed (ordinary or counter-sunk) without any attachments;
- q) Plates of classification (p) above with riveted, bolted or welded attachments;
- r) Running rails and girders for sliding doors;
- s) Platemwork with or without stiffeners for:
 - 1) bunkers,
 - 2) chutes,
 - 3) chimneys including ladders,
 - 4) tanks with or without covers including stays but excluding stagings,
 - 5) gutters and downpipes, and
 - 6) furnace shell.
- t) Anchor bolts, holding down bolts including all fittings and sag rods;
- u) Wind ties to roofs, strakes for wooden bridges, cores for handrails (straight

portion), running bars for doors and fencing posts and struts;

- v) Framed work, such as grills, gratings, framed guard bars, ladders, walkways, railings, brackets and similar work;
- w) Straps, hooks, clamps, holdfasts, wall ties, insets, knee pieces, and similar works;
- y) Ornamental work as in grills, balustrades, and curved, ramped and scroll portion of cores for handrails; and
- z) Steelwork for:
 - 1) doors,
 - 2) hydraulic gates, and
 - 3) cassions and well curbs.

NOTES

1 In composite construction shear connectors, if any, will form part of structural steelwork.

2 The above classification with suffix B, R or W shall be indicated in bills of quantities to denote bolted, riveted or welded construction respectively.

4.2 The steelwork shall be measured by mass except otherwise mentioned.

4.3 Unless otherwise specified, mass of cleats, brackets, packing pieces, bolts, nuts, washers, distance pieces, separators, diaphragm, gussets (taking overall rectangular dimensions), fish plates, etc, shall be added to the weight of respective items. In riveted work, allowance is to be made for mass of rivet heads (see 3.8). No deduction shall be made for rivet or bolt holes (excluding holes for anchor or holding down bolts). Deduction in case of rivet or bolt hole shall, however, be made if its area exceeds 0.02 m^2 and for notch if its area exceeds 0.05 m^2 . For other type of openings like holes for service pipe etc, deduction shall be made if its area exceeds 0.1 m^2 .

5 TUBULAR STRUCTURES

The tubular structures shall be described and measured by weight.

6 CABLES/GUY WIRES

The cables and guy wires shall be described and measured in running metre stating the diameter or by weight.

7 BEARINGS

These shall be classified as roller, rocker, sliding, etc, and fully described and enumerated.

8 PIPES FOR FLUES

8.1 Flue pipes of steel sheeting shall be measured overall in running metres and described as including all short lengths, cutting and waste. The method of jointing and fixing shall be described. Supports shall be measured separately.

8.2 The diameter of pipes, thickness of sheeting and whether black or galvanized shall be stated. In case of galvanized steel pipes, class of galvanization [see IS 1239 (Part 1) : 1979] shall also be stated.

8.3 Bends, elbows, cowls, tapered pipes to fit outlets of ranges, and roof plates with sleeve shall be enumerated and measured as extra over.

9 DUCT WORK

The duct metal work shall be described and measured in square metres on the basis of surface area. Support shall be measured separately.

10 EXPANDED METAL WORK AND WELD MESHWORK

Expanded metalwork and weld meshwork shall be described including laps, meshes, weight, strands and method of fixing and measured in square metres. Openings exceeding 0.2 m² shall be deducted. Raking or circular cutting and waste shall be included in the description.

11 STEEL REINFORCEMENT

11.1 Reinforcement bars shall be measured in running metres and their mass calculated as per 3.7.1. The item of work shall include removal of surface rust, straightening, cutting to lengths, hooked ends, cranking or bending (straight or spiral). Authorized overlaps, chairs/separators shall be measured.

11.1.1 When welding of joints is authorized the same shall be described; joints, butt welded shall be measured in numbers and lap welded shall be measured in running metres of the length welded.

11.2 Fabric reinforcement shall be described (including meshes and strands) and measured in square metres. Authorized laps shall be measured.

11.2.1 Wire netting used as encasement shall be described (including meshes and wires) and shall be measured in square metres. Authorized laps shall be measured.

11.2.2 Raking or circular cutting and waste shall be included in description.

11.3 Binding wire for reinforcement shall not be measured, but shall be included in description of item.

NOTE — Term 'binding wire' is reserved for wire binding together reinforcement in contact.

11.4 Hoop iron shall be fully described and measured in running metres,

12 MISCELLANEOUS WORK

12.1 Bolts including nuts and washers other than those covered in 4.1 (t) shall be described and measured by mass in kilograms.

12.2 Plain or barbed wire fencing shall be fully described and each line or wire shall be measured in running metres.

12.3 Patent plain wire fencing shall be fully described and measured in square metres.

12.4 Wire mattresses, nets shall be fully described including method of tying and measured in square metres. Authorised laps shall be measured.

12.5 Collapsible gates shall be described and measured in square metres as fixed stating size of gate opening, pickets, pivoted flat bars and size of meshes formed by them when fully extended.

12.5.1 Top and bottom runners, pulleys, locking lugs and handles shall be described and included with item. Description shall also include erection in position and securing runners with holdfasts and brackets.

12.6 Steel rolling shutter/grills shall be described and measured in square metres. The width shall be measured as the outer distance between the backs of the two guide channels of the rolling shutters and the height shall be the distance between the still and the centre of the hood cover.

12.6.1 Gauge and type of the shutter/grills, distance between centres of interlock and bridge depth shall be stated.

12.6.2 Description shall include spring winding mechanism operated mechanically or manually, jamb guides, bottom rail, locking and door operating arrangements.

12.6.3 Where a wicket gate has to be provided it shall be described.

12.6.4 Any protective treatment required to be applied at manufacturer's works, such as painting or hot dip galvanizing shall be described.

12.7 Unless otherwise stated, steel doors, windows, ventilators and glazing frames shall be measured in square metres as fixed stating type given in relevant Indian Standard.

12.7.1 Method of fixing and hanging and fastenings shall be included with item.

12.8 Gates for Compound Walls and Railing

Gates shall be described and enumerated or measured in square metres; hangings, guide rails and fastenings shall be described and included with item.

12.9 Steel Louvre

Louvres shall be described and measured in square metres on basis of opening covered.

12.10 Slotted Pipes

Site perforated pipes shall be described and measured by mass in kilogram. Deductions for perforations/slots shall, however, be made if its area exceeds 0.02m^2 .

12.10.1 The manufactured perforated pipe shall, however, be described and measured in running metres.

13 CAST IRONWORK

13.1 Cast iron flue (or smoke) pipes shall be measured overall in running metres and described as including all short length, cutting and waste.

13.1.1 Method of jointing and fixing shall be described, and diameter of pipes and mass per standard length stated.

13.1.2 Bends, inspection doors and cowls shall be enumerated and measured as extra over.

13.2 Spiral Staircases

Spiral staircases shall be enumerated, stating

overall diameter and height, total number of treads, risers and sleeves in one piece, central shaft or poles including base plate and other attachment handrail and balusters.

13.2.1 Exit landings shall be described and enumerated.

13.2.2 Stays, if required, shall be stated.

13.3 Stanchions, Columns and Lamp Posts

These shall be described and measured in numbers specifying mass.

13.4 Grid flooring and grills shall be described including size and mass of each piece and measured in square metres on the basis of overall area.

13.5 Except as hereinbefore described, cast ironwork shall be measured by mass and classified under following headings.

- a) *Unmachined* — such as brackets, frames, gully tops, manhole covers, gratings, fire doors, soot doors and frames; and balls and stop cock boxes.
- b) *Machine turned* — such as pulleys and similar work.

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TO
IS 1200 (PART 8) : 1993 METHODS OF
MEASUREMENT OF BUILDING AND CIVIL
ENGINEERING WORKS
PART 8 STEELWORK AND IRON WORK

(Fourth Revision)

[*Page 2, clause 4.1(z)*] — Insert the following new category after(z):

‘z1) Purpose made butt hinges for fixing to stone or concrete door and window frames.’

(*Page 3 clause 12.2, line 2*) — Substitute ‘of’ for ‘or’.

(*Page 4, clause 12.10*) — Insert the following new clause after **12.10**:

‘**12.11** Metal sheet in wall cladding etc shall be described and measured in square metres. Gauge and type of sheet (whether black or galvanized), type of connection/adjustment with the supporting structures by bolting, welding or by any other arrangements shall be stated.’

[*Page 4, clause 13.5(a), line 2*] — Substitute ‘traps’ for ‘tops’.

(CED 44)