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IS 965 (1963): Equivalent Metric Units For Scales Dimensions And Quantities In General Construction Work [CED 13: Building Construction Practices including Painting, Varnishing and Allied Finishing]

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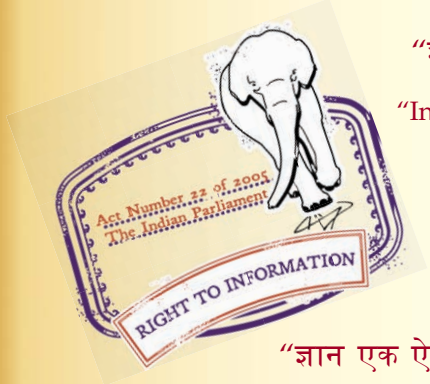

"ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है"
Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

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IS : 965 - 1963
(Reaffirmed 2010)

Indian Standard

EQUIVALENT METRIC UNITS FOR SCALES, DIMENSIONS AND QUANTITIES IN GENERAL CONSTRUCTION WORK

(Revised)

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr 7

March 1964

Indian Standard

EQUIVALENT METRIC UNITS FOR SCALES, DIMENSIONS AND QUANTITIES IN GENERAL CONSTRUCTION WORK

(Revised)

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(*Continued on page 2*)

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CONTENTS

Indian Standard

EQUIVALENT METRIC UNITS FOR SCALES, DIMENSIONS AND QUANTITIES IN GENERAL CONSTRUCTION WORK

(Revised)

0. FOREWORD

0.1 This revised Indian Standard was ad pted by the Indian Standards Institution on 12 November 1963, after the draft finalized by the Standing Working Committee of the Building Divisicn Council had been approved by the Building Division Council.

0.2 This standard was first issued in 1958. Since the issue of the standard considerable experience has been gained with regard to actual working to the standard during the last few years. The various Public Works Departments and othei concerned organizations adopted this standard and difficulties in implementation of certain proposed metric units were experienced. The Committee has taken note of these and has issued this revision which in addition to some minor modifications incorporates an additional item on carriage of materials for which also metric units have been suggested.

0.3 Dimensions of building materials and components, quantities of construction work and strength of materials bear close inter-relation to one another and influence preparation of material specifications and codes of practice. Further, the units of length, area or volume used today, have significance in terms of the actual quantity implied, and while making conversion, care has to be exercised as to what the equivalent quantity would mean in the new system. A concrete grasp of the quantity eferred to by the units by reading a descr iption of the quantity is an essential requirement in evolving standard units; for instance one cubic yard is vividly grasped as the volume of a cube having a length, breadth and height equal to one yard. When converting into metric units, and choosing a rationalized value, two requirements are to be fulfilled; firstly the equivalent unit should be in round number, and secondly the equivalent unit should have an easily understood direct relationship to the original unit. One cubic metre which is nearly equivalent to one cubic yard fulfils both these requirements; the tonne which is equivalent to the present ton is also another instance. The advantage in choosing such units as cubic metre and tonne is that

the numerical value expressing the quantity either in the foot-pound system or in the metric system will not change much and the quantity specified can be easily imagined. In many other cases such a direct conversion into a convenient metric unit is not possible, and consequently the conception of the actual quantity specified takes time to grasp.

In the preparation of estimates for construction work where certain units and rates in terms of such units have been established by tradition, the importance of choosing new units in the metric system which have a simple and convenient relationship to these units is further emphasized. The new unit will have a derived rate and the familiarization of this derived rate will be quicker if the relationship between the former units and the metric units is direct and simple, preferably in whole numbers.

On account of this close inter-relationship between materials and quantities of construction work carried out and also in view of the variety of materials and types of constructional quantities which even a very simple type of construction involves, the necessity has been felt to establish, as a first step, equivalent metric units which should be used for dimensions, scales, quantities, etc, generally met with in the building field. The proposed equivalent metric units in place of the existing units take note of the practices at present being followed in the metric countries and the units which have become familiar and conversant over a period of their use.

0.4 This standard has been prepared with the purpose of guiding the various technical committees under the Building Division Council in selecting the equivalent metric units for dimensions and quantities which they come across while preparing standard specifications and codes of practice. For convenience of reference, a tabulation of basic metric units in regard to length, area, volume and weight is given in Appendix A.

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1. SCOPE

1.1 This standard lays down equivalent metric units for the various dimensional values met with in general construction work and at present expressed in the foot-pound-second (fps) system.

2. SCALES FOR SURVEY PLANS AND BUILDING AND ARCHITECTURAL DRAWINGS

2.1 Topographical Maps

fps Scale Currently Used		*Metric Scale to be Used*	
1 in. = 4 miles	$\left(\frac{1}{253\ 440}\right)$	1 cm = 2·5 km	$\left(\frac{1}{250\ 000}\right)$
1 in. = 2 miles	$\left(\frac{1}{126\ 720}\right)$	1 cm = 1 km	$\left(\frac{1}{100\ 000}\right)$
1 in. = 1 mile	$\left(\frac{1}{63\ 360}\right)$	1 cm = 0·5 km	$\left(\frac{1}{50\ 000}\right)$

2.2 Town Surveys

fps Scale Currently Used		*Metric Scale to be Used*	
1 in. = 1 mile	$\left(\frac{1}{63\ 360}\right)$	2 cm = 1 km	$\left(\frac{1}{50\ 000}\right)$
3 in. = 1 mile	$\left(\frac{1}{21\ 120}\right)$	4 cm = 1 km	$\left(\frac{1}{25\ 000}\right)$
6 in. = 1 mile	$\left(\frac{1}{10\ 560}\right)$	10 cm = 1 km	$\left(\frac{1}{10\ 000}\right)$
10·56 in. = 1 mile or 1 in. = 500 ft	$\left(\frac{1}{6\ 000}\right)$	1 cm = 50 m	$\left(\frac{1}{5\ 000}\right)$

2.3 Large Scale Surveys and Layouts

fps Scale Currently Used		*Metric Scale to be Used*	
1 in. = 100 ft	$\left(\frac{1}{1\ 200}\right)$	1 cm = 10 m	$\left(\frac{1}{1\ 000}\right)$
1 in. = 64 ft	$\left(\frac{1}{768}\right)$		
1 in. = 32 ft	$\left(\frac{1}{384}\right)$	1 cm = 5 m	$\left(\frac{1}{500}\right)$

NOTE — Metric scale 1 cm = 20 m $\left(\frac{1}{2\ 000}\right)$ may also be used though there is no corresponding fps scale currently used.

2.4 Preliminary or Sketch Drawings Dependent on the Subject

fps Scale Currently Used		*Metric Scale to be Used*	
1 in. = 32 ft	$\left(\frac{1}{384}\right)$	1 cm = 5 m	$\left(\frac{1}{500}\right)$
1 in. = 16 ft	$\left(\frac{1}{192}\right)$	1 cm = 2 m	$\left(\frac{1}{200}\right)$
1 in. = 8 ft	$\left(\frac{1}{96}\right)$	1 cm = 1 m	$\left(\frac{1}{100}\right)$

2.5 Working Drawings: Plans, Elevations and Sections

fps Scale Currently Used		*Metric Scale to be Used*	
1 in. = 16 ft	$\left(\frac{1}{192}\right)$	1 cm = 2 m	$\left(\frac{1}{200}\right)$
1 in. = 8 ft	$\left(\frac{1}{96}\right)$	1 cm = 1 m	$\left(\frac{1}{100}\right)$
1 in. = 4 ft	$\left(\frac{1}{48}\right)$	1 cm = 0·5 m	$\left(\frac{1}{50}\right)$

2.6 Large Scale Drawings: General Details

fps Scale Currently Used	*Metric Scale to be Used*
$\frac{1}{2}$ in. = 1 ft $\left(\frac{1}{24}\right)$	1 cm = 20 cm $\left(\frac{1}{20}\right)$
1 in. = 1 ft $\left(\frac{1}{12}\right)$	1 cm = 10 cm $\left(\frac{1}{10}\right)$

2.7 Enlarged Details

fps Scale Currently Used	*Metric Scale to be Used*
1 in. = 1 ft $\left(\frac{1}{12}\right)$	1 cm = 10 cm $\left(\frac{1}{10}\right)$
3 in. = 1 ft $\left(\frac{1}{4}\right)$	1 cm = 5 cm $\left(\frac{1}{5}\right)$
4 in. = 1 ft $\left(\frac{1}{3}\right)$	1 cm = 2·5 cm $\left(\frac{1}{2{\cdot}5}\right)$
6 in. = 1 ft $\left(\frac{1}{2}\right)$	1 cm = 2 cm $\left(\frac{1}{2}\right)$
1 in. = 1 in. or Full Size	1 cm = 1 cm or Full Size

3. SURVEYING INSTRUMENTS

3.1 Levelling Staff (*see* IS : 1779-1961 Specification for 4-Metre Levelling Staff, Folding Type)

	fps Staff Currently Used	*Metric Staff to be Used*
Height	5 + 5 + 4 = 14 ft	2 + 2 = 4 m
Division	0·01 ft	5 mm

3.2 Measuring Tapes

	fps Tape Currently Used	*Metric Tape to be Used*
1) Woven Metallic Tapes (*see* *IS : 1269-1958 Specification for Metric Woven Metallic Tape Measures):		
Lengths	100 ft 50 ft	30 m 20 m
Division	$\frac{1}{4}$ in.	1 cm
2) Steel Tapes [*see* *IS : 1270 - 1959 Specification for Metric Steel Tape Measures (Winding Type)]:		
Lengths	200 ft 100 ft 50 ft 25 ft 6 ft 3 ft	50 m 30 m 20 m 10 m 2 m 1 m
Division	$\frac{1}{8}$ in.	5 mm

3.3 Measuring Chains (*see* IS : 1492-1959* Specification for Metric Surveying Chains)

	fps Measuring Chain Currently Used	*Metric Measuring Chain to be Used*
Lengths	100 ft 66 ft	30 m 20 m
Link	1 ft	200 mm

*Since revised.

4. DIMENSIONS

4.1 Flooring Materials

	fps Units Currently Used	*Metric Units to be Used*
Slabs, tiles, etc:		
Length, breadth and thickness	in.	mm or cm

4.2 Walling Materials

	fps Units Currently Used	*Metric Units to be Used*
1) Stone blocks, bricks, etc:		
All dimensions	in.	mm or cm
2) Wall boards:		
Length	ft	m
Breadth	in.	mm or cm
Thickness	in.	mm
3) Plaster:		
Length and breadth	ft	m
Thickness	in.	mm

4.3 Assembled Components

	fps Units Currently Used	*Metric Units to be Used*
1) Doors, windows and ventilators:		
Height and breadth	ft	mm or cm
Thickness	in.	mm
2) Parts of doors, windows, ventilators, etc (such as glass panes, panels, shutters and frames)	in. or ft	mm or cm

4.4 Builder's Hardware

	fps Units Currently Used	*Metric Units to be Used*
1) Expanded metal:		
Size of mesh	in.	mm
Dimensions of strands	in.	mm
2) Wires:		
Length	ft	m
Diameter	SWG	mm
3) Wire products:		
Length	ft or in.	m or cm
Diameter	SWG	mm
4) Mild steel bars:		
Length	ft	m
Diameter or side of square	in.	mm
5) Rivets, bolts, nuts and washers:		
All dimensions	in.	mm
6) Rolled steel sections:		
Length	ft	m
Size	in. × in. and lb per ft run	mm × mm and kg per m run
7) Tower bolts, hinges, handles, etc:		
All dimensions	in.	mm

4.5 Roofing Materials

	fps Units Currently Used	*Metric Units to be Used*
1) Tiles, slabs, etc:		
Length and breadth	in. or ft	mm or cm
Thickness	in.	mm
2) Asbestos cement sheets:		
Length	ft	m
Breadth	in	mm or cm
Thickness	in.	mm

	fps Units Currently Used	*Metric Units to be Used*
3) Plain and corrugated galvanized steel sheet:		
Length	ft	m
Breadth	in.	mm or cm
Thickness	BG	mm
4) Copper roofing sheet:		
Length	ft	m
Breadth	in.	mm or cm
Thickness	SWG	mm
5) Lead sheet:		
Length	ft	m
Breadth	in.	mm or cm
Thickness	in.	mm
6) Zinc sheet:		
Length	ft	m
Breadth	in.	mm or cm
Thickness	Zinc gauge	mm

4.6 Ceiling Boards

	fps Units Currently Used	*Metric Units to be Used*
Length and breadth	ft	m
Thickness	in.	mm

4.7 Furniture

	fps Units Currently Used	*Metric Units to be Used*
1) Overall dimensions	in.	mm or cm
2) Parts:		
Length and other dimensions	in.	mm or cm

4.8 Sanitary Appliances

	fps Units Currently Used	*Metric Units to be Used*
Length, breadth and thickness	in.	mm

4.9 Pipes, Gutters, etc

	fps Units Currently Used	*Metric Units to be Used*
1) Pipes (asbestos, stoneware or metallic):		
Length	ft	m
Other dimensions	in.	mm
2) Gutters, Metallic:		
Length	ft	m
Other dimensions	in.	mm

4.10 Miscellaneous

	fps Units Currently Used	*Metric Units to be Used*
1) Aggregates for concrete (size)	in.	mm
2) Timber:		
Length	ft	m or cm
Girth	in.	cm
Cross-sectional dimensions	in.	mm

5. QUANTITIES

5.1 General

	fps Units Currently Used	*Corresponding Metric Value*	*Metric Units to be Used*
1) Dimensions shall be measured to the nearest	0·1 ft	0·03 m	0·01 m
2) Areas shall be worked out to the nearest	0·1 ft^2	0·009 m^2	0·01 m^2
3) Cubic contents shall be worked out to the nearest	0·1 ft^3	0·003 m^3	0·01 m^3

NOTE — These provisions will apply only to such items for which a definite degree of accuracy has not been specified.

5.2 Excavation and Earthwork

	fps Units Currently Used	*Corresponding Metric Value*	*Metric Units to be Used*
1) Rough excavation, foundation trenches, and excavation over areas	1 000 ft³ 100 ft³	28·3 m³ 2·83 m³	10 m³ m³
2) Surface excavation	yd³ 100 ft²	0·765 m³ 9·29 m²	m³ 10 m²
3) Surface dressing	1 000 ft²	92·9 m²	100 m²
4) Trenches for pipes, cables, etc	100 rft	30·5 m	m
5) Return, fill and ram	100 ft³	2·83 m³	m³
6) Forming embankments	1 000 ft³ 100 ft³	28·3 m³ 2·83 m³	10 m³ m³
7) Removal of excavated material; the distance (lead) of removal shall be in units of	100 rft	30·5 m	50 m or 10 m
8) Lifting of excavated material; the height (lift) shall be in units of	5 ft	1·52 m	1 m or 1·5 m
9) Planking and strutting to uphold the face of loose earth	100 ft²	9·29 m²	10 m² or m²
10) Puddling	100 ft³	2·83 m³	m³
11) Hard core and floors of shingle, ballast, *moorum*, red *bajri*	100 ft³	2·83 m³	m³
12) Filling in soakage pits	100 ft³	2·83 m³	m³
13) Hand-packed filling of stone, brick-ballast, etc	100 ft³	2·83 m³	m³

5.3 Concrete

	fps Units Currently Used	*Corresponding Metric Value*	*Metric Units to be Used*
1) Concrete work	yd³ ft³	0·765 m³ 28 dm³	m³ 10 dm³

	fps Units Currently Used	*Corresponding Metric Value*	*Metric Units to be Used*
2) Concrete cast-in-situ in solid articles (reinforced or otherwise)	ft³	{ 0·028 m³ / 28 dm³	m³ / 10 dm³
3) Precast cement concrete solid articles (reinforced or otherwise)	ft³	{ 0·028 m³ / 28 dm³	m³ / 10 dm³
4) Precast concrete block construction	{ 100 ft³ / ft³	2·83 m³ / 28 dm³	m³ / 10 dm³
5) Special finish to concrete block construction	100 ft²	9·29 m²	10 m²
6) Reinforced cement concrete-in-situ *chajjas*	{ ft³ / rft	28 dm³ / 0·305 m	10 dm³ / m
7) Expansion joints in concrete work: Length per mm width and per cm depth	100 rft	30·5 m	10 m
8) (a) Concrete casing to beams and the like	{ 100 ft³ / ft³	2·83 m³ / 28 dm³	m³ / 10 dm³
(b) Wrapping of netting, expanded metal, for concrete casing, etc	{ 100 ft² / ft²	9·29 m² / 9·3 dm²	10 m² / 10 dm²
9) Cavty walls of concrete, stone, brick, etc	{ 100 ft² / ft²	9·29 m² / 9·3 dm²	10 m² / 10 dm²
10) Surface channels	100 rft	30·5 m	10 m
11) Damp-proof course	{ 100 ft² / ft²	9 29 m² / 9·3 dm²	10 m² / 10 dm²
12) Waterproofing: Waterproofing agent	gal per cwt of cement	8·95 litres per quintal of cement	litre per 50 kg of cement or kg per 50 kg of cement
Surface treatment	{ ft² / 100 ft²	0·093 m² / 9·29 m²	m² / 10 m²

	fps Units Currently Used	*Corresponding Metric Value*	*Metric Units to be Used*
13) ***Jallies*** and louvres of concrete, wood, etc	ft²	9·3 dm²	10 dm²
14) Fencing posts of:			
Concrete	ft³	28 dm³	10 dm³
Wood	rft	0·305 m	m
15) Piles:			
Concrete piles	ft³	0·028 m³ 28 dm³	m³ 10 dm³
Wood piles	rft	0·305 m	m
Sheet piles	100 ft² ft²	9·29 m² 9·3 dm²	10 m² 10 dm²
16) Pitching and driving of piles:			
Whole piles	ft³	28 dm³	10 dm³
Sheet piles	ft²	9·3 dm²	10 dm²
17) Cement breeze blocks	ft³	28 dm³	10 dm³
18) Cutting in concrete, brick masonry per mm width and per cm depth	100 rft	30·5 m	10 m
19) Toothing and bonding in brick masonry, stone masonry, concrete work, etc	100 ft²	9·29 m²	10 m²

5.4 Brickwork and Stone Masonry

	fps Units Currently Used	*Correspondng Metric Vake*	*Metric Units to be Used*
1) Brickwork and stone masonry	100 ft³	2·83 m³	m³
2) Honeycomb brickwork of specified thickness	100 ft³	2·83 m³	m²
3) Under pinning	100 ft²	9·29 m²	10 m²

	fps Units Currently Used	*Corresponding Metric Value*	*Metric Units to be Used*
4) Brick or stone edging	100 rft 100 ft²	30·5 m 2·83 m²	10 m —
5) Filleting	100 rft	30·5 m	10 m
6) Brickwork or stone masonry around steel joists	100 ft²	2·83 m²	m²
7) Extra labour for stone masonry or brickwork around steel joists	100 ft²	9·29 m²	10 m²
8) Extra labour in dressed stonework:			
Sunk to faces, beds and joints and moulded work in cornices and the like	ft²	9·3 dm²	10 dm²
Chamfers, arrises, splays, rounded bullnose angle, rebates, grooves and cutting	rft	0·305 m	m
9) Levelling up in stonework with lime or cement concrete	100 ft²	9·29 m²	10 m²
10) Dressing to arches in faced work	ft²	9·3 dm²	10 dm²
11) Dressed stonework	ft²	28 dm²	10 dm²
12) Angles in facings:			
External angles	rft	0·305 m	m
Squints, birds-mouths, splayed or rounded angles	100 rft	30·5 m	10 m
13) Stops, mitres, etc	rft	0·305 m	m
14) Boulder work	100 ft³	2·83 m³	m³

5.5 Woodwork and Joinery (Measurements)

	fps Units Currently Used	*Corresponding Metric Value*	*Metric Units to be Used*
1) Lengths shall be measured to the nearest	in.	2·54 cm	cm
2) Width of surfaces to the nearest	½ in.	1·27 cm	cm
3) Width of single or detached boards and thickness of all boarding to the nearest	⅛ in.	3·2 mm	mm
4) Framework	ft^3	28 dm^3	10 dm^3
5) Shoring and strutting	100 ft^3	2·83 m^3	m^3
6) Rough boarding in temporary partition	100 ft^2	9·29 m^2	10 m^2
7) Centering to brick or stone arches	100 ft^2	9·29 m^2	10 m^2
8) Formwork to:			
Concrete	100 ft^2	9·29 m^2	10 m^2
	ft^2	9·3 dm^2	10 dm^2
Moulding	ft^2	9·3 dm^2	10 dm^2
9) Fillets required to produce throating	100 rft	30·5 m	10 m
10) Planing of timber	100 ft^2	9·29 m^2	10 m^2
11) Scribing, notching and circular cutting in:			
Cubic timber	ft^3	9·3 dm^3	10 dm^3
Boarding	rft	0·305 m	m
12) Rebates, tongues, grooves, beads, staff beads and flutes and mouldings	100 rft	30·5 m	10 m
13) Roof battens	100 ft^2	9·29 m^2	10 m^2
	ft^3	28 dm^3	10 dm^3

	fps Units Currently Used	*Corresponding Metric Value*	*Metric Units to be Used*
14) Trellis work:			
Generally	100 ft²	9·29 m²	10 m²
Doors and windows formed in trellis work	ft²	9·3 dm²	10 dm²
15) Plugging to walls	100 rft	30·5 m	10 m
16) ***Ballies***	rft	0·305 m	m
17) Rough-hewn scantlings	ft³	28 dm³	10 dm³
18) Rough planking	100 ft²	9·29 m²	10 m²
19) Wood piles [(*see* 5.3) (item 15)]			
20) Door and window *chowkats*	ft³	28 dm³	10 dm³
21) Fitting frames, fixing and hanging with hinges, pivots, etc	ft²	9·3 dm²	10 dm²
22) Cased frames of vertical sliding windows	ft²	9·3 dm²	10 dm²
23) Skirting cornices, picture and dado rails, etc	rft	0·305 m	m
24) Staircases:			
Wall strings, outer strings and cut strings	rft	0·305 m	m
Hand-rails	rft	0·305 m	m
Turned work	rft	0·305 m	m
Treads, risers	ft²	9·3 dm²	10 dm²
Circular cutting and waste	100 rft	30·5 m	10 m
Sealing joints of plaster or fibre boards	100 rft	30·5 m	10 m
Chamfering or rounding edges of fibre boarding and cutting v-groove	100 rft	30·5 m	10 m

5.6 Steel and Iron Work

	fps Units Currently Used	*Corresponding Metric Value*	*Metric Units to be Used*
1) Plates, flats, angles, bars for reinforcement and general purpose, channels, etc	cwt	0·508 quintal	quintal
2) Mild steel beams, joists, etc	ton cwt	1·016 tonnes 0·508 quintal	tonne quintal
3) Gates	ft^2	9·3 dm^2	10 dm^2
4) Spiral staircases; centre shaft	cwt	0·508 quintal	quintal
5) Railings	rft	0·305 m	m
6) Flue pipes	100 rft rft	30·5 m 0·305 m	10 m m
7) Expanded metal	100 ft^2	9·29 m^2	10 m^2
8) Fabric reinforcement	100 ft^2	9·29 m^2	10 m^2
9) Wire netting in wrappings to steel work embedded in concrete	100 ft^2	9·29 m^2	10 m^2
10) Hoop iron	100 rft cwt	30·5 m 0·508 quintal	10 m quintal
11) Bolts, nuts and washers	cwt	0·508 quintal	quintal
12) Wire fencing	100 rft	30·5 m	10 m
13) Patent plain wire fencing	100 ft^2	9·29 m^2	10 m^2
14) Wire mattresses, nets, etc	100 ft^2	9·29 m^2	10 m^2
15) Rolling shutters	ft^2	9·3 dm^2	10 dm^2
16) Collapsible gates	cwt ft^2	0·508 quintal 9·3 dm^2	quintal 10 dm^2
17) Steel doors and windows	ft^2	9·3 dm^2	10 dm^2

5.7 Roof Coverings

	fps Units Currently Used	*Corresponding Metric Value*	*Metric Units to be Used*
1) Roof coverings	100 ft²	9·29 m²	10 m²
2) Sheet roofing:			
Ridges, hips and valleys	rft	0·305 m	m
Rolls, drips and flashings	100 ft²	9·29 m²	10 m²
3) Raking cutting and waste to hips, valleys, etc	100 rft rft	30·5 m 0·305 m	10 m m
4) Asbestos-cement sheets:			
Filler pieces, aprons, barge boards, corner pieces, flashings, louvres and similar specials	100 rft rft	30·5 m 0·305 n	10 m m
Ridges, hips and raking cutting, etc (*see* items 2 & 3 above)			
5) Roof tiling:			
Ridges, hips, etc	100 rft	30·5 m	10 m
Hips and ridges formed in plaster	100 rft	30·5 m	10 m
Eave tiles bedded in mortar	100 rft	30·5 m	10 m
Filling ends and spaces	100 rft	30·5 m	10 m
Screwing eave tiles to battens	100 rft	30·5 m	10 m
Half tiles or 1½ tiles at verges	100 rft	30·5 m	10 m
Tiles at verges bedded in mortar on walls	100 rft	30·5 m	10 m
Cutting and waste to square abutments — chimney stacks, and the like	100 rft	30·5 m	10 m

	fps Units Currently Used	*Corresponding Metric Value*	*Metric Units to be Used*
6) Terraced roofing:			
Jack arches	ft^3	{ 0·028 m^3 / 28 dm^3 }	m^3 / 10 dm^3
Lime concrete in terracing over jack arching, RCC slab roof, etc	100 ft^2	2·83 m^2	m^3 or m^2
Fair finish or trowelled smooth to surface of lime concrete	100 ft^2	9·29 m^2	10 m^2
Mud layer on terraced verges	100 ft^2	9·29 m^2	10 m^2
Waterproofing layer	100 ft^2	9·29 m^2	10 m^2
7) Felt-work:	Weight of felt in lb per 100 ft^2	Weight of felt 0·049 kg per m^2	Weight of felt in kg per m^2
Dressing or sealing top of felt by bitumen	100 ft^2	9·29 m^2	10 m^2
Felt strips	100 ft^2	9·29 m^2	10 m^2
8) Matting, thatch and bamboo work:			
Ridges and hips	100 rft	30·5 m	10 m
Matting, cover strips and cross bracings of split bamboos	100 ft^2	9·29 m^2	10 m^2
Bamboo work	100 rft	30·5 m	10 m
Bamboo-framing and trellis or *jaffri* work	100 ft^2	9·29 m^2	10 m^2

5.8 Ceilings and Linings

	fps Units Currently Used	*Corresponding Metric Value*	*Metric Units to be Used*
1) Ceilings and linings	100 ft^2	9·29 m^2	10 m^2
2) Cover fillets, sealing joints, chamfering, rounding, etc	100 rft	30·5 m	10 m
3) Insulation board, slabs, etc	100 ft^2	9·29 m^2	10 m^2
4) Hollow insulation blocks	100 ft^2	2·83 m^2	m^2

5.9 Pavings and Floor Finishes

	fps Units Currently Used	*Corresponding Metric Value*	*Metric Units to be Used*
1) Paving and floor finishes	100 ft^2	9·29 m^2	10 m^2
2) Treads, risers, etc	ft^2	9·3 dm^2	10 dm^2
3) Moulded nosings	rft	0·305 m	m
4) Surface finish to concrete floors	100 ft^2	9·29 m^2	10 m^2
5) Cement-concrete coved skirting	100 rft	30·5 m	m^2
6) Building paper	100 ft^2	9·29 m^2	10 m^2
7) Underlayer of sand to paving	100 ft^3	2·83 m^3	m^3
8) Granolithic finish	100 ft^2	9·29 m^2	10 m^2
9) Terrazzo laid on floors	100 ft^2	9·29 m^2	10 m^2
10) Extra for internal and external angles in terrazzo floor	100 rft	30·5 m	10 m
11) Narrow bands in terrazzo finish	100 rft	30·5 m	10 m
12) Coloured topping to cement floors	100 ft^2	9·29 m^2	10 m^2
13) Mosaic finish	100 ft^2	9·29 m^2	10 m^2 or m^2
14) Brick paving:			
Raking or circular fair cutting	100 rft	30·5 m	10 m
15) Wood block paving and parquet finish:			
Forming of expansion joints per mm width and per cm depth	100 rft	30·5 m	10 m
16) Asphalt paving:			
Internal angle fillets	100 rft	30·5 m	10 m
Skirting	100 rft	30·5 m	m^2

5.10 Plastering and Pointing

	fps Units Currently Used	*Corresponding Metric Value*	*Metric Units to be Used*
1) Plastering and pointing generally	100 ft^2	9·29 m^2	10 m^2
2) Pointing in single detached joints	100 rft	30·5 m	10 m
3) Raking out joints	100 ft^2	9·29 m^2	10 m^2
4) Plastering bands not exceeding 30 cm in width — per cm depth and per mm projection	100 rft	30·5 m	10 m
5) Stone imitation	100 ft^2	9·29 m^2	10 m^2
6) Flush or staff beads	100 rft	30·5 m	10 m

5.11 White Washing, Colour Washing and Distempering

	fps Units Currently Used	*Corresponding Metric Value*	*Metric Units to be Used*
Generally	100 ft^2	9·29 m^2	10 m^2

5.12 Glazing

	fps Units Currently Used	*Corresponding Metric Value*	*Metric Units to be Used*
1) Generally	100 ft^2	9·29 m^2	10 m^2 or m^2
2) Hacking out old broken glass	100 ft^2	9·29 m^2	10 m^2 or m^2

5.13 Painting

	fps Units Currently Used	*Corresponding Metric Value*	*Metric Units to be Used*
1) Painting	100 ft^2	9·29 m^2	10 m^2 or m^2
2) Painting up to 150 mm in width or girth not in conjunction with similar painted work	100 rft	30·5 m	10 m

5.14 Wood Preservative Treatment, Varnishing and Polishing

	fps Units Currently Used	*Corresponding Metric Value*	*Metric Units to be Used*
Generally	100 ft^2	9·29 m^2	10 m^2

5.15 Water Supply, Plumbing, Drains and Sanitary Fittings

	fps Units Currently Used	*Corresponding Metric Value*	*Metric Units to be Used*
1) Pipes	100 rft	30·5 m	10 m
2) Insulating coverings	100 ft^2	9·29 m^2	10 m^2
3) Concrete beds, haunchings and coverings stating details of section size of pipe and mix of concrete	100 rft	30·5 m	10 m
4) Effluent drains	100 rft	30·5 m	10 m

5.16 Electrical Work

	fps Units Currently Used	*Corresponding Metric Value*	*Metric Units to be Used*
1) Overhead earth wire, bearer wire, cradle, anti-climbing device, over-head conductor, etc	lb	0·454 kg	kg
2) Service connection and cables	100 rft	30·5 m	10 m
3) Ducts, cover tiles and other form of protection for underground cables	100 rft	30·5 m	10 m
4) Flexibles	100 rft	30·5 m	10 m
5) Boards	ft^2	9·3 dm^2	10 dm

5.17 Roadwork

	fps Units Currently Used	*Corresponding Metric Value*	*Metric Units to be Used*
1) Collection of aggregate	100 ft^3	2·83 m^3	m^3
2) Measurement of roadwork pertaining to building-wearing coat	100 ft^2	9·29 m^2	10 m^2
3) Bases or soling	100 ft^3 ft^3	2·83 m^3 28 dm^3	m^3 10 dm^3
4) Tar and bitumen for road surfacing	lb per 100 ft^2 of road	0·049 kg/m^2	kg/m^2 of road surface
5) Edging of premixed metal	100 rft	30·5 m	10 m
6) Special surface finishings	100 ft^2	9·29 m^2	10 m^2
7) Expansion and dummy joints — per cm depth and per mm width	100 rft	30·5 m	10 m
8) Screening and/or breaking of road aggregate	100 ft^3	2·83 m^3	m^3
9) Scarifying	100 ft^2	9·29 m^2	10 m^2
10) Berms [(*see* **5.2**) (item 3)]			

5.18 Demolition and Dismantling

NOTE — The units of measurement where applicable shall generally be the same as those employed for construction of the work.

	fps Units Currently Used	*Corresponding Metric Value*	*Metric Units to be Used*
1) Removal of material shall be in the units of	100 yd	91·4 m	50 m or 10 m
2) Mud on roofs	100 ft^3	2·83 m^3	m^3
3) Sheet, lead in roofs	cwt 100 ft^2	0·508 quintal 9·29m^2	quintal 10 m^2
4) Supporting members, such as roof battens, purlins, beams, etc, of wood or concrete	ft^3	28 dm^3	10 dm^3

	fps Units Currently Used	*Corresponding Metric Value*	*Metric Units to be Used*
5) Stripping of ceilings	100 ft^2	9·29 m^2	10 m^2
6) Breaking down floors, roofs of brick or concrete	100 ft^3	2·83 m^3	m^3
7) Taking down walls, piers, etc, of brick or concrete	100 ft^3	2·83 m^3	m^3
8) Reinforced concrete structures and reinforced brick roofs and walls	ft^3	28 dm^3	10 dm^3
9) Woodwork including rough hewn scantlings average 40 cm^2 section	ft^3	28 dm^3	10 dm^3
10) Woodwork under 40 cm^2 section	100 rft	30·5 m	10 m
11) *Ballies*	rft	0·305 m	m
12) Boarding	100 ft^2	9·29 m^2	10 m^2
13) Steel and iron work	cwt	0·508quintal	quintal
14) Picking up of drains, removal of water pipes, etc	100 ft^3	2·83 m^3	m^3

6. CARRIAGE OF MATERIALS

	fps Units Currently Used	*Corresponding Metric Value*	*Metric Units to be Used*
1) Lime, moorum, building rubbish, earth, manure and sludge and excavated earth	100 ft^3	2·83 m^3	m^3
2) Sand, stone aggregates, soling stone, etc	100 ft^3	2·83 m^3	m^3
3) Bricks, tiles, etc	1 000 No.	—	1 000 No.
4) Cement, stone blocks, steel sections, pipes, below 100 mm size and other heavy materials	ton	1·016 tonnes	tonne
5) Timber	100 ft^3	2·83 m^3	m^3
6) Tar, bitumen, etc	ton	1·016 tonnes	tonne
7) Steam coal	ton	1·016 tonnes	tonne
8) All types of pipes above 100-mm size	100 yds	91·4 m	100 m

7. WEIGHTS AND STRENGTH OF MATERIALS

	fps Units Currently Used	*Metric Units to be Used*	*Conversion Factor* (from fps unit to metric unit)
1) Simple weights of materials	ton	tonne	1·016
	cwt	q (quintal)	0·508
	lb	kg	0·454
	oz (ounes)	g (grams)	28·350
2) Weight per unit length	lb/yd	kg/m	0·496
	lb/ft	kg/m	1·488
3) Density	lb/in^3	g/cm^3	27·680
	lb/ft^3	g/m^3	16·018
	cwt/yd^3	q/m^3	0·664
4) Concentrations	oz/imp gal	g/l	6·236
	lb/ft^3	g/l	16·019
5) Compressive strength requirements of materials	lb/in^2	kg/cm^2	0·070
6) Tensile strength requirements of materials	$lb/in.^2$	kg/cm^2	0·070
	$tons/in.^2$	kg/mm^2	1·575
7) Breaking loads of materials	lb	kg	0·454
8) Stresses (tensile, compressive bearing or shear)	$lb/in.^2$	kg/cm^2	0·070
	$tons/in.^2$	kg/mm^2	1·575
9) Hydraulic pressure (head)	ft	m	0·305
10) Other pressures	$lb/in.^2$	kg/cm^2	0·070
11) Bearing pressures	$tons/ft^2$	$tonne/m^2$	10·937
	lb/ft^2	kg/m^2	4·882
12) Atmospheric pressure in head of water	ft	m	0·305
13) Atmospheric pressure in head of mercury	in.	mm	25·4
14) Moment of inertia	$in.^4$	cm^4	41·623
15) Section modulus	$in.^3$	cm^3	16·387

	fps Units Currently Used	*Metric Units to be Used*	*Conversion Factor* (from fps unit to metric unit)
16) Radius of gyration	in.	cm or mm	25·4
17) Bending moment and moments	in.-lb	kg-cm	1·152
	ft-lb	kg-cm	13·825
	in.-tons	kg-m	25·808
18) Force	lb/ft^2	kg/m^2	4·882
	tons/ft^2	tonne/m^2	10·937
	tons/rft	tonne/m	3·333
	lb/rft	kg/m	1·488
19) Speed and velocity	mile/h	km/h	1·609
	ft/s	m/s	0·305
20) Acceleration	ft/s^2	m/s^2	0·305
21) Discharge in rivers, channels, etc	Cusec	m^3/s	0·028
22) Velocity head	ft	m	0·305
23) Work and energy	foot pound	kilogram force metre	0·138
24) Power	hp	kilowatt	0·746

8. MISCELLANEOUS

	fps Units Currently Used	*Corresponding Metric Value*	*Metric Units to be Used*
1) Reduced levels	Height in ft above mean sea level	0·305 m	Height in metres above mean sea level
2) Catchment area	mile^2	2·59 km^2	km^2 or hectare
3) Rainfall	in.	2·54 cm	mm

	fps Units Currently Used	*Corresponding Metric Value*	*Metric Units to be Used*
4) Road length	mile	1·609 km	km
	furlong	0·201 km	0·2 km
5) Land areas	acre	0·405 hectare	hectare
6) Storage in reservoir	acre feet	0·123 3 hectare metre	hectare m
	million ft^3	0·028 32 million m^3	million m^3
	million gallons	4·55 meg litres	meg litres
7) Flow	gal/s	4·546 l/s	l/s
	cusec	0·028 m^3/s	m^3/s
	ft^3/day	0·028 m^3/day	m^3/day
8) Duties	acre/gal/s	0·089 hectare/l/s/	hectare/l/s
	acre/ft^3/day	14·464 hectares/m^3/day	hectares/m^3/day
9) Viscosity	(lb/ft)/s	(14·88 g/cm)/s	(g/cm)/s
10) Kinematic viscosity	ft^2/s	0·092 903 m^2/s 929·03 St	m^2/s St (Stokes)
11) Surface tension	lb/ft	14·59 N/m	N/m
12) Cement bag (weight) [*see* IS : 269-1958* Specification for Ordinary, Rapid Hardening and Low Heat Portland Cement (*Revised*)]	1 cwt	50·802 kg	50 kg

APPENDIX A

(*Clause* 0.4)

BASIC METRIC UNITS

A-1. LINEAR MEASURES

10 millimetres (mm) = 1 centimetre (cm)
10 centimetres (cm) = 1 decimetre (dm)
10 decimetres (dm) = 1 metre (m)

* Third revision issued in 1976

10 metres (m)	= 1 decametre
10 decametres	= 1 hectometre
10 hectometres	= 1 kilometre

A-2. SQUARE MEASURES

100 square millimetres (mm^2)	= 1 square centimetre (cm^2)
100 square centimetres (cm^2)	= 1 square decimetre (dm^2)
100 square decimetres (dm^2)	= 1 square metre (m^2)
100 square metres (m^2)	= 1 are (a)
100 ares	= 1 hectare
100 hectares	= 1 square kilometre

A-3. CUBIC MEASURES AND CAPACITIES

1 000 cubic millimetres (mm^3)	= 1 cubic centimetre (cm^3)
1 000 cubic centimetres (cm^3)	= 1 cubic decimetre (dm^3)
1 000 cubic decimetres (dm^3)	= 1 cubic metre (m^3)
10 millilitres (ml)	= 1 centilitre
10 centilitres	= 1 decilitre
10 decilitres	= 1 litre (l)
10 litres (l)	= 1 decalitre
10 decalitres	= 1 hectolitre
10 hectolitres	= 1 kilolitre (kl)
1 000 kilolitres	= 1 meglitre

A-4. WEIGHTS

10 milligrams (mg)	= 1 centigram
200 milligrams	= 1 metric carat
10 centigrams	= 1 decigram
10 decigrams	= 1 gram (g)
10 grams (g)	= 1 decagram
10 decagrams	= 1 hectogram
10 hectograms	= 1 kilogram (kg)
100 kilograms (kg)	= 1 quintal (q)
1 000 kilograms (kg)	= 1 tonne (t)

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