SP 27 (1987): Handbook of Method of Measurement of Buildings Works [CED 44: Methods of Measurement of Works of Civil Engineering]

BLANK PAGE

Handbook of Method of Measurement of Building Works

First Revision

(Reaffirmed 2003)

BUREAU OF INDIAN STANDARDS

HANDBOOK
OF
METHOD OF MEASUREMENT OF BUILDING WORKS

(First Revision)

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

SP 27 : 1987

First Published July 1985
First Revision October 1987

First Reprint August 1988
Second Reprint March 1993
Third Reprint May 1997
Fourth Reprint March 1998

UDC 69·0031·12(021)
ISBN 81-7061-002-8

PRICE : Rs 325.00

Printed in India at Central Electric Press, A-12/1 Naraina Industrial Area, Phase I, New Delhi 110028
and published by the Bureau of Indian Standards, New Delhi 110 002

FOREWORD

Measurement of work occupies a very important place in the planning and execution of any civil engineering project from the time of first estimates to final completion and settlement of payments. Methods followed for the measurement are not uniform, and considerable differences exist between the practices followed by different construction agencies and also between various Central and State Government Departments. While it is recognized that each system of measurement has to be specifically related to administrative and financial organization with departments responsible for the work, a unification of the various systems at the 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 information and knowledge of various systems followed.

Indian Standards on method of measurement of building and civil engineering works have, therefore, been formulated which have been covered in various parts of IS : 1200 based on the trades. These parts are further amended and revised from time to time so as to keep the same based on the latest practices being followed by the major construction agencies. So far, 25 parts have been prepared covering various trades.

A need for a consolidated handbook covering the methods of measurement of building works at a place has been felt by various organizations, in general, and the educational institutions, in particular. Such a handbook is also expected to help those organizations which are dealing with all the trades. This Handbook was first compiled in 1984 and was based on information given in various parts of IS : 1200 as on 31 March 1984. This revision includes information as on 31 March 1987 which incorporates revised parts 13, 15, 17 and 23, and amendments issued to Part 21. However, for the purpose of exact latest information which is required to be referred in case of contracts, etc, reference may be made only to the relevant parts of IS : 1200 instead of this Handbook.

As in the Original Standard, this Page is Intentionally Left Blank

CONTENTS

SECTION 1 GENERAL

SUB-SECTION 1A TERMINOLOGY

SUB-SECTION 1B RULES FOR ROUNDING OFF VALUES

SUB-SECTION 1C GENERAL PROVISIONS APPLICABLE TO ALL SECTIONS

As in the Original Standard, this Page is Intentionally Left Blank

SUB-SECTION 1A

TERMINOLOGY

(**Relevant Indian Standards**)

B

Barge Board — A purpose-made fitting, normally of angular section, to form the junction between roof covering and either wall or vertical cladding at a gable end.

Batten — A piece of sawn timber whose cross-sectional dimensions do not exceed 5 cm in either direction.

Berm — A shelf that breaks the continuity of a slope.

Boulder — A more or less rounded block or fragment of rock and of average dimension 300 mm or greater. Usually boulders are rounded by being carried or rolled along by water or ice; sometimes also by weathering in place in which case they are known as boulders of weathering, disintegration or exploitation.

C

Chair — A rigid device used to support and/or hold reinforcing bars in proper position to prevent displacement before or during concreting.

Chhajja — The projected reinforced cement concrete member of average thickness not exceeding 100 mm.

Cobble — A rock fragment, usually rounded or semi-rounded, with an average dimension between 80 and 300 mm.

Compaction — The densification of a soil by means of mechanical manipulation.

Corner Piece (Corner Flashing) — An accessory to form the junction between vertical corrugated sheeting at internal or external angles.

D

Demolition — Taking up or down or breaking up.

Dismantling — Carefully taking up or down and removing without damage; the article shall be passed by hand, where necessary, and lowered to the ground and not thrown and where these are fixed by nails, screws, bolts, etc, these shall be taken out with proper tools and not by tearing or ripping.

Dubbing Out — The operation of attaching pieces of slate, tile, etc, to a wall with plaster, and then likewise covering them in order to fill out hollows or to form projections.

F

Finial — A decorative fitting used at the junction of ridges and hips, and at the top of conical, pyramidal or dome roofs.

Flashing — A strip of impervious material usually metal, used to exclude water from the junction between a roof covering and another part of the structure.

H

Hacking — The roughing of solid backgrounds, by hand or mechanical methods, to provide a suitable key.

Haunch — The deepend portion of a beam that increases in depth toward the support.

Hip — The outer angle (more than 180°) formed by the inclined ridge between two intersecting roof slopes.

Hook — A bend in the end of a reinforcing bar.

L

Lap — The length by which one bar or sheet of fabric reinforcement overlaps another.

P

Plank — A piece of sawn timber whose thickness does not exceed 5 cm but the width exceeds 5 cm.

R

Raking — Removing mortar from masonry joints to provide suitable key for the plastering and pointing.

Rock — Natural solid mineral matter connected by strong and permanent cohesive forces, occurring in large masses or fragments.

S

Sand — Cohesionless aggregates of angular, sub-angular, sub-rounded, rounded, flaky or flat fragments of more or less unaltered rocks or mineral of size between 4·75 mm and 75 microns.

Scantling — A piece of timber whose cross-sectional dimensions exceed 5 cm but do not exceed 20 cm in both directions.

Stopends — The forming of the lower ends of cappings above drips, gutters and the like, to form a closure.

V

Verge — The edge of the roof surface finished at a gable or the edge of the vertical tiling at window reveals and of walls and dormer cheeks.

Void — Space in a soil mass not occupied by solid mineral matter. This space may be occupied by air, water or other gaseous or liquid material.

SUB-SECTION 1B

RULES FOR ROUNDING OFF VALUES

(IS : 2)

1. SCOPE

1.1 This sub-section prescribes rules for rounding off numerical values for the purpose of reporting results of a test, an analysis, a measurement or a calculation. It also makes recommendations as to the number of figures that should be retained in course of computation.

2. TERMINOLOGY

2.0 For the purpose of this sub-section, the following definitions shall apply.

2.1 Number of Decimal Places — A value is said to have as many decimal places as there are number of figures in the value, counting from the first figure after the decimal point and ending with the last figure on the right.

Examples:

Value	*Decimal Places*
0·029 50	5
21·029 5	4
2 000·000 001	6
291·00	2
$10{\cdot}32 \times 10^3$	2

(*see* Note 1)

NOTE 1 — For the purpose of this sub-section, the expression $10{\cdot}32 \times 10^3$ should be taken to consist of two parts, the value proper which is 10·32 and the unit of expression for the value, 10^3.

2.2 Number of Significant Figures — A value is said to have as many significant figures as there are number of significant *digits* (*see* Note 2) in the value, counting from the left-most *non-zero* digit and ending with the right-most digit in the value.

Examples:

Value	*Significant Figures*
0·029 500	5
0·029 5	3
10·029 5	6
2 000·000 001	10
5 677·0	5
567 700	6
$56{\cdot}77 \times 10^2$	4
0 056·770	5
3 900	4

(*see* Note 3)

NOTE 2 — Any of the digits, 1, 2, 3,..... ,9 occurring in a value shall be a significant digit(s); and zero shall be a significant digit only when it is preceded by some other digit (excepting zeros) on its left. When appearing in the power of 10 to indicate the magnitude of the unit in the expression of a value, zero shall not be a significant digit.

NOTE 3 — With a view to removing any ambiguity regarding the significance of the zeros at the end in a value like 3 900, it would be always desirable to write the value in the power-of-ten notation. For example, 3 900 may be written as $3{\cdot}9 \times 10^3$, $3{\cdot}90 \times 10^3$ or $3{\cdot}900 \times 10^3$ depending upon the last figure(s) in the value to which it is desired to impart significance.

2.3 Fineness of Rounding — The unit to which a value is rounded off.

For example, a value may be rounded to the nearest 0·000 01, 0·000 2, 0·000 5, 0·001, 0·002 5, 0·005, 0·01, 0·07, 1, 2·5, 10, 20, 50, 100 or any other unit depending on the fineness desired.

3. RULES FOR ROUNDING OFF VALUES

3.0 The rule usually followed in rounding off a value to unit fineness of rounding is to keep unchanged the last figure retained when the figure next beyond is less than 5 and to increase by 1 the last figure retained when the figure next beyond is more than 5. There is diversity of practice when the figure next beyond the last figure retained is 5. In such cases, some computers 'round up', that is, increase by 1, the last figure retained; others 'round down', that is, discard everything beyond the last figure retained. Obviously, if the retained value is always 'rounded up' or always 'rounded down', the sum and the average of a series of values so rounded will be larger or smaller than the corresponding sum or average of the unrounded values. However, if rounding off is carried out in accordance with the rules stated in **3.1** in one step (*see* **3.3**), the sum and the average of the rounded values would be more nearly correct than in the previous cases (*see* Appendix A).

3.1 Rounding Off to Unit Fineness — In case the fineness of rounding is unity in the last place retained, the following rules shall be followed:

Rule I — When the figure next beyond the last figure or place to be retained is less than 5, the figure in the last place retained shall be left unchanged.

Rule II — When the figure next beyond the last figure or place to be retained is more than 5 or is 5 followed by any figures other than zeros, the figure in the last place retained shall be increased by 1.

Rule III — When the figure next beyond the last figure or place to be retained is 5 alone or 5 followed by zeros only, the figure in the last place retained shall be (a) increased by 1 if it is odd and (b) left unchanged if even (zero would be regarded as an even number for this purpose).

Some examples illustrating the application of Rules I to III are give in Table 1.

TABLE 1 EXAMPLES OF ROUNDING OFF VALUES TO UNIT FINENESS

(*Clause* 3.1)

VALUE	FINENESS OF ROUNDING							
	1		0·1		0·01		0·001	
	Rounded Value	Rule	Rounded Value	Rule	Rounded Value	Rule	Rounded Value	Rule
7·260 4	7	I	7·3	II	7·26	I	7·260	I
14·725	15	II	14·7	I	14·72	III(b)	14·725	—
3·455	3	I	3·5	II	3·46	III(a)	3·455	—
13·545 001	14	II	13·5	I	13·55	II	13·545	I
8·725	9	II	8·7	I	8·72	III(b)	8·725	—
19·205	19	I	19·2	I	19·20	III(b)	19·205	—
0·549 9	1	II	0·5	I	0·55	II	0·550	II
0·650 1	1	II	0·7	II	0·65	I	0·650	I
0·049 50	0	I	0·0	I	0·05	II	0·050	III(a)

3.1.1 The rules for rounding laid down in **3.1** may be extended to apply when the fineness of rounding is 0·10, 10, 100, 1 000, etc. For example, 2·43 when rounded to fineness 0·10 becomes 2·40. Similarly, 712 and 715 when rounded to the fineness 10 become 710 and 720, respectively.

3.2 Rounding Off to Fineness Other than Unity — In case the fineness of rounding is not unity, but, say, it is n, the given value shall be rounded off according to the following rule:

Rule IV — When rounding to a fineness n, other than unity, the given value shall be divided by n. The quotient shall be rounded off to the nearest whole number in accordance with the rules laid down in **3.1** for unit fineness of rounding. The number so obtained, that is, the rounded quotient, shall then be multiplied by n to get the final rounded value.

Some examples illustrating the application of Rule IV are given in Table 2.

NOTE 4 — The rules for rounding off a value to any fineness of rounding, n, may also be stated in line with those for unit fineness of rounding (*see* **3.1**) as follows:

Divide the given value by n so that an integral quotient and a remainder are obtained. Round off the value in the following manner:

a) If the remainder is less than $n/2$, the value shall be rounded down such that the rounded value is an integral multiple of n.

b) If the remainder is greater than $n/2$, the value shall be rounded up such that the rounded value is an integral multiple of n.

c) If the remainder is exactly equal to $n/2$, that rounded value shall be chosen which is an integral multiple of $2n$.

TABLE 2 EXAMPLES OF ROUNDING OFF VALUES TO FINENESS OTHER THAN UNIT

VALUE	FINENESS OF ROUNDED, n	QUOTIENT	ROUNDED QUOTIENT	FINAL ROUNDED VALUE
(1)	(2)	(3) = (1)/(2)	(4)	(5) = (2) × (4)
1·647 8	0·2	8·239	8	1·6
2·70	0·2	13·5	14	2·8
2·496 8	0·3	8·322 7	8	2·4
1·75	0·5	3·5	4	2·0
0·687 21	0·07	9·817 3	10	0·70
0·875	0·07	12·5	12	0·84
325	50	6·5	6	3×10^2
1 025	50	20·5	20	$10\frac{1}{2} \times 10^2$

3.2.1 Fineness of rounding other than 2 and 5 is seldom called for in practice. For these cases, the rules for rounding may be stated in simpler form as follows:

a) Rounding off to fineness 50, 5, 0·5, 0·05, 0·005, etc.

Rule V — When rounding to 5 units, the given value shall be doubled and rounded off to twice the required fineness of rounding in accordance with **3.1.1**. The value thus obtained shall be halved to get the final rounded value.

For example, in rounding off 975 to the nearest 50, 975 is doubled giving 1 950 which becomes 2 000 when rounded off to the nearest 100; when 2 000 is divided by 2, the resulting number 1 000 is the rounded value of 975.

b) Rounding off to fineness 20, 2, 0·2, 0·02, 0·002, etc.

Rule VI — When rounding to 2 units, the given value shall be halved and rounded off to half the required fineness of rounding in accordance with **3.1**. The value thus obtained shall then be doubled to get the final rounded value.

For example, in rounding off 2·70 to the nearest 0·2, 2·70 is halved giving 1·35 which becomes 1·4 when rounded off to the nearest 0·1; when 1·4 is doubled, the resulting number 2·8 is the rounded value.

3.3 Successive Rounding — The final rounded value shall be obtained from the most precise value available in one step only and not from a series of successive roundings. For example, the value 0·549 9, when rounded to one significant figure, shall be written as 0·5 and not as 0·6 which is obtained as a result of successive roundings to 0·550, 0·55, and 0·6. It is obvious that the most precise value available is nearer to 0·5 and not to 0·6 and that the error involved is less in the former case. Similarly, 0 650 1 shall be rounded off to 0·7 in one step and not successively to 0·650, 0·65 and 0·6, since the most precise value available here is nearer to 0·7 than to 0·6 (*see also* Table 1).

NOTE 5 — In those cases where a final rounded value terminates with 5 and it is intended to use it in further computation, it may be helpful to use a '+' or '−' sign after the final 5 to indicate whether a subsequent rounding should be up or down. Thus 3·214 7 may be written as 3·215 — when rounded to a fineness of rounding 0·001. If further rounding to three significant figures is desired, this number would be rounded down and written as 3·21 which is in error by *less* than half a unit in the last place otherwise, rounding off 3·215 would have yielded 3·22 which is in error by *more* than half a unit in the last place. Similarly, 3·205 4 could be written as 3·205 + when rounded to 4 significant figures. Further rounding to 3 significant figures would yield the value as 3·21.

In case the final 5 is obtained exactly, it would be indicated by leaving the 5 as such without using '+' or '−' sign. In subsequent rounding the 5 would then be treated in accordance with Rule III.

4. NUMBER OF FIGURES TO BE RETAINED

4.0 Pertinent to the application of the rules for rounding off is the underlying decision as to the number of figures that should be retained in a given problem. The original values requiring to be rounded off may arise as a result of a test, an analysis or a measurement, in other words, experimental results, or they may arise from computations involving several steps.

4.1 Experimental Results — The number of figures to be retained in an experimental result, either for the purpose of reporting or for guiding the formulation of specifications will depend on the significance of the figures in the value.

4.2 Computations — In computations involving values of different accuracies, the problem as to how many figures should be retained at various steps assumes a special significance as it would affect the accuracy of the final result. The rounding off error will, in fact, be injected into computation every time an arithmetical operation is performed. It is, therefore, necessary to carry out the computation in such a manner as would obtain accurate results consistent with the accuracy of the data in hand.

4.2.1 While it is not possible to prescribe details which may be followed in computations of various types, certain basic rules may be recommended for single arithmetical operations which, when followed, will save labour and at the same time enable accuracy of original data to be normally maintained in the final answers.

4.2.2 As a guide to the number of places or figures to be retained in the calculations involving arithmetical operations with rounded or approximate values, the following procedures are recommended:

a) *Addition* — The more accurate values shall be rounded off so as to retain *one more place* than the last significant figure in the least accurate value. The resulting sum shall then be rounded off to the last significant place in the least accurate value.

b) *Subtraction* — The more accurate value (of the two given values) shall be rounded off, before subtraction, to the *same place* as the last significant figure in less accurate value; and the result shall be reported as such (*see also* Note 6).

c) *Multiplication and division* — The number of *significant figures* retained in the more accurate values shall be kept *one more* than that in the least accurate value. The result shall then be rounded off to the same number of significant figures as in the least accurate value.

d) When a long computation is carried out in several steps, the intermediate results shall

be properly rounded at the end of each step so as to avoid the accumulation of rounding errors in such cases. It is recommended that, at the end of each step, one more significant figure may be retained than is required under (a), (b) and (c) (*see also* Note 7).

NOTE 6 — The loss of the significant figures in the subtraction of two nearly equal values is the greatest source of inaccuracy in most computations, and it forms the weakest link in a chain computation where it occurs. Thus, if the values 0·169 52 and 0·168 71 are each correct to five significant figures, their difference 0·000 81, which has only two significant figures, is quite likely to introduce inaccuracy in subsequent computation.

If, however, the difference of two values is desired to be correct to k significant figures and if it is known, beforehand that the first m significant figures at the left will disappear by subtraction, then the number of significant figures to be retained in each of the values shall be $m + k$ (*see* Example 4).

NOTE 7 — To ensure a greater degree of accuracy in the computations, it is also desirable to avoid or defer as long as possible certain approximation operations like that of the division or square root. For example, in the determination of sucrose by volumetric method, the expression $\frac{20w_1}{w_2}\left(\frac{f_2}{v_2} - \frac{f_1}{v_1}\right)$ may be better evaluated by taking its calculational form as $20w_1 (f_2v_1 - f_1v_2)/w_2v_1v_2$ which would defer the division until the last operation of the calculation.

4.2.3 *Examples*

Example 1

Required to find the sum of the rounded off values 461·32, 381·6, 76·854 and 4·746 2.

Since the least accurate value 381·6 is known only to the first decimal place, all other values shall be rounded off to one more place, that is, to two decimal places and then added as shown below:

$$\begin{array}{r} 461{\cdot}32 \\ 381{\cdot}6 \\ 76{\cdot}85 \\ 4{\cdot}75 \\ \hline 924{\cdot}52 \end{array}$$

The resulting sum shall then be reported to the same decimal place as in the least accurate value, that is, as 924·5.

Example 2

Required to find the sum of the values 28 490, 894, 657·32, 39 500, and 76 939, assuming that the value 39 500 is known to the nearest hundred only.

Since one of the values is known only to the nearest hundred, the other values shall be rounded off to the nearest ten and then added as shown below:

$$\begin{array}{r} 2\,849 \times 10 \\ 89 \times 10 \\ 66 \times 10 \\ 3\,950 \times 10 \\ 7\,694 \times 10 \\ \hline 14\,648 \times 10 \end{array}$$

The sum shall then be reported to the nearest hundred as $1\,465 \times 100$ or even as $1{\cdot}465 \times 10^5$.

Example 3

Required to find the difference of 679·8 and 76·365, assuming that each number is known to its last figure but no farther.

Since one of the values is known to the first decimal place only, the other value shall also be rounded off to the first decimal place and then the difference shall be found.

$$\begin{array}{r} 679{\cdot}8 \\ 76{\cdot}4 \\ \hline 603{\cdot}4 \end{array}$$

The difference, 603·4 shall be reported as such.

Example 4

Required to evaluate $\sqrt{2{\cdot}52} - \sqrt{2{\cdot}49}$ correct to five significant figures.

Since $\sqrt{2{\cdot}52} = 1{\cdot}587\,450\,79$

$\sqrt{2{\cdot}49} = 1{\cdot}577\,973\,38$

and three significant figures at the left will disappear on subtraction, the number of significant figures retained in each value shall be 8 as shown below:

$$\begin{array}{r} 1{\cdot}587\,450\,8 \\ 1{\cdot}577\,973\,4 \\ \hline 0{\cdot}009\,477\,4 \end{array}$$

The result, 0·009 477 4, shall be reported as such (or as $9{\cdot}477\,4 \times 10^{-3}$).

Example 5

Required to evaluate $35{\cdot}2/\sqrt{2}$, given that the numerator is correct to its last figure.

Since the numerator here is correct to three significant figures, the denominator shall be taken as $\sqrt{2} = 1{\cdot}414$. Then,

$$\frac{35{\cdot}2}{1{\cdot}414} = 24{\cdot}89$$

and the result shall be reported as 24·9.

Example 6

Required to evaluate $3{\cdot}78\,\pi/5{\cdot}6$, assuming that the denominator is true to only two significant figures.

Since the denominator here is correct to two significant figures, each number in the numerator would be taken up to three significant figures. Thus,

$$\frac{3{\cdot}78 \times 3{\cdot}14}{5{\cdot}7} = 2{\cdot}08.$$

The result shall, however, be reported as 2·1.

APPENDIX A

(*Clause* 3.0)

VALIDITY OF RULES

A-1. The validity of the rules for rounding off numerical values, as given in **3.1**, may be seen from the fact that to every number that is to be 'rounded down' in accordance with Rule I, there corresponds a number that is to be 'rounded up' in accordance with Rule II. Thus, these two rules establish a balance between rounding 'down' and 'up' for all numbers other than those that fall exactly midway between two alternatives. In the latter case, since the figure to be dropped is exactly 5, Rule III, which specifies that the value should be rounded to its nearest even number, implies that rounding shall be 'up' when the preceding figures are 1, 3, 5, 7, 9 and 'down' when they are 0, 2, 4, 6, 8. Rule III hence advocates a similar balance between rounding 'up' and 'down' (*see also* Note 8). This implies that if the above rules are followed in a large group of values in which random distribution of figures occurs, the number 'rounded up' and the number 'rounded down' will be nearly equal. Therefore, the sum and the average of the rounded values will be more nearly correct than would be the case if all were rounded in the same direction, that is, either all 'up' or all 'down'.

NOTE 8 — From purely logical considerations, a given value could have as well been rounded to an odd number (and not an even number as in Rule III) when the discarded figures fall exactly midway between two alteratives. But there is a practical aspect to the matter. The rounding off a value to an even number facilitates the division of the rounded value by 2 and the result of such division gives the correct rounding off of half the original unrounded value. Besides, the (rounded) even values may generally be exactly divisible by many more numbers, even as well as odd, than are the (rounded) odd value.

SUB-SECTION 1C

GENERAL PROVISIONS APPLICABLE TO ALL SECTIONS

(All Parts of **IS : 1200**)

1. SCOPE

1.1 This sub-section covers the general provisions normally applicable to all sections.

NOTE — Deviation for a particular section has been indicated in the note of each clause.

2. GENERAL PROVISIONS

2.1 Clubbing of Items — Items may be clubbed together provided these are on the basis of the detailed description of items stated in this handbook.

2.2 Booking of Dimensions — In booking dimensions, the order shall be consistent and generally in the sequence of length, breadth or width and height or depth or thickness.

2.3 Bills of Quantities — The bills of quantities shall fully describe the materials and workmanship, and accurately represent the work to be executed.

2.4 Measurement in Stages — Works in case of Sections 5, 6, 7, 19, 20, 21 shall be measured under the following categories in convenient stages stating the height or depth:

a) Below ground/datum level, and

b) Above ground/datum level.

NOTE — The ground/datum level shall be specified in each case.

2.5 Work to be Measured Separately (not Applicable to Sections 2, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19 and 22) — Work executed in the following conditions shall be measured separately:

a) Work in or under water (or on dry soil in case of Section 4B);

b) Work in liquid mud (in case of Sections 4A, 6 and 20);

c) Work in or under foul positions (not applicable to Section 4A);

d) Work under tides; and

e) Work in snow [In marshy land in case of Section 4A and in wet soil (30 cm above subsoil water) in case of Section 4B].

As in the Original Standard, this Page is Intentionally Left Blank

SECTION 2 MATERIALS

As in the Original Standard, this Page is Intentionally Left Blank

MATERIALS

[IS : 1200 (Part 22)]

1. SCOPE

1.1 This section covers the method of measurement of materials normally used in buildings and civil engineering works.

2. GENERAL

2.1 Description of Item — Description of each item shall, unless otherwise stated, include wherever necessary, conveyance and delivery, handling, unloading, storing, etc.

2.2 Limits of Measurement — Dimensions shall be measured net in decimal system to the nearest 0·01 m, area to nearest 0·01 m^2, volume to nearest 0·01 m^3, weight to nearest 1 kg, unless otherwise stated in the relevant Indian Standard(s) on the specification of materials.

3. METHOD OF MEASUREMENT OF MATERIALS

3.1 Various types of materials shall be measured as mentioned in Table 1.

TABLE 1 MEASUREMENT OF MATERIALS

NAME OF MATERIAL	HOW MEASURED
Aggregates	
Brick/stone of 40 mm nominal size and above	In m^3 after making a deduction of 7·5 percent from stack measurements and as per type
Brick/stone aggregates of less than 40 mm size cinder, sand, *moorum*, fly ash, pozzolana, stone, stone dust	In m^3 of gross stack measurements according to nominal size and type
Aluminium Flats	In kg, stating size
Aluminium Strip and Edging	In running metre stating size
Asbestos Cement Products	
Barge boards	Enumerated, stating size
Ridge	In pairs, according to size and type
Gutters	Enumerated, stating size, type and length
Roof lights, north light curves	Enumerated, stating size and type
Sheets	Enumerated, stating type, size and length
Ventilators, eaves fillers, apron pieces, louvers, cowls, ridge finials, septic tanks	Enumerated and described
Bitumem Products	
Bitumen felt	In m^2, stating type, grade and width
Bitumen hot sealing compound	By weight, in kg, stating grade and type
Bitumen road tar	In tonnes, stating type
Joint filler (sealing compound)	In kg
Boards	
Plywood, etc	In m^2, stating type and thickness
Brick/Brick Tiles	Enumerated, stating class and size
Blocks Building (Clay, Cement, Stone, etc)	Enumerated stating size, type and grade, if any
Cement/Lime Pozzolana Mixture	In kg, stating type
Distemper	In kg
Doors/Windows/Ventilator Frames	In linear metre and described (outside dimensions measured)
Doors/Windows/Ventilators (Excluding Fittings and Finishes)	In m^2 and described
Fibre Glass Felt	In m^2 stating thickness and grade
Filler Fibrous/Non Fibrous	In m^2 and described
Fittings for Doors and Windows	Enumerated

(*Continued*)

TABLE 1 MEASUREMENT OF MATERIALS — *Contd*

NAME OF MATERIAL	HOW MEASURED
Galvanized Steel Barbed Wire	In kg, stating type and size
Galvanized Steel Sheets (Corrugated/Plain)	In quintals or enumerated, stating type and size
Glass Sheets (Plain/Pin Head/Frosted/Wired/Splinter Proof)	In m^2, stating type, thickness and size
Glass Strips	In running metres, stating thickness and width
Jali (Cement Concrete/Clay)	In m^2, stating thickness and type
Lead for Caulking	In kg
Lime	In kg, stating class
Marble Chips	In quintal, stating size and described
Marble Dust	In kg
Marble Pieces	In kg, stating colour
Marble Slab	In m^2, stating thickness and type
Metal Beading	In running metres, stating type and size
Paints, Emulsions and Thinners	In litres, stating type and class
Paint (Stiff) and Pigment	In kg, stating type and class
Pipes and Accessories	
Pipe fittings	Enumerated and described
Pipes (except mild steel)	In running metres and described
Precast Units for Flooring	Enumerated and described
Rope Manila	In kg and described
Rubber Rings for Pipes	Enumerated and described
Steel	
Mild steel sheets	In tonnes, stating size and thickness
Mild steel expanded metal	In m^2 and described
Wire fabric/chain fabric	In m^2 and described
Hoop iron/bolts/rivets/bars/structural sections/rails/ mild steel pipes	In kg or tonnes and described
Stone	
Boundary stone/kilometre stone	Enumerated, stating size and type
Kerb stone	Enumerated, stating size
Floor stone slabs	In m^2 and described
Soling stone, boulders, rubble	In m^3, after making a deduction of 15 percent from gross stack measurements, stating nominal size and type
Sanitary Fittings	
Cisterns/clamps/cocks/ferrules/footrests/gratings/hydrants/ traps/bath tubs/urinal/valves/wash basins/WC pans/ showers/towel rails/ bidets	Enumerated and described
Tiles	Enumerated, stating type and size
Timber	
Blocks/baulks	Enumerated, stating type and size
Ballies	Enumerated, specifying diameter and described (diameter shall be measured at 1·5 m from the thick end)
Bamboos	Enumerated and described
Scantlings/planks/battens	In m^3, stating size and type
Tiles (Other than sanitary)	In m^2, stating size and type
Wall Tiles/False Ceiling Tiles/Roofing Tiles	Enumerated, stating type and size
Water Proofing Compound	In kg
Water Proofing Paste/Emulsion/Liquid	In litres
Wire	In kg and described
Wire Rope	In running metre and described

SECTION 3 EARTHWORK

As in the Original Standard, this Page is Intentionally Left Blank

EARTHWORK

[IS : 1200 (Part 1)]

1. SCOPE

1.1 This section covers the method of measurement of earthwork in building and civil engineering works.

2. GENERAL RULES

2.1 Measurements — Unless otherwise stated, hereinafter all work shall be measured net in decimal system, as fixed in position as given below:

a) Each dimension shall be measured to the nearest 0·01 m, where any dimension is more than 25 m it should be measured to the nearest 0·1 m;

b) Areas shall be worked out to the nearest 0·01 m^2; and

c) Cubical contents shall be worked out to the nearest 0·01 m^3.

2.2 The following works shall not be measured separately and allowance for the same shall be deemed to have been made in the description of main item:

a) Setting out works, profiles, etc;

b) Site clearance, such as cleaning grass and vegetation;

c) Unauthorized bettering or benching of excavation;

d) Forming (or leaving) 'dead men' or 'tell-tales' in borrow pits and their removal after measurements;

e) Forming (or leaving) steps in sides of deep excavation and their removal after measurements;

f) Excavation for insertion of planking and strutting;

g) Unless otherwise specified, removing slips or falls in excavations;

h) Bailing out or pumping of water in excavation from rains;

j) Bailing out or pumping of water in excavation from sub-soil water when measured under **2.5**(a) of sub-section; and

k) Slinging or supporting pipes, electric cables, etc, met during excavation.

2.3 Special pumping other than what is included in **2.2**(h) and (j) and well point dewatering where resorted to, shall each be measured separately for all stages of pumping, including, intermediate stages unless otherwise stated, in kWh against separate specific provision(s) made for the purpose.

3. CLASSIFICATION

3.1 The materials to be excavated shall be classified as follows unless otherwise specified:

a) *Soft/Loose Soil* — Generally any soil which yields to the ordinary application of pick and shovel, or to *phawra*, rake or other ordinary digging implement; such as vegetable or organic soil, turf, gravel, sand, silt, loom, clay peat, etc.

b) *Hard/Dense Soil* — Generally any soil which requires the close application of picks, or jumpers or scrifiers to loosen; such as stiff clay, gravel and cobblestone.

c) *Mud* — A mixture of soil and water in fluid or weak solid state.

d) *Soft/Disintegrated Rock (not Requiring Blasting)* — Rock or boulders which may be quarried or split with crowbars. This will also include laterite and hard conglomerate.

e) *Hard Rock (Requiring Blasting)* — Any rock or boulder for the excavation of which blasting is required.

f) *Hard Rock (Blasting Prohibited)* — Hard rock requiring blasting as described under (e) but where blasting is prohibited for any reason and excavation has to be carried out by chiselling, wedging or any other agreed method.

NOTE — A broad classification of soil and rock for earthwork suitable for conditions generally occurring in practice has been provided where necessary, further sub-classification may be done to suit individual cases depending on the properties of the substrata.

4. METHOD OF MEASUREMENT OF VARIOUS TYPES OF EXCAVATION

4.1 The measurement of earthwork shall be done in cubic metres, unless otherwise mentioned. The measurements to be taken shall be those of the authorized dimensions from which soil has been taken out and shall be measured without allowance for increase in bulk.

4.2 Excavation in Earthwork Including Rock Cutting — The measurement of excavation in earthwork including rock cutting shall be made as follows:

a) Where the excavation is in trenches or from borrow pits in fairly uniform ground, the measurements of cutting in trenches or borrow pits shall be made. 'Dead men' or 'tell-tales' may be left at suitable intervals to determine the average depth of excavation.

b) Where the ground is not uniform levels shall be taken before the start, after site clearance and after the completion of the work and the quantity of excavation in cutting computed from these levels.

c) Where soft/disintegrated rock and hard rock are mixed the measurement for the total quantity shall be made by method (a) and/or (b) given above. The hard rock excavated shall be stacked and measured in stack. The quantity of the hard rock excavated shall be arrived at by applying pre-accepted deductions (stated as a percentage) for voids. From the total quantity of the mixture the quantity of hard rock excavated thus arrived at shall be deducted to work out the quantity of the soft, disintegrated rock excavated.

d) Where hard/dense soil, soft/disintegrated rock and hard rock are mixed, the measurement for the total quantity shall be made by methods (a) and/or (b) given above. If possible after the removal of the hard/dense soil the levels of the exposed rock surface shall be taken and the quantity of the hard/dense soil removed, worked out from the difference between the original levels and the new levels. If this is not possible the excavation shall be completed leaving tell-tales and from the cross-section of these tell-tales, the area of the hard/dense soil excavated shall be worked out and then the volume of the hard/dense soil excavated arrived at. Quantity of hard/dense soil shall then be deducted from the total quantities of excavation done. The balance shall then be treated as total quantity of hard rock and soft/disintegrated rock. The quantities of hard rock and soft/disintegrated rock shall then be separated as in (c) above by stacking the hard rock separately.

e) Where soft/loose soil, hard/dense soil, soft/disintegrated rock and hard rock are mixed, the measurements of the entire quantity shall be made by methods (a) and/or (b) given above. The separate quantities of soft/loose soil and hard/dense soil shall be worked out from the cross-section based on dead men or tell-tales as mentioned in (d) in case of hard/dense soil. The total quantity of soft/loose and hard/dense soil shall then be deducted from the total excavation to arrive at the total quantity of rock excavated. The quantities of soft/disintegrated rock and hard rock excavated be worked out separately as in case of (c) above.

4.2.1 Wherever it is not possible or convenient to take measurements from borrow pits or cutting, excavation shall be worked out from 'filling' (*see* **4.3**).

4.2.2 Dressing or trimming sides of excavations and levelling or grading and ramming of bottoms shall be described with the item of excavation except in the case of rough excavation (*see* **4.5**).

4.2.3 All excavation shall be measured in successive stages of 1·5 m stating the commencing level. This shall not apply to cases where no lift is involved as in hillside cutting.

4.2.4 All excavation shall generally be described as 'excavate and get out'. Getting out shall include throwing the excavated earth at least one metre or 1/3 depth (*see* Note) of excavation whichever is more clear of the edge of excavation. The subsequent disposal of the surplus excavated material shall either be stated as a separate item or included with the item of excavation stating the lead.

NOTE — In special cases where the disposal area is limited or where the application of this requirement if impracticable person in-charge may adopt a berm of reduced width in any case not less than one metre provided the material being excavated is sufficiently stable and shoring is designed to carry the additional loads.

4.2.5 In case of the following works, authorized quantities (calculated on the basis of authorized working space) or those actually excavated, whichever are less, shall be measured:

a) In work which requires form work;

b) In work which will be covered externally with a damp proof covering;

c) In work which will be covered externally with protective masonry work of brick, stone, precast concrete, etc;

d) Trenches which are to receive post tensioned concrete ground beams;

e) Special works like guniting, etc; and

f) In work which requires workmen to operate from the outside.

4.2.5.1 Authorized working space shall be specified in each case (Relevant Indian Standards, if any, may be consulted for guidance). Where authorized working space is not so specified the following shall apply:

'60 cm measured from the face of structure (including protective measures, if any) at lowest level, where extra working space is required. In addition, for item (d) the extra length at each end shall be 1·5 m.'

4.2.6 Battering and benching shall be specified and measured along with main item of excavation.

4.3 Filling

4.3.1 The actual measurement of the fill shall be calculated by taking levels of the original ground before start of the work after site clearance and after compaction of the fill at suitable intervals and the quantity of fill computed from these levels.

4.3.2 The deductions shall be made from actual measurements in all cases of fills except for floors as in **4.12** to arrive at net measurement of filling based on pre-accepted or specified deduction (stated as percentage) for voids.

4.3.3 If the fillings is obtained from the borrow pits it shall be measured from the borrow pits as 'excavation' (*see* **4.2**).

4.4 Surface Dressing — Trimming of natural ground, excavated surface and filled up area to remove vegetation and/or small inequalities not exceeding 15 cm deep shall be described as surface dressing and measured in square metres.

4.5 Rough Excavation — Excavation not requiring dressing of sides and bottom and reduction to exact levels, such as winning earth from borrow pits, hillside cutting, etc, shall be described as rough excavation and measured in cubic metres.

4.6 Surface Excavation — Excavation exceeding 1·5 m in width as well as 10 m^2 on plan but not exceeding 30 cm in depth shall be described as 'surface excavation' and measured in square metres.

4.7 Excavation Over Area — Excavation exceeding 1·5 m in width as well as 10 m^2 on plan, and 30 cm in depth shall be described as excavation over areas and measured in cubic metres.

4.8 Excavation in Trenches for Foundations and for Pipes, Cables, etc — Excavation in trenches for foundations and for pipes, cables, etc, not exceeding 1·5 m in width and for shafts, wells, cesspits and the like not exceeding 10 m^2 on plan shall be so described and measured in cubic metres.

4.8.1 The authorized quantities (calculated on the basis of authorized width) or those excavated whichever are less shall be measured in case of excavation for pipes, cables, etc. For purpose of calculating the contents, cross-sections shall be taken at suitable intervals. The authorized width shall be specified in each case. (Relevant Indian Standards, if any, may be consulted for guidance)'.

4.8.2 Excavation trenches for foundation : for depth exceeding 1 m, an allowance of 5 cm/m depth for each side of trench shall be added to the specified width.

4.9 Post Holes — Independent post holes (or similar holes), each not exceeding 0·5 m^3, shall be enumerated and the description shall include return, fill and ram and removal of surplus spoil.

4.10 Return, Fill and Ram — Returning, filling and ramming of excavated earth where not described with the item of excavation shall be measured in cubic metres and shall include spreading in layers not exceeding 20 cm in depth, watering, well ramming and levelling.

4.11 Embankments — Forming embankments and filling to make up levels shall be measured in cubic metres and shall include the formation of slopes. If the material is to be deposited in layers this shall be described stating the thickness of such layers. The method of consolidation shall be described. The measurement shall be taken in successive stages of 1·5 m stating commencing level.

4.12 Filling under floors shall be measured in cubic metres and shall include spreading in layers not exceeding 20 cm in depth watering, well ramming and levelling.

5. LEAD AND LIFT

5.1 Lead — The distance for removal shall be measured over the shortest practicable route and not necessarily the route actually taken. Distances not exceeding 250 m shall be measured in units of 50 m. Distance exceeding 250 m and not exceeding 500 m shall be measured as a separate item. Leads beyond 500 m shall be measured in units of 500 m, that is, there will be one item for lead exceeding 500 m and not exceeding 1 000 m, another item for lead exceeding 1 000 m and not exceeding 1 500 m and so on up to 5 km. Where the lead exceeds 5 km, it will be measured in units of 1 km, half kilometre and above be reckoned as one and less than half kilometre shall be ignored.

5.1.1 The description of items shall include loading and unloading.

5.1.2 If spoil heaps requiring re-handling have become consolidated due to passage of time or any other reason, it shall be so stated and such heaps shall be measured separately.

5.1.3 For the purpose of measurements of lead, the area excavated shall be divided into suitable blocks and for each block the distance from the centre of the block to centre of placed earth pertaining to this block shall be taken as lead.

5.2 Lift — Lift shall be measured from ground level. Excavation up to 1·5 m depth below ground level and depositing excavated material on the ground shall be included in the item of earthwork for various kinds of soil. Extra lift shall be measured in unit of 1·5 m or part thereof. Obvious lift shall only be measured; that is lifts inherent in the lead due to ground slope shall not be measured except for lead up to 250 m.

When earth has to be carried over a bank/obstruction and dumped beyond it, the left shall be the difference in level between the centre of gravity of the excavated earth and the top of bank/construction.

6. PLANKING AND STRUTTING

6.1 The planking and strutting required to uphold the face of excavated earth, etc, shall be measured in square metres of face supported, and grouped; separately in stages of 1·5 m.

6.1.1 The description shall include use and waste of all necessary timber work, including wales, struts and open or close poling boards, their fixing and subsequent removal.

6.1.2 Planking and strutting to the following shall be measured separately:

a) Trenches;

b) Areas (the description shall include use and waste of raking shores); and

c) Shafts, wells, cesspits, manholes and the like.

6.1.3 Where tightly driven close butt jointed sheeting is necessary as in the case of running sand, the item shall be measured separately and the packing of cavities behind sheeting with suitable material shall be included in description of the item.

6.1.4 Planking and strutting required to be left permanently in position shall be measured separately.

7. REMOVING TREES AND HEDGES

7.1 Clearing of shrubs, brushwood, small trees not exceeding 30 cm girth shall be measured in square metres, and shall deem to include removal and disposal.

7.2 Cutting down hedges and removal of fences shall be fully described and measured in running metres and shall deem to include removal and disposal.

7.3 Cutting down trees of 30 cm girth and over up to 100 cm girth shall be enumerated as one item. The cutting down of trees exceeding 100 cm girth shall be enumerated stating the girth. The girth shall be measured at one metre above ground level. The item shall include lopping of branches and removal and disposal.

7.4 Digging out of roots including stacking shall be measured separately and enumerated.

SECTION 4 FOUNDATIONS

SUB-SECTION 4A PILE FOUNDATION

SUB-SECTION 4B WELL FOUNDATION

As in the Original Standard, this Page is Intentionally Left Blank

SUB-SECTION 4A
PILE FOUNDATION
[IS : 1200 (Part 23)]

1. SCOPE

1.1 This sub-section covers the method of measurement of piling.

2. GENERAL RULES

2.1 Description of Items — The description of each item shall, unless otherwise stated, be held to include where necessary, conveyance and delivery, handling, unloading, storing, fabrication, hoisting, all labour for finishing to required shape and size, setting, fitting and fixing in position, straight cutting and waste, return of packings, etc.

2.2 Measurements — All work shall be measured net in decimal system as fixed in its place as given below:

a) Linear dimensions shall be measured to the nearest 0·01 m,

b) Areas shall be worked out to the nearest 0·01 m^2, and

c) Cubic contents shall be worked to the nearest 0·01 m^3.

2.3 A general description of the nature of the site shall be stated.

2.4 The available information as to the strata through which the piles are to be driven shall be stated or reference showing records of bores be given.

2.5 If piles are to be provided from any level other than ground level, it shall be stated. If the piling frame is to be lowered or raised, the exact height and nature of the working shall be described, separate items shall be provided for driving raker/in groups/isolated/lengthened/trial piles.

2.6 Items shall include any extra excavation filling and/or ramming required at the time of construction for the movement of piling frame for executing piling work.

2.7 Bringing plant to the site and erecting it and dismantling and taking it back, shall be measured separately as lump sum items.

NOTE — Shifting of plant at site of work shall be included in the item of piles.

2.8 If load testing is to be done, the provision for such test shall be specified and measured separately.

3. METHOD OF MEASUREMENT OF PRECAST REINFORCED CONCRETE PILES

3.1 The precast reinforced concrete piles shall be described according to grade of concrete, section and length, the extra strength of the heads being stated. Any requisite mould shall be included in the description as also the necessary strapping, bolts and lifting holes.

3.2 The cement concrete in piles shall be measured in cubic metres, arrived at by multiplying the cross-section area of the pile by the length of the pile as cast from the head of the pile to the tip of shoes.

3.3 No deduction shall be made for chamfers, tapered points or the volume of reinforcement or holes for lifting piles.

3.4 The formwork, links and sleeves shall be included in the description of the item.

3.5 The reinforcement shall be measured separately in accordance with Section 10.

3.6 The shoes for each size shall be enumerated separately stating the approximate mass.

3.7 Driving piles to a given level and redriving of lengthened piles shall be measured in running metres, separate measurements being made for piles of 5 m length and less and subsequently for every 1 m length range. The driving of piles shall be measured from the tip of the shoes to the ground level as shown in the drawings or as found at site at the time of driving. The raker piles shall be measured along the axis of the pile.

3.8 The measurement of handling transporting and pitching of piles shall be enumerated for each occasion.

3.9 For stripping the heads of the piles, the length to be stripped shall be stated and measured per linear metre.

3.10 Stripping off the head of the piles for bond length shall be enumerated.

3.11 When concrete piles are lengthened in position, after they have been lowered, the cement concrete when used for lengthening shall be measured as a separate item. This item should include the extra labour involved in stripping the exposed end to form connection of new with old work and any excavation, if required.

4. METHOD OF MEASUREMENT OF TIMBER PILES

4.1 Timber piles shall be described and measured in running metre stating the species of timber and size of the pile. If over 5 m in length, the length extra over 5 m shall be measured in stages of one metre.

4.1.1 The diameter of the pile shall be arrived at by measuring girth at two metres below the large end of the piles. Any tolerance on the cross-sectional dimensions of the timber in permitting above or below those shown in drawings shall be specified.

4.1.2 Shaping and shoeing of pile shall be enumerated stating the approximate weight of the shoe and size of the pile.

4.2 Handling, transporting and pitching of piles shall be enumerated for each occasion.

4.3 Driving timber piles shall be measured from the tip of the shoe to ground level as shown in the drawings or as found at site at the time of driving. The method of measurement of driving pile shall be the same as given in **3.7.** This item shall also include cutting the top of the pile and dressing it for fixing mild steel ring against splitting during driving.

4.4 The supply and fiixing of iron rings to the pile head before driving and also the labour involved in cutting off the ringed portion or any portion damaged in driving shall be included in the description of the item.

4.5 Joints in piles shall be described and enumerated.

5. METHOD OF MEASUREMENT OF STEEL SHEET PILES (PERMANENT)

5.1 Supply only of sheet piles shall be measured by weight in accordance with Section 10. The description of the item shall include the cross-sectional shape, nomenclature of manufacture, specification of material, details of fabrication such as lengthening by means of welding, riveting, drilling or burning holes, joining or fixing of structural rolled steel sections, handling and transportation to the site and the like. Piles exceeding 12 m long shall be described separately stating the lengths in further stages of 3 m.

5.2 All struts, anchor bolts, anchor plates, turn buckles, waling, etc, shall be measured separately in accordance with Section 10.

5.3 When sheet piles are to be painted prior to driving, such painting shall be measured in square metres obtained by multiplying the length by the perimeter of the fabricated sheet pile measured along the profile. Description of the item shall include the method of preparation of surface, number of coats, mode of painting and the like.

5.4 Lifting, handling, pitching, engaging through interlocks or clutches of an adjacent sheet piles and driving shall be measured separately for each type in square metres obtained by multiplying the length of the embedded portion of the pile in soil and half of the perimeter as defined in IS : 2314-1963. The length of the embedded portion shall be obtained by measuring from the level of the ground where the tip of the sheet pile first touches before driving, to the ultimate level of the tip of the piles after driving.

5.5 Wherever sheet piles are to be driven under/ in water necessitating use of special hammers and/ or loader frames such piles shall be described and measured separately.

5.6 Driving corner piles and junction piles shall be measured in running metres representing the length of embedment.

5.7 Cutting or burning through steel piles shall be measured in running metres as extra over the pile. The disposal of cut length shall be described.

5.8 Extraction of piles other than described in **5.6** shall be measured separately in square metres obtained by multiplying the embedded length in soil by the nominal width of piles from centre to centre of clutches. Operations such as lifting, handling and removing from site shall be described and included in the item.

6. METHOD OF MEASUREMENT OF CAST *IN-SITU* DRIVEN CONCRETE PILES

6.1 The description of the pile shall state the nominal diameter, grade of concrete, reinforcing bars, length of the cage.

6.2 Forming pile shafts including concrete, and driving casings to a given level shall be measured as one item in running metres.

6.3 Reinforcement including bars to be left in the pile cap for embedding shall be measured separately in accordance with Section 10.

6.4 The length of the cast *in-situ* piles shall be measured from the toe of the pile to the pile cut off level. The description of the pile shall state the diameter and type of casing, the grade of concrete, details of reinforcement of the core, and whether the casing is to be withdrawn or left in.

6.5 The provision of pile shoes and the forming of enlarged bases shall be included in the item.

6.6 Empty boring shall be measured separately in running metres and the length shall be from working ground level to the cut off level of the pile. The type of the filling shall be stated.

7. METHOD OF MEASUREMENT OF CAST *IN-SITU* BORED REINFORCED CONCRETE PILES

7.1 Empty boring shall be measured separately in running metres and the length shall be from working level to the cut off level of the pile. The type of filling shall be stated. Concrete shall be measured separately in cubic metres from founding level to cut off level of the pile.

7.2 The boring through boulders and rock strata except in respect of isolated boulders not exceeding the diameter of the pile shaft shall be measured extra over.

7.3 Reinforcement in pile including bars to be left in the pile cap for embedment shall be measured separately.

7.4 The description of the pile shall state the nominal diameter, grade of concrete, size of aggregate, the reinforcing bars, the length of cage, the provision of liners, if any.

7.5 Permanent mild steel liners if provided shall be measured separately in weight in accordance with Section 10.

7.6 In case of under-reamed or bulb-based piles, the bulbs shall be measured and enumerated. The description of piles shall state the diameter of the bulb.

8. METHOD OF MEASUREMENT OF REINFORCED CEMENT CONCRETE SHEET PILES

8.1 The reinforced cement concrete sheet piles shall be measured in cubic metres arrived at by multiplying the cross-section area of the pile by the length of the pile as cast from the head of the pile to the tip of the shoes.

8.2 The description of the item shall include the cross-sectional shape, grade of concrete, extra strength of the head. Any requisite mould shall be included in the description as also necessary strapping, bolts and lifting holes.

8.3 Lifting, handling, pitching engaging through adjacent piles and driving shall be measured separately for each type in square metres obtained by multiplying the length of the embedded portion of the pile and half the parameter of the section. The length of the embedded portion shall be obtained by measuring from the level of the ground where the tip of the pile first touches before driving to the ultimate level of the tip of the piles after driving.

8.4 Wherever sheet piles are to be driven under/in water necessitating use of special hammers and/or loader frames such piles shall be described by measuring separately.

8.5 Driving corner piles and junction piles shall be measured separately.

8.6 Cutting piles shall be measured in running metres as extra over. The disposal of cut length shall be described.

8.7 The extraction of piles other than due to defective driving shall be measured separately in square metres as mentioned in **8.3**.

9. METHOD OF MEASUREMENT OF TIMBER SHEET PILES

9.1 The timber sheet piles shall be described and measured in running metres stating the species of timber and cross-section.

9.2 Handling, transporting and pitching of piles shall be innumerated for each occasion.

9.3 Driving timber sheet piles shall be measured in square metres obtained by multiplying the length of the embedded portion of the pile in soil and half the parameter of the construction.

9.4 Whenever sheet piles are to be driven under/in water necessitating use of special hammers and/or loader frames such piles shall be described and measured separately.

9.5 The corner and junction piles shall be measured separately.

9.6 Cutting pile shall be measured in running metres as extra over. The disposal of cut length shall be described.

9.7 The extraction of piles other than due to defective driving shall be measured separately as in **9.3**.

10. METHOD OF MEASUREMENT OF BORED PRECAST CONCRETE PILES

10.1 The precast reinforced concrete piles shall be described according to grade of concrete, section and length, the extra strength of the heads being stated. Any requisite mould shall be included in the description as also the necessary strapping, bolts and lifting holes.

10.2 The cement concrete shall be measured separately in cubic metres arrived at multiplying the cross-sectional area of the pile by the length of pile as cast from head of the pile to the tip. No deduction shall be made for chamfers, tapered points or the volume of reinforcement on holes for lifting piles.

10.3 The formwork, links and sleeves should be included in description of the item.

10.4 The reinforcement shall be measured separately

10.5 Placing pile shaft shall be measured in running metres from founding level to working level of the pile.

10.6 Empty boring shall be measured separately in running metres and the length shall be from working ground level to the cut off level of the pile. The boring through boulders and rock strata except in respect of isolated boulders not exceeding diameter of the pile shaft shall be made measured as extra over.

10.7 The measurement of handling, transporting and pitching of piles shall be enumerated for each occasion.

10.8 For strapping the heads of the pile, the length to be stripped shall be stated and measured in running metres.

10.9 Stripping off the heads of the pile for bond length shall be enumerated.

10.10 Grouting shall be measured in cubic metre describing fully type and method.

SUB-SECTION 4B
WELL FOUNDATION
[IS : 1200 (Part 24)]

1. SCOPE

1.1 This sub-section covers the method of measurement of well foundations.

2. GENERAL

2.1 Description of Items — The description of each item shall, unless otherwise stated, be held to include where necessary, conveyance and delivery, handling, loading, unloading, storing, fabrication, hoisting, all labour for finishing to required shape and size, setting, fitting and fixing in position, straight cutting and waste.

2.2 Measurements — All work shall be measured net in decimal system as fixed in its place as given below:

a) Linear dimensions shall be measured to the nearest 0·01 m,

b) Areas shall be worked out to the nearest 0·01 m^2, and

c) Cubic contents shall be worked to the nearest 0·01 m^3.

2.3 Removal of obstructions other than those requiring use of one-tonne-chisel for 24 hours during sinking operations shall be measured separately on the basis of quantum meruit.

3. WELL SINKING

3.1 The item of well sinking shall include use of kentiledge to the extent required for sinking and correcting the well in position.

3.2 The provision of island, if required, shall be measured separately.

3.3 The sinking shall be measured in running metres stating the shape and size. For this purpose, the measurement shall be taken from the level at which the cutting edge is pitched to the level at which it rests finally.

NOTE — The level of cutting edge shall be plane joining the lower most portion of the well curb, which cuts into the soil during sinking or acts as a penetration face.

4. STEINING AND CURB

4.1 Concrete/brick work/stone masonry in the steining and concrete in top plug and curb shall be described and measured in cubic metres. The formwork shall be included in the item.

4.2 Concrete in the bottom plug including sump, if any, shall be measured on the basis of cement bags consumed.

4.3 The filling in the well shall be measured in cubic metres stating the type of filling.

4.4 Measurement for the reinforcement including mild steel bars, steel links, binders and steel plates shall be made separately as specified in accordance with Section 10.

4.5 Measurement for the steel cutting edge and steel armouring (if done) shall be made separately, as specified in accordance with Section 10.

4.6 Cutting off the extra height of steining where required shall be measured in cubic metres.

5. PNEUMATIC SINKING

5.1 Work executed under different working pressure range shall be measured separately.

5.2 Pneumatic sinking shall be measured in running metres stating the size and shape. The depth of sinking shall be measured from the level at which air is introduced to the level at which air is stopped.

5.3 The following shall be measured separately:

a) Bringing of and removing the pneumatic sinking plant from the site;

b) Use of this plant when fitted on well/when not fitted on well (to be measured separately);

c) Fixing and removing of adopter and airlock;

d) Corbel slab; and

e) Keeping the well under pressure during plugging, guniting, repairing, inspection, testing but excluding sinking.

SECTION 5 CONCRETE WORKS

As in the Original Standard, this Page is Intentionally Left Blank

CONCRETE WORKS

[IS : 1200 (Part 2)]

1. SCOPE

1.1 This section covers the method of measurement of concrete works in building and civil engineering works.

2. GENERAL RULES

2.1 Description of Items — The description of each item shall, unless otherwise stated, be held to include where necessary, conveyance and delivery, handling, unloading, storing, fabrication, lowering, hoisting, all labour for finishing to required shape and size, setting, fitting and fixing in position, straight cutting and waste, disposal of packing, etc.

2.2 Dimensions — Unless otherwise stated all work shall be measured net in decimal system as fixed in its place as given in **2.2.1** to **2.2.3.** Any work done extra over the specified dimensions shall be ignored.

2.2.1 Dimensions shall be measured to nearest 0·01 m except for the thickness of slab which shall be measured to nearest 0·005 m.

2.2.2 Areas shall be worked out to nearest 0·01 m^2.

2.2.3 Cubic contents shall be worked out to nearest 0·01 m^3.

3. LIME CONCRETE AND MUD CONCRETE

3.1 Works of lime concrete and mud concrete shall be fully described and measured in cubic metres.

4. CEMENT CONCRETE WORKS

4.1 General

4.1.1 Concrete works shall be measured under the following categories. Works in plain/reinforced/prestressed concrete shall each be measured separately. Works in precast and cast *in-situ* concrete shall be kept separate:

a) Bridges;
b) Dams and spillways;
c) Barrages and weirs;
d) Canal works;
e) Tunnels and shafts;
f) Harbour, docks and marine works;
g) Special structures, such as power house, overhead water reservoir, chimneys and shafts, towers, silos and similar other structures;
h) Buildings; and
j) Other structures not covered by (a) to (h) above.

4.1.2 *Units of Measurement* — Unless otherwise stated all concrete work shall be measured in cubic metres.

4.1.3 *Formwork* — Unless otherwise stated formwork shall be measured separately in accordance with Section 8.

4.1.4 *Finishes* — Fair finishing of exposed surfaces, of concrete including backing or roughening surfaces of concrete shall be included in the description. Special finishes other than those obtained through formwork shall be so described and measured separately in square metres.

4.1.5 *Reinforcement* — Unless otherwise stated reinforcement shall be measured separately in accordance with Section 10. Where concrete and reinforcement are measured as a composite item they shall be fully described indicating that supply of reinforcement is included in the item; in such cases items identical in other respects but varying in reinforcement shall be measured separately.

4.1.6 *Special Concrete* — Concrete processed in special manner, such as cooled, heated, cellular, expansive and heat resisting shall be fully described and measured separately.

4.1.7 All plain, rebated, grooved, locking and tongued joints shall be included in the description.

4.1.8 No deductions shall be made for the following:

a) Ends of dissimilar materials, for example, beams, posts, girders, rafters, purlins, trusses, corbels and steps up to 500 cm^2 in cross-section;
b) Opening up to 0·1 m^2 or as specified;
c) Volume occupied by reinforcement;
d) Volume occupied by pipes, conduits, sheathing, etc, not exceeding 100 cm^2 each in cross-sectional area or as specified;
e) Small voids, such as the shaded portions in Fig. 1, when these do not exceed 40 cm^2 each in cross-section;
f) Moulds, drip moulding, chamfers, splays rounded or covered angles, beds, grooves and rebates up to 10 cm in girth; and
g) Stops, mitres, returns, rounded ends, junctions, dishings, etc, in connection with linear or super labours.

NOTE — In calculating area of an opening, the thickness of any separate lintel or sill shall be included in the height. No extra labour for forming such openings or voids shall be measured.

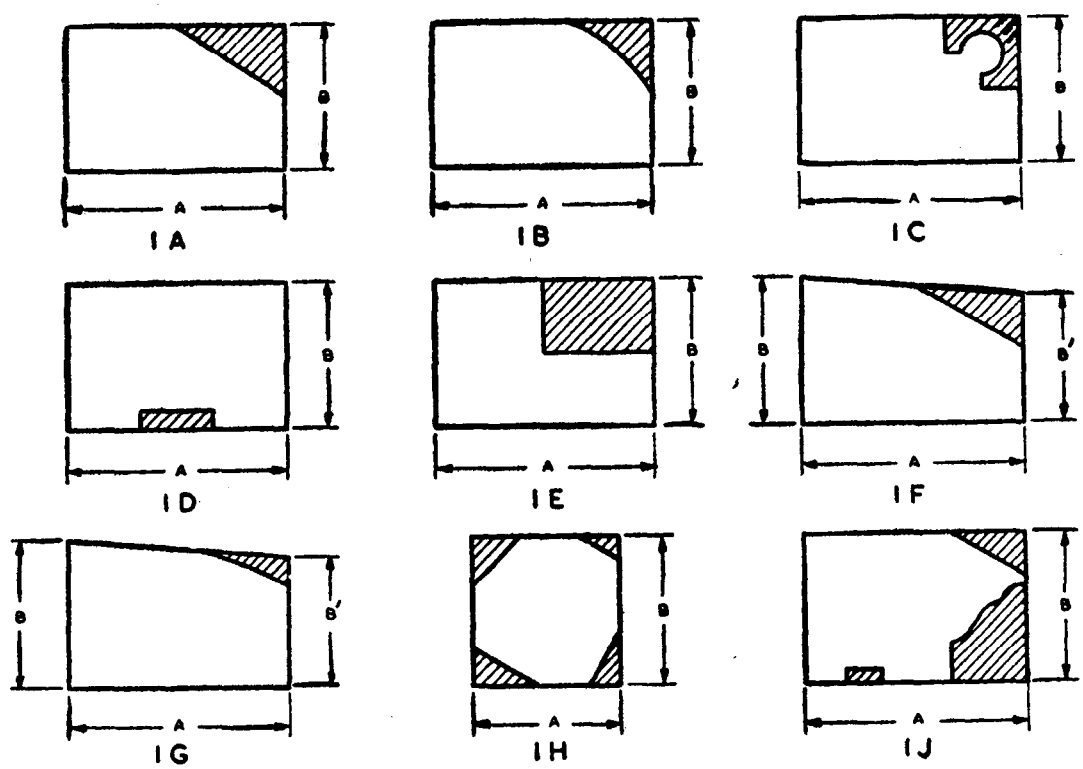

FIG. 1 SHADED PORTION SHOWING SMALL VOIDS

4.2 Reinforced/Plain Cement Concrete (Cast *In-Situ*)

4.2.1 Concrete cast *in-situ* shall be classified as follows:

a) Foundations, footings, bases for columns;
b) Walls (any thickness) including attached pilasters, buttresses, plinth and string courses, fillets, etc;
c) Slabs, supported on wall/beams/columns, landings, balconies, canopies, bridge slabs;
d) Slabs other than those specified in (c);
e) *Chhajjas* including portions bearing on the wall;
f) Lintels, shelves, beams and bressumers;
g) Columns, piers, abutments, pillars, posts and struts;
h) Staircase including stringer beams but excluding landings;
j) Balustrades, newels and railing;
k) Spiral staircases (including landing);
m) Arches;
n) Domes, vaults;
p) Shell roof, arch rib and folded plates;
q) Chimneys and shafts;
r) Canal lining;
s) Ballast walls, retaining walls, return walls;
t) Concrete filling to precast components;
u) Kerbs, steps and the like;
v) String or lacing courses, parapets, copings, bed block, anchor blocks, plain, window sills and the like;
w) Cornices and moulded window sills; and
y) Louvers, fins, fascia.

NOTE — All projections, etc, shall be included in the main items.

4.2.2 *Concrete in Columns and Beams*

4.2.2.1 Columns shall be measured from top of column base to underside of first floor slab and subsequently from top of floor slab to underside of floor slab above.

4.2.2.2 In case of columns for flat slabs, flare of column shall be included with column for measurement.

4.2.2.3 Beams shall be measured from face to face of columns and shall include haunches, if any, between columns and beams. The depth of beams shall be measured from bottom of slab to bottom of the beam except in case of inverted beam where it shall be measured from top of slab to top of beam.

4.2.3 *Concrete in Chhajjas* — The *chhajjas* shall be measured inclusive of bearing. When *chhajjas* is combined with lintel, beam and slab, it shall be measured as clear portion.

4.2.3.1 Whenever vertical fin(s)/facia(s) and *chhajjas* are combined, *chhajjas* shall be measured clear between fin(s)/facia(s). The vertical fins and facies shall be measured through.

4.2.4 *Forming Cavity in Wall*

4.2.4.1 Forming of cavity shall be measured in square metres. The description shall state the width of cavity, the material, size, shape of ties and their number per square metre.

4.2.4.2 Measurements of cavity shall be taken along a plane at centre of cavity; deduction being made for all openings and solid portion of walls.

4.2.4.3 Labour and material for closing cavities at the jambs, sills and heads of openings shall be described and measured separately in running metres.

4.2.4.4 Items shall include use of cores for keeping cavity clear, uniform, and forming the requisite weep and vent holes.

4.2.5 *Concrete Casing to Beams and Steel Stanchions*

4.2.5.1 Concrete casing to steel joists or beams, steel stanchions, etc, shall be measured in cubic metres.

4.2.5.2 Volume occupied by joists shall not be deducted except in the case of boxed stanchions or girders, in which case boxed portion only shall be deducted.

4.2.6 *Surface Channels*

4.2.6.1 Concrete in channel shall be measured in cubic metres. Volume of channel shall be deducted from the concrete. Where shape of cross-section is round, elliptical or oval, area of section shall be taken as three-fourth of the width at top, multiplied by average depth at centre.

4.2.6.2 Forming channels in concrete shall be measured in running metres and inner girth stated.

4.2.6.3 Channel, finished fair or formed in spade finish to receive lining of brick, concrete or stone, etc, shall be measured separately.

4.3 Reinforced/Plain Concrete — Precast — Precast concrete works shall include use of mould, finishing face and supply of reinforcement as described. Mix and ingredients of setting mortar, providing and fixing inserts, if required, for fixing at site and finishing shall be stated. Alternatively, reinforcement may be measured separately. Unless otherwise stated hoisting and setting in position shall be included in item. The work shall be classified and measured as indicated in Table 1. Each item of work shall be fully described.

TABLE 1 MEASUREMENT REINFORCED/PLAIN CONCRETE — PRECAST COMPONENT

Sl No.	Classification	Method of Measurement
(1)	(2)	(3)
i)	Wall panel, floor/roof slabs	In square metres
ii)	Beams unit and columns, trusses, etc	In running metres or numbers
iii)	Channel unit and purlins	In running metres or numbers
iv)	String or lacing courses, copings, bed plates, anchor blocks, plain window sills, shelves louvers, steps, staircases, etc	In running metres or numbers
v)	Kerbs, edgings, etc	In running metres or numbers
vi)	Solid blockwork	In cubic metres or square metres
vii)	Hollow blockwork	In cubic metres or square metres
viii)	Light weight partitions	In square metres stating the thickness
ix)	Door/window frames	In running metres stating the size
x)	Waffle units	In square metres or numbers
xi)	Water tank	In numbers
xii)	*Jallies*	In square metres of opening fitted stating thickness
xiii)	Fencing posts	In numbers or cubic metres
xiv)	Folded slab	In cubic metres

4.3.1 Plain and moulded work shall be measured separately.

4.3.2 Any finishing work on precast component shall be fully described and measured separately in square metres.

4.3.3 *Fencing Posts*

4.3.3.1 Concrete fencing posts, corner posts, straining or terminal posts and struts shall be classified according to size as follows:

a) Those having an average sectional area not exceeding 100 cm^2,

b) Those having an average sectional area exceeding 100 cm^2 but not exceeding 250 cm^2, and

c) Those of an average area over 250 cm^2.

4.3.3.2 The item shall include forming of chamfered or rounded angles, and flat, splayed, rounded or mitred tops. Holes for wire or nails and/or building in fastenings shall also be included.

4.4 Prestressed Concrete — Cast *In-Situ* — Prestressed concrete work cast *in-situ* shall be fully described.

4.4.1 Concrete in structural members, such as columns, beams and slabs shall each be measured separately.

4.4.1.1 Members cast in sections (that is not in one continuous operation) shall be fully described.

4.4.2 Forming and grouting or sealing ducts or grooves shall be measured in running metres fully describing size and other particulars of sleeves (or sheating), temporary supports required in formation of ducts and composition of grout.

4.4.3 Forming and grouting the air-holes at ends middle or sides or any other position of ducts shall be included in the description of item.

4.4.4 Filling in the jacking or anchoring recesses shall be described stating finish to exposed surface or filling and measured separately in cubic metres.

4.4.5 Supplying, fixing and tensioning steel wire/strands/or cables (measured between anchorages) shall be measured in kilograms stating ultimate strength and proof stress and size of wire or cable. Each size shall be measured separately. No allowance shall be made for extra lengths in anchorages or elsewhere. The number of stands in each cable, type of central core, and type of sheathing, if any, on wires shall be stated. Degreasings, straightening, cutting to lengths and assembling wires and cables, cones, wedges, anchor-plates, spacers, distance pieces and other expandable items shall be deemed to be included with main item.

4.5 Prestressed Concrete — Precast — Prestressed concrete precast works shall be fully described.

4.5.1 Formwork or moulds for precast units and for forming anchorage pockets shall be deemed to be included with items.

4.5.2 Precast units shall be enumerated stating number, size, length, method of fixing and bedding. Unless otherwise stated, hoisting, transportation, assembly and setting in position shall be included in item. The classification shall be as follows:

a) Pre-tensioned in the mould;

b) Post-tensioned on ground after casting;

c) Cast in section, assembled and post-tensioned before erection;

d) Post-tensioned after hoisting but capable of self-support;

e) Cast in sections for assembly *in-situ* and post-tensioned after erection; and

f) Post-tensioned after hoisting but requiring support until tensioning is completed.

4.5.3 Cores, wires, strands and cables for post-tension members shall be measured as in **4.4.5**. In case of pre-tension members, these items shall be included in the main item.

4.6 Miscellaneous Items

4.6.1 *Expansion Joints* — Expansions joints in floors, roofs and walls shall be described as including all formwork and labour necessary to form joint and shall be measured in running metres stating depth and width of joint. Alternatively, these may be measured in square metre stating the width of the joint.

4.6.1.1 Material used in filling and or for covering shall be fully described and measured separately in running metres.

4.6.1.2 Where sheet of copper, brass, aluminium or of any other material is used, it shall be fully described and measured in running metres.

4.6.2 Damp-proof course in concrete shall be described and measured in square metres stating thickness. Item shall include formwork and fair finish to edges and also levelling and preparing of brickwork or stone masonry to receive damp-proof course. Horizontal and vertical damp-proof courses shall each be measured separately.

4.6.3 *Waterproofing Concrete*

4.6.3.1 Waterproofing material used for waterproofing of concrete shall be described stating

quantity of material to be used and measured separately in litres or kilograms.

4.6.3.2 Surface treatment of concrete shall be measured in square metres stating number of coats or dressings and proportion of waterproofing material to water.

4.6.4 *Guniting* — Guniting shall be fully described and finished surface measured in square metres.

4.6.5 *Pack/Pressure Grouting*

4.6.5.1 *Grout holes* — The length of grout holes drilled either for pack grouting or pressure grouting through concrete shall be measured in running metres. Grout holes drilled through plate steel liners shall, however, be enumerated separately.

4.6.5.2 *Grout pipes and fittings* — Grout pipes and fittings provided for grouting shall be measured in kilograms and weight of all pipes and fittings shall be derived either actual weighment or from known weights and lengths.

4.6.5.3 *Water pressure testing* — Measurement for water pressure testing shall, where necessary, be made separately for each hole and enumerated.

4.6.5.4 Measurement for grouting shall be made on basis of the weight of cement in grout actually forced into holes. Stone dust and other additions, if used, shall be measured separately in loose dry state before mixing and shall be measured by boxes of approved size and design.

4.6.6 *Grouting Stanchion Bases* — Cement grouting under plates of stanchion or precast concrete column or steel grillages shall be measured in square metres and its mix stated.

4.6.7 *Holding Down Bolts* — Grouting in of holding down bolts and the temporary boxings or wedges to form holes for the same shall be enumerated. Depth and height of the hole and mix shall be stated and grouting included in description.

4.6.8 *Cutting in Concrete*

4.6.8.1 Work involving cutting, or sinking into existing concrete shall be classified as follows:

a) Grooves, chases and like shall be measured in running metres stating girth; and

b) Holes, mortices and openings shall be measured per centimetre of depth of cutting and shall be classified as follows:

1) Up to 250 cm^2 in area, and

2) Exceeding 250 cm^2 and up to and including 0·1 m^2 area.

NOTE — Area shall be reckoned as the net area required and not necessarily the area actually cut.

4.6.8.2 Cutting opening exceeding 0·1 m^2 in area shall be measured in cubic metre and items shall include provision for fixing and removal of existing support and temporary support.

4.6.8.3 Cutting of existing reinforced cement concrete surfaces and exposing reinforcement without damaging the same shall be measured in square metres stating depth.

4.6.9 *Toothing and Bonding* — Where new concrete walls are bonded to existing walls an item of labour and material in cutting, toothing and bonding shall be measured in square metres.

As in the Original Standard, this Page is Intentionally Left Blank

SECTION 6 BRICKWORK

As in the Original Standard, this Page is Intentionally Left Blank

BRICKWORK

[IS : 1200 (Part 3)]

1. SCOPE

1.1 This section covers the method of measurement of brickwork in buildings and civil engineering works.

2. GENERAL

2.1 Measurement — All work shall be measured net in the decimal system, as fixed in place, as given below:

a) Dimensions shall be measured to the nearest 0·01 m,

b) Areas shall be worked out to the nearest 0·01 m^2, and

c) Cubic contents shall be worked out to the nearest 0·01 m^3.

2.2 Description of Item — Description of each item shall, unless otherwise stated, be held to include, where necessary, conveyance, delivery, handling, unloading, storing, waste, return of packings, necessary scaffolding, tools and tackle.

2.3 Waste — All measurements of cuttings shall, unless otherwise stated, be deemed to include consequent waste.

2.4 Deduction — Where minimum area is defined for deduction of an opening, void or both, such area shall refer only to opening or void within the space measured.

3. BRICKWORK — GENERAL

3.1 Bricks and mortar to be used for brickwork shall be fully described. Where it is proposed to specify a bond other than English bond, it shall be so stated.

3.1.1 The item of general brickwork shall be deemed to include the following:

a) Raking out joints for plastering or for pointing done as a separate process or finishing joints flush as work proceeds;

b) Preparing tops of existing walls and the like for raising;

c) Rough cutting and waste for forming gables, cores of arches, splays at eaves and the like and all rough cutting in the body of brickwork, unless otherwise stated;

d) Plumbing to angles;

e) Forming reveals to jambs where fair cutting on exposed faces is not involved;

f) Leaving holes for pipes, etc;

g) Building-in holdfasts, air bricks, fixing bricks, etc;

h) Building-in ends of beams, joists, slabs, lintels, sills, trusses, etc;

j) Forming openings and flues for which no deduction is made (*see* **4.1.5**);

k) Bedding wall plates, lintels, sills, roof tiles, corrugated sheets, etc, in or on walls, if not covered in respective trade; and

m) Leaving chases of section not exceeding 50 cm in girth.

3.1.2 The following categories of brickwork shall be included with general brickwork:

a) Footings;

b) Battered (measured net). Battered surfaces shall, however, be measured separately in square metres as an extra-over;

c) Eaves or beam fillings, no deduction being made for joists, etc;

d) Brickwork (excluding refractory brickwork) in chimney breasts, chimney stacks, smoke or air flues (except independent chimney shaft as in factories for steam boilers); and

e) Pilasters, plain copings and sills.

NOTE — In the case of receding courses of panels, recess shall not be deducted.

4. MEASUREMENT

4.1 Brickwork shall generally be measured in cubic metres, unless otherwise stated.

4.1.1 Walls one brick thick and less shall each be measured separately in square metres stating thickness.

4.1.2 Walls exceeding one brick thick but not exceeding three bricks in thickness shall be measured in multiples of half-brick which shall be deemed to be inclusive of mortar joints. Where fractions of half-brick occur due to architectural or other reasons, measurement shall be taken as follows:

a) Up to ¼ brick — actual measurement, and

b) Exceeding ¼ brick — full half-brick.

4.1.3 For walling which is more than three bricks in thickness actual thickness of wall shall be measured.

4.1.4 No deductions or additions shall be made on any account for the following:

a) Ends of dissimilar materials (that is, joists, beams, lintels, posts, girders, rafters, purlins, trusses, corbels, steps, etc); up to 0·1 m^3 in section;

b) Opening up to 0·1 m^2 in area (*see* Note);

c) Wall plates, bed plates, and bearing of slabs, *chhajjas* and the like, where thickness does not exceed 10 cm and bearing does not extend over the full thickness of wall;

d) Cement concrete blocks as for holdfasts and holding down bolts;

e) Iron fixtures, such as wall ties, pipes up to 300 mm diameter and holdfasts for doors and windows; and

f) Chases of section not exceeding 50 cm in girth.

NOTE — In calculating area of an opening, any separate lintel or sills shall be included with the size of the opening but end portions of lintel shall be excluded [*see* **4.1.4**(a)] and extra width of rebated reveals, if any, shall also be excluded.

4.1.5 *Fireplaces, Chimneys, etc* — Brickwork (excluding refractory brickwork) in chimney breasts, chimney stacks, smoke or air flues not exceeding 0·2 m^2 in sectional area shall be measured as solid, and no extra measurement shall be made for pargetting and coring such flues. Where flues exceed 0·2 m^2 in sectional area, deduction shall be made for the same, and pargetting and coring flues measured in running metres, stating size of flue. Apertures for fireplaces, shall not be deducted and no extra labour shall be measured for splaying of jambs and throating.

4.1.6 *Pillars/Columns* — Pillars shall be fully described and measured in cubic metres. Where pillars of different sections and shapes are involved their numbers shall be stated in addition in each case. Pillars shall be measured and kept separate as under:

a) Rectangular or polygonal on plan,

b) Curved on plan to any radius, and

c) Any other type.

NOTE — Rectangular pillar/column shall mean a detached masonry portion such that its breadth does not exceed 3 times its thickness and thickness itself does not exceed 3-brick lengths.

5. CIRCULAR BRICKWORK

5.1 Brickwork circular on plan to a mean radius not exceeding 6 m shall be measured separately and shall include all cutting and waste and templates.

5.1.1 Brickwork circular on plan to a mean radius exceeding 6 m shall be measured separately and included with general brickwork.

6. BACKING TO MASONRY

6.1 Brickwork in backing to masonry shall be measured separately stating average thickness; description shall include all cutting and waste for bonding.

7. HONEYCOMB BRICKWORK

7.1 Honeycomb brick walling shall be measured in square metres stating thickness and pattern of honeycombing. Honeycomb opening shall not be deducted.

8. INDEPENDENT CHIMNEY SHAFTS

8.1 Brickwork in independent chimney shafts (as for large steam boilers) shall be measured net inclusive of all cutting, waste and templates and kept under the following categories:

a) Rectangular on plan,

b) Polygonal on plan, and

c) Curved on plan to any radius.

8.1.1 Height of chimney from ground/datum line shall be stated.

9. CAVITY WALLS

9.1 Forming of cavity shall be measured in square metres stating-width of cavity and shall include ties and their number per square metre. Material, size and shape of ties shall be described.

9.2 Measurement of cavity shall be taken along a plane at centre of cavity, deduction being made for all openings and solid portions of walls.

9.3 Labour and material for closing cavities at jambs, sills and heads of openings shall be described and measured separately in running metres.

9.4 Use of cores for keeping cavity clear and forming requisite weep and vent holes shall be described.

10. REINFORCED BRICKWORK

10.1 Reinforced brickwork shall be measured and kept separate from general brickwork and unless otherwise stated, reinforcement shall be measured separately in accordance with Section 10.

11. BRICK NOGGING

11.1 Brickwork above one brick in thickness shall be included with general brickwork, brickwork one brick and less in thickness shall be measured as described in **4.1.1.** Dimensions shall be measured overall.

11.1.1 Timber work shall be measured separately in accordance with Section 9.

12. BRICKWORK WITH FAIR FACE OR ARCHITECTURAL APPEARANCE

12.1 Brickwork with fair face or architectural appearance shall be measured separately.

13. BRICKWORK IN ARCHES, VAULTS OR STAIRCASES

13.1 Brickwork in arches, vaults or staircases shall be measured separately; work in selected uncut bricks and in purpose made or fair cut and rubbed bricks shall be so described and measured separately and shall include centering for spans up to 2 m. For spans exceeding 2 m, centering shall be measured separately as in Section 8. Cutting to skews shall be included in the description.

14. UNDERPINNING

14.1 Brickwork in underpinning shall be measured separately and an item for extra labour and material in wedging up on top of underpinning shall be measured in square metres as length multiplied by width of top course.

15. FAIR CUTTING OF BRICKWORK

15.1 Fair cutting exceeding 10 cm in width or in girth in splayed angles weatherings, cornices, quoins, etc (where purpose-made bricks are not used), shall be measured separately in square metres.

15.2 Fair cutting not exceeding 10 cm in width or girth, such as in splays and chamfers, shall be measured in running metres, stating width/girth.

15.3 Circular fair cutting shall be measured separately in square metres.

16. BRICK EDGINGS

16.1 Brick edgings, as to roads and the like, shall be described and measured in running metres.

17. FILLETING

17.1 Filleting in mortar, as in flashings on roofs, shall be described and measured in running metres stating shape and sectional area of fillets.

18. BROKEN GLASS COPING

18.1 Broken glass coping laid along with brickwork shall be measured in square metres and described stating thickness of mortar and weight of broken glass per square metre of coping.

19. DAMP-PROOF COURSES

19.1 Damp-proof course shall be described and measured in square metres stating thickness. Description shall include levelling up and/or preparing brickwork to receive the treatment and use and waste of form work, if required.

19.1.1 Vertical and horizontal damp-proof courses shall be measured separately.

20. BRICKWORK AROUND STEEL JOISTS (ENCASING)

20. Encasing brickwork to steel joists or beams, steel stanchions, etc, shall be measured in cubic metres.

20.2 Volume occupied by joists shall not be deducted except in case of boxed stanchions or girders in which case box portion only shall be deducted.

20.3 Extra labour in cutting and fitting brickwork around steel joists, stanchions, girders, etc, shall be measured separately in square metres of finished surfaces.

21. SILLS, CORNICES, ETC

21.1 Plain corbels, string courses, aprons, friezes, sills, cornices, drip courses, oversailing courses, and other projections, etc, of splayed, bullnosed or any other type of purpose-made or cut bricks shall be fully described and measured in running metres stating depth and width of projection. No deduction shall be made from masonry of wall for the bearing portion of drip course, bearing of moulding and cornice.

22. BRICK TILE WORK

22.1 Brick tile work shall be measured separately and the rules for measuring ordinary brickwork shall be followed.

23. CHASES, REBATES, ETC

23.1 Cutting chases, rebates, throatings, grooves, etc, in brickwork shall be measured in running metres stating girth and classified as follows:

a) Not exceeding 10 cm in girth, and

b) Exceeding 10 cm but not exceeding 20 cm in girth.

23.1.1 Chases, rebates, etc, exceeding 20 cm in girth shall be measured in square metres (girth × length).

24. CUTTING HOLES

24.1 Cutting holes through brickwork including making good shall be measured per centimetre of depth of cutting and shall be classified as follows:

a) Holes not exceeding 400 cm^2 in area, and

b) Holes exceeding 400 cm^2 and not exceeding 0·1 m^2 in area.

25. CUTTING OPENINGS

25.1 Cutting openings exceeding 0·1 m^2 in area in walls one brick thick and less shall be measured in square metres and in walls exceeding one brick thick shall be measured in cubic metres.

26. TOOTHING AND BONDING

26.1 Where new walls are bonded to existing walls, an item of labour and material in cutting, toothing and bonding shall be measured in square metres of vertical face in contact with new work only.

As in the Original Standard, this Page is Intentionally Left Blank

SECTION 7 STONE MASONRY

As in the Original Standard, this Page is Intentionally Left Blank

STONE MASONRY

[IS : 1200 (Part 4)]

1. SCOPE

1.1 This section covers method of measurement of stone masonry in buildings and civil engineering works.

2. GENERAL

2.1 Measurements — All work shall be measured net in decimal system, as fixed in its place, unless otherwise stated herein as given below:

a) Dimensions shall be measured to the nearest 0·01 m,

b) Areas shall be worked out to the nearest 0·01 m^2, and

c) Cubic contents shall be worked out to the nearest 0·01 m^3.

2.2 Description of Item — Description of each item shall, unless otherwise stated, be held to include, conveyance, delivery, handling, unloading, storing, waste, return of packings, scaffolding, tools and tackle, as necessary.

2.3 Waste — All measurements of cutting shall, unless otherwise stated, be deemed to include consequent waste.

2.4 Deduction — Where minimum area is defined for deduction of an opening, void, or both, such area shall refer only to opening or void within the space measured.

3. WALLING

3.1 Type of stone, kind of walling and mix of mortar shall be described. Item of general walling shall be deemed to include the following:

a) Bond stones;

b) Raking out joints for plastering or for pointing, done as a separate process or finishing joints flush as work proceeds;

c) Preparing top of existing wall and the like for raising;

d) Rough cutting and waste for forming gables, cores of arches, splays at eaves and the like and all rough cutting in the body of walling;

e) Leaving holes for pipes and similar items;

f) Building-in holdfasts, air bricks, fixing bricks, etc;

g) Bedding wall plates, lintels, sills, roof tiles, corrugated sheets, etc, in or on walls, if not covered in respective trade;

h) Building-in-ends of joists, beams, lintels, etc, and making good; and

j) Forming openings and flues for which no deduction is made (*see* **4.3**).

3.1.1 Random or uncoursed rubble walling brought up to courses shall be measured separately stating minimum and maximum heights of courses.

3.1.2 In case of coursed work, height of course shall be stated, if regularly diminished, it shall be so described stating maximum and minimum heights of courses.

3.1.3 Stone walling circular on plan to a mean radius not exceeding 6 m shall be measured separately and shall include all cutting and waste and templates.

3.1.4 Stone walling circular on plan to a mean radius exceeding 6 m shall be measured net and included with general walling.

3.1.5 The following classes of work shall be included with general walling:

a) Footings;

b) Battered stone masonry (measured net). Battered surfaces shall, however, be measured separately in square metres as an extra over.

c) Eaves or beam filling, no deduction being made for joists, rafters, etc;

d) Stone walling in chimney breasts, chimney stacks; smoke or air flues; and

e) Pilasters.

4. MEASUREMENT

4.1 Except where otherwise stated, stone masonry generally shall be measured in cubic metres and face work in square metres.

4.2 No deduction or addition shall be made for the following:

a) Ends of dissimilar materials (that is, joists, beams, lintels, posts, girders, rafters, purlins, trusses, corbels, steps, etc) up to 0·1 m^2 in section;

b) Openings up to 0·1 m^2 in area (*see* Note);

c) Wall plates, bed plates, and bearing of slabs, *chhajjas* and the like, where thickness does not exceed 10 cm and bearing does not extend over the full thickness of wall;

d) Cement concrete blocks for holdfasts, holding-down bolts and the like; and

e) Iron fixtures, such as wall ties, pipes up to 300 mm diameter and holdfasts for doors and windows.

NOTE — In calculating area of an opening, any separate lintel or sill shall be included with the size of the opening but end portions of lintel shall be excluded [*see* **4.2** (a)] and extra width of rebated reveals, if any, shall also be excluded.

4.3 Fireplaces, Chimneys, etc — Stone walling in chimney breasts, chimney stacks, with smoke or air flue(s) not exceeding 0·20 m^2 each in sectional area shall be measured as solid, and no extra measurement shall be taken for pargetting and coring such flue(s). Where flue(s) exceed 0·20 m^2 in sectional area, deduction shall be made for the same and pargetting and coring flue(s) shall be measured in running metres stating size(s) of flue(s). Aperture for fireplace shall not be deducted and no extra labour shall be measured for splaying of jambs and throating.

4.4 Pillars/Columns — Pillars/columns shall be fully described and measured in cubic metres. These shall be measured in the following categories:

a) Rectangular or polygonal on plan,

b) Curved on plan to any radius, and

c) Any other type.

NOTE — Rectangular pillar/column shall mean a detached masonry portion such that its breadth does not exceed 3 times its thickness and thickness itself does not exceed 60 cm.

5. STONE NOGGING

5.1 Stone nogging shall be measured in square metres, stating thickness of wall and shall include face work to both sides. Dimensions shall be measured overall.

5.1.1 Timber work shall be measured separately in accordance with Section 9.

6. STONE MASONRY IN ARCHES AND VAULTS

6.1 Stone work in rough arches and vaults shall be described and measured separately and shall include centering for spans up to 2 m. For spans exceeding 2 m, centering shall be measured separately in accordance with Section 8.

6.1.1 Facings to arches shall be measured separately.

7. UNDERPINNING

7.1 Stone walling in underpinning shall be measured separately and an item for extra labour and material in wedging up on top of underpinning with thin slabs or slates shall be measured in square metres (as length multiplied by width of top course).

8. LEVELLING UP

8.1 Levelling up of uncoursed random walling for damp-proof courses, band courses, and the like shall be measured separately in square metres and the material, such as concrete or mortar to be used in levelling up shall be described.

9. FACINGS

9.1 If facing stones are the same as those used in body of walling, additional work involved in dressing stones shall be described as 'extra over' walling.

9.1.1 If stones are to be dressed on beds and joints, it shall be so stated.

9.1.2 If facing stones are different from those used in body of walling, facings may be stated as 'stone and labour in facing'. Type of such facing and average bed shall be described, and bonders, if any, shall also be described and number per square metre stated. Bonding to stone walling and to brick work shall be measured separately.

9.1.3 In case of circular facings, not exceeding 6 m radius on plan, radius shall be stated. Circular facing exceeding 6 m radius on plan shall be included with general facing.

10. ARCHES IN FACINGS

10.1 Dressing to arches in faced work shall be measured in square metres, measured on face and exposed soffit; rise of arch and width of soffit shall be stated and joints described. In case of arches in random rubble, cutting of skewbacks and over and under arches shall be included with the item. Cutting over arches, skewbacks, etc, in superior type of facework shall be measured separately in running metres.

11. ANGLES IN FACINGS

11.1 External angles in facings shall be measured in running metres and if quoin stones are larger than general facing stones, their average size shall be stated. If edge margins of quoin stones are drafted, this shall be described stating width of drafting.

11.1.1 Squints, birds-mouths, splayed or rounded angles and the like shall each be measured separately in running metres stating width of splay or girth of rounded angle.

11.1.2 Squints, birds-mouths and external and internal angles to battered facings shall each be measured separately in running metres; if quoin stones to battered facings have horizontal joints, these shall be so described.

12. CHASES, REBATES, ETC

12.1 Cutting chases, rebates, throatings, grooves, etc, in walling shall be measured in running metres stating girth and classified according to girth as follows except in case of throating which shall be measured separately:

a) Not exceeding 10 cm in girth, and

b) Exceeding 10 cm but not exceeding 20 cm in girth.

12.1.1 Chases, rebate, etc, exceeding 20 cm in girth, shall be measured in square metres (girth multiplied by length).

13. CUTTING HOLES

13.1 Cutting holes through walling and making good shall be measured per centimetre of depth of cutting and shall be classified as follows:

a) Holes not exceeding 400 cm^2 in area, and

b) Holes exceeding 400 cm^2 and not exceeding 0·1 m^2 in area.

14. CUTTING OPENINGS

14.1 Cutting openings exceeding 0·1 m^2 in area shall be measured in cubic metres.

15. TOOTHING AND BONDING

15.1 Where new walls are bonded to existing walls, an item of labour and material in cutting, toothing and bonding shall be measured in square metres of surface in contact with new work only. Spacing and size of toothings required to be cut in the existing work shall be described.

16. DRESSED STONEWORK

16.1 Stonework as in sills, steps, string courses, cornices, columns, caps, copings, lintels, etc, shall each be measured in cubic metres. Type of dressing shall be described and measured in square metres as extra over.

16.2 Dressed stonework as in *chhajjas*, *jallies*, shelves and the like shall be described as measured in square metres (inclusive of bearing).

16.3 Each stone shall be measured as smallest rectangular block from which finished dressed stone can be worked.

17. ADDITIONAL LABOUR IN DRESSED STONEWORK

17.1 The following labours shall be measured separately in square metres when exceeding 10 cm in girth or width and in running metres if not exceeding 10 cm in girth or width, unless included in the main item:

a) Sunk work to faces, beds and joints as in arches, voussoirs and key blocks, splays, batters, weatherings, etc; and

b) Moulded work as in cornices (girth of moulding measured).

17.2 The following labours shall be measured separately in running metres, when not exceeding 10 cm in width or girth, unless included in the main item:

a) Chamfers, arrises, or splays not exceeding 1·5 cm in width;

b) Chamfers, arrises, or splays exceeding 1·5 cm but not exceeding 10 cm in width;

c) Rounded bullnoze-angles or mouldings or hollow angles;

d) Rebates, grooves (square, hollow or dove-tailed) in facework;

e) Rebates, grooves (square, hollow or dove-tailed) for joints, tongues of sills, etc; and

f) Cutting chisel drafted margin.

17.3 Drilling or cutting holes shall be enumerated stating diameter of hole and its depth.

17.4 Cutting rectangular or dove-tailed mortice in dressed stones shall be enumerated stating size in cubic centimetres; and running with cement or lead shall be described.

18. STOPS, MITRES, ETC

18.1 Stops, mitres and returned ends shall be described and enumerated.

19. FIGURES, LETTERS, ETC

19.1 Curved figures, letters, etc, shall be described and enumerated stating dimensions.

20. BOULDER WORK

20.1 Boulder work shall be measured in cubic metres stating size of boulders and classified as follows:

a) Boulder filling dry hand-packed,

b) Boulder walling dry, and

c) Boulder walling in mortar stating mix of mortar.

As in the Original Standard, this Page is Intentionally Left Blank

SECTION 8 FORMWORK

As in the Original Standard, this Page is Intentionally Left Blank

FORMWORK

[IS : 1200 (Part 5)]

1. SCOPE

1.1 This section covers the method of measurement of formwork, where it is required to be measured separately.

2. GENERAL RULES

2.1 Description of Items — The description of each item shall, unless stated otherwise, be held to include where necessary, conveyance and delivery, handling, loading, unloading, storing, fabrication, hoisiting, lowering all labour for finishing to required shape and size, and levels of striking and removal.

2.2 Measurements — All works shall be measured net in decimal system, as fixed in its place as given in **2.2.1** and **2.2.2**.

2.2.1 Dimensions shall be measured to the nearest 0·01 m.

2.2.2 Areas shall be worked out to the nearest 0·01 m^2.

3. DESCRIPTION OF FORMWORK

3.1 The formwork shall include the following:

a) Splayed edges, notchings, allowance for overlaps and passings at angles, sheathing battens, strutting, bolting, nailing, wedging, casing, striking and removal;

b) All supports, struts, braces, wedges as well as mud sills, piles or other suitable arrangements to support the formwork;

c) Bolts, wire ties, clamps, spreaders, nails or any other items to hold the sheathing together;

d) Working, scaffolds, ladder, gangways, and similar items;

e) Filleting to form stop-chamfered edge or splayed external angles not exceeding 20 mm wide to beams, columns and the like;

f) If required, temporary opening in the forms for pouring concrete, inserting vibrators, and cleaning holes for moving rubbish from the interior of the sheathing before pouring concrete;

g) Dressing with oil to prevent adhesion; and

h) Raking of circular cutting.

4. TYPE OF FORMWORK

4.1 Separate items shall be provided for formwork with type of contact surface, such as:

a) wrought formwork (that is, sheathing having planed surface or sawn timber);

b) sheathing formed from tongued and grooved boards;

c) sheathing having plywood lining;

d) sheathing having special lining or any other arrangement to give extra smooth finish or texture or decorative surface for architectural concrete;

e) sheathing of steel sheeting, tubing or other varieties; and

f) slip from technique extrusion process.

5. CLASSIFICATION

5.1 Formwork shall be generally classified as follows and measured separately, unless specified otherwise:

a) Foundation, footings, bases of columns, etc; and mass concrete;

b) Flat surfaces, such as soffits of floors, roofs landing and the like; where floors exceed 200 mm in thickness the formwork shall be measured separately stating the thickness;

c) Vertical surfaces, such as walls, partitions and the like, including attached pilasters, butteresses, plinth and string courses and the like, etc;

d) Sloping or battering surfaces, including folded plates;

  i) Where inclination to horizontal plane does not exceed 30° (requiring shuttering only on the underside);

  ii) Where inclination to horizontal plane exceeds 30° (where shuttering may be provided both on underside and upperside, if required) (only underside area to be measured);

c) *Arches*

  i) up to 6 m span

  ii) above 6 m span

f) *Cylindrical Shells (Area of Underside to be Measured)*

  i) radius less than 3 m

  ii) radius above 3 m

g) Wafle or ribbed slabs where shuttering is required for bottom inclined surface;

h) Dormer vaults and shell roofs having curved surfaces in both directions (only the area of underside shall be measured);

j) Sides and soffits of beams, beam haunchings, cantilevers, griders, bressumers and lintels; beams and girders 1 m deep and over shall be measured separately;

k) Sides of columns, piers, pillars, posts and stanchions and struts (square/rectangular/ polygonal/circular/curved to be measured separately);

m) Edges of slabs and breaks in floors and walls (to be measured in running metres where under 200 mm width or thickness);

n) Cornices and mouldings;

p) Small surfaces, such as cantilever ends, brackets and ends of steps, caps and bases to pilasters and columns and the like;

q) *Chullah* hoods, weather shades, *chhajjas*, corbels, etc, including edges;

r) Staircases with sloping or stepped soffits, including risers and stringers, excluding landing;

s) Spiral staircases;

t) Chimneys and shafts;

u) Elevated water reservoirs;

v) Well steining; and

w) Fins.

6. METHOD OF MEASUREMENT

6.1 Formwork shall be measured in square metres as the actual surfaces in contact with the concrete or any other material requiring formwork. Formwork to small features, such as in **5.1** (p) shall be enumerated. Formwork left in shall be so described.

6.2 Where formwork is required to be lined with wallboard, hardboard, polyethylene sheet or paper lining or to be coated with mould liquid or lime-white, such formwork shall be so described and measured separately.

6.3 Where lining of wallboard, asbestos, cork slab and the like is of a permanent character and is to be left in, such lining shall be measured separately the description shall include any necessary fixing to the concrete.

6.4 No deductions shall be made for opening up to 0·4 m^2. No deduction shall be made for any opening/cutouts when slip form technique is used.

6.5 Raking of circular cutting and rounded or moulded edges shall be measued in running metres. Moulded stoppings shall be enumerated.

6.6 Formwork to secondary beams shall be measured up to the sides of main beams, but no deduction shall be made from the formwork of the main beam where the secondary beam intersects it. Formwork to beam shall be measured up to sides of column, but no deduction shall be made from the formwork to stanchion or column casings at intersections of beam.

SECTION 9 WOODWORK AND JOINERY

As in the Original Standard, this Page is Intentionally Left Blank

WOODWORK AND JOINERY

[IS : 1200 (Part 21)]

1. SCOPE

1.1 This section covers the method of measurement of woodwork and joinery in buildings and civil engineering works.

2. GENERAL RULES

2.1 Description of Items — The description of each item shall, unless otherwise stated, be held to include where necessary, conveyance and delivery, handling, unloading, storing, fabrication, hoisting, all labour for finishing to required shape and size, setting, fitting and fixing in position, and straight cutting waste.

2.2 Measurements — Unless otherwise stated all works shall be measured net in decimal system, as fixed in position as given in **2.2.1** and **2.2.1.1**.

2.2.1 Length and width shall be measured to the nearest 0·01 m. Width of single or detached planks shall, however, be measured to the nearest 2 mm. Thickness shall be measured to the nearest 2 mm.

2.2.1.1 Scantlings, battens, and baulks shall, however, be measured to the nearest 2 mm in each cross-sectional dimension.

2.2.2 Areas shall be worked out to the nearest 0·01 m^2.

2.2.3 Cubical contents shall be worked out to the nearest 0·001 m^3.

3. GENERAL

3.1 The description and type of the wood to be used shall be stated; each kind of wood shall be measured separately.

3.2 The work shall be measured in cubic metres unless otherwise stated hereinafter.

3.3 The work shall be measured separately for 'fixed' and 'framed and fixed'. 'Framed and fixed' work shall be that which involve mortice and tenon or dove-tailed joints.

3.4 All work shall include nails. Work 'secret fixed', 'fixed with screws' or 'fixed with screws and cups' or 'fixed with bolts and washers' shall be so described and measured separately. If screws are of other than ordinary steel, they shall be so described. Screws used for fixing builders hardware shall be measured along with the hardware.

3.5 All work shall be measured net as fixed, that is, no extra measurement shall be made for shape, joints, etc, except as mentioned in **3.5.1** to **3.5.4**.

3.5.1 Scantlings, battens, etc, in sections other than rectangular shall be measured as the least rectangle from which the section can be obtained.

3.5.2 In case of scantlings, battens, etc, with varying sections, largest section shall be measured.

3.5.3 Mitred pieces shall be measured along longest length.

3.5.4 Circular or segmental portions shall be measured net separately.

3.6 The description of items shall include all the necessary keys, wedges, dowels, wood or bamboo pins to tenoned joints and clenching of nail heads.

3.7 In measuring framed timber, length of tenons and scarfs shall be added to site length of framed member. Extra lengths where required to be embedded in walls/floors shall be added to site lengths.

3.8 Unless specifically mentioned a tolerance of 1·5 mm shall be allowed for each wrought face.

3.9 Items of plain woodwork exceeding 20 cm in width, if required in one width, shall be so described and measured separately.

3.10 All lineal labours, such as rebates (straight or splayed) beads and chambers shall be described and included with the item.

3.11 Plugging to walls for planks, etc, shall be described and measured in running metres per row stating the spacing of plugs. Plugging to walls for fittings or detached work, etc, shall be described and enumerated.

3.12 Wrought timber shall be so described and measured separately except where planing is measured separately.

NOTE — The term 'wrought' carries the same meaning as 'planed'.

3.13 Planing shall be measured in square metres for all wrought surfaces, unless timber has been described as wrought.

3.14 The following labours shall be measured separately in square metres when the timbers measured in cubic metres and in running metres stating the thickness when timber is measured in square metres:

a) Scribing,

b) Notching exceeding 15 cm each in girth, and

c) Circular cutting.

3.15 Unless included in the description of main item the following labours shall be measured separately in running metres stating width or girth, and include all mitres and stops:

a) Rebates, tongues and grooves;

b) Beads, staff beads and flutes; and

c) Mouldings.

3.16 The following labours shall be measured separately in numbers:

a) Ends, splayed or rounded and wrought;

b) Wrought and pointed or rounded ends to posts, etc, including mitred intersections where necessary;

c) Rafter feet projecting with splayed or moulded ends;

d) Notches not exceeding 15 cm each in girth stating thickness;

e) Boring holes (other than for bolt), stating diameter and depth of holes; and

f) Cutting holes square in section, stating size and depth of holes.

4. TYPES OF WORK

4.1 Doors and windows leaves shall be described, method of fixing indicated and measured in square metres. Each type shall be measured separately.

NOTE — Where there is a combination of two or more types of doors or windows, it shall either be measured as clubbed item or the different portions measured separately, the dividing line being the centre of the rail separating the different portions.

4.1.1 No extra width or labour shall be measured for rebated and/or splayed meeting stiles of doors and windows.

4.2 Boarding shall be described and measured in square metres under the following headings stating the finished thickness in each case:

a) Roof boarding;

b) Ceiling;

c) Floors;

d) Panelling;

e) Weather boarding; and

f) Shelves, fittings racks, bins, almirah linings and the like.

4.2.1 Description shall include all straight and raking cutting and waste and heading joints where required.

4.2.2 Side joints shall be described and work with different kinds of joints shall be measured separately.

4.2.3 In the case of rebated, tongued and grooved, grooved and fillered and secret jointed boarding and weather boarding the measurement shall be net as fixed, extra width of rebates, tongues, etc, being ignored.

4.2.4 Boarding fixed to curved surfaces in narrow widths shall be measured separately and shall include shooting the joints to proper splay.

4.2.5 In case of boarded floors the width of boards, the method of jointing and nailing shall be described; if floors are to be traversed or finished for polishing, it shall be so stated.

4.2.6 In case of weather boarding, width and thickness of boards and lap shall be stated. In case of feather-edged boarding, thickness shall be the maximum thickness.

4.2.6.1 All chamfering, rebating, etc, to edges of weather boarding shall be described.

4.3 Batten work shall be described and measured in running metres.

4.4 Trellis work shall be measured in square metres stating size of laths and spacing.

4.4.1 One-way and two-way trellis work shall each be measured separately.

4.4.2 Posts, rails, stiles, braces and other supports for trellis work and for doors and windows frames in trellis work shall be measured separately.

4.4.3 Doors and windows formed in trellis work shall be measured along with trellis work.

4.5 Shoring and Strutting — Shoring and strutting timbers (use and waste) shall be measured in cubic metres and shall include necessary bolts, wedges, dog-spikes, nails, putting together, erecting maintaining in position for the required period, striking and removal.

4.6 Bally Work — Bally work shall be measured in running metres stating mean diameter.

NOTE — Mean diameter shall be the average of diameters at the ends.

4.7 Staircases — Work to staircases shall be measured under a separate heading and measured in detail as in **4.7.1** to **4.7.16**. Where detailed working drawings are available staircases may be measured as an omnibus item fully described stating the tread area in square metres.

4.7.1 Landings including bearers shall be measured as for boarded floors.

4.7.2 Treads and risers shall be measured in square metres, the area being obtained by multiplying the length of tread by the exposed width of tread plus the rise from step to step. Winders and risers shall be included with the item.

4.7.3 Housing of treads risers, fliers and winders shall be included in the description, as also all labours, such as cross-tonguing, cross-grooving, cross-rebating, framing and gluing, wedging and blocking.

4.7.4 Carriages, if provided, shall be measured separately.

4.7.5 Returned ends to treads with shaped brackets under a rounded, quadrant of curtail ends to treads and risers shall be enumerated.

4.7.6 Walls strings shall be measured in running metres stating the width and thickness and shall include plugging to wall and housing for treads and risers.

4.7.7 Outer strings shall be measured in for wall strings and shall include housing for treads and risers, tenoning or notching at ends to fit newel posts, landings, etc.

4.7.8 Cut strings shall be measured as for outer strings and shall include cutting of upper edge for treads.

4.7.9 Ramped, circular and wreathed portion shall be measured separately and so described.

4.7.10 Hand-rails shall be measured in running metres along top centre line stating extreme section of straight portions and whether rounded or moulded.

4.7.11 Circular level, ramped and wreathed hand-rails shall be measured separately. Quadrants, short ramps and wreaths and scroll ends shall be enumerated.

4.7.12 Mitres, housing joints and hand-rail screws and dowels at junction of circular part with straight one shall be enumerated.

4.7.13 Balusters shall be described and enumerated stating size and shall include framings or housing at ends.

4.7.14 Newels shall be described and measured in running, metres stating the section, and if turned the length of turning shall be stated.

4.7.15 Sunk panels and mouldings planted-on housed-in to newels shall be stated.

4.7.16 Newel caps and pendants shall be described and enumerated.

4.8 Cased Frames of Vertical Sliding Windows — Cased frames of vertical sliding windows shall be described and measured in running metres, along the outer edge.

4.9 Skirtings, Cornices, Picture and Dado Rails, etc — Skirtings, cornices, picture rails, dado rails and similar mouldings shall be described including method of fixing and measured in running metres.

4.10 Trap Doors — Trap doors shall be described and enumerated as 'extra over' relevant item.

4.11 Pelmet boxes shall be described and measured in running metres along the sides and face planking.

4.12 Turned Work — Turned work shall be measured in running metres stating the girth.

4.13 Sundries — The following types of work shall be fully described and enumerated:

a) Wardrobes and cupboards;
b) Draining boards;
c) Plate racks;
d) Curtain brackets;
e) Towel rails;
f) Toilet fixtures;
g) Back boards to cisterns; and
h) Small fittings, such as door and window stops.

As in the Original Standard, this Page is Intentionally Left Blank

SECTION 10 STEELWORK AND IRONWORK

As in the Original Standard, this Page is Intentionally Left Blank

STEELWORK AND IRONWORK

[IS : 1200 (Part 8)]

1. SCOPE

1.1 This section covers the method of measurement of steelwork and ironwork in buildings and civil engineering works.

2. GENERAL RULES

2.1 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.

2.2 Dimensions — Unless otherwise stated all work shall be measured net in decimal system, as fixed in its place, as given in **2.2.1** to **2.2.3.**

2.2.1 Dimensions excepting cross-section and thickness of plate shall be measured to nearest 0·001 m except for reinforcement which shall be measured to nearest 0·005 m.

2.2.2 Areas excluding cross-sectional measurement shall be worked out to nearest 0·001 m^2.

2.2.3 Weights shall be worked out to nearest 1 kg.

2.3 Mill tolerance shall be ignored when the weight is determined by calculation.

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

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

2.6 Unless otherwise specified, an addition of 2·5 percent of the weight of structure shall be made for shop and site rivet heads in riveted steel structures.

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

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

3. STEELWORK

3.1 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 weight 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 countersunk) without any attachments;

q) Plates of classification(p) above with riveted, bolted or welded attachments;

r) Running rails and girders for sliding doors;

s) Platework with or without stiffeners for:

   1) bunkers,
   2) chutes,
   3) chemineys 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 hand rails (straight portion), running bars for doors and fencing posts and struts;

v) Framed work, such as grills, gratings, framed guard bars, ladders, walk ways, railings, brackets and similar work;

w) Straps, hooks, clamps, holdfasts, wall ties, inserts, knee pieces, and similar work;

y) Ornamental work as in grills, balustrades, and curved, ramped and scroll portion of cores for hand-rails; and

z) Steelwork for:

1) doors,

2) hydraulic gates, and

3) cassions and well curbs.

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

NOTE 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.

3.2 The steelwork shall be measured by weight except otherwise mentioned.

3.3 Unless otherwise specified, weight 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 weight of rivet heads (*see* **2.6**). 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 0·5 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.

4. TUBULAR STRUCTURES

4.1 The tubular structures shall be described and measured by weight.

5. CABLES/GUY WIRES

5.1 The cables and guy wires shall be described and measured in running metres stating the diameter or by mass.

6. BEARINGS

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

7. PIPES FOR FLUES

7.1 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 joining and fixing shall be described. Supports shall be measured separately.

7.2 The diameter of pipes, thickness of sheeting and whether black or galvanized shall be stated. In case of galvanized steel pipes, class of galvanization shall be stated.

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

8. DUCT WORK

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

9. EXPANDED-METAL WORK AND WELD MESHWORK

9.1 Expanded-metal work and weld meshwork shall be described including laps, meshes, weight, strands and method of fixing and measured in square metres. Openings exceeding 0·2 m^2 shall be deducted. Raking or circular cutting and waste shall be included in the description.

10. STEEL REINFORCEMENT

10.1 Bar reinforcement shall be measured by weight in kilograms and shall include cutting to lengths, hooked ends, cranking or bending (straight or spiral). Authorized overlaps, chairs/separators shall be measured.

10.1.1 When welding of joints is authorized 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.

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

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

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

10.3 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.

10.4 Hoop iron shall be fully described and measured in running metres.

11. MISCELLANEOUS WORK

11.1 Bolts including nuts and washers other than those covered in **3.1**(t) shall be described and measured by weight in kilograms.

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

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

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

11.5 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.

11.5.1 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.

11.6 Steel rolling shutters/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 sill and the centre of the hood cover.

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

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

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

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

11.7 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.

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

11.8 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.

11.9 Steel Louvre — Louvres shall be described and measured in square metres on the basis of opening covered.

11.10 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 0·02 m^2.

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

12. CAST IRONWORK

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

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

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

12.2 Spiral Staircases — Spiral staircases shall be enumerated, stating overall diameter and height, total number of treads, riser and sleeves in one piece, central shaft or poles including base plate and other attachment handrail and balusters.

12.2.1 Exit landings shall be described and enumerated.

12.2.2 Stays, if required, shall be stated.

12.3 Stanchions, Columns and Lamp Posts — These shall be described and measured in numbers specifying mass.

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

12.5 Except as hereinbefore described, cast ironwork shall be measured by mass and classified under the 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.

As in the Original Standard, this Page is Intentionally Left Blank

SECTION 11 HARDWARE

As in the Original Standard, this Page is Intentionally Left Blank

HARDWARE

[IS : 1200 (Part 7)]

1. SCOPE

1.1 This Section covers the method of measurement of hardware in buildings and civil engineering work.

2. GENERAL

2.1 Description of Item — The description of each item shall, unless otherwise stated, be held to include, wherever necessary, conveyance and delivery, handling, unloading, storing and all labour for fitting and fixing in position, cutting and waste, return of packing, etc.

2.2 Limits of Measurement — The dimensions shall be measured net in decimal system nearest to 0·01 m.

2.3 Mode of Measurements — The various kinds of builders hardware shall be described and measured separately according to the material, finish, size, pattern and method of fixing.

2.3.1 All builders hardware shall be fully described and enumerated except the following which shall be measured in running metres:

a) Curtain rods or poles, stating the outer diameter;

b) Curtain Rails — Curtain runners, brackets and stops shall be described and included with the item stating the number per metre of rail;

c) Rails for sliding sashes stating the size of the rail; and

d) Sash Lines — The girth or diameter shall be stated.

2.4 Fixing of hardware items shall include all fittings, cutting, sinking, boring and morticing, the supply of screws (or bolts, nuts and washers in the case of hardware made for fixing with bolts), to match.

2.5 Hardware fixed to wood and metal shall each be measured separately.

2.6 Hardware fixed flush shall be so described.

3. MEASUREMENT OF SIZES OF HARDWARE

3.1 The sizes of the hardware articles (*see* **2.3**) shall be measured as indicated in Table 1.

TABLE 1 MEASUREMENT OF SIZES OF HARDWARE

Sl No.	Name of Article	How Measured
1)	Bolts	a) The length of face plate in flush bolts b) The length of shoots (bolt) in other bolts
2)	Hinges	a) The length of the joint or knuckle of butt hinges b) The width between flanges and also the height of parliament hinges c) The length of the leaf (that is, from the joint or kunckle to the point), in case of tee and strap hinges d) The length of the spring cylinder for regulating spring of butt hinges e) The length of joint in case of back flap hinges
3)	Latches (Suffolk or Norfolk)	The dimensions of the plate (having the bow handle) and the size number
4)	Latches, rim (Night)	The horizontal length of face across the body excluding the box staple or striking plate
5)	Locks, rim	
6)	Locks, mortice	
7)	Locks, cabinet or cup board	
8)	Locks drawer	
9)	Locks furniture	The maximum diameter of the knob
10)	Cleats belaying	Straight distance between two ends of cleat
11)	Catches, spring (for fanlight)	The flat overall size in elevation of the plate with spring catch excluding the striking plate

(*Continued*)

TABLE 1 MEASUREMENT OF HARDWARE — *Contd*

Sl No.	Name of Article	How Measured
12)	Fasteners, cockspur	The length of handle from the centre of pivot or hinged joint
13)	Fasteners and stays (casement)	Extreme length including thickness of back plate
14)	Pivots and sockets	The dimensions of each plate
15)	Stays, quadrant (for fanlight)	The shortest straight length between the extreme ends of the quadrant stay
16)	Brackets for shelving	The extreme width and height
17)	Door handles	Grip length
18)	Hat pegs	Extreme length including thickness of plate
19)	Hat and coat hooks	Measured diagonally from extreme top of fixing plate to the extreme top of knob
20)	Wardrobe hooks	Measured diagonally from extreme top of fixing plate to the extreme top of knob
21)	Screw hooks dresser or cup pattern	Straight length excluding screwed end
22)	Cabin or casement hook with two eyes on plate	Straight length between centre of two eyes when fixed
23)	Wire hooks with two screwed eyes	The overall length of the hook excluding the screwed eye. The diameter of wire shall be stated
24)	Knob	The maximum diameter of the knob
25)	Hasp and staples:	
	a) Wire type	The overall length of hasp including the hinged plate
	b) Plate type	The length measured from the centre of the hinge to the end of the hasp excluding the hinged plate
26)	Strips, rat-tail including friction plate	Length measured from the centre of the spindle to the centre of the roller
27)	Springs, patent helical	
28)	Screwed eyes	The overall length of the screwed eye and diameter of wire shall be stated
29)	Door closer (hydraulically regulated)	The weight and the width of the door to which it is intended to be fitted shall be stated
30)	Finger plates	The length, width and thickness of the plates
31)	Sliding door bolt (Aldrop)	Length of the bolt
32)	Floor door stopper with plate	Length of its plate
33)	Hooks and eyes	Length of the hook measured out to out

SECTION 12 GLAZING

As in the Original Standard, this Page is Intentionally Left Blank

GLAZING

[IS : 1200 (Part 14)]

1. SCOPE

1.1 This section covers the method of measurement of glazing in buildings and civil engineering works.

2. GENERAL RULES

2.1 Description of Items — The description of each item shall, unless stated otherwise, be held to include where necessary, conveyance and delivery, handling, loading, unloading, storing and waste.

2.2 Measurements — All works shall be measured net in decimal system as fixed in its place as given in **2.2.1** and **2.2.2**.

2.2.1 Dimensions shall be measured to the nearest 0·01 m.

2.2.2 Areas shall be worked out to the nearest 0·01 m^2.

2.3 The various kinds of sheets for glazing like glass and other materials shall be described and shall be measured separately. In the case of wired glass, design or pattern of reinforcement shall be described and in case of frosted glass it shall be stated whether it is on one or both sides.

2.4 Work in wood, metal concrete and the like shall be measured separately.

2.5 The method of glazing shall be described and measured separately under the following classification. The type and putty shall also be described:

a) Front and back putty and sprigged or fixed with glazing pins;

b) Bedded in putty and fixed with beads; and

c) Bedded in rubber or velvet and fixed with beads (wherever required).

3. METHOD OF MEASUREMENT

3.1 Work shall be measured in square metres stating the thickness.

3.1.1 The dimensions of each pane shall be clear dimensions of opening plus width of rebates of structural member of window/door. The pane other than rectangular or square shall be measured as the smallest rectangular area from which pane can be cut. Straight cutting shall be deemed to be included in the item.

3.2 Circular cutting shall be measured as extra over in running metres. The term circular shall be deemed to include any form of curve.

3.3 Glass and sheet louvres shall be described and enumerated.

3.4 Hacking-out old broken glass and preparing for new glass shall be measured in square metres.

3.5 Holes drilled in work shall be enumerated stating diameter of the hole, type and thickness of the glass/sheet and size of the pane.

3.6 Grinding, polishing and rounding off edges of glass or glazing sheet shall be described and measured in running metres.

As in the Original Standard, this Page is Intentionally Left Blank

SECTION 13 PAVING, FLOOR FINISHES, DADO AND SKIRTING

As in the Original Standard, this Page is Intentionally Left Blank

PAVING, FLOOR FINISHES, DADO AND SKIRTING

[IS : 1200 (Part 11)]

1. SCOPE

1.1 This section covers the method of measurement of pavings, floor finishes, dado and skirting in buildings and civil engineering works.

2. GENERAL

2.1 Description of Items — The description of each item shall, unless otherwise stated, be held to include wherever necessary conveyance and delivery, handling, unloading, storing, fabrication hoisting, all labour for finishing to required shape and size, setting, fitting and fixing in position, straight cutting and waste, return of packings, and other incidental operations.

2.2 Dimension — All work shall be measured net, as laid, in the decimal system as under, unless otherwise stated hereinafter:

a) Dimensions shall be measured to the nearest 0·01 m, and

b) Areas shall be worked out to nearest 0·01 m^2.

2.3 Cuttings — All cuttings shall unless otherwise stated be held to include the consequent waste.

2.4 Mode of Measurement — All work shall be measured in square metres unless otherwise stated. Deductions for ends of dissimilar materials or other articles embedded shall not be made for areas not exceeding 0·1 m^2.

2.4.1 Work in isolated width not matching with the general finish shall be measured as below:

a) Width 30 cm and below in running metres (the description to include for cutting to edges if any), and

b) Width above 30 cm in square metres.

2.5 Expansion and dummy joints shall be described and measured separately in running metres stating depth and width of joints. The filler shall be described and included in the description of item.

2.6 Work in repairs shall be so described and preparation of old surfaces to receive such work shall be included in the description.

2.7 Work in isolated areas not exceeding 1 m^2 each shall be so described stating the nature thereof.

2.8 Work to a pattern or in more than one colour shall be so described stating the nature thereof.

2.9 Curved work, conical work and spherical work shall be described separately stating the radius.

2.9.1 Labour in such works shall be so described and measured separately.

3. *IN SITU* FINISHES

3.1 *In situ* finishes shall be classified according to the kind of material (for example, granolithic, terrazzo, mosaic, etc) and measured separately. The following particulars shall be given for each classification:

a) Composition and mix;

b) Thickness, which shall be exclusive of keys, grooves and open joints;

c) Number of coats;

d) Nature of surface treatment (for example, steel trowelled, wood floated, polished, sprinkled with carborundum powder, etc);

e) Nature of base and any special treatment to the same; and

f) Situations, for example, whether in flooring or in dado/skirting.

3.2 Work executed to imitate stone slab, or stone blocks shall be so described stating the average size of the slabs or blocks, the surface finish (for example, plain, rough, etc).

3.3 Work to floors laid in bays and work to floors laid in panels between dividing strips shall be so described stating the size of bay or area of panel or bay. The dividing strip shall be measured separately (*see* **3.13**).

3.4 Work in floors laid in one operation with the base concrete shall be so described.

3.5 No deduction shall be made for voids not exceeding 0·2 m^2.

3.6 Work in treads, risers and edges of landings shall be measured in square metres. Work in landings shall be included in the main item.

3.7 Work to wall strings and open strings shall be measured in square metres. Ends, angles, ramps and wreathed corners shall be included with the item.

3.8 Moulded nosings shall be measured in running metres; returned moulded ends and angles to mouldings shall be included in the description.

3.9 Dados (including raking dados) shall be measured in square metres. Skirting (including raking skirting) shall be measured in running metres stating the height. Mitres, stops, returned ends and the like shall be included with the item.

3.10 Work to kerbs shall be measured in running metres stating the girth on face. Raking kerbs and vertical kerbs shall each be so described. Arrises, rounded edges and coves shall be included in the description. Angles and intersections shall be enumerated separately.

3.11 Forming channels shall be measured in running metres as extra over the finishings in which they occur stating the girth on face. Arrises shall be included in the description. Ends, angles, intersections and outlets shall each be enumerated separately.

3.12 Lining to channels shall be measured in running metres stating the girth on face. Arrises and coves shall be included in the description. Ends, angles, intersections and outlets shall each be enumerated separately.

3.13 Dividing strips shall be described stating size and thickness and measured separately in running metres. Description shall include for ends, angles and intersections and method of fixing, embedding, etc.

4. TILE, SLAB OR BLOCK FINISHES

4.1 Particulars of the following shall be given:

a) Kind of tile, slab or block units (for example, precast concrete, precast terrazzo, brick, natural stone, cast stone, slate, marble, woodblocks, cork, rubber, etc);

NOTE — In case of precast concrete work, the mix to be stated.

b) Thickness and size of tile, slab or block units;

c) Shape of units where other than rectangular;

d) Nature of surface finish (for example, glazed, rubbed, polished, type of dressing in case of stone, etc);

e) Bedding or other method of fixing units;

f) Grouting, pointing or other finish to joints;

g) Nature of base (for example, wood, screeded bed, concrete, brickwork, etc);

h) Situations, for example, whether in flooring or in dado/skirting; and

j) Layout of joints.

4.2 Temporary moulds for precast tile, slab or block units shall be deemed to be included with the item.

4.3 No deduction shall be made for voids not exceeding 0·2 m^2.

4.4 Square cutting at joint and at boundaries shall be deemed to be included with the items except as provided in **4.5.** Raking, cutting and curved cutting shall each be measured separately in running metres except where occurring within a pattern. In case of work laid to diagonal patterns, straight cutting at boundary (measured around the perimetre of each area) shall be measured in running metres.

4.5 Fair edges, rebated edges, rounded edges, chamfered edges, splayed edges, bevelled edges and the like shall be measured separately in running metres including ends, angles, mitres, intersections, etc.

4.6 Moulded edges, grooves, flutes and the like shall each be measured separately in running metres. Ends, angles and intersections shall each be enumerated separately.

4.7 Cutting and fitting around steel stanchions and the like (grouped together) shall be described and enumerated.

4.8 Cutting and fitting around pipes, tubes, bars, cables, conduits and the like shall be described and enumerated.

4.9 Cutting and fitting around profile of steps shall be enumerated.

4.10 Cutting and fitting around ducting brackets, newels, WC pedestals, vents, soot-doors and the like (grouped together) shall be enumerated stating the size in stages of 25 cm girth.

4.11 Dividing strips shall be described stating size and thickness and measured separately in running metres. Description shall include for ends, angles and intersections and method of fixing, embedding, etc.

4.12 Dados (including raking dados) shall be measured in square metres. Skirting (including raking skirting) shall be measured in running metres stating the height. Mitres, stops, returned ends and the like shall be included with the item.

4.13 Channels and lining to channels shall each be measured separately in running metres describing the section and average depth. Channels to falls shall be so described. Rounded edges shall be included in the description. Ends, angles, intersections and outlets shall each be enumerated separately.

4.14 Kerbs shall be measured in running metres describing the section and shall include rounded edges coves, etc.

4.15 Special tiles and special slabs to form coved internal angles of any radius, rounded external angles, architraves, mouldings, ceiling ribs, cornices and the like shall each be measured in running metres separately according to size and shape.

4.16 Work to treads, risers and edges of landings shall be measured separately in sequare metres. Work in landings shall be included in the main item.

5. SHEET FINISHES

5.1 Particulars of the following shall be given:

a) Kind of sheeting (linoleum, cork, rubber, etc);
b) Thickness and quality of sheeting;
c) Method of fixing and joining; and
d) Nature of base.

5.2 Laps and seams shall be included in the description stating the lap and type of seam and shall not be measured separately.

5.3 Sheet finishes to vertical inclined and horizontal surfaces shall be measured separately.

5.4 No deduction shall be made for voids not exceeding 0·2 m^2.

5.5 Raking cutting and curved cutting shall each be measured separately in running metres except where occurring within a pattern. Forming rounded external angles and coved internal angles shall each be measured separately in running metres stating the girth.

5.6 Cover strips over joints of finishes shall be described stating the size and measured in running metres. Description shall include for ends, angles and intersections.

5.7 Cutting and fitting around steel stanchions and the like (grouped together) shall be described and enumerated.

5.8 Cutting and fitting around pipes, tubes, bars, cables, conduits and the like shall be described and enumerated.

5.9 Cutting and fitting around profile of steps shall be enumerated.

5.10 Cutting and fitting around ducting brackets newels, WC pedestals, vents, soot-doors and the like (grouped together) shall be enumerated stating the size in stages of 25 cm girth.

6. BEDDING AND BACKINGS

6.1 Particulars of the following shall be given:

a) Composition and mix;
b) Thickness which shall be exclusive of keys, grooves, open joints; and
c) Nature of base and any treatment of the same.

6.2 Screeded beds for all floor finishes shall be described and measured.

6.3 No deduction shall be made for voids not exceeding 0·2 m^2.

6.4 Bedding and backing laid in bays or laid in panels between dividing strips shall be so described stating the size of bay or area of panel or bay.

6.5 Bedding and backing in treads, risers and edges of landings shall each be measured separately in square metres. Work in landings shall be included in the main item.

6.6 Bedding and backing in skirtings and dados shall be measured separately.

6.7 Forming channels in beds shall be measured in running metres as extra over the beds in which they occur stating the girth on face. Arrises, rounded edges, coves, ends, angles, intersections, outlets and the like shall be included with the items.

As in the Original Standard, this Page is Intentionally Left Blank

SECTION 14 ROOF COVERING

As in the Original Standard, this Page is Intentionally Left Blank

ROOF COVERING

[IS : 1200 (Part 9)]

1. SCOPE

1.1 This section covers the method of measurement of roof covering (including cladding) for buildings and civil engineering works.

2. GENERAL RULES

2.1 Description of Items — The description of each item shall, unless otherwise stated, be held to include, where necessary, conveyance and delivery, handling, unloading, storing fabrication, hoisting, all labour for finishing to required shape and size.

2.2 Measurements — Unless otherwise stated hereinafter all works shall be measured net in decimal system, as fixed in its place as given in **2.2.1** and **2.2.2.**

2.2.1 Dimensions shall be measured to the nearest 0·01 m.

2.2.2 Areas shall be worked out to the nearest 0·01 m^2.

2.3 Work executed in the snow shall be measured separately.

2.4 Bills of Quantities — The bills of quantities shall fully describe the materials and workmanship, and accurately represent the work to be executed.

2.5 The superficial area of roof coverings and cladding as laid shall be measured on the flat in square metres without allowance for laps and corrugations, if any.

2.5.1 Portions of roof covering overlapped by ridge or hip, etc, shall be included in the measurements of the roof except where otherwise stated.

2.6 Any opening not exceeding 0·4 m^2 shall not be deducted and forming such openings requiring cutting shall be enumerated.

2.7 Any opening exceeding 0·4 m^2 shall be deducted and cutting required shall be measured in running metres.

2.8 Cutting across corrugations shall be measured on the flat and not girthed.

2.9 No additions shall be made for laps cut through.

2.10 Sheeting curved or bent to curvature shall be measured separately.

2.11 The woodwork and steelwork shall be measured separately under the relevant sections.

3. METAL SHEET ROOFINGS

3.1 The type of sheeting shall be described stating the thickness. The side and end laps shall be stated.

3.2 If the side and end laps are bolted or riveted, it shall be so stated specifying the spacing of the bolts or rivets.

3.3 Nainital pattern sheet-roofing shall be fully described and measured separately and shall include all rolls, clips, etc. Measurements shall be taken on the flat and not girthed.

3.4 Ridges, hips and valleys shall be measured along the central line in running metres stating the girth and flashings in square metres. The laps, passings and method of fixing shall be described.

3.4.1 The laps along the length of the ridge, hips, valleys or flashing pieces shall not be measured separately.

4. ASBESTOS CEMENT SHEET ROOFING

4.1 The type of sheeting shall be described stating the thickness.

4.1.1 The side and end laps shall be stated and the method of fixing described. If required to be fixed in accordance with maker's instructions, it shall so be stated.

4.2 Ridges and hips shall be described stating the laps and measured in running metres along the central line; where in two pieces, these shall be measured as one length.

4.3 Ridge finials, cowl type ventilators, curved barge boards for northlight curves, roof lights, expansion joints for ridges and expansion joints for northlight curves shall be described and enumerated. Ridge finials where in two interlocking pieces, shall be measured as one number.

4.4 Eaves filler pieces, aprons, barge boards, corner pieces, flashings, louvers, northlight and ventilator curves, expansion joints for sheets and other similar specials shall be described and measured for the finished work in running metres stating the laps and the method of fixing.

4.5 Ventilator sheets and other sheeting of dissimilar material shall be described and enumerated as 'extra over' on ordinary sheeting.

4.6 Eaves and valley gutters shall be described and measured in running metres along the central line.

4.7 Accessories, such as drop ends, stop ends, nozzles and angles shall be described and enumerated as 'extra over' gutters.

4.8 Union clips (loosesockets) shall not be measured separately.

5. ROOF SHEETING OTHER THAN METAL AND ASBESTOS CEMENT

5.1 The method of measurement given in **4** shall also be applicable to roof sheeting of plastic, fibre glass, etc.

6. CLADDING (PLAIN, CORRUGATED OR SEMI-CORRUGATED)

6.1 The type of sheeting shall be described stating the thickness. The side and end laps shall be stated and method of fixing described. If the side and end laps are bolted or riveted it shall be so stated specifying the spacing of bolts or rivets.

7. ROOF TILING

7.1 The description shall state the kind, pattern quality and size of the tiles, the gauge to which they are to be laid and the method of laying.

7.2 Single and double tiling shall each be measured separately.

7.3 Ridges, hips and valleys, shall be measured in running metres. If set in mortar, it shall be so stated specifying the mortar.

7.4 Special ridge and hip tiles shall be described stating the kind, pattern, quality and size as also the mortar in which bedded and pointed. Coloured mortar (to match the coloured tiling, if required to be used for pointing) shall be described.

7.5 Hip hooks shall be enumerated stating the size and whether black or galvanized.

7.6 Eaves tiles bedded in mortar on walls shall be measured in running metres as extra for eaves describing the motar and width of bedding.

7.7 Filling ends and spaces between tiles at caves with mortar shall be measured in running metres and described stating the depth of filling.

7.8 Filling to single and double tiling shall be measured separately.

7.9 Screwing eaves tiles to battens shall be measured in running metres stating type, size, spacing of screws and washers. Drilling holes in the tiles shall be included in the description.

7.10 Half tiles or one and a half tiles at verges shall not be measured separately, but straight cutting and waste at verges shall be allowed for the full length of the verge and measured in running metres.

7.11 Tiles at verges bedded in mortar on walls shall be measured in running metres as 'extra over' for verges describing the mortar and width of the bedding.

7.12 Country tiling shall be described as including all cutting and waste.

7.13 Special ventilating tiles and glass tiles shall be enumerated as 'extra over' only over roof tilling.

8. ROOF SHINGLES

8.1 Wood shingles to roof shall be measured in the same way as in the case of roof tiling (*see* **7**).

9. ROOF SLATING

9.1 Slate roofs shall be measured in the same way as in the case of roof tiling (*see* **7**).

10. TERRACED ROOFING

10.0 The size and quality of burnt bricks, brick tiles, stone slabs and similar materials for terraced roofing, method of laying, jointing, pointing and mix and type of mortar shall be described, stating the number of layers of bricks tiles, etc.

10.1 Madras terrace roofing shall be fully described and plaster finish on the top and underside included in the item.

10.2 Flat brick tile roofing shall be fully described stating the thickness and number of layers.

10.3 Hollow roof with brick on edge bridging courses in between two layers of tiles shall be fully described and measured separately.

10.4 Flush pointing to tiles on top and underside of roof shall be described and included in the item of roofing.

10.5 Tiles laid in *Chhajjas* and sun shades shall be measured separately.

10.6 The type of stone, quality and its dressing for stone slab roofing shall be described stating the thickness of slabs and spacing of battens or joists. If the size of slabs is required to be uniform, it shall be so stated.

10.7 Jack arch roofing including provision of centering shall be measured flat overall in square metres. The clear span, rise and thickness of arch, method of laying, joining and pointing shall be described. The finish to top and underside shall also be stated and included in the description.

11. ROOF TREATMENT

11.1 Lime concrete in terracing shall be described and measured in square metres stating consolidated average thickness.

11.2 Mud terraced roof shall be described stating average consolidated thickness.

11.3 Each type of waterproofing treatment shall be fully described (including type, quality and quantity of materials, side and end laps, where necessary) and shall be measured in square metres. All cutting, waste, forming of openings and wedging and pointing edges in masonry work shall be included in the description. Turn-ups and turn-downs at eaves, verges, abutment, etc, shall be measured along with waterproofing treatment.

11.4 The primer where provided shall also be measured separately as in **11.3**.

11.5 The waterproofing treatment in flashings, aprons, gutters, hips, ridges, valleys, etc, shall be fully described (*see* **11.3**), and measured net separately in square metres.

11.6 The waterproofing treatment between laps of corrrugated sheeting shall be fully described including the method of securing and measured in running metres stating the width.

12. THATCHING, MATTING AND BAMBOO WORK

12.1 The materials shall be described stating the kind of fibre or straw and the finished thickness. The description shall include bamboo or wood securing fillers, tying string and trimming to eaves and verges.

12.2 Thatched capping to ridges and hips shall be described and measured along central line in running metres stating the girth. Matting, material, number of layers, laps and the method of fixing shall be described and all cutting and waste shall be included.

12.3 Cover strips and cross bracings of split bamboos or wooden laths shall be measured in square metres as 'extra over' matting and the method of fixing shall be described.

12.4 Bamboos laid one-way or two-way *Jaffri* work shall each be measured separately in square metres stating the size of bamboos and their spacing. Framing shall be included with the item.

12.5 Split bamboo work and whole bamboo work shall be measured separately.

12.6 Whole bamboos fixed independently as support to matting shall be measured in running metres stating the mean girth. The description shall state the method of fixing and application of preservatives, if required.

13. RAIN WATER GOODS

13.1 Gutters and pipes shall be described and measured in running metres including all short lengths, cutting and waste. The material, protective coating, if any, the pattern, the method of jointing and fixing shall be described. The length shall be measured along the central line. The length of all fittings, such as bends, junctions angles and the like shall be included.

13.2 Brackets for gutters shall be measured separately under the relevant section.

13.3 Angles (internal or external), drop ends and stopped ends shall be enumerated as 'extra over' the length of gutters and shall include extra joints, cutting and waste.

13.4 Pipe rails, distance pieces and holder bats shall be described and included with the fixing of the pipes.

13.5 Bends, elbows, offsets, shoes, branches, swan necks and heads shall be enumerated as 'extra over' the length of pipe and shall include for extra joints, cutting and waste.

As in the Original Standard, this Page is Intentionally Left Blank

SECTION 15 CEILING AND LINING

As in the Original Standard, this Page is Intentionally Left Blank

CEILING AND LINING

[IS : 1200 (Part 10)]

1. SCOPE

1.1 This section covers the method of measurement of ceilings and linings for buildings and civil engineering works.

2. GENERAL RULES

2.1 Description of Items — The description of each item shall, unless otherwise stated, be held to include where necessary, conveyance and delivery, handling, unloading, storing, fabrication, hoisting, all labour for finishing to required shape and size.

2.2 Measurements — Unless otherwise stated here-in-after all works shall be measured net in decimal system, as fixed in its place, as given in **2.2.1** and **2.2.2**.

2.2.1 Dimension shall be measured to the nearest 0·01 m.

2.2.2 Areas shall be worked out to the nearest 0·01 m^2.

2.3 Each type of work in ceiling and lining shall be measured separately.

3. MEASUREMENTS

3.1 The materials, its thickness and method of fixing, shall be described. Supporting members shall be measured separately in the relevant section, unless otherwise specified.

3.2 If work is to be formed to any specific pattern, it shall be so stated.

3.2.1 Work formed to circular surfaces shall be measured separately; if fixed with screws, it shall be so stated. All straight and raking cutting and waste shall be included with the item concerned.

3.3 All work unless otherwise described shall be measured as flat in square metres.

3.4 No deduction in measurement shall be made for openings not exceeding 0·4 m^2 and no extra measurement shall be made for forming such openings. For any opening exceeding 0·4 m^2 in area, deductions in measurements for the full openings shall be made and in such cases any labour involved in marking these openings shall be measured separately.

3.5 Boarding fixed to curved surfaces in width not exceeding 15 cm shall be measured separately and shall include shooting the edges to proper splays.

3.6 Circular cutting and waste shall be measured in running metres stating the thickness and type of material.

3.7 Cover fillets over joints shall be measured separately in running metres stating the material, width and thickness of fillet. If the edges of fillets are chamfered, rounded or moulded, this shall be stated. Mitring at junctions shall be included in the description.

3.8 Sealing joints of plaster or fibre boards shall be measured in running metres. The method of sealing shall be described.

3.9 Chamfering or rounding edges of fibre boarding and cutting V-groove in the same shall be measured in running metres.

3.10 Insulation boards and slabs fixed to surfaces shall be measured in square metres stating type, the number of layers, thickness of each layer and the method of fixing.

3.10.1 Hollow insulation blocks shall be measured in square metres specifying the thickness. The method of setting and the type of mortar shall be described.

As in the Original Standard, this Page is Intentionally Left Blank

SECTION 16 PLASTERING AND POINTING

As in the Original Standard, this Page is Intentionally Left Blank

PLASTERING AND POINTING

[IS : 1200 (Part 12)]

1. SCOPE

1.1 This section covers the method of measurement of plastering and pointing for buildings and other civil engineering works.

2. GENERAL RULES

2.1 Description of Items — Description of each item shall, unless otherwise stated, be held to include, wherever necessary, conveyance; delivery; handling; unloading; storing; necessary scaffolding; protective cover; cleaning stains from floors, walls, return of packings, etc; and other incidental changes.

2.2 Dimensions — All work shall be measured net as executed in the decimal system, as given below:

a) Dimensions shall be measured to the nearest 0·01 m, and

b) Areas shall worked out to the nearest 0·1 m^2.

2.3 Preparatory Work — Preparatory work, such as raking out joints, scarifying and cleaning, shall be included in the description of item unless otherwise specified.

3. PLASTERING

3.1 Plaster work shall be classified according to the material used and each classification shall be measured separately. The following particulars shall be given for each classification:

a) Mix of mortar;

b) Number of coats and thickness of each coat;

c) Nature of surface treatment;

d) Nature of base;

e) Curved work, conical work, spherical work and eliptical work stating the radius; and

f) Any special treatment of base.

3.1.1 Description shall include arrises, internal rounded angles, external chamfers and/or rounded angles not exceeding 80 mm in girth.

NOTE — For work exceeding 80 mm girth, *see* **3.4.**

3.1.2 In case of fibrous plaster, particulars of methods of application and of treatment of joints shall also be given.

3.1.3 Work in repairs shall be so described stating thickness of dubbing, if any.

3.2 Plastering on roofs, ceilings and walls shall be measured separately.

3.3 Removing plaster by scraping or otherwise shall be measured separately in sequare metres.

3.4 Plastering in isolated widths or in widths not forming part of general plastering work (as in bands, cornices, sunk, panels, etc) and in chamfers, rounded angles exceeding 80 mm in girth shall be measured as below:

a) 30 cm or below in width/girth, in running metres; and

b) Width/girth above 30 cm in square metres.

3.5 Plastering at a height greater than 10 m above ground/datum level shall be measured separately in stages of 5 m height except interior plastering in case of building which shall be measured separately for each storey.

3.6 All plastering shall be measured in square metres unless otherwise described.

3.7 Cutting to edges shall be measured separately in running metres or alternatively described and included in the item.

3.8 Deductions

3.8.1 For jambs, soffits, sills, etc; for openings not exceeding 0·5 m^2 each in area, for ends of joists, beams, posts, girders, steps, etc, not exceeding 0·5 m^2 each in area, and for openings exceeding 0·5 m^2 and not exceeding 3 m^2 in each area, deductions and additions shall be made in the following manner:

a) No deduction shall be made for ends of joists, beams, posts, etc, and openings not exceeding 0·5 m^2 each and no addition shall be made for reveals, jambs, soffits, etc, of these openings nor for finish to plaster around ends of joists, beams, posts, etc.

b) Deductions for openings exceeding 0·5 m^2 but not exceeding 3 m^2 each shall be made as follows and no addition shall be made for reveals, jambs, soffits, sill, etc, of these openings:

1) When both faces of wall are plastered with same plaster, deduction shall be made for one face only.

2) When two faces of wall are plastered with different types of plaster or if one face is plastered and the other pointed, deduction shall be made from the plaster or pointing on the side on which width of reveals is less than that on the other side but no deduction shall be made on the other side. Where widths of reveals on both faces of wall are equal, deduction of 50 percent of area of opening on each face shall be made from areas of plaster and/or pointing as the case may be.

3) When only one face is plastered and the other face is not, full deduction shall be made from plaster if width of reveal on plastered side is less than that on unplastered side but if widths of reveal on both sides are equal or width of reveal on plastered side is more, no deduction shall be made.

4) When width of door frame is equal to thickness of wall or is projecting beyond thickness of wall, full deduction for opening shall be made from each plastered face of the wall.

3.8.2 In case of openings of area above 3 m^2 each, deduction shall be made for opening on each face but jambs, soffits and sills shall be measured.

NOTE — In calculating areas of openings, the extra width of rebated reveals, if any, shall be excluded.

3.9 Ceilings shall be measured between walls or partitions and dimensions before plastering shall be taken. Width covered by cornices or coves, if any shall be deducted.

3.10 Soffits of stairs shall be measured as plastering on ceilings. Flewing soffits shall be measured separately.

3.11 Ribs and mouldings on ceilings shall be measured as for cornices (*see* **3.4**), deduction being made from plastering if width/girth exceeds 15 cm.

3.12 Measurement of wall plastering shall be taken between walls or partitions (dimensions before plastering being taken) for length and from top of floor or skirting to ceiling for height. Depth of cornices or coves, if any, shall be deducted.

3.12.1 Sides of pilasters, projections, etc, shall be added to plaster on walls.

3.12.2 Mouldings, architraves, ceiling ribs, cornices and the like on pilasters and around openings, etc, shall be measured separately as in **3.4**.

3.13 Length shall be measured in running metres at the centre of girth. Girth shall be measured along curve of moulding.

3.14 Moulded cornices and coves shall be measured in square metres, the area being arrived at by multiplying length by girth.

3.15 Forming letters or figures in plaster shall be enumerated stating the height.

3.16 Plastering on lathing shall be measured separately stating the number of coats and thickness af each coat.

3.16.1 Lathing shall be fully described and measured net: wood and steel lathing shall be measured separately.

3.16.2 Laps, gauge and mesh of steel lathing shall be stated, no allowance being made for laps or cutting.

3.16.3 Size of laths, their distance apart and the kind of timber shall be stated in the case of wood lathing.

3.16.4 Connector lathing shall be measured separately.

3.17 Plastering on honeycomb work shall be described and measured in square metres on the basis of overall superficial area without deducting openings.

4. POINTING

4.1 Proportions of materials shall be described. Various types of pointing shall be measured separately. Pointing of different types of walls, floors, roofs, etc, shall be measured separately. Type and material of surface to be pointed shall be described.

4.2 Pointing in single detached joints as for flashings shall be measured in running metres.

4.3 Pointing brick and tile work with mortars of matching shades shall be measured separately.

4.4 Pointing shall be measured in square metres.

4.5 Removing pointing by raking or otherwise shall be measured in square metres.

4.6 Deductions

4.6.1 For jambs, soffits, sills, etc, for openings not exceeding 0·5 m^2 each in area; for ends of joists, beams, posts, girders, steps, etc, not exceeding 0·5 m^2 each in area; and for openings exceeding 0·5 m^2 and not exceeding 3 m^2 each, deductions and additions shall be made in the following manner:

a) No deduction shall be made for ends of joists, beams, posts, etc, and openings not exceeding 0·5 m^2 each, and no addition shall be made for reveals, jambs, soffits, sills, etc, of these openings nor for finish around ends of joists, beams posts, etc.

b) Deductions for openings exceeding 0·5 m^2 but not exceeding 3 m^2 each shall be made as follows and no addition shall be made for reveals, jambs, soffits, sills, etc, of these openings:

1) When both faces of wall are pointed with the same type of pointing, deduction shall be made for one face only.

2) When two faces of wall are pointed with different types of pointing or if one face is plastered and the other pointed, deduction shall be made in the plaster or pointing on the side on which the width of reveals is less than that on the other side, but no deduction shall be made from plaster or pointing on the other side. Where widths of reveals on both faces of wall are equal, deduction of 50 percent of area of opening on each face shall be made from areas of plastering and/or pointing as the case may be.

3) When width of door frame is equal to thickness of wall or is projecting beyond thickness of wall, full deduction for opening shall be made from each pointed face of the wall.

4) When only one face is pointed and the other face is not pointed, full deduction shall be made from pointing if width of reveal on the pointed side is less than that on unpointed side, but if widths of the reveals on both sides are equal or width of reveal on pointed side is more, no deduction shall be made nor any addition shall be made for reveals, jambs, soffits, sills, etc.

4.6.2 In case of openings of area above 3 m^2 each, deduction shall be made for opening on each face but jambs, soffits and sills shall be measured.

NOTE — In calculating areas of openings, extra width of rebated reveal, if any, shall be excluded.

4.7 Racking-out joints shall be measured in square metres of alternatively included in description of item.

4.7.1 Raking-out single detached joint shall be measured separately in running metres.

4.8 Pointing on honey-comb work shall be described and measured in square metres on the basis of overall superficial area without deducting openings.

As in the Original Standard, this Page is Intentionally Left Blank

SECTION 17 WHITEWASHING, COLOUR WASHING, DISTEMPERING AND OTHER FINISHES ETC

As in the Original Standard, this Page is Intentionally Left Blank

WHITEWASHING, COLOUR WASHING DISTEMPERING, ETC

[IS : 1200 (Part 13)]

1. SCOPE

1.1 This section covers the method of measurement of whitewashing, colour washing, distempering, etc, in building and civil engineering works.

2. GENERAL RULES

2.1 Description of Items — Description of each item shall, unless otherwise stated, be held to include, where necessary, conveyance; delivery handling; unloading; storing; waste; return of packings, necessary scaffolding; protective cover; and cleaning stains from floors, walls, glass panes, etc.

2.2 Number of Coats — Decorative treatment shall be fully described stating the number of coats in each case.

2.3 Preparatory Work — Preparatory work, such as brooming down, steel wire brushing, scrapping washing and rubbing down, shall be described and included in the main item.

2.3.1 Preparatory work on new surfaces and primary coats, if any, shall be described and included in the main item.

2.3.2 Preparatory work on old treated surfaces shall be described and included in the main item.

2.4 Classification — Various decorative treatments shall be measured separately under the various classifications as given below and materials and type of surfaces to be treated shall be fully described:

a) Whitewash, colour wash, etc;
b) Non-washable distemper;
c) Washable distemper;
d) Waterproof paint (colour/colour less);
e) Chalk whiting to cloth or hessian surface;
f) Linseed oil and cement to steel and iron work; and
g) Cement slurry wash.

2.4.1 Priming and alkali neutralizing treatments, scraping of surface, washing surfaces spoilt by smoke soot, removal of oil and grease spots, treatment for disinfection with efflorescence moulds moss, fungi algae and litchen shall be measured separately and materials described.

2.5 Walls, Ceilings, etc — Work on walls, ceilings and sloping roofs shall each be measured separately.

2.6 Old Treated Surfaces — Work on old treated surfaces shall be measured separately and so described.

3. MEASUREMENT

3.1 All work shall be measured net in the decimal system as executed and as given below:

a) Dimensions shall be measured to the nearest 0·01 m, and
b) Areas of individual items shall be worked out to the nearest 0 01 m^2.

3.2 Whitewashing, colour washing, and distempering, except where otherwise stated, shall be measured in square metres.

3.3 Deductions

3.3.1 For jambs, soffits, sills, etc, for openings not exceeding 0·5 m^2 each in area; for ends of joists beams, posts, girders, steps, etc, not exceeding 0·5 m^2 each in area; and for openings exceeding 0·5 m^2 and not exceeding 3 m^2 each in area, deductions and additions shall be made in the following manner:

a) No deduction shall be made for ends of joists, beams posts, etc, and openings not exceeding 0·5 m^2 each and no addition shall be made for reveals, jambs, soffits, sill of these openings nor for finish around ends of joists, beams, posts, etc.

b) Deduction for openings exceeding 0·5 m^2 but not exceeding 3 m^2 each shall be made as follows and no addition shall be made for reveals, jambs, soffits, sills, etc, of these openings:

1) When both faces of wall are provided with the same finish, deduction shall be made for one face only.

2) When each face of wall is provided with a different finish, deduction shall be made for that side on which width of reveal is less than that of the other side but no deduction shall be made on the other side; where widths of reveals on both faces of wall are equal, deduction of 50 percent of area of opening on each face shall be made from area of finish.

3) When only one face is treated and other face is not treated, full deduction shall be made if width of reveal on the treated side is less than that on the untreated side, but if width of reveal is equal or more than that on the untreated side, neither deduction for the opening nor addition for reveals, jambs, soffits, sills, etc, shall be made.

4) When width of door frame is equal to thickness of wall or is projecting beyond the thickness of wall, full deduction for opening shall be made from each face of wall.

5) When the reveal is only on one side, full deduction for the face having no reveal shall be made and for the face having reveal, deduction of 50 percent of the opening shall be made.

3.3.2 In case of opening of areas above 3 m^2 each, deductions shall be made for openings, but jambs, soffits and reveals shall be measured.

3.4 No deduction shall be made for attachments, such as casings, conduits, pipes, electric wiring and the like.

3.5 Corrugated surfaces shall be measured flat as fixed and not girthed. Quantities so measured shall be increased by the following percentages and the resultant shall be included in general areas:

a) Corrugated steel sheets	14 percent
b) Corrugated asbestos cement sheets	20 percent
c) Semi-corrugated asbestos cement sheets	10 percent
d) Nainital pattern roofs (plain sheeting with rolls)	10 percent
e) Nainital pattern roofs with corrugated sheets	25 percent

3.6 Cornices and other wall features, when not picked out in a different finish/colour, shall be girthed and included in general area.

3.7 The painting for building surfaces shall be kept separate and the surfaces to be painted shall be described. It shall be stated whether measurements are flat or girthed. Alternatively different surfaces may be grouped into one general item, areas of uneven surfaces be converted into equivalent plain areas as under:

a) External walls of plain brick work faced with recessed, raised or weather stuck pointing — 20 percent

b) Sand faced plaster width up to 4 mm size — 50 percent

c) Rough cast plaster with stone aggregate up to 10 mm — 100 percent

d) Pebble dash finish — 275 percent

3.8 RCC Jallies up to 50 mm thick, the quantity shall be increased by 50 percent if painted on one side and 70 percent if painted on both sides; when thicker than 50 mm the quantity shall be based on actual area painted.

SECTION 18 PAINTING, POLISHING VARNISHING, ETC

As in the Original Standard, this Page is Intentionally Left Blank

PAINTING, POLISHING, VARNISHING, ETC

[IS : 1200 (Part 15)]

1. SCOPE

1.1 This section covers the method of measurement of painting, polishing, varnishing, etc, in buildings and civil engineering works.

2. GENERAL RULES

2.1 Description of Item — Description of each item shall, unless otherwise stated, be held to include, where necessary, conveyance; delivery; handling; unloading; storing; waste; return of packings; necessary scaffolding; protective cover; and cleaning stains from floors, walls, glass panes, etc.

2.2 Measurement — All work shall be measured net in the decimal system, as executed and as given below:

a) Dimensions shall be measured to the nearest 0·01 m, and

b) Areas shall be worked out to the nearest 0·01 m^2.

2.3 Bill of Quantities — Items of works shall fully describe materials and truly represent the work to be executed.

2.4 Preparatory work, such as knotting, priming, stopping and rubbing down, burning off or stripping shall be described and the number of coats shall be stated. Work on surfaces previously painted shall be measured separately.

2.4.1 Where special colours or other special finishes are required, it shall be so stated.

2.5 Work on different surfaces shall be measured separately classified as follows and the preparatory work shall be described and included in the items:

a) Non-absorbent surfaces, such as on steel and other metals; and

b) Semi-absorbent surfaces, such as wood, fibre-board.

3. MEASUREMENT OF PAINTING

3.1 Painting, except where otherwise stated, shall be measured in square metres.

3.1.1 No deduction shall be made for openings not exceeding 0·5 m^2 each, and no addition shall be made for painting to beading, moulding, edges, jambs, soffits, sills, etc, of such openings.

3.2 In case of fabricated structural steel and iron work, priming coat of paint shall be included with fabrication. Subsequent coats of paint shall be measured separately on the basis of weight of steel work and iron work or in square metres. The weight/area of steel sheet, plate and strip; rolled steel sections, steel rods and steel strips forged steel, steel castings and steel tubes shall be taken from relevant Indian Standard. If rivet heads, bolt heads (with or without washers), nuts (with or without washers and including projecting portion of shank) are picked out in a tint different from that of adjacent work, these shall be enumerated and measured as extra over.

NOTE — No addition shall be made to the weight calculated for the purpose of measurement of steel and iron work for the paint applied either in shop or at site.

3.3 Painting up to 10 cm in width or in girth and not in conjunction with similar painted work shall be measured in running metres and shall include cutting to line where so required.

3.3.1 Cutting to line, where not included in the item, shall be measured separately in running metres.

3.4 Small articles up to 0·1 m of painted surface, where not in conjunction with similar painted work, shall be enumerated.

3.5 Painting on different types of work shall be kept separate and surfaces to be painted shall be described. It shall be stated whether measurements are flat or girthed. Alternatively, different surfaces may be grouped a into one general item, areas of uneven surfaces being converted into equivalent plain areas in accordance with Table 1.

3.6 Corrugated sheet surfaces and Nainital pattern roof surfaces shall be included with plain surfaces after increasing their areas by the following percentages:

a) Corrugated sheets	14 percent
b) Nainital pattern roof (plain sheets with rolls)	10 percent
c) Nainital pattern roof with corrugated sheets	25 percent
d) Asbestos cement sheets, corrugated	20 percent
e) Asbestos cement sheets, semi-corrugated	10 percent

3.7 Painting on eaves-gutters, rain-water pipes, soil and ventilating pipes and steel poles shall be measured in running metres stating the size or girth. Fittings, such as bends, shoes, branches, heads, etc, shall be included in the length.

TABLE 1 EQUIVALENT PLAIN AREAS OF UNEVEN SURFACES

(*Clause* 3.5)

Sl No.	Description of Work	How Measured	Multiplying Factor
(1)	(2)	(3)	(4)
i)	Panelled or framed and braced or ledged and battened or ledged, batten-battened and braced joinery	Measured flat (not girthed) including *CHOWKAT* or frame. Edges, chocks, cleats, etc, shall be deemed to be included in the item	1·30 (for each side)
ii)	Flush joinery	Measured flat (not girthed) including *CHOWKAT* or frame. Edges, chocks, cleats, etc, shall be deemed to be included in the item	1·20 (for each side)
iii)	Flush shutter	Measured flat overall	1·20 (for each side)
iv)	Fully glazed or gauzed joinery	Measured flat (not girthed) including *CHOWKAT* or frame. Edges, chocks, cleats, etc, shall be deemed to be included in the item	0·80 (for each side)
v)	Partly panelled and partly glazed or gauzed joinery	Measured flat (not girthed) including *CHOWKAT* or frame. Edges, chocks, cleats, etc, shall be deemed to be included in the item	1 (for each side)
vi)	Fully venetianed or louvred joinery	Measured flat (not girthed) including *CHOWKAT* or frame. Edges, chocks, cleats, etc, shall be deemed to be included in the item	1·80 (for each side)
vii)	Weather boarding	Measured flat (not girthed) supporting framework shall not be measured separately	1·20 (for each side)
viii)	Wood shingle roofing	Measured flat (not girthed)	1·10 (for each side)
ix)	Boarding with cover fillets and match boarding	Measured flat (not girthed)	1·05 (for each side)
x)	Tile and slate battening	Measured flat overall; no deduction shall be made for open spaces	0·80 (for painting all over)
xi)	Trellis (or *JAFFRI*) work one-way or two-way	Measured flat overall; no deduction shall be made for open spaces; supporting members shall not be measured separately	2 (for painting all over)
xii)	Guard bars, balus-trades, gates, gratings, grills, expanded metal and railings	Measured flat overall; no deduction shall be made for open spaces; supporting members shall not be measured separately	1 (for painting all over)
xiii)	Gates and open palisade fancing including standards, braces, rails, stays, etc	Measured flat overall; no deduction shall be made for open spaces; supporting members shall not be measured separately (*see* Note 1)	1 (for painting all over)
xiv)	Carved or enriched work	Measured flat	2 (for each side)
xv)	Steel roller shutters	Measured flat (size of opening) overall; jamb guides, bottom rails and locking arrangement, etc, shall be included in the item (top cover shall be measured separately)	1·10 (for each side)
xvi)	Plain sheet steel doors and windows	Measured flat (not girthed) including frame, edges, etc	1·10 (for each side)
vii)	Fully glazed or gauzed steel doors and windows	Measured flat (not girthed) including frame, edges, etc	0·50 (for each side)
iii)	Partly panelled and partly glazed or gauzed steel doors	Measured flat (not girthed) including frame, edges, etc	0·80 (for each side)
ix)	Collapsible gate	Measured flat (size of opening)	1·50 (for painting all over)

Note 1 — The height shall be taken from bottom of lowest rail, if palisades do not go below it or from lower end of palisades, if they project below lowest rail, up to top of palisades, but not up to top of standards, if they are higher than palisades.

Note 2 — Where doors, windows, etc, are of composite types other than those included in this table, different portions shall be measured separately with their appropriate coefficients, centre line of common rail being taken as the dividing line between the two portions.

Note 3 — Measurement of painting doors, windows, collapsible gates, rolling shutters, etc, as given in this table shall be deemed to include painting, if required, of all iron fittings in the same shade.

Note 4 — When two faces of a door, window, etc, are to be treated with different specified finishes, measurable under separate items, edges of frames and shutters shall be treated with the one or the other type of finish and measurement thereof shall be deemed to be included in the measurement of the face treated with that finish.

Note 5 — In case where shutters are fixed on both faces of a frame, measurement for the door frame and shutter on one face shall be taken in the manner already described, while the additional shutter on the other face shall be measured exclusive of the frame.

Note 6 — Where shutter is provided with clearance exceeding 15 cm at top and/or at bottom, such openings shall be deducted from the overall measurement and relevant coefficients applied.

3.8 Painting on small articles, such as gate and turn straps, metal ceiling/roses, metal switch-blocks, heads and nuts or bolts, articles of builder's hardware and the like when picked out in different tint or not in conjunction with similar painted work shall be enumerated.

3.9 Flag staffs, chimneys, aerial masts (not latticed), water tanks, flood light towers, over-head electric masts, spires and the like requiring special scaffolding shall be measured separately stating the size, height and average girth.

3.10 Painting in repair work up to 1 m^2 shall be enumerated in the following categories:

a) Not exceeding 0·1 m^2,
b) Exceeding 0·1 m^2 and not exceeding 0·5 m^2, and
c) Exceeding 0·5 m^2 and not exceeding 1 m^2.

NOTE -- Areas exceeding 1 m^2 shall be measured as in **2.6**.

4. VARNISHING

4.1 Application of sizing, staining and varnishing on wood-work shall be measured in accordance with the work provisions contained in **3**.

5. POLISHING

5.1 Polishing on wood-work shall be described as including all preparatory work and bodying-in and shall be measured in square metres in accordance with the provisions contained in **3**. Alternatively, articles shall be described and enumerated.

6. PRESERVATIVE TREATMENT

6.1 Surface application of wood preservatives shall be measured in square metres irrespective of girth or size, and the provisions contained in **3** shall be followed.

7. TARRING

7.1 Tarring shall be measured as for painting in accordance with the provisions contained in **3**.

8. WRITING LETTERS AND FIGURES

8.1 Letters, figures and similar items shall be enumerated stating height and form or style, namely, block, italics, etc; stops, commas, hyphens and the like shall be deemed to be included in the item.

As in the Original Standard, this Page is Intentionally Left Blank

SECTION 19 DEMOLITION AND DISMANTLING

As in the Original Standard, this Page is Intentionally Left Blank

DEMOLITION AND DISMANTLING

[IS : 1200 (Part 18)]

1. SCOPE

1.1 This section covers the method of measurement of demolition and dismantling work in buildings and civil engineering works.

2. GENERAL RULES

2.1 Measurements

2.1.1 Measurement of all work, except hidden work, shall be taken before demolition or dismantling and no allowance for increase in bulk shall be made.

2.1.2 All work shall be measured net in the decimal system as fixed in its place, as given in **2.1.2.1** to **2.1.2.3**.

2.1.2.1 Dimensions shall be measured to the nearest 0 01 m.

2.1.2.2 Areas shall be worked out to the nearest 0 01 m^2.

2.1.2.3 Cubic contents shall be worked out to the nearest 0·01 m^3.

2.2 Precautions

2.2.1 Attention shall be drawn to any necessary precaution that may be taken for the protection of the public and the owner's property.

2.2.2 Temporary shoring for the safety of portions not required to be pulled down or of adjoining property, and temporary enclosures or partitions shall be included in the main item.

2.2.3 If precautions are required to be taken to keep down dust, nuisance, etc, it shall be so stated.

2.3 Demolition and Dismantling — Works required to be demolished and those required to be dismantled shall each be measured separately.

2.4 Lead — The description shall include separation of serviceable material from the unserviceable, stacking within 100 m and disposal of debris. Removal of material beyond 100 m shall be measured separately (*see* **2.4.1**). The distance for removal shall be measured over the shortest practicable route and not necessarily the route actually taken.

2.4.1 Distances exceeding 100 m and up to 1 km shall be measured in units of 100 m and those exceeding 1 km in units of 500 m.

2.5 Works laid dry and with mortar shall be measured separately and the type of mortar shall be stated. Framed and unframed works shall be measured separately.

2.6 Disconnecting/Maintaining of Services – Attention shall be directed to any necessary dis connecting or maintaining of services, whethe temporary or permanent; and an item shall b provided for making good if required.

3. WALLS AND PIERS

3.1 Walls, independent piers, columns and thei footing and foundation of brick, stone or concret shall be described and measured in cubic metres All copings, corbels, cornices and other projection shall be included with the wall measurements.

3.1.1 In measuring the thickness of plasterec walls, the thickness of the plaster shall be excluded.

3.2 Ashlar face stones, dressed stone work, precast concrete articles, etc, if required to be taken down in tact, shall be so stated and measured separately in cubic metres.

3.3 Honeycomb work and hollow block walling of bricks, stone or concrete shall be measured as solid.

3.4 Cleaning of bricks and stacking them for measurement, including all extra handling and removal and disposal of rubbish as stated, shall be enumerated in thousands of cleaned bricks.

3.5 Cleaning of stone obtained from demolished/ dismantled stone masonry of any description including ashlar facing, dressed stonework, stone slabs or flagging and precast concrete blocks including all extra handling and disposal of rubbish as stated shall be measured in cubic metres of cleaned stone.

4. REINFORCED CONCRETE AND REINFORCED BRICK WORK

4.1 Reinforced concrete structures and reinforced brick roofs and walls with their footing and foundation shall be measured in cubic metres and if reinforcement is required to be cut, it shall be so stated.

4.2 Where reinforcement is required to be separated, scraped and cleaned, the work shall be stated separately and measured in kilograms of salvaged steel.

5. ROOFS

5.1 Roof coverings generally including battens, boarding matts, bamboo *jaffari*, other subsidiary support, shall be measured in square metres stating the thickness and size or gauge. Ridges, hips and valleys shall be girthed and included with the roof

area. Corrugated and semicorrugated surfaces shall be measured flat and not girthed.

5.2 Mud on roofs shall be measured in cubic metres.

5.3 Lead sheets in roofs shall be measured in kilograms and hips valleys, flashings, linings to gutters, etc, shall be included in this weight.

5.4 Supporting members, such as rafters, purlins, beams, joists and trusses, where of wood, shall be measured in cubic metres and where of steel or iron sections, in kilograms. If the span exceeds 10 m, it shall be so stated.

6. CEILINGS

6.1 Stripping of ceiling shall be measured in square metres and described.

6.2 Supporting joists, beams, etc, shall be measured in cubic metres or in kilograms as specified in **5.4**.

7. CONCRETE AND BRICK ROOFS AND FLOORS

7.1 Concrete and brick roofs and floors shall be measured in cubic metres. Beams, cantilevers and other supports of similar material shall be included in the item.

8. FLOORS AND PAVINGS

8.1 Floors and pavings except concrete pavings, shall be measured in cubic metres and mode of fixing shall be described. Concrete pavings shall be measured in square metres stating their thickness.

9. PARTITIONS, TRELLIS WORK (*JAFFARI*), ETC

9.1 Partitions or light walls of lath and plaster, trellis work (*jaffari*), expanded metal, thin concrete or terra-cotta slabs and other similar materials, including framework, if any, shall be measured in square metres stating the thickness.

10. WOODWORK

10.1 *Ballies* shall be measured in running metres.

10.2 All other woodwork under 40 cm^2 in section shall be measured in running metres and average 40 cm^2 and over in cubic metres.

10.3 Boarding including wooden *chhajjas* and sunshades with supports shall be measured in square metres stating the thickness.

11. STEEL AND IRON WORK

11.1 All steel and iron work shall be measured in kilograms. The weight shall be computed from standard tables unless the actual weight can be readily determined.

11.2 Riveted work, where rivets are required to be cut, shall be measured separately.

11.3 Structural steel required to be re-erected shall be measured separately.

11.4 In framed steel gates the weight of any covering material or filling, such as iron sheets and expanded metal, shall be added to the weight of the main article if such covering is not ordered to be taken out separately.

12. DOORS AND WINDOWS

12.1 Doors, windows, clear storey windows, ventilators, etc (wood or steel) whether to be removed while dismantling of walls or by making recesses in walls, when the walls are not to be dismantled, shall be enumerated. Those exceeding 3 m^2 in the size of openings shall be measured separately. Removal of *chowkhats*, architraves, holdfasts and other attachments shall be included in the item.

13. POSTS OR STRUTS

13.1 Posts or struts (wood, steel or R. C. C.) any section including taking out embedded portion shall be measured in running metres.

14. FENCING WIRE MESH

14.1 Fencing wire mesh of any type with frame work shall be measured in square metres. If the frame work is required to be separated and wire mesh put into rolls, it shall be so stated.

15. GLAZING

15.1 Taking out any description of serviceable glass, except polished plate, from old sashes, skylights, etc (any thickness, weight or size) raking out old putty, etc, shall be measured in square metres.

15.2 Irregular or circular plans shall be measured as rectangular or square.

16. WATER PIPE LINES AND SEWER LINES

16.1 Water pipe lines including rain water pipes with clamps and specials, sewer lines (salt glazed ware or concrete), etc, shall be described by their internal diameter and length and measured in running metres inclusive of joint (the measurement shall be taken along the centre line of pipe and fittings).

16.2 If the joints, specials and fittings, etc, are required to be separated, it shall be so stated and enumerated.

16.3 Pucca drains shall be measured in cubic metres and described.

16.4 Valve, cisterns, public foundation platforms, fire hydrants, etc, shall be enumerated.

16.5 Manholes and inspection chambers shall be enumerated stating the size and depth of manhole/ inspection chamber. They shall be classified into different groups depending upon the depth, such as up to half metre depth, half to one metre, one to two metres depth and so on. The depth of manhole shall be the distance between the top of manhole cover and invert level of the drain.

16.6 Ventilating shafts, gulley traps, flushing cisterns and other appurtenant items of work shall be enumerated.

17. ROAD WORK

17.1 Different types of road surfaces shall be measured separately.

17.2 Road paving shall be measured in square metres and described.

17.3 Concrete paving shall be measured as in **8.1**. If concrete is reinforced with bars or fabric reinforcement, it shall be so stated and measured separately.

17.4 Soling and sub-bases shall be measured in cubic metres separately for each type of material.

As in the Original Standard, this Page is Intentionally Left Blank

SECTION 20 WATER SUPPLY, PLUMBING AND DRAINS

As in the Original Standard, this Page is Intentionally Left Blank

WATER SUPPLY, PLUMBING AND DRAINS

[IS : 1200 (Part 19)]

1. SCOPE

1.1 This section covers the method of measurement of water supply, plumbing and drains in buildings and civil engineering works.

2. GENERAL RULES

2.1 Description of Items — The description of each item shall, unless otherwise stated, be held to include, wherever necessary, conveyance and delivery, handling, loading, unloading, storing, fabrication, hoisting, all labour for finishing to required shape and size, setting, fitting and fixing in position, straight cutting and waste, return of packings, and other incidental operations.

2.2 Dimensions — All work shall be measured net as fixed, to the nearest 0·01 metre unless otherwise stated hereinafter.

3. GENERAL

3.1 All pipes and fittings shall be classified according to their nominal diameter, kind of material, quality and the method of jointing and shall be measured in running metres unless otherwise specified. The method of laying jointing and fixing shall be fully described.

NOTE — The nominal diameter is as defined in relevant Indian Standard.

3.1.1 The item shall include all cutting and waste of pipes and also cutting threads where necessary.

3.2 In the case of fittings of unequal diameter, it shall be designated by largest diameter.

3.3 The testing of water supply, drains and plumbing shall be included in the description of the item.

3.4 Lead caulked joints shall be enumerated separately.

3.5 Pipes laid or fixed in ducts, chases, trenches, embedded in floor, fixed to walls, ceilings, etc, with supports shall be measured separately.

3.6 The method of mersurement for excavation of trenches for laying pipelines and other allied works and refilling of the trenches, etc, shall be in accordance with Section 3.

3.7 Concrete beds, haunchings and coverings, including any formwork required, shall be described and measured in running metres stating size of the pipe, dimensions and mix of concrete.

3.8 Cutting through walls, floors, etc, and making good shall be included with the item. This shall, however, not include concealed pipe work in which case the cutting of chase and making good shall be measured separately in running metres.

3.9 Lengths of pipes not exceeding one metre, other than running lengths, shall be measured separately in running metres and described as in short length.

4. WATER SUPPLY

4.0 Standard fittings like elbows, bends, tees, connectors, unions, diminishing sockets shall be included along with the pipes.

4.1 Caps, collers, plugs, stopped ends and similar items of the pipe shall be described and enumerated.

4.2 Sluice valves, hydrants, stop-cocks, covers, surface boxes and water meters shall be described and enumerated and shall be measured separately according to the diameter. The jointing to pipe on either side shall be described.

4.3 The connection to the water main shall be described and enumerated.

4.4 Boilers, Cisterns and Cylinders — Boilers, cisterns and cylinders shall be enumerated stating the type, size, location, method of fixing, working and test pressure and the type and size of the connections for pipes. Perforations for connections shall be enumerated.

4.4.1 *Insulating Coverings to Boilers, Pipes, etc* — Insulating coverings shall be fully described and measured in square metres in the case of boilers, cylinders and tanks and in running metres in the case of pipes stating the diameter. No deduction shall be made for manholes, hands, holes, pipes, etc, passing through insulation, nor shall any extra be measured for finishing insulations around such openings.

4.4.2 Insulation to bends, elbows, tees, valves and the like shall be enumerated as extra over.

5. PLUMBING

5.1 Plumber's Work — locks, taps, valves, pillar-cock, stop-cock, ball valves, caps and linings, also cleaning, eyes with screw caps, ferrules, thimbles, unions, waste washers, perforated gratings and the like shall be described and enumerated. The joints and the fixing shall also be described and included in the item.

5.2 Bends, elbows, tees, branches, inspection or access doors, swan necks, enlarged sockets, etc, for soil waste and bent pipes shall be enumerated as extra over.

5.2.1 Wire guards and ventilating cowls over tops of pipes shall be described and enumerated and measured separately according to the bore of the pipe.

5.2.2 Stack clamps shall be described and enumerated stating the length of stay and the method of fixing to wall or roof.

5.3 Brass pipes shall be classified according to their external diameter and thickness of metal. The description shall state the method of jointing and fixing.

5.3.1 Standard fittings like elbows, bends, tees, connectors, unions and diminishing sockets shall be enumerated.

5.4 Traps shall be described and enumerated. Joints at both ends shall be included in the item.

5.5 Water closets, washdown type/squating type/ siphonic washdown type wash basins, laboratory sinks, urinals, bowl type/half stall type/squatting plate type partition slabs, siphonic toilets, foot rests, shower roses, traps for squatting pans, universal water closets, flushing cisterns for urinals, automatic type, flushing cisterns for water closets and urinals, siphonic type, brackets and supports, bath tubs, cast iron gratings for drainage purposes, mixing valves, water closets, seats, self-closing taps, kitchen sinks, water spreaders for urinals, half round channels, foot rests, traps for squatting pans, waste fittings for wash basins and sinks, waste plugs and accessories for sinks and wash basins and other similar fittings together with fixing of the same shall be enumerated and fully described.

6. DRAIN

6.1 Drain Pipes — The pipes shall be classified according to their nominal diameter, the quality of pipe, kind of material and the method of jointing and shall be measured in running metres, inclusive of all joints. The measurement shall be taken along the central line of the pipes and fittings or specials. All fittings or specials shall be enumerated separately as extra over the pipes. Cutting and jointing the pipes to such fittings or specials shall be deemed to be included with the item of fittings or specials.

6.1.1 Alternatively, the pipes shall be classified according to the nominal diameter, quality, kind of material and shall be measured in running metres. The measurement shall be taken along the central line of the pipes and in between the fittings or specials. All joints, fittings or specials shall be described and enumerated spearately. Cutting of pipes for jointing to such fittings or specials shall be deemed to be included with the item of fittings or specials.

6.2 The manholes and inspection chamber shall be measured in detail as per relevant Sections.

6.2.1 Alternatively the manholes and inspection chambers shall be described and enumerated. They shall be classified into different groups depending upon the depth, such as up to half metre depth, half to one, one to two, two to three and so on. The depth of the manhole shall be the distance between the top of the manhole cover and the invert of the main drain.

SECTION 21 WATER AND SEWER LINES

As in the Original Standard, this Page is Intentionally Left Blank

WATER AND SEWER LINES

[IS : 1200 (Part 16)]

1. SCOPE

1.1 This section covers the method of measurement of laying of water and sewer lines; and other appertinent items of work, involved in the execution of water supply and sewerage projects.

2. GENERAL RULES

2.1 Description of Items — The description of each item shall, unless otherwise stated, be held to include wherever necessary conveyance and delivery, handling, unloading, storing, fabrication, hoisting, all labour for finishing to the required shape and size, setting, fitting and fixing in position, straight cutting and waste, and other incidental operations.

2.2 Dimensions — All work shall be measured net as fixed, to the nearest 0·01 metre, unless otherwise stated hereinafter.

2.3 Excavation and Earthwork — Method of measurement for excavation and earthwork for laying pipelines and other allied works shall be as given in Section 3.

2.4 Bed, Benchings and Covering — Method of measurement for beds, benchings and covering shall be as given in Section 3.

3. METHOD OF MEASUREMENT OF WATER LINES

3.1 Pipes shall be classified according to their diameter, length of each pipe, kind of material, the quality of pipe and the method of jointing, and shall be measured in running metres inclusive of all joints. The measurement shall be taken along the central line of the pipes and fittings or specials. All fittings or specials shall be enumerated separately as extra over the pipes. Cutting and jointing the pipes to such fittings or specials shall be deemed to be included with the item of fittings or specials.

3.1.1 Alternatively, pipes shall be classified according to their diameter, kind of material quality of the pipe and shall be measured in running metres. The measurement shall be taken along the central line of the pipes and in between the fittings or specials. All joints, fittings or specials shall be fully described and enumerated separately. Cutting of pipes for jointing to such fittings or specials shall be deemed to be included with the item of fittings or specials.

3.2 Suspended pipes and vertical pipes shall be so described and the supports and other fixing arrangement (*see* **3.4.2**) measured separately.

3.3 Testing — The measurement for testing of the pipelines shall be in running metres, unless otherwise stated.

3.4 Miscellaneous Works

3.4.1 The valve cistern, public fountain platforms, fire hydrants, etc, shall be fully described and enumerated.

3.4.2 All other miscellaneous works, such as supports like hangers, pillars, crossing of railway lines and culverts, cutting and reconditioning of pavements, deviation of pipelines and cables, dismantling and reconstruction of masonry works shall be measured as given in relevant Sections.

4. METHOD OF MEASUREMENT OF SEWER LINES

4.1 Sewer lines shall be classified according to their diameter, length of each pipe, kind of material, the quality of pipe and the method of jointing, and shall be measured in running metres inclusive of all joints. The measurement shall be taken along the central line of the sewers and fittings or specials. All fittings or specials shall be enumerated separately as 'extra over' the sewers. Cutting and jointing the sewers to such fittings or specials shall be deemed to be included with the item of fittings or specials.

4.1.1 Alternatively, sewers shall be classified according to their diameter, kind of material, quality of the pipe and shall be measured in running metres. The measurement shall be taken along the central line of the sewers and in between the fittings or specials. All joints, fittings or specials shall be fully described and enumerated separately. Cutting and jointing of sewers to such fittings or specials shall be deemed to be included with the item of fittings or specials.

4.2 Manholes — The manholes and the inspection chambers shall be measured in detail in accordance with the relevant section.

4.2.1 Alternatively, the manholes and inspection chambers shall be described and enumerated. They shall be classified into different groups depending upon the depth, such as, up to half metre depth, half to one, one to two, two to three and so on. The depth of the manhole shall be the distance between the top of the manhole cover and the invert of the main drain.

4.3 Appurtenant Items

4.3.1 Ventilating shafts, pumping mains and other appurtenant items of work shall be described and enumerated. Alternatively, these items shall be measured in detail as recommended in relevant Sections.

4.3.2 For all other miscellaneous items of work, the method given in **3.4.2** may be followed.

4.4 Testing — Measurement for testing of sewers shall be in running metres between manholes.

As in the Original Standard, this Page is Intentionally Left Blank

SECTION 22 ROADWORK INCLUDING AIRFIELD PAVEMENT

As in the Original Standard, this Page is Intentionally Left Blank

ROADWORK INCLUDING AIRFIELD PAVEMENT

[IS : 1200 (Part 17)]

1. SCOPE

1.1 This section covers the method of measurement of road work including airfield pavements.

2. GENERAL

2.1 Measurements — All work shall be measured net in the decimal system, fixed in its place, subject to the following limits, unless otherwise stated:

a) Length and width shall be measured to the nearest 0 01 m the thickness shall be measured to nearest 0·005 m or nearest to specified tolerance whichever is less;

b) Areas shall be worked out to the nearest 0·01 m^2; and

c) Cubic contents shall be worked out to the nearest 0·01 m^3.

2.2 Bills of Quantities — The bills of quantities shall describe the materials and workmanship, and accurately represent the work to be executed.

2.3 The finished thickness of sub-base, base and bituminous courses shall be computed as in **2.5.1.**

2.3.1 The levels shall be taken before and after construction, at a grid of points 5 m centre to centre longitudinally in straight reaches and at 2·5 m on curves. On 2 lane roads, the levels shall be taken at four positions from transversely at 0·75 m and 2·75 m from either edge of the carriage way, and single lane roads at two positions transversely at 1·25 m from either edge of the carriage way, and also at the crown and edges. The reference for the transverse grid line shall be left in the form of embedded reference points on either ends so as to locate the grid points for level measurement after each successive course is laid. However, for pavement courses laid on widening portions at least one line of level shall be taken on each strip of the widening. The thickness of the pavement at these points shall be the difference of levels before and after construction falling in that area.

2.4 All work shall be measured in square metres, except where otherwise stated. The length shall be measured between the end of the pavement and the central line of the expansion joint or between the central line of consecutive expansion joint; the width shall be between the edge of a pavement and the central line of the construction joint or between the central line of construction and expansion joint or between the central line of consecutive construction joints.

2.5 Excavation and earthwork necessary to bring the road alignment to proper levels making embankment, drains and site clearance shall be measured in accordance with the provisions given in Section 3.

2.5.1 Rolling and watering formations, when required, may be either included with the item or measured separately in square metres.

2.6 The dismantling of roadwork shall be measured as in Section 19.

2.7 The method of measurement for the materials for the roadwork shall be as given in Section 2.

2.8 Works involved in the preparation of cut formation shall be measured in units indicated below:

i) Loosening and recompacting of subgrade level	square metre
ii) Removal of unsuitable material	cubic metre
iii) Replacement with suitable material in lieu of unsuitable material removed	cubic metre
iv) Preparing rocky subgrade	square metre

2.9 Stripping including storing and re-application of top soil shall be measured in cubic metres.

3. ROADWORK GENERALLY

3.1 Soiling and sub-bases shall be described stating the thickness.

3.2 Levelling course shall be measured as volume compacted in position in cubic metres. The volume shall be worked out as product of surface area and average thickness (*see* **2.5.1**) using prismoidal formulae.

3.3 Stripping including storing and re-application of top soil shall be measured as volume in cubic metres.

3.4 Works involving loosening and recompacting of original ground shall be measured in square metres.

3.5 Removal of unsuitable material at embankment foundation and replacement with suitable material shall be measured as in cubic metres.

4. TAR AND BITUMEN ROADS

4.1 Binder — Tar or bitumen, hereinafter referred to as 'binder' shall be described stating type, grade and penetration value.

4.1.1 Work carried out with different types of binders, shall be measured separately.

4.2 Priming — Priming surfaces of water-bound macadam prior to surface dressing shall be measured separately stating the type and quantity of primer per square metre.

4.3 Edging — Edging shall be measured in running metres describing the material and method of placing.

4.3.1 The excavation required to be done shall be included in the description of item and shall not be measured separately.

4.4 Tack Coat — Tack coat shall be measured in terms of surface area of application in square metres depending upon the rate of spread specified.

4.5 Bituminous Macadam Base in Binder Course — Bituminous macadam with binder course shall be measured as finished work in cubic metres.

4.5.1 The work of filling potholes not exceeding 0·005 m^3 shall be included in the description of item and shall not be measured separately.

4.6 Bituminous Penetration Macadam Base in Binder Course — Penetration macadam base with binder course shall be measured as finished work in square metres.

4.7 Built Up Spray Gourt Base Course — Built up spray grout shall be measured as finished work in square metres.

4.8 Surface Dressing — Each coat of surface dressing shall be measured as finished work in square metres.

4.9 Open Graded Premix Carpet — Open-graded premix carpet shall be measured as finished work in square metres.

4.10 Mix Seal Surfacing — Mix seal surfacing shall be measured as finished work in square metres.

4.11 Semi Dense Carpet — The semi-dense carpet shall be measured as finished work in cubic metres.

4.12 Asphaltic Concrete — Asphaltic concrete shall be measured as finished work in cubic metres.

4.13 Seal Coat — Seal coat shall be measured as finished work in square metres.

4.14 Pre-Fabricated Bitumenized Surfacing — The work shall be described and work in single layer and double layer shall each be measured separately in square metres.

5. MISCELLANEOUS

5.1 Screening — Total quantity of rod metal, stone chips, etc, required to be screened shall be measured in cubic metres.

5.2 Breaking — Breaking stone, brick or other road materials into required sizes be measured in cubic metres of stacked materials after breaking, stating the size before and after breaking, and shall include tracking.

5.3 Scarifying — Scarifying shall be measured in square metres stating the depth scarified and the type of surface.

5.3.1 Hand and machine scarifying shall each be measured separately.

5.4 Berms — Preparation of berms shall be measured in running metres stating the average filling and width.

5.5 Sub-bases, Bases and Shoulders — Granular sub-base shall be measured as finished work in position in cubic metres.

5.5.1 Stabilized soil sub-base shall be measured as finished work in position in cubic metres.

5.5.2 Water bound macadam base and sub-base course shall be measured as finished work in position in cubic metres.

5.6 Potholes — Potholes exceeding ·005 m^3 shall be measured in cubic metres.

5.7 Shoulder — Shoulder construction shall be measured as finished work in position in cubic metres.

5.8 Pre-splitting Rock Excavation Slopes — The area of presplitting shall be measured as square metres of specified presplit slope surface.

5.9 Turfing with Sods — Turfing with sods shall measured as finished work in square metres.

5.10 Seeding and Mulching — Seeding and mulching shall be measured as finished work in square metres.

5.11 Drain — Pipe for sub-surface drain shall be measured in linear metres between extreme ends of the installation is complete. Jointing of pipes including the provision of hessian wrappings at open joints, plugging the upgrade end of pipe, providing grating/screen at the outlet end and providing impervious clay covering where required shall be included in the description and shall not be measured separately.

5.11.1 Backfill material and aggregates for aggregate drains shall be measured as laid in position in cubic metres.

5.11.2 Removal of unsuitable material and its replacement with suitable material in the trench bed shall be measured in volume of suitable material laid in position in cubic metres.

5.12 Culverts — RCC pipe culverts shall be measured along their centre between the inlet and the outlet ends in running metres. The concrete bedding shall be measured as per Section 5.

6. CEMENT CONCRETE PAVEMENTS

6.1 The strength of cement concrete to be used shall be described and the work shall be measured either in cubic metres or square metres.

6.1.1 Concrete required to be spread and consolidated by mechanical spreaders and vibratory compacting equipment shall be measured separately and so described.

6.1.2 If concrete is reinforced with bars or fabric reinforcement, it shall be so stated and measured separately. Reinforcement shall be measured separately [*see* Section 10].

6.1.3 Formwork for pavings shall be measured separately [*see* Section 8].

6.1.4 Special surface fininishes shall be described and measured separately in square metres or alternatively included with the main item itself.

6.1.5 Construction and dummy joints shall be described and measured separately if not included in the main item in running metres stating the thickness and depth of joint. The expansion joints shall be measured in running metres stating the thickness and depth of joint.

6.1.6 Steel dowel bars including ferrules shall be described stating the length and diameter or bars and enumerated.

6.1.7 Steel plate reinforcement to the joints shall be described as including the metal sheath stating the thickness and width of the plate and the gauge of the metal sheath and measured in running metres of the joint.

6.1.8 Forming tongued and groved longitudinal butt-joints shall be measured in running metres.