Public Works

~~Marine~~ (1895) Department.

G.O., No. 1913 W

Dated 24th July 1895

[Despatch Abstract.]

Endents for Iron & Steel:

Circular from the Govt. of India only: suggestions as to the preparation in India of ——— Commd to officers of the P.W. Dept, for guidance.

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BACK PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.

FURTHER PAPERS.

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GENERAL.
ACCOUNT.

Government {1899} of Madras.

PUBLIC WORKS.

Recd. } 1899. *Enclosures*

Regd. *Spare copies*

G.O., No. 1913 W., 24th July 1899.

JULY.

Indents for Iron and Steel

Circular from the Government of India communicating suggestions as to the preparation in India of —, communicated to officers of the Public Works Department for guidance.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

General.
Account.

READ—the following paper:—

From the C. J. COLE, Esq., Under Secretary to Government of India, Public Works Department (Railway Stores), to the Secretary to the Government of Madras, Public Works Department, dated Simla, 26th June 1899, Circular No. 3 Railway.

(1) *Preparation in India of Indents for iron and steel.*
(2) *Tables for the calculation of "schedule" weights of plates and sheets of various metals.*

The undermentioned papers are forwarded to the Local Governments and Administrations and to the officers noted in the margin, for information and guidance, in supersession of all previous orders on the subject.

The Governments of Madras, Bombay, Bengal, North-Western Provinces and Oudh, the Punjab and Burma Public Works Department.
The Chief Commissioners, Central Provinces, Assam, and Coorg.
The Resident at Hyderabad.
The Agents to the Governor-General, Rajputana, Central India and Baluchistan.
The Accountant-General, Public Works Department.
The Director-General of Telegraphs.
The Consulting Engineers to the Government of India for Railways, Calcutta, Lucknow and Assam.
The Superintendent of Port Blair and Chief Commissioner, Andaman and Nicobar Islands.
The Manager, North-Western Railway.
The Manager, Oudh and Rohilkhand Railway.
The Manager, Eastern Bengal State Railway.
The Manager, East Coast Railway.
The Engineer-in-Chief, Indus Bridge Works, and British Section, Shadipali-Balotra Railway.
The Engineer-in-Chief, Gódávari Bridge Works.
The Engineer-in-Chief, Hurdwar-Dehra Railway.
The Engineer-in-Chief, Ghaziabad-Moradabad Railway.
The Port Storekeeper, State Railway Department, Calcutta.

2. These revised instructions are applicable to all branches of the Public Works Department.

ENCLOSURES.

SUGGESTIONS AS TO THE PREPARATION IN INDIA OF INDENTS FOR IRON AND STEEL.

(*Revised, November* 1898.)

Bars, Iron and Mild Steel.

1. Unless certain lengths are required for a specific purpose, the section and total weight should be stated for each item, the bars will then be supplied in commercial lengths as shown in the following table. Commercial lengths are generally correct to within about 3 inches, *i.e.*, 15 feet 9 inches or 16 feet 3 inches would be passed as 16 feet.

Description.	Lengths. FEET.
Rod—	
$\frac{3}{16}$ inch to $\frac{3}{8}$ inch diameter	12
$\frac{7}{16}$ inch to $1\frac{1}{16}$ inch diameter	14
Above $1\frac{1}{16}$ inch diameter	16
Square—	
$\frac{3}{8}$ inch side and under	12
$\frac{7}{16}$ inch to $1\frac{1}{16}$ inch side	14
Above $1\frac{1}{16}$ inch side	16
Angle, tee, channel—	
$\frac{3}{16}$ inch and under in thickness	12
Above $\frac{3}{16}$ inch in thickness	14
Flat—	
$\frac{3}{8}$ inch and under in thickness	14
Above $\frac{3}{8}$ inch in thickness	16
Hoop	12
Fire bar iron	16
	36 to 40
	16

Hoops can be supplied in straight lengths like small flats; the lengths required should in such cases be specified in the indent and should not exceed 12 feet.

Rods should not be demanded of less than $\frac{3}{16}$ inch diameter. Smaller diameters should be described as wire.

2. When lengths differing from those in above table are required, length should be stated in addition to section and total weight.

3. When dead lengths are required, *i.e.*, bars sawn cold to within $\frac{1}{8}$ of an inch of those specified in the indent, "in dead lengths" should be added.

When bars are required in lengths not less than those specified in the Indent and not exceeding them by more than 1 inch they can be sawn hot, thus saving the expense of cold sawing; in such cases "sawn hot to length" should be added.

In either of these cases the number of lengths required should be stated, and, in estimating the weight, 5 per cent. should be added to the "book" or theoretical weight to give the "schedule" weight. The schedule weight *in cwt.* of *l* feet lineal of any section whose book weight is *w*. lb. per foot lineal is $\frac{3}{3\,2\,0}\,lw$.

Swedish Iron.

4. Swedish iron should not be demanded unless there is some special reasons for its use; it is expensive (about 11*l.* per ton) and is not easily procurable. The only sections in which it can be supplied are rounds, squares and flats. It is suggested that mild steel having a tensile strength of 25 to 27 tons per square inch with an elongation of 25 per cent. in a length of 8 inches would answer all the purposes for which Swedish iron has hitherto been demanded. Mild steel is particularly suitable for working in a charcoal fire. (*See also* paragraph 8 below.)

Wire, Iron and Mild Steel.

5. Wire for ordinary purposes (*i.e.*, other than spiral springs) should be described either as "bright," *i.e.*, hard, or "annealed," *i.e.*, soft, it is supplied in coils unless straight lengths (not exceeding 12 feet) are specified. On account of its high price "puddled" iron wire is not supplied unless specially demanded, ordinary "iron" wire is drawn from billets of "ingot iron" which is really mild steel. Ordinary "steel" wire is not intended to harden though it sometimes does so. The ultimate tensile stresses usually specified for ordinary wire are approximately as follows, viz.:—

Iron, bright	36 tons per square inch.
Iron, annealed	24 " "
Steel, bright	46 " "
Steel, annealed	31 " "

Steel wire for spiral springs differs entirely from that for ordinary work, and should be described as explained in paragraph 13 below.

Plates and Sheets, Iron and Mild Steel.

6. The number, dimensions and "schedule" weight (*i.e.*, "book" weight + 5 per cent.) should be stated for each item. When plates of special sizes are demanded, it is advisable to specify the number and dimensions of smaller plates for alternative supply in case manufacturers should be unable to supply the special sizes. The limits given in the two following tables should not be exceeded:—

Thickness.	Maximum length, width and area.					
	Yorkshire iron.			Mild steel.		
	Length.	Width.	Area.	Length.	Width.	Area.
INCHES.	FEET.	FT. IN.	SQ. FT.	FT.	FT. IN.	SQ. FT.
$\frac{1}{16}$		Too thin		14	4 0	30
$\frac{1}{8}$		" "	18	18	4 6	40
$\frac{3}{32}$	8	3 0	24	..	..	..
104	16	4 0	48	22	5 0	50
$\frac{1}{8}$	16	4 0	48	25	5 3	65
$\frac{5}{32}$	10	5 4	52	30	5 6	80
$\frac{3}{16}$	14	6 0	72	33	6 3	90
$\frac{1}{4}$	14	6 0	72	35	6 9	95
$\frac{5}{16}$	14	9 0	108	38	7 4	100
$\frac{3}{8}$	14	9 0	108	40	7 9	105
$\frac{7}{16}$	14	10 0	120	40	8 3	110
$\frac{1}{2}$	16	10 0	120	40	8 9	120
$\frac{9}{16}$	16	10 0	120	40	9 3	140
$\frac{5}{8}$	16	9 0	108	40	9 6	140
$\frac{11}{16}$	14	9 0	108	40	10 0	150
$\frac{3}{4}$	14	8 0	96	40	10 0	150
$1\frac{1}{2}$	14	8 0	96	40	10 0	150
$1\frac{1}{4}$	14					

The maximum area divided by any length (not exceeding maximum) will give maximum width for that length; maximum length for any given width (not exceeding maximum) can be similarly determined.

Maximum Dimensions.

Iron.

Width in feet.	1½	2	2½	3	3½	4	4½	5	5½	6	6½
Thickness.	Length in feet.										
Inches.											
1/16	10	10	10	10	10	10	..	..	..	..	..
3/32	10	10	10	10	10	10	9	..	..	..	..
1/8 & 5/32	20	20	16	12	12	12	10	10	..	..	..
3/16	25	25	25	25	20	20	16	16	12	..	..
1/4 & 5/16	35	35	35	25	25	20	20	16	12	..	..
3/8	35	35	35	30	25	24	20	18	12	10	6½
7/16 & 1/2	35	35	35	30	24	24	18	16	12	10	8
9/16 & 5/8	30	30	30	25	24	20	16	16	12	10	8
11/16 & 3/4	30	30	30	25	20	15	15	15	10	8	8
13/16 & 7/8	30	30	25	20	20	14	14	14	10	8	7
15/16 & 1	30	30	25	20	20	14	14	13	10	8	7
1 1/16 & 1 1/8	25	25	24	20	16	14	13	12	10	8	7
1 3/16 & 1 1/4											

The area of iron and steel sheets less than 1/16 inch thick should not, if possible, exceed 18 square feet. Yorkshire iron sheets should not be demanded in any thickness less than 12 S.W.G. or ·104 inch.

7. The following nomenclature is recommended for adoption:—

"Plate" for thicknesses of ⅜ inch and upwards (including 3/0 to 7/0 S.W.G.) when width is *above* 12 inches.

"Flat" for ditto, ditto, when width is *not* above 12 inches.

"Plate" for thicknesses of 3/16 to 5/16 (including 6 to 2/0 S.W.G.) when width is *above* 4 inches.

"Flat" for ditto, ditto, when width is *not* above 4 inches.

"Sheet" for any thickness less than 3/16 inch (including 7 S.W.G. and under) when width is *above* 3 inches.

"Hoop" for ditto, ditto, when width is *not* above 3 inches.

Plates and sheets are sheared on all edges; the parallel edges of flats and hoops are rolled.

Mild Steel as a Substitute for Wrought Iron.

8. Mild steel is rapidly supplanting wrought iron for all ordinary purposes; it is more easily obtained, and is more uniform in strength and quality than wrought iron. It welds readily, but should not be raised to as high a heat as wrought iron in any forging process, otherwise it does not require any special treatment. There is now very little difference between the prices of the two materials. Mild steel (plates, sheets, bars, etc.) of the quality supplied for ordinary work should bear a tensile stress of 26 to 30 tons per square inch, with an elongation of 20 per cent. in a length of 8 inches; if supplied for rivets the elongation is required to be 25 per cent., and if the rivets are for boiler-making the limits of stress are 25 to 27 tons. Plates for boiler-making are supplied in two different qualities, as shown in the following extract from the specification. The quality required should be stated as "quality A" or "quality B."

Extract from Specification.

Strips cut crosswise and lengthwise are to have an ultimate tensile strength per square inch of original section as follows:—

(*a*) For shell and other plates which are not exposed to flame and which will not be flanged, not less than 27 tons and not exceeding 30 tons, with an elongation of not less than 20 per cent. in a length of 8 inches.

(*b*) For plates which are exposed to flame and plates which are to be flanged, not less than 24 tons and not exceeding 27 tons, with an elongation of not less than 25 per cent. in a length of 8 inches.

Corrugated Sheets.

9. The thickness should be stated by the Imperial standard wire gauge (S.W.G.) *before* galvanizing, and the size of the flutes given; those most commonly used are 3 inches × ¾ inches, 5 inches × 1¼ inches, and 5 inches × 1½ inches. The usual dimensions for length and width (from centre to centre of outside flutes) are 7 to 8 feet, and 2½ feet respectively. Sheets of larger dimensions are charged for as extra sizes; lengths exceeding 12 feet cannot be supplied. The number of sheets with dimensions and "schedule" weight should be stated for each item.

Blister, Shear, Crucible Cast, and Swedish Bessemer Steels.

10. The purposes for which these descriptions of steel are required should always be specified in indents, excepting, however, crucible cast steel when demanded by letters indicating the temper as detailed in paragraph 13 below.

Blister Steel.

11. Blister steel is only suitable for hammer or anvil faces, or any purpose where the *surface only* of the steel is used and not the centre. It is usually made in 3 inches × ⅝ inch flat bars, and for smith's work is supplied of "country" temper, *i.e.*, the outer layer is steel or highly carbonized iron, whilst the core is "sap" or slightly altered iron. For special purposes blister steel can be supplied in flat bars up to 6 inches × 1 inch, any section except "flat" is unusual. Trade lengths are from 8 to 12 feet. Blister steel costs from 20*l.* to 24*l.* per ton for ordinary brands, but about 34*l.* if made from first-class brands of Dannemora iron, such as (L) or OO.

Shear Steel.

12. Single-shear steel is produced by welding several bars of blister steel together, and tilting them down to smaller dimensions, the result is a mechanical mixture of iron and steel. It costs about 32*l.* per ton.

Double-shear steel is produced by piling several bars of single-shear steel and re-welding them together, so that the mixture of iron and steel may be more perfect. It costs about 40*l.* per ton.

Shear steel is supplied in flat and square bars of sections not exceeding 3 inches × ¾ inch and 1¼ inches side, respectively. If other sections are required it is better to give manufacturers the option of supplying shear steel or cast steel of suitable temper for the specified purpose. Trade lengths are from 8 to 12 feet.

Crucible Cast Steel.

13. In the case of crucible cast steel it is particularly necessary to specify against each item either (1) the purpose for which the steel is to be used, or (2) the letter indicating the temper as detailed in the following table:—

A.—Suitable for turning very hard surfaces, such as chilled rolls, special steel castings, etc.

B.—For ordinary turning, planing, shaping tools, etc.

C.—Cutters, milling tools, rimers, gauges, drills, taps, etc.

D.—Screwing dies, chisels, springs, small punches, etc.

E.—Cold sets, punches, dies and stamps, shear blades, dies, etc.

F.—Large dies, cup tools, snaps, hammers, etc.

Otherwise manufacturers cannot determine the most suitable qualities and tempers for the supplies. When such information is omitted the size is the only clue to guide the manufacturer, and it affords no guidance whatever in the case of round or square sections.

In demands for steel wire or rods for spiral springs, the purpose for which the springs are to be used should be stated; thus crucible cast steel would be supplied for the springs of safety valves, balances or other important work, whereas a cheaper description, such as Bessemer, would answer for comparativly unimportant work.

The price of crucible cast steel (excluding special descriptions, such as Mushet's self-hardening) ranges from about 27*l.* to 60*l.* per ton according to *quality*; the latter, however, has nothing to do with *temper*, as two steels of entirely different qualities may be of exactly the same temper; one quality may, however, stand continuous work, as a lathe tool, for instance, for twice the time that the other will.

Several makers have their own descriptions for steel, and, if such are required, the name of the maker and his description of the steel should be given. The best brands of Dannemora iron used in the manufacture of crucible cast steel cost from about 20*l.* to 28*l.* a ton, and steel made exclusively from these brands cannot be had for less than about 52*l.* a ton; it is hardly worth while, however, to pay so much unless it is certain that the steel will be put into the hands of skilful workmen; if this cannot be ensured, steel at about 30*l.* a ton would probably be more economical.

Swedish Bessemer Steel.

14. This steel is suitable for many of the purposes for which crucible cast steel is sometimes demanded, such as the manufacture of jumpers, boring bars, tools for steam hammers, smith's tools, *excepting chisels and setts*, and generally for tools not requiring a fine cutting edge; it can be had in all ordinary sections, and costs from about 18*l.* to 22*l.* a ton.

Spring Steel.

15. The temper of steel for laminated springs differs from that of steel for volute springs; the description of spring for which spring steel is required should, therefore, be stated in indents.

Flat steel for springs is supplied with rounded edges and in lengths of 15 feet, unless otherwise specified.

Oiling.

16. All iron and steel is oiled before shipment, with the following exceptions:—

Swedish iron.

Fire-bar iron.

Iron intended to be galvanized in India.

Calculation of weights.

17. To ensure uniformity in the method of estimating the weights of iron and steel, it is desirable that Jordon's tabulated weights of iron steel should be used, but 5 per cent. should be added to the results when numbers and all dimensions are specified.

Special tables for reducing clerical labour in the calculation of schedule weights of plates and sheets of various metals are annexed.

TABLES FOR THE CALCULATION OF "SCHEDULE" WEIGHTS OF PLATES AND SHEETS OF VARIOUS METALS.

Contents.

Explanation.

Schedule weights of 100 feet super in thicknesses from $\frac{1}{16}$ to 1 inch for—

Iron and steel. Table I.
Brass, copper, and phosphor-bronze. Table II.
Zinc and naval brass. Table III.

Schedule weights of 100 feet super in thicknesses from 7/0 S.W.G. to 30 S.W.G., for—

Iron and Steel. Table IV.
Brass, copper, and phosphor-bronze. Table V.
Zinc and naval brass. Table VI.

Schedule weights of 100 feet lineal of corrugated iron sheets of various widths and thicknesses (S.W.G.) Table VII.

Number of feet *lineal* to 1 ton of ditto. Table VIII.

Decimals of a cwt. reduced to quarters and pounds. Table IX.

Areas in duodecimals reduced to decimals of a foot super. Table X.

Dimensions in lineal inches reduced to decimals of a foot. Table XI.

List of marks, sizes, weights, etc., of tin sheets. Table XII.

Explanation.

"Schedule weight" is a conventional term for the weight inserted in the schedule of a contract against any item ordered by number but paid for by weight. Schedule weights include an allowance of 5 per cent. above "book" or theoretical weights and show the maximum weights for which payment is made on each item; in the event, however, of the actual weight being less than the schedule weight, payment is made for the actual weight only.

The system has been adopted because it has been found in practice that without a provision of the sort, plates and sheets are likely to be rolled "heavy."

The following tables are intended to reduce clerical labour in calculating such weights:—

To use tables I to VI:—

(i) Find the *total* area in square feet and decimals of the plates or sheets required (Jordan's Tables, pp. 38 to 49, show areas for single plates, etc., of various dimensions, and Table X below shows the decimal equivalents for duodecimals).

(ii) Multiply the total area by the tabular weight for the particular thickness and metal required.

(iii) Divide the result by 100; the result is the schedule weight in cwt. and decimals.

(Table IX, from Molesworth's Pocket Book, gives the equivalents of decimals of a cwt. in quarters and pounds.)

Tables I to VI also show approximately the number of superficial feet, for each thickness, in a ton; these figures will be found useful when ordering for stock, *i.e.*, if about 10 tons of $\frac{1}{4}$ inch iron plate were wanted, the table shows that the total area for this weight would be about 2,130 feet super and if the size required were 6 feet × 3 feet, the demand should be for 118 plates, 6 feet × 3 feet × $\frac{1}{4}$ inch = 199 cwts. 0 qr. 14 lb. Schedule weights for thickness such as $\frac{1}{32}$, $\frac{1}{64}$, $\frac{3}{32}$, $\frac{3}{64}$, etc., can be obtained from those for $\frac{1}{16}$, $\frac{3}{16}$, etc., by dividing 2 or 4; for thicknesses not fractions or multiples of those given in the tables, the weights may be found by multiplying the tabular weight for a thickness of 1 inch by the thickness for which weight is required. The formula used for calculating the tabular weights is—

$$\frac{C \times 1{\cdot}05}{112} \times A \times T \text{ or } \frac{3}{320} C \times A \times T.$$

C = "Book" weight in *lb.* of 1 foot super of the metal 1 inch thick.

A = Area in *feet* super.

T = Thickness in *inches*.

When A = 100 feet super the formula reduces to $\frac{15}{16} C \times T$.

The values which have been used for C are as follows: viz:—

For iron	40·0
„ steel	40·8
„ brass	43·9
„ copper }	46·5
„ phosphor-bronze }	
„ naval brass	44·75
„ zinc	37·5

For iron it may be convenient to remember that the schedule weight in cwt. for any area A (in feet) and thickness T (in inches) is $\frac{3}{20}$ A × T, and for steel and Yorkshire iron 2 per cent. more than for the corresponding area and thickness of iron.

The schedule weights of the under-mentioned metals can be calculated from those for iron by using the factor set against each:—

	Book weight or C.	Factor.
	LB.	
Aluminium	14	0·35
Aluminium-bronze	40	1·00
Delta metal	43·2	1·08
Gun-metal	44	1·10

Table VII shows the schedule weights of 100 feet *lineal* (not super as in Tables I to VI) of corrugated iron sheets of various widths and thicknesses. It should be used as described above for tables I to VI substituting "total length in feet" for "total area in square feet." The number of feet lineal to one ton for each width and thickness is shown in table VIII for *galvanized* sheets only.

Tin sheets are paid for by the box or by number and therefore do not fall under the arrangements for schedule weight. Table XI shows the marks, usual sizes, etc., with explanatory notes.

Sheet lead is described by the weight per foot super, and paid for by actual weight; it therefore does not fall under the arrangements for schedule weight. The descriptions in ordinary use weigh 5, 6, 7 and 8 lb. per foot super, and the corresponding thicknesses are ·084, ·101, ·118, and ·135 inch, respectively. The usual dimensions of sheets are: length 25 to 35 feet, width 6 to 8 feet. The weight per foot super, width, and total weight required should be specified in indents.

Table I.

Iron and Steel.

Thickness.	Iron (except Yorkshire).		Steel and Yorkshire iron.		Thickness.
	Schedule weight of 100 feet superficial.	Number of feet superficial to 1 ton, approximate.	Schedule weight of 100 feet superficial.	Number of feet superficial to 1 ton, approximate.	
			Sheets.		
INCH.	CWT.		CWT.		INCH.
1/16	2·344 (1 1/2)	853	2·391 (2 5/64)	837	1/16
1/8	4·688 (4 11/16)	427	4·781 (4 25/32)	418	1/8
			Plates.		
3/16	7·031 (7 1/32)	284	7·172 (7 3/16)	279	3/16
1/4	9·375	213	9·563 (9 9/16)	209	1/4
5/16	11·719 (11 23/32)	171	11·953 (11 61/64)	167	5/16
3/8	14·063 (14 1/16)	142	14·344 (14 11/32)	139	3/8
7/16	16·406 (16 13/32)	122	16·734 (16 47/64)	120	7/16
1/2	18·75	107	19·125	105	1/2
9/16	21·094 (21 3/32)	95	21·516 (21 33/64)	93	9/16
5/8	23·438 (23 7/16)	85	23·906 (23 29/32)	84	5/8
11/16	25·781 (25 25/32)	78	26·297 (26 19/64)	76	11/16
3/4	28·125	71	28·688 (28 11/16)	70	3/4
13/16	30·469 (30 15/32)	66	31·078 (31 5/64)	64	13/16
7/8	32·813 (32 13/16)	61	33·469 (33 15/32)	60	7/8
15/16	35·156 (35 5/32)	57	35·859 (35 55/64)	56	15/16
1	37·5	53	38·25	52	1

To obtain the schedule weights of galvanized plates or sheets, add 0·134 cwt. to the weights given in the above table; this extra amount provides for galvanizing both sides of 100 feet super.

To obtain the schedule weight of chequered iron plates add 1·172 cwt. to the tabular weight for the thickness required, *e.g.*, the schedule weight of 100 feet super of 1/4 inch chequered iron plate is 9·375 + 1·172 = 10·547 cwt.

Note.—The above weights are correct to the nearest third place of decimals; the exact binary fractions are added after the decimals which are not exact.

Table II.

Brass Copper and Phosphor-Bronze.

Thickness.	Brass.		Copper and phosphor-bronze.		Thickness.
	Schedule weight of 100 feet superficial.	Number of feet superficial to 1 ton, approximate.	Schedule weight of 100 feet superficial.	Number of feet superficial to 1 ton, approximate.	
			Sheets.		
INCH.	CWT.		CWT.		INCH.
1/16	2·572	778	2·725	734	1/16
1/8	5·145	389	5·449	367	1/8
			Plates.		
3/16	7·717	259	8·174	235	3/16
1/4	10·289	194	10·898	184	1/4
5/16	12·861	156	13·623	147	5/16
3/8	15·434	130	16·348	122	3/8
7/16	18·006	111	19·072	105	7/16
1/2	20·578	97	21·797	92	1/2
9/16	23·150	86	24·521	82	9/16
5/8	25·723	78	27·246	73	5/8
11/16	28·295	71	29·971	67	11/16
3/4	30·867	65	32·695	61	3/4
13/16	33·439	60	35·420	56	13/16
7/8	36·012	56	38·145	52	7/8
15/16	38·584	52	40·869	49	15/16
1	41·156	49	43·594	46	1

Note.—The above weights are correct to the nearest third place of decimals.

The usual trade size for brass and copper sheets is 4 feet × 2 feet. Other sizes can, however, be obtained.

Table III.

Zinc and Naval Brass.

Thickness.	Zinc.		Naval brass.		Thickness.
	Schedule weight of 100 feet superficial.	Number of feet superficial to 1 ton, approximate.	Schedule weight of 100 feet superficial.	Number of feet superficial to 1 ton approximate.	
			Sheets.		
INCH.	CWT.		CWT.		INCH.
1/16	2·197	910	2·622	763	1/16
1/8	4·395	455	5·244	381	1/8
			Plates.		
3/16	6·592	303	7·866	254	3/16
1/4	8·789	228	10·488	191	1/4
5/16	10·986	182	13·110	153	5/16
3/8	13·184	152	15·732	127	3/8
7/16	15·381	130	18·354	109	7/16
1/2	17·578	114	20·977	95	1/2
9/16	19·775	101	23·599	85	9/16
5/8	21·973	91	26·221	76	5/8
11/16	24·170	83	28·843	69	11/16
3/4	26·367	76	31·465	64	3/4
13/16	28·564	70	34·087	59	13/16
7/8	30·762	65	36·709	55	7/8
15/16	32·959	61	39·331	51	15/16
1	35·156	57	41·953	48	1

Note.—The above weights are correct to the nearest third place of decimals.

The usual trade sizes for zinc *sheets* are 7 feet × 2 feet 8 inches, 7 feet × 3 feet and 8 feet × 3 feet.

Table IV.

Iron and Steel.

Thickness.		Iron (except Yorkshire).		Steel and Yorkshire iron.		
Number of S.W.G.	Decimals of an inch.	Schedule weight of 100 feet superficial.	Number of feet superficial to 1 ton approximate.	Schedule weight of 100 feet, superficial.	Number of feet superficial to 1 ton approximate.	Number of S.W.G.
			Plates.			
		cwt.		cwt.		
7/0	·500	18·75	107	19·125	105	7/0
6/0	·464	17·40	115	17·748	113	6/0
5/0	·432	16·20	123	16·524	121	5/0
4/0	·400	15·00	133	15·300	131	4/0
3/0	·372	13·95	143	14·229	141	3/0
2/0	·348	13·05	153	13·311	150	2/0
0	·324	12·15	165	12·393	161	0
1	·300	11·25	178	11·475	174	1
2	·276	10·35	193	10·557	189	2
3	.252	9·45	212	9·639	207	3
4	·232	8·70	230	8·874	225	4
5	·212	7·95	252	8·109	247	5
6	·192	7·20	278	7·344	272	6
			Sheets.			
7	·176	6·60	303	6·732	297	7
8	·160	6·00	333	6·120	327	8
9	·144	5·40	370	5·508	363	9
10	·128	4·80	417	4·896	408	10
11	·116	4·35	460	4·437	451	11
12	·104	3·90	513	3·978	503	12
13	·092	3·45	580	3·519	568	13
14	·080	3·00	667	3·060	654	14
15	·072	2·70	741	2·754	726	15
16	·064	2·40	833	2·448	817	16
17	·056	2·10	952	2·142	934	17
18	·048	1·80	1,111	1·836	1,089	18
19	·040	1·50	1,333	1·530	1,307	19
20	·036	1·35	1,481	1·377	1,452	20
21	·032	1·20	1,667	1·224	1,634	21
22	·028	1·05	1,905	1·071	1,867	22
23	·024	·90	2,222	·918	2,179	23
24	·022	·825	2,424	8·415	2,377	24
25	·020	·75	2,667	·765	2,614	25
26	·018	·675	2,963	·6885	2,905	26
27	·0164	·615	3,252	·6273	3,188	27
28	·0148	·555	3,604	·5661	3,533	28
29	·0136	·510	3,922	·5202	3,845	29
	·0124	·465	4,301	·4743	4,217	30

Note.—The above weights are exact.

To obtain the schedule weights of *galvanized* plates or sheets, add 0·134 cwt. to the weights given in the above table; this extra amount provides for galvanizing both sides of 100 feet super.

Table V.

Brass, Copper and Phosphor-Bronze.

Thickness.		Brass.		Copper and phosphor-bronze.		
Number of S.W.G.	Decimals of an inch.	Schedule weight of 100 feet superficial.	Number of feet superficial to 1 ton, approximate.	Schedule weight of 100 feet superficial.	Number of feet superficial to 1 ton, approximate.	Number of S.W.G.
			Plates.			
		cwt.		cwt.		
7/0	·500	20·578	97	21·797	92	7/0
6/0	·464	19·097	105	20·228	99	6/0
5/0	·432	17·780	112	18·833	106	5/0
4/0	·400	16·463	121	17·438	115	4/0
3/0	.372	15·310	131	16·217	123	3/0
2/0	·348	14·322	140	15·171	132	2/0
0	·324	13·335	150	14·124	142	0
1	·300	12·347	162	13·078	153	1
2	·276	11·359	176	12·032	166	2
3	·252	10·371	193	10·986	182	3
4	·232	9·548	209	10·114	198	4
5	·212	8·725	229	9·242	216	5
6	·192	7·902	253	8·37	239	9
			Sheets.			
7	·176	7·244	276	7·673	261	7
8	·160	6·585	304	6·975	287	8
9	·144	5·926	337	6·278	319	9
10	·128	5·268	380	5·58	358	10
11	·116	4·774	419	5·057	396	11
12	·104	4·280	467	4·534	441	12
13	·092	3·786	528	4·011	499	13
14	·080	3·293	607	3·488	573	14
15	·072	2·963	675	3·139	637	15
16	·064	2·634	759	2·79	717	16
17	·056	2·305	868	2·441	819	17
18	·048	1·976	1,012	2·093	956	18
19	·040	1·646	1,215	1·744	1,147	19
20	·036	1·482	1,350	1·569	1,274	20
21	·032	1·317	1,519	1·395	1,434	21
22	·028	1·152	1,736	1·221	1,639	22
23	·024	·988	2,025	1·046	1,912	23
24	·022	·905	2,209	·959	2,085	24
25	·020	·823	2,430	·872	2,294	25
26	·018	·741	2,700	·785	2,549	26
27	·0164	·675	2,963	·715	2,797	27
28	·0148	·609	3,283	·645	3,100	28
29	·0136	·560	3,573	·593	3,373	29
30	·0124	·510	3,919	·541	3,700	30

Note.—The above weights are correct to the nearest third place of decimals.

Table VI.

Zinc and Naval Brass.

Thickness.		Zinc.		Naval brass.		Number of S.W.G.
Number of S.W.G.	Decimals of an inch.	Schedule weight of 100 feet superficial.	Number of feet superficial to 1 ton, approximate.	Schedule weight of 100 feet superficial.	Number of feet superficial to 1 ton, approximate.	
		Plates.				
		cwt.		cwt.		
7/0	·500	17·578 ($\frac{31}{64}$)	114	20·977	95	7/0
6/0	·464	16·313 ($\frac{15}{32}$)	123	19·466	103	6/0
5/0	·432	15·188 ($\frac{27}{64}$)	132	18·124	110	5/0
4/0	·400	14·063 ($\frac{13}{32}$)	142	16·781	119	4/0
3/0	·372	13·078 ($\frac{25}{64}$)	153	15·607	128	3/0
2/0	·348	12·234 ($\frac{11}{32}$)	163	14·600	137	2/0
0	·324	11·391 ($\frac{23}{64}$)	176	13·593	148	0
1	·300	10·547 ($\frac{21}{64}$)	190	12·586	159	1
2	·276	9·703 ($\frac{19}{64}$)	206	11·579	173	2
3	·252	8·859 ($\frac{17}{64}$)	226	10·572	189	3
4	·232	8·156 ($\frac{5}{32}$)	245	9·733	205	4
5	·212	7·453 ($\frac{15}{64}$)	268	8·894	225	5
6	·192	6·75	296	8·055	248	6
		Sheets.				
7	·176	6·188 ($\frac{3}{16}$)	323	7·384	271	7
8	·160	5·625	356	6·713	298	8
9	·144	5·063 ($\frac{3}{16}$)	395	6·041	331	9
10	·128	4·5	444	5·37	372	10
11	·116	4·078 ($\frac{7}{64}$)	490	4·867	411	11
12	·104	3·656 ($\frac{13}{128}$)	547	4·363	458	12
13	·092	3·234 ($\frac{11}{128}$)	618	3·860	518	13
14	·080	2·813 ($\frac{9}{128}$)	711	3·356	596	14
15	·072	2·531 ($\frac{17}{256}$)	790	3·021	662	15
16	·064	2·25	889	2·685	745	16
17	·056	1·969 ($\frac{15}{256}$)	1,016	2·349	851	17
18	·048	1·688 ($\frac{11}{256}$)	1,185	2·014	993	18
19	·040	1·406 ($\frac{13}{512}$)	1,422	1·678	1,192	19
20	·036	1·266 ($\frac{17}{512}$)	1,580	1·510	1,324	20
21	·032	1·125	1,778	1·343	1,490	21
22	·028	·984 ($\frac{63}{64}$)	2,032	1·175	1,703	22
23	·024	·844 ($\frac{27}{32}$)	2,370	1·007	1,986	23
24	·022	·773	2,586	0·923	2,167	24
25	·020	·703	2,844	·839	2,384	25
26	·018	·633	3,160	·755	2,648	26
27	·0164	·577	3,469	·688	2,907	27
28	·0148	·520	3,844	·621	3,221	28
29	·0136	·478	4,182	·571	3,505	29
30	·0124	·436	4,587	·520	3,845	30

Note.—The above weights are correct to the nearest third place of decimals. In the case of zinc, from 7/0 S.W.G. to 23 S.W.G., the exact binary fractions are added after the decimals that are not exact.

Table VII.

Corrugated Iron Sheets.

Reference letter.	Corrugations. Width.	Corrugations. Depth.	Corrugations. No.	To cover.	Width. Out to out.	Width. In the flat before corrugating.	Schedule weights, in cwt. and decimals, of 100 feet *lineal of galvanized* corrugated iron sheets. 14 S.W.G.	15 S.W.G.	16 S.W.G.	17 S.W.G.	18 S.W.G.	19 S.W.G.	20 S.W.G.	21 S.W.G.	22 S.W.G.	23 S.W.G.	24 S.W.G.	25 S.W.G.	Deduct if sheets are required black, *i.e.*, not galvanized.	Reference letter.
	inches.	inches.		ft. in.	ft. in.	ft. in.													cwt.	
A	2	½	12	2 0	2 1	2 5	..	..	..	..	..	..	3·586	3·224	2·861	2·499	2·317	2·136	0·324	A
B			8	2 0	2 2	2 5½	..	..	..	..	..	..	3·648	3·279	2·911	2·542	2·358	2·173	·329	B
C			9	2 3	2 2	2 8½	..	..	..	..	..	..	4·050	3·641	3·232	2·822	2·617	2·413	·366	C
D	3	¾	10	2 6	2 5	3 0	..	..	..	..	..	..	4·452	4·002	3·552	3·102	2·877	2·652	·402	D
E			11	2 9	2 8	3 3½	..	..	..	..	..	..	4·885	4·391	3·897	3·405	3·167	2·910	·441	E
F			12	3 0	2 11	3 7½	..	..	..	..	..	..	5·333	4·794	4·255	3·715	3·446	3·177	·482	F
G			6	2 0	3 2	2 6½	..	..	..	..	..	..	3·772	3·390	3·009	..	..	..	·341	G
H	4	1	7	2 4	2 5½	2 11	..	..	..	..	..	..	4·329	3·891	3·454	..	..	..	·391	H
J			8	2 8	2 10½	3 3½	..	..	..	..	..	..	4·885	4·391	3·897	..	..	..	·441	J
K			9	3 0	3 2½	3 8	..	..	..	..	..	..	5·442	4·891	4·341	..	..	..	·491	K
L			5	2 1	2 3½	2 6½	7·066	..	..	..	..	..	4·772	3·390	3·009	..	..	..	·341	L
M	5	1	6	2 6	2 8½	3 0	9·492	..	..	..	..	..	5·452	4·002	3·552	..	..	..	·402	M
N			7	2 11	3 1½	3 5½	10·838	..	..	..	..	..	6·132	4·614	4·095	..	..	..	·463	N
P			5	2 1	2 4	2 8½	8·488	..	..	..	..	..	4·651	..	..	..	..	..	·363	P
Q	5	1¼	6	2 6	2 9	3 2½	9·990	..	..	..	..	..	5·425	..	..	..	..	..	·427	Q
R			7	2 11	3 2	3 8	11·491	..	..	..	..	..	6·209	..	..	..	..	..	·491	R
S			5	2 1	2 4	2 10	8·880	..	..	..	..	..	4·992	..	..	..	..	..	·380	S
T	5	1½	6	2 6	2 9	3 4	10·447	..	..	..	..	..	5·630	..	..	..	..	..	·447	T
V			7	2 11	3 2	3 10	12·014	..	..	..	..	..	6·264	..	..	..	..	..	·514	V

Note.—The sizes marked B, C, D, P and S are those in ordinary use.
" E, F, J, K, N, Q, R, T and V are "extra" sizes.
Ordinary lengths are 7 to 8 feet. Maximum length is 12 feet.
The following particulars should be given in demands:—
(i) Size of corrugations.
(ii) Either number of corrugations, or the width from out to out.
(iii) Numbers and lengths of sheets.
(iv) Schedule weight.
(v) Include either "black" or "galvanized" in description.

TABLE VIII.

Corrugated Iron Sheets.

Reference letter.	Corrugations. Width.	Corrugations. Depth.	Corrugations. No.	Width. To cover.	Width. Out to out.	Width. In the flat before corrugation.	Approximate number of feet *lineal* to 1 ton—*Galvanized* sheets only. 14 S.W.G.	15 S.W.G.	16 S.W.G.	17 S.W.G.	18 S.W.G.	19 S.W.G.	20 S.W.G.	21 S.W.G.	22 S.W.G.	23 S.W.G.	24 S.W.G.	25 S.W.G.	Reference letter.
	INCHES.	INCHES.		FT. IN.	FT. IN	FT. IN.													
A	2	½	12	2 0	2 1	2 5	..	..	..	..	..	..	558	620	699	800	863	936	A
B			8	2 0	2 2	2 5½	..	..	..	364	417	498	548	610	687	787	848	920	B
C	3	¾	9	2 3	2 5	2 8½	..	..	321	328	379	449	494	549	619	709	764	829	C
D			10	2 6	2 8	2 11½	..	..	289	298	345	408	449	500	563	645	696	754	D
E			11	2 9	2 11	3 2½	..	..	263	272	314	372	409	455	513	587	634	687	E
F			12	3 0	3 2	3 5½	..	..	240	249	288	340	375	417	470	538	580	630	F
G			6	2 0	2 2½	2 6½	..	..	220	228	264	312	344	383	432	..	..	..	G
H	4	1	7	2 4	2 6½	2 10½	..	..	311	352	407	482	530	590	666	..	..	..	H
J			8	2 8	2 10½	3 2½	..	..	271	307	355	419	462	514	579	..	..	..	J
K			9	3 0	3 2½	3 6½	..	..	240	272	314	372	409	455	513	..	..	..	K
L			5	2 1	2 3½	2 7½	..	..	215	244	282	334	368	409	461	..	..	..	L
M	5	1	6	2 6	2 8½	3 0½	..	..	311	352	407	482	530	590	665	..	..	..	M
N			7	2 11	3 1½	3 5½	..	..	263	298	345	408	449	500	563	..	..	..	N
P			5	2 1	2 4	2 8½	..	..	228	259	299	354	390	433	488	..	..	..	P
Q	5	1¼	6	2 6	2 9	3 0½	..	..	291	331	382	452	498	..	..	..	..	..	Q
R			7	2 11	3 2	3 6½	..	..	248	281	324	384	423	..	..	..	..	..	R
S			5	2 1	2 4	2 8½	..	..	215	244	282	334	368	..	..	..	..	..	S
T	5	1½	6	2 6	2 9	3 0½	..	..	279	316	365	432	476	..	..	..	..	..	T
V			7	2 11	3 2	3 6½	..	..	237	269	310	367	404	..	..	..	..	..	V
							..	..	206	234	270	320	351	..	..	..	..	..	

NOTE.—For "black" sheets the number of feet lineal to 1 ton may be found by dividing the number of feet superficial, given for the corresponding thickness of iron in table IV, by the width in the flat before corrugation.

TABLE IX.

Decimals of a cwt. reduced to quarters and pounds.

Decimal.	Qr.	Lb.	Decimal.	Qr.	Lb.	Decimal.	Qr.	Lb.	Decimal.	Qr.	Lb.
·009	0	1	·259	1	1	·509	2	1	·759	3	1
·018	0	2	·268	1	2	·518	2	2	·768	3	2
·027	0	3	·277	1	3	·527	2	3	·777	3	3
·036	0	4	·286	1	4	·536	2	4	·786	3	4
·045	0	5	·295	1	5	·545	2	5	·795	3	5
·054	0	6	·304	1	6	·554	2	6	·804	3	6
·063	0	7	·313	1	7	·563	2	7	·813	3	7
·071	0	8	·321	1	8	·571	2	8	·821	3	8
·080	0	9	·330	1	9	·580	2	9	·830	3	9
·089	0	10	·339	1	10	·589	2	10	·839	3	10
·098	0	11	·348	1	11	·598	2	11	·848	3	11
·107	0	12	·357	1	12	·607	2	12	·857	3	12
·116	0	13	·366	1	13	·616	2	13	·866	3	13
·125	0	14	·375	1	14	·625	2	14	·875	3	14
·134	0	15	·384	1	15	·634	2	15	·884	3	15
·143	0	16	·393	1	16	·643	2	16	·893	3	16
·152	0	17	·402	1	17	·652	2	17	·902	3	17
·161	0	18	·411	1	18	·661	2	18	·911	3	18
·170	0	19	·420	1	19	·670	2	19	·920	3	19
·179	0	20	·429	1	20	·679	2	20	·929	3	20
·188	0	21	·438	1	21	·688	2	21	·938	3	21
·196	0	22	·446	1	22	·696	2	22	·946	3	22
·205	0	23	·455	1	23	·705	2	23	·955	3	23
·214	0	24	·464	1	24	·714	2	24	·964	3	24
·223	0	25	·473	1	25	·723	2	25	·973	3	25
·232	0	26	·482	1	26	·732	2	26	·982	3	26
·241	0	27	·491	1	27	·741	2	27	·991	3	27
·25	1	0	·5	2	0	·75	3	0			

TABLE X.

Areas in Duodecimals (12ths and 144ths of a foot) reduced to decimals of a foot super.

No. of 12ths.	Equivalent decimal.	No. of 144ths.	Equivalent decimal.
1	·083	1	·007
2	·167	2	·014
3	·25	3	·021
4	·333	4	·028
5	·417	5	·035
6	·5	6	·042
7	·583	7	·049
8	·667	8	·056
9	·75	9	·063
10	·833	10	·069
11	·917	11	·076

Example: 151·7·11 (in duodecimals) = 151 + ·583 + ·076 = 151·66 (in decimals).

Table XI.

Dimensions in lineal inches reduced to decimals of a foot.

Inches.	0	1	2	3	4	5	6	7	8	9	10	11	Inches.
						Decimals of a foot.							
0	..	·083	·167	·25	·333	·417	·5	·583	·667	·75	·833	·917	0
1/16	·005	·089	·172	·255	·339	·422	·505	·589	·672	·755	·839	·922	1/16
1/8	·010	·094	·177	·26	·344	·427	·510	·594	·677	·760	·844	·927	1/8
3/16	·016	·099	·182	·266	·349	·432	·516	·599	·682	·766	·849	·932	3/16
1/4	·021	·104	·188	·271	·354	·438	·521	·604	·688	·771	·854	·938	1/4
5/16	·026	·109	·193	·276	·359	·443	·526	·609	·693	·776	·859	·943	5/16
3/8	·031	·115	·198	·281	·365	·448	·531	·615	·698	·781	·865	·948	3/8
7/16	·036	·120	·203	·286	·370	·453	·536	·620	·703	·786	·870	·953	7/16
1/2	·042	·125	·208	·292	·375	·458	·542	·625	·708	·792	·875	·958	1/2
9/16	·047	·130	·214	·297	·380	·464	·547	·630	·714	·797	·880	·964	9/16
5/8	·052	·135	·219	·302	·385	·469	·552	·635	·719	·802	·885	·969	5/8
11/16	·057	·141	·224	·307	·391	·474	·557	·641	·724	·807	·891	·974	11/16
3/4	·063	·146	·229	·313	·396	·479	·563	·646	·729	·813	·896	·979	3/4
13/16	·068	·151	·234	·318	·401	·484	·568	·651	·734	·818	·901	·984	13/16
7/8	·073	·156	·240	·323	·406	·490	·573	·656	·740	·823	·906	·990	7/8
15/16	·078	·161	·245	·328	·411	·495	·578	·661	·745	·828	·911	·995	15/16

The above figures are correct to the nearest third place of decimals.

This table is intended to facilitate the calculation of areas in feet super and decimals from dimensions, such as 2 ft. $3\frac{7}{16}$ in. × 5 ft. $1\frac{11}{16}$ in.

Table XII.

Tin Sheets.

List of Marks, usual Sizes, Weights, etc.

Mark.	Size.	Number in a box.	Standard weight.		Mark.	Size.	Number in a box.	Standard weight.	
			Per box.	Per sheet.				Per box.	Per sheet.
	INCHES.		LB.	LB. OZ.		INCHES.		LB.	LB. OZ.
IC	14 × 10	225	112	0 8	DC	17 × 25	50	98	1 15½
IX			140	0 10	DX			126	2 8¼
IXX			161	0 11½	DXX			147	2 15
IXXX			182	0 13	DXXX			168	3 5½
IXXXX			203	0 14½	DXXXX			189	3 12¾
IC	14 × 20	112	112	1 0	DC	34 × 25	25	98	3 14½
IX			140	1 4	DX			126	5 0⅝
IXX			161	1 7	DXX			147	5 14
IXXX			182	1 10	DXXX			168	6 11½
IXXXX			203	1 13	DXXXX			189	7 9
IC	28 × 20	56	112	2 0	SDC	15 × 11	200	168	0 13½
IX			140	2 8	SDX			189	0 15¾
IXX			161	2 14	SDXX			210	1 0¾
IXXX			182	3 4	SDXXX			231	1 2¼
IXXXX			203	3 10	SDXXXX			252	1 4¾
DC	17 × 12½	100	98	0 15⅝	SDC	15 × 22	100	168	1 10⅞
DX			126	1 4¾	SDX			189	1 14¼
DXX			147	1 7⅞	SDXX			210	2 1⅝
DXXX			168	1 10⅞	SDXXX			231	2 5
DXXXX			189	1 14¼	SDXXXX			252	2 8¼

IC = Common No. 1
IX = Cross No. 1.
IXX = Two cross No. 1.
DC = Common Doubles.
DX = Cross Doubles.
SDC = Small Common Doubles.
Each X after the first X adds 21 lb. to the weight of a box.

The following variations from standard weights are allowed, viz. :—

Per box, at the rate of 2 oz. in 7 lb.
Per sheet, at the rate of 1 oz. in 1 lb. } up or down,

i.e., for IC 14 in. × 20 in., the weight per box must not be less than 110 lb., nor more than 114 lb., and no sheet may weigh less than 15 oz. nor more than 17 oz.

There are two qualities, viz., "charcoal finish" and "coke finish," the former being the better. The marks sizes, and qualities required should be specified in demands and, when trade sizes will suit, the quantities should be stated by numbers of boxes rather than by numbers of sheets. Sizes other than the trade sizes can be supplied, but the marks must be specified, as they

indicate the substance, and the quantities should be stated by numbers of sheets. When tin sheets are demanded by marks only, the following sizes are supplied :—

IC, IX, etc. ... ... 14 in. × 20 in.
DC., DX, etc. ... ... 17 in. × 12½ in.
SDC, SDX, etc. ... ... 15 in. × 11 in.

If no quality is specified, "charcoal finish" is understood to be required.

The weights per foot super and the *approximate* standard wire gauge thicknesses of the different marks are as follows :—

Mark.	Weight.	S.W.G.	Mark.	Weight.	S.W.G.	Mark.	Weight.	S.W.G.
	LB.			LB.			LB.	
IC	·514	30	DC	·664	27	SDC	·733	26
IX	·643	27	DX	·864	24	SDX	·825	25
IXX	·739	26	DXX	·936	23	SDXX	·916	24
IXXX	·836	25	DXXX	1·138	22	SDXXX	1·008	23
IXXXX	·932	23	DXXXX	1·281	21	SDXXXX	1·100	22

Order—No. 1913 W., dated 24th July 1899.

Communicated to officers of the Public Works Department for information and guidance, in continuation of the undermentioned orders :—

G.O., No. 398 W., dated 16th February 1895.
G.O., No. 1724 W., dated 30th June 1897.

(True Extract.)

Under Secretary to Government.

To the Chief Engineer for Irrigation.
" the Consulting Engineer for Railways.
" Superintending Engineers.
" the Consulting Architect to Government.
" the Superintendent of Works, Lighthouse Division.

Exd. T. K. Narayana Aiyangar.

A 6 (189 9) Department.

CURRENT No. 5871.

11 P

From The Govt of India

A
No. 1913 W dy 24-7-99

Govt Asst

Gi No. 3 Ry.

Communicated to Officers of the P. W. Dept. for information and guidance in continuation of the undermentioned orders:-

G.O. No. 398 W dated 16th Febry 1895
" No. 1724 W dated 30th June 1897.

Dated 26 June 99
Received at Ootacamund 17-7-99.
Registered at Madras 19-7-99
Enclosures Plan and Detail
Spare copies

SUBJECT.

Offering suggestions as to the preparation in duplicate of Indents for Iron & Steel

Rec'd 22/7

22-7

To
The Chief Engr. for Irrigation
" Comss. Engr. for Railways
Supts. Engrs.
The Consg. Architect to Govt.
" Supdt. of Works, LH/Dies

[P. W. 39. 1,000—28-6-99.]

9/11/99

12/11/7

DJ. 3/3.

G.O.	No.	Department.	Date.

FURTHER PAPERS.

G.O.	No.	Department.	Date.

1724 W 30.6.97
3282 W 16.2.95
3186 W 7.12.93
1681 W 22.6.91
1271 W 29.5.91

[*For General Distribution.*]

Circular No. 3 Railway.

GOVERNMENT OF INDIA.

PUBLIC WORKS DEPARTMENT.

RAILWAY STORES.

18

Simla, the 26th June 1899.

(1) Preparation in India of Indents for Iron and Steel.

(2) Tables for the Calculation of "Schedule" Weights of Plates and Sheets of various Metals.

The undermentioned papers are forwarded to the Local Governments and Administrations and to the officers noted in the margin, for information and guidance, in supersession of all previous orders on the subject.

The Governments of Madras, Bombay, Bengal, North-Western Provinces and Oudh, the Punjab, and Burma, Public Works Department.
The Chief Commissioners, Central Provinces, Assam, and Coorg.
The Resident at Hyderabad.
The Agents to the Governor General, Rajputana, Central India, and Baluchistan.
The Accountant General, Public Works Department.
The Director General of Telegraphs.
The Consulting Engineers to the Government of India for Railways, Calcutta, Lucknow and Assam.
The Superintendent of Port Blair and Chief Commissioner, Andaman and Nicobar Islands.
The Manager, North-Western Railway.
The Manager, Oudh and Rohilkhand Railway.
The Manager, Eastern Bengal State Railway.
The Manager, East Coast Railway.
The Engineer-in-Chief, Indus Bridge Works and British Section, Shadipali-Balotra Railway.
The Engineer-in-Chief, Godavari Bridge Works.
The Engineer-in-Chief, Hurdwar-Dehra Railway.
The Engineer-in-Chief, Ghaziabad-Moradabad Railway.
The Port Storekeeper, State Railway Department, Calcutta.

2. These revised instructions are applicable to all branches of the Public Works Department.

By order,

C. J. L.
Under Secretary.

50 Spare Copies for Ry Branch.
15 — for Dr. Bok
(Sent per Packet (A) Post)

Here

Suggestions as to the preparation in India of Indents for Iron and Steel.

(Revised November, 1898).

Bars, Iron and Mild Steel.

1. Unless certain lengths are required for a specific purpose, the section and total weight should be stated for each item, the bars will then be supplied in commercial lengths

To The Secretary to the Govt. of Madras Public Works Department

as shewn in the following table. Commercial lengths are generally correct to within about 3 inches, *i.e.*, 15 feet 9 inches or 16 feet 3 inches would be passed as 16 feet.

Description.	Lengths.
	Feet.
Rod—	
$\frac{3}{16}$ inch to $\frac{3}{8}$ inch diameter	12
$\frac{7}{16}$ inch to $\frac{11}{16}$ inch diameter	14
Above $\frac{11}{16}$ inch diameter	16
Square—	
$\frac{3}{8}$ inch side and under	12
$\frac{7}{16}$ inch to $\frac{11}{16}$ inch side	14
Above $\frac{11}{16}$ inch side	16
Angle, tee, channel—	
$\frac{3}{16}$ inch and under in thickness	14
Above $\frac{3}{16}$ inch in thickness	16
Flat—	
$\frac{3}{8}$ inch and under in thickness	12
Above $\frac{3}{8}$ inch in thickness	16
Hoop	36 to 40
Fire bar iron	16

Hoops can be supplied in straight lengths like small flats; the lengths required should in such cases be specified in the Indent and should not exceed 12 feet.

Rods should not be demanded of less than $\frac{3}{16}$ inch diameter. Smaller diameters should be described as Wire.

2. When lengths differing from those in above Table are required, length should be stated in addition to section and total weight.

3. When dead lengths are required, *i.e.*, bars sawn cold to within $\frac{1}{8}$ of an inch of those specified in the Indent, "in dead lengths" should be added.

When bars are required in lengths not less than those specified in the Indent and not exceeding them by more than 1 inch they can be sawn hot, thus saving the expense of cold sawing; in such cases "sawn hot to length" should be added.

In either of these cases the number of lengths required should be stated, and, in estimating the weight, 5 per cent. should be added to the "book" or theoretical weight to give the "Schedule" weight. The schedule weight *in cwt.* of *l* feet lineal of any section whose book weight is *w.* lb. per foot lineal is $\frac{3}{3\,2\,0}\,lw$.

Swedish Iron.

4. Swedish iron should not be demanded unless there is some special reasons for its use; it is expensive (about 11*l.* per ton) and is not easily procurable. The only sections in which it can be supplied are Rounds, Squares, and Flats. It is suggested that mild steel having a tensile strength of 25 to 27 tons per square inch with an elongation of 25 per cent. in a length of 8 inches would answer all the purposes for which Swedish iron has hitherto been demanded. Mild steel is particularly suitable for working in a charcoal fire. (*See also* paragraph 8 below.)

Wire, Iron and Mild Steel.

5. Wire for ordinary purposes (*i.e.*, other than spiral springs) should be described either as "Bright," *i.e.*, hard, or "Annealed," *i.e.*, soft, it is supplied in coils unless

straight lengths (not exceeding 12 feet) are specified. On account of its high price "Puddled" iron wire is not supplied unless specially demanded, ordinary "iron" wire is drawn from billets of "ingot iron" which is really mild steel. Ordinary "steel" wire is not intended to harden though it sometimes does so. The ultimate tensile stresses usually specified for ordinary wire are approximately as follows, *viz.* :—

Iron, Bright	36 tons per square inch.
Iron, Annealed	24 " "
Steel, Bright	46 " "
Steel, Annealed	31 " "

Steel wire for spiral springs differs entirely from that for ordinary work, and should be described as explained in paragraph 13 below.

Plates and Sheets, Iron and Mild Steel.

6. The number, dimensions, and "schedule" weight (*i.e.*, "book" weight + 5 per cent.) should be stated for each item. When plates of special sizes are demanded, it is advisable to specify the number and dimensions of smaller plates for alternative supply in case manufacturers should be unable to supply the special sizes. The limits given in the two following tables should not be exceeded :—

Thickness.	Maximum Length, Width, and Area.					
	Yorkshire Iron.			Mild Steel.		
	Length.	Width.	Area.	Length.	Width.	Area.
In.	Ft.	Ft. in.	Sq. ft.	Ft.	Ft. in.	Sq. ft.
		Too thin		14	4 0	30
$\frac{1}{16}$		" "		18	4 6	40
$\frac{3}{32}$						
104	8	3 0	18	—	—	—
$\frac{1}{8}$	16	4 0	48	22	5 0	50
$\frac{5}{32}$	16	4 0	48	25	5 3	65
$\frac{3}{16}$	10	5 4	52	30	5 6	80
$\frac{1}{4}$	14	6 0	72	33	6 3	90
$\frac{5}{16}$	14	6 0	72	35	6 9	95
$\frac{3}{8}$	14	9 0	108	38	7 4	100
$\frac{7}{16}$	14	9 0	108	40	7 9	105
$\frac{1}{2}$	16	10 0	120	40	8 3	110
$\frac{5}{8}$	16	10 0	120	40	8 9	120
$\frac{3}{4}$	16	10 0	120	40	9 3	140
$\frac{7}{8}$	14	9 0	108	40	9 6	140
1	14	9 0	108	40	10 0	150
$1\frac{1}{8}$	14	8 0	96	40	10 0	150
$1\frac{1}{4}$	14	8 0	96	40	10 0	150

The maximum area divided by any length (not exceeding maximum) will give maximum width for that length; maximum length for any given width (not exceeding maximum) can be similarly determined.

Maximum Dimensions.

IRON.

Width in Feet.	1½	2	2½	3	3½	4	4½	5	5½	6	6½
Thickness.	Length in Feet.										
Inches.											
1/16	10	10	10	10	10	10	...	...	...	...	...
3/32	10	10	10	10	10	10	9	...	...	..	...
1/8 and 5/32	20	20	16	12	12	12	10	10	...	...	...
3/16	25	25	25	25	20	20	16	16	12	...	...
1/4 and 5/16	35	35	35	25	25	20	20	16	12	...	...
3/8	35	35	35	30	25	24	20	18	12	10	6½
7/16 and 1/2	35	35	35	30	24	24	18	16	12	10	8
9/16 ,, 5/8	30	30	30	25	24	20	16	16	12	10	8
11/16 ,, 3/4	30	30	30	25	20	15	15	15	10	8	8
13/16 ,, 7/8	30	30	25	20	20	14	14	14	10	8	7
15/16 ,, 1	30	30	25	20	20	14	14	13	10	8	7
1 1/16 ,, 1 1/8	25	25	24	20	16	14	13	12	10	8	7
1 3/16 ,, 1 1/4											

The area of iron and steel sheets less than 1/16 inch thick should not, if possible, exceed 18 square feet. Yorkshire iron sheets should not be demanded in any thickness less than 12 S.W.G. or ·104 inch.

7. The following nomenclature is recommended for adoption—

"Plate" for thicknesses of 3/8 inch and upwards (including 3/0. to 7/0. S.W.G.) when width is *above* 12 inches.

"Flat" for ditto, ditto, when width is *not* above 12 inches.

"Plate" for thicknesses of 3/16 to 5/16 (including 6 to 2/0. S.W.G.) when width is *above* 4 inches.

"Flat" for ditto, ditto, when width is *not* above 4 inches.

"Sheet" for any thickness less than 3/16 inch (including 7 S.W.G. and under) when width is *above* 3 inches.

"Hoop" for ditto, ditto, when width is *not* above 3 inches.

Plates and sheets are sheared on all edges; the parallel edges of flats and hoops are rolled.

Mild Steel as a Substitute for Wrought Iron.

8. Mild steel is rapidly supplanting wrought iron for all ordinary purposes; it is more easily obtained, and is more uniform in strength and quality than wrought iron. It welds readily, but should not be raised to as high a heat as wrought iron in any forging process, otherwise it does not require any special treatment. There is now very little difference between the prices of the two materials. Mild steel (plates, sheets, bars, &c.) of the quality supplied for ordinary work should bear a tensile stress of 26 to 30 tons per square inch, with an elongation of 20 per cent. in a length of 8 inches; if supplied for rivets the elongation is required to be 25 per cent., and if the rivets are for boiler making the limits of stress are 25 to 27 tons. Plates for boiler making are supplied in two different qualities, as shewn in the following extract from the specification. The quality required should be stated as "quality A" or "quality B."

Extract from Specification.

Strips cut crosswise and lengthwise are to have an ultimate tensile strength per square inch of original section as follows:—

(A) For shell and other plates which are not exposed to flame and which will not be flanged, not less than 27 tons and not exceeding 30 tons, with an elongation of not less than 20 per cent. in a length of 8 inches.

(B) For plates which are exposed to flame and plates which are to be flanged, not less than 24 tons and not exceeding 27 tons, with an elongation of not less than 25 per cent. in a length of 8 inches.

Corrugated Sheets.

9. The thickness should be stated by the Imperial Standard wire gauge (S. W. G.) *before* galvanizing, and the size of the flutes given; those most commonly used are 3 ins. × 3/4 ins., 5 ins. × 1¼ ins., and 5 ins. × 1½ ins. The usual dimensions for length and width (from centre to centre of outside flutes) are 7 to 8 feet and 2½ feet respectively. Sheets of larger dimensions are charged for as extra sizes; lengths exceeding 12 feet cannot be supplied. The number of sheets with dimensions and "schedule" weight should be stated for each item.

Blister, Shear, Crucible Cast, and Swedish Bessemer Steels.

10. The purposes for which these descriptions of steel are required should always be specified in Indents, excepting, however, crucible cast steel when demanded by letters indicating the temper as detailed in paragraph 13 below.

Blister Steel.

11. Blister steel is only suitable for hammer or anvil faces, or any purpose where the *surface only* of the steel is used and not the centre. It is usually made in 3 ins. × 5/8 in. flat bars, and for smiths' work is supplied of "country" temper, *i. e.*, the outer layer is steel or highly carbonized iron, whilst the core is "sap" or slightly altered iron. For special purposes blister steel can be supplied in flat bars up to 6 ins. × 1 in., any section except "flat" is unusual. Trade lengths are from 8 to 12 feet. Blister steel costs from 20*l.* to 24*l.* per ton for ordinary brands, but about 34*l.* if made from first-class brands of Dannemora iron, such as (L) or OO.

Shear Steel.

12. Single-shear steel is produced by welding several bars of blister steel together, and tilting them down to smaller dimensions, the result is a mechanical mixture of iron and steel. It costs about 32*l.* per ton.

Double-shear steel is produced by piling several bars of single-shear steel and re-welding them together, so that the mixture of iron and steel may be more perfect. It costs about 40*l.* per ton.

Shear steel is supplied in flat and square bars of sections not exceeding 3 ins. × 3/4 in. and 1¼ in. side respectively. If other sections are required it is better to give manufacturers the option of supplying shear steel or cast steel of suitable temper for the specified purpose. Trade lengths are from 8 to 12 feet.

Crucible Cast Steel.

13. In the case of crucible cast steel it is particularly necessary to specify against each item either (1) the purpose for which the steel is to be used, or (2) the letter indicating the temper as detailed in the following table:—

A.—Suitable for turning very hard surfaces, such as chilled rolls, special steel castings, &c.

B.—For ordinary turning, planing, shaping tools, &c.

C.—Cutters, milling tools, rimers, gauges, drills, taps, &c.

D.—Screwing dies, chisels, springs, small punches, &c.

E.—Cold sets, punches, dies and stamps, shear blades, dies, &c.

F.—Large dies, cup tools, snaps, hammers, &c.

Otherwise manufacturers cannot determine the most suitable qualities and tempers for the supplies When such information is omitted the size is the only clue to guide the manufacturer, and it affords no guidance whatever in the case of round or square sections.

In demands for steel wire or rods for spiral springs, the purpose for which the springs are to be used should be stated; thus crucible cast steel would be supplied for the springs of safety valves, balances, or other important work, whereas a cheaper description, such as Bessemer, would answer for comparatively unimportant work.

The price of crucible cast steel (excluding special descriptions, such as Mushet's self-hardening) ranges from about 27*l.* to 60*l.* per ton according to *quality*, the latter, however, has nothing to do with *temper*, as two steels of entirely different qualities may be of exactly the same temper; one quality may, however, stand continuous work, as a lathe tool, for instance, for twice the time that the other will.

Several makers have their own descriptions for steel, and, if such are required, the name of the maker and his description of the steel should be given. The best brands of Dannemora iron used in the manufacture of crucible cast steel cost from about 20*l.* to 28*l.* a ton, and steel made exclusively from these brands cannot be had for less than about 52*l.* a ton; it is hardly worth while, however, to pay so much unless it is certain that the steel will be put into the hands of skilful workmen; if this cannot be ensured, steel at about 30*l.* a ton would probably be more economical.

Swedish Bessemer Steel.

14. This steel is suitable for many of the purposes for which crucible cast steel is sometimes demanded, such as the manufacture of jumpers, boring bars, tools for steam hammers, smiths' tools, *excepting chisels and setts*, and generally for tools not requiring a fine cutting edge; it can be had in all ordinary sections, and costs from about 18*l.* to 22*l.* a ton.

Spring Steel.

15. The temper of steel for laminated springs differs from that of steel for volute springs; the description of spring for which spring steel is required should, therefore, be stated in Indents.

Flat steel for springs is supplied with rounded edges and in lengths of 15 feet, unless otherwise specified.

Oiling.

16. All iron and steel is oiled before shipment, with the following exceptions:—

Swedish iron.

Fire-bar iron.

Iron intended to be galvanized in India.

Calculation of Weights.

17. To ensure uniformity in the method of estimating the weights of iron and steel, it is desirable that Jordon's Tabulated Weights of Iron and Steel should be used, but 5 per cent. should be added to the results when numbers and all dimensions are specified.

Special tables for reducing clerical labour in the calculation of schedule weights of plates and sheets of various metals are annexed.

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4 8 6

Tables for the Calculation of "Schedule" Weights of Plates and Sheets of various Metals.

CONTENTS.

Explanation.

Schedule weights of 100 feet super in thicknesses from $\frac{1}{16}$ to 1 inch for,—

Iron and Steel. Table I.

Brass, Copper, and Phosphor-bronze. Table II.

Zinc and Naval Brass. Table III.

Schedule weights of 100 feet super in thicknesses from 7/0 S. W. G. to 30 S. W. G., for,—

Iron and Steel. Table IV.

Brass, Copper, and Phosphor-bronze. Table V.

Zinc and Naval Brass. Table VI.

Schedule weights of 100 feet lineal of Corrugated Iron Sheets of various widths and thicknesses (S. W. G.). Table VII.

No. of feet *lineal* to 1 ton of ditto. Table VIII.

Decimals of a cwt. reduced to quarters and pounds. Table IX.

Areas in duodecimals reduced to decimals of a foot super. Table X.

Dimensions in lineal inches reduced to decimals of a foot. Table XI.

List of marks, sizes, weights, etc., of Tin Sheets. Table XII.

EXPLANATION.

"Schedule weight" is a conventional term for the weight inserted in the schedule of a contract against any item ordered by number but paid for by weight. Schedule weights include an allowance of five per cent. above "book" or theoretical weights and show the maximum weights for which payment is made on each item; in the event, however, of the actual weight being less than the schedule weight, payment is made for the actual weight only.

The system has been adopted because it has been found in practice that without a provision of the sort, plates and sheets are likely to be rolled "heavy."

The following Tables are intended to reduce clerical labour in calculating such weights.

To use Tables I to VI:—

(i) Find the *total* area in square feet and decimals of the plates or sheets required (Jordan's Tables, pp. 38 to 49, show areas for single plates, etc., of various dimensions, and Table X, below shows the decimal equivalents for duodecimals).

(ii) Multiply the total area by the tabular weight for the particular thickness and metal required.

(iii) Divide the result by 100; the result is the schedule weight in cwt. and decimals.

(Table IX, from Molesworth's Pocket Book, gives the equivalents of decimals of a cwt. in quarters and pounds.)

Tables I to VI also show approximately the number of superficial feet, for each thickness, in a ton; these figures will be found useful when ordering for stock, *i.e.*, if about 10 tons of $\frac{1}{4}$ inch iron plate were wanted, the table shows that the total area for this weight would be about 2,130 feet super and if the size required were 6 feet × 3 feet the demand should be for 118 plates, 6 ft. × 3 ft. × $\frac{1}{4}$ in. = 199 cwts. 0 qrs. 14 lbs. Schedule weights for thickness such as $\frac{1}{32}$, $\frac{1}{64}$, $\frac{3}{32}$, $\frac{3}{64}$, etc., can be obtained from those for $\frac{1}{16}$, $\frac{3}{16}$, etc., by dividing 2 or 4; for thicknesses not fractions or multiples of those given in the tables the

weights may be found by multiplying the tabular weight for a thickness of 1 inch by the thickness for which weight is required. The formula used for calculating the tabular weights is—

$$\frac{C \times 1{\cdot}05}{112} \times A \times T \text{ or } \frac{3}{320} C \times A \times T.$$

C="book" weight in *lb.* of 1 foot super of the metal 1 inch thick.

A=area in *feet* super.

T=thickness in *inches.*

When A=100 feet super the formula reduces to $\frac{15}{16} C \times T$.

The values which have been used for C are as follows; *viz.*—

For Iron	40·0
,, Steel	40·8
,, Brass	43·9
,, Copper	46·5
,, Phosphor-Bronze	
,, Naval Brass	44·75
,, Zinc	37·5

For iron it may be convenient to remember that the schedule weight in cwt. for any area A (in feet) and thickness T (in inches) is $\frac{3}{8} A \times T$, and for steel and Yorkshire iron 2 per cent. more than for the corresponding area and thickness of iron.

The schedule weights of the under-mentioned metals can be calculated from those for iron by using the factor set against each:—

	Book Weight or C.	Factor.
	Lbs.	
Aluminium	14	0·35
Aluminium-bronze	40	1·00
Delta metal	43·2	1·08
Gun-metal	44	1·10

Table VII shows the schedule weights of 100 feet *lineal* (not super as in Tables I to VI) of corrugated iron sheets of various widths and thicknesses. It should be used as described above for Tables I to VI substituting "total length in feet" for "total area in square feet." The number of feet lineal to one ton for each width and thickness is shown in Table VIII for *galvanized* sheets only.

Tin sheets are paid for by the box or by number and therefore do not fall under the arrangements for schedule weight. Table XI shows the marks, usual sizes, etc., with explanatory notes.

Sheet lead is described by the weight per foot super, and paid for by actual weight it therefore does not fall under the arrangements for schedule weight. The descriptions in ordinary use weigh 5, 6, 7 and 8 lbs. per foot super, and the corresponding thicknesses are ·084, ·101, ·118, and ·135 inch respectively. The usual dimensions of sheets are length 25 to 35 feet, width 6 to 8 feet. The weight per foot super, width, and total weight required should be specified in indents.

TABLE I.

Iron and Steel.

Thickness.	Iron (except Yorkshire). Schedule Weight of 100 Feet superficial.	Iron (except Yorkshire). No. of Feet superficial to 1 Ton, approximate.	Steel and Yorkshire Iron. Schedule Weight of 100 Feet superficial.	Steel and Yorkshire Iron. No. of Feet superficial to 1 Ton, approximate.	Thickness.
		Sheets.			
Inch.	Cwt.		Cwt.		Inch.
1/16	2·344 (11/32)	853	2·391 (23/64)	837	1/16
1/8	4·688 (11/16)	427	4·781 (23/32)	418	1/8
		Plates.			
3/16	7·031 (1/32)	284	7·172 (11/64)	279	3/16
1/4	9·375	213	9·563 (9/16)	209	1/4
5/16	11·719 (33/32)	171	11·953 (61/64)	167	5/16
3/8	14·063 (1/16)	142	14·344 (11/32)	139	3/8
7/16	16·406 (13/32)	122	16·734 (47/64)	120	7/16
1/2	18·75	107	19·125	105	1/2
9/16	21·094 (3/32)	95	21·516 (23/64)	93	9/16
5/8	23·438 (7/16)	85	23·906 (29/32)	84	5/8
11/16	25·781 (25/32)	78	26·297 (19/64)	76	11/16
3/4	28·125	71	28·688 (11/16)	70	3/4
13/16	30·469 (15/32)	66	31·078 (25/64)	64	13/16
7/8	32·813 (13/16)	61	33·469 (15/32)	60	7/8
15/16	35·156 (5/32)	57	35·859 (59/64)	56	15/16
1	37·5	53	38·25	52	1

To obtain the schedule weights of galvanized plates or sheets, add 0·134 cwt. to the weights given in the above table; this extra amount provides for galvanizing both sides of 100 feet super.

To obtain the schedule weight of chequered iron plates add 1·172 cwt. to the tabular weight for the thickness required, *e. g.*, the schedule weight of 100 feet super of ¼ inch chequered iron plate is 9·375 + 1·172 = 10·547 cwt.

NOTE.—The above weights are correct to the nearest third place of decimals; the exact binary fractions are added after the decimals which are not exact.

TABLE II.

Brass, Copper, and Phosphor Bronze.

Thickness.	Brass.		Copper and Phosphor Bronze.		Thickness.
	Schedule Weight of 100 Feet superficial.	No. of Feet superficial to 1 Ton approximate	Schedule Weight of 100 Feet superficial.	No. of Feet superficial to 1 Ton approximate.	
		Sheets.			
Inch.	Cwt.		Cwt.		Inch.
$\frac{1}{16}$	2·572	778	2·725	734	$\frac{1}{16}$
$\frac{1}{8}$	5·145	389	5·449	367	$\frac{1}{8}$
		Plates.			
$\frac{3}{16}$	7·717	259	8·174	245	$\frac{3}{16}$
$\frac{1}{4}$	10·289	194	10·898	184	$\frac{1}{4}$
$\frac{5}{16}$	12·861	156	13·623	147	$\frac{5}{16}$
$\frac{3}{8}$	15·434	130	16·348	122	$\frac{3}{8}$
$\frac{7}{16}$	18·006	111	19·072	105	$\frac{7}{16}$
$\frac{1}{2}$	20·578	97	21·797	92	$\frac{1}{2}$
$\frac{9}{16}$	23·150	86	24·521	82	$\frac{9}{16}$
$\frac{5}{8}$	25·723	78	27·246	73	$\frac{5}{8}$
$\frac{11}{16}$	28·295	71	29·971	67	$\frac{11}{16}$
$\frac{3}{4}$	30·867	65	32·695	61	$\frac{3}{4}$
$\frac{13}{16}$	33·439	60	35·420	56	$\frac{13}{16}$
$\frac{7}{8}$	36·012	56	38·145	52	$\frac{7}{8}$
$\frac{15}{16}$	38·584	52	40·869	49	$\frac{15}{16}$
1	41·156	49	43·594	46	1

Note.—The above weights are correct to the nearest third place of decimals.

The usual trade size for brass and copper sheets is 4 feet × 2 feet. Other sizes can, however, be obtained.

TABLE III.

Zinc and Naval Brass.

Thickness.	Zinc.		Naval Brass.		Thickness.
	Schedule Weight of 100 Feet superficial.	No. of Feet superficial to 1 Ton, approximate.	Schedule Weight of 100 Feet superficial.	No. of Feet superficial to 1 Ton, approximate.	
		Sheets.			
Inch.	Cwt.		Cwt.		Inch.
$\frac{1}{16}$	2·197	910	2·622	763	$\frac{1}{16}$
$\frac{1}{8}$	4·395	455	5·244	381	$\frac{1}{8}$
		Plates.			
$\frac{3}{16}$	6·592	303	7·866	254	$\frac{3}{16}$
$\frac{1}{4}$	8·789	228	10·488	191	$\frac{1}{4}$
$\frac{5}{16}$	10·986	182	13·110	153	$\frac{5}{16}$
$\frac{3}{8}$	13·184	152	15·732	127	$\frac{3}{8}$
$\frac{7}{16}$	15·381	130	18·354	109	$\frac{7}{16}$
$\frac{1}{2}$	17·578	114	20·977	95	$\frac{1}{2}$
$\frac{9}{16}$	19·775	101	23·599	85	$\frac{9}{16}$
$\frac{5}{8}$	21·973	91	26·221	76	$\frac{5}{8}$
$\frac{11}{16}$	24·170	83	28·843	69	$\frac{11}{16}$
$\frac{3}{4}$	26·367	76	31·465	64	$\frac{3}{4}$
$\frac{13}{16}$	28·564	70	34·087	59	$\frac{13}{16}$
$\frac{7}{8}$	30·762	65	36·709	55	$\frac{7}{8}$
$\frac{15}{16}$	32·959	61	39·331	51	$\frac{15}{16}$
1	35·156	57	41·953	48	1

Note.—The above weights are correct to the nearest third place of decimals.

The usual trade sizes for zinc *sheets* are 7 feet × 2 feet 8 inches, 7 feet × 3 feet and 8 feet × 3 feet.

TABLE IV.

Iron and Steel.

Thickness.		Iron (except Yorkshire).		Steel and Yorkshire Iron.		No. of S. W. G.
No. of S. W. G.	Decimals of an Inch.	Schedule Weight of 100 Feet. superficial.	No. of Feet superficial to 1 Ton, approximate.	Schedule Weight of 100 Feet superficial.	No. of Feet superficial to 1 Ton, approximate.	
			Plates.			
		Cwt.		Cwt.		
7/0	·500	18·75	107	19·125	105	7/0
6/0	·464	17·40	115	17·748	113	6/0
5/0	·432	16·20	123	16·524	121	5/0
4/0	·400	15·00	133	15·300	131	4/0
3/0	·372	13·95	143	14·229	141	3/0
2/0	·348	13·05	153	13·311	150	2/0
0	·324	12·15	165	12·393	161	0
1	·300	11·25	178	11·475	174	1
2	·276	10·35	193	10·557	189	2
3	·252	9·45	212	9·639	207	3
4	·232	8·70	230	8·874	225	4
5	·212	7·95	252	8·109	247	5
6	·192	7·20	278	7·344	272	6
			Sheets.			
7	·176	6·60	303	6·732	297	7
8	·160	6·00	333	6·120	327	8
9	·144	5·40	370	5·508	363	9
10	·128	4·80	417	4·896	408	10
11	·116	4·35	460	4·437	451	11
12	·104	3·90	513	3·978	503	12
13	·092	3·45	580	3·519	568	13
14	·080	3·00	667	3·060	654	14
15	·072	2·70	741	2·754	726	15
16	·064	2·40	833	2·448	817	16
17	·056	2·10	952	2·142	934	17
18	·048	1·80	1,111	1·836	1,089	18
19	·040	1·50	1,333	1·530	1,307	19
20	·036	1·35	1,481	1·377	1,452	20
21	·032	1·20	1,667	1·224	1,634	21
22	·028	1·05	1,905	1·071	1,867	22
23	·024	·90	2,222	·918	2,179	23
24	·022	·825	2,424	8·415	2,377	24
25	·020	·75	2,667	·765	2,614	25
26	·018	·675	2,963	·6885	2,905	26
27	·0164	·615	3,252	·6273	3,188	27
28	·0148	·555	3,604	·5661	3,533	28
29	·0136	·510	3,922	·5202	3,845	29
30	·0124	·465	4,301	·4743	4,217	30

To obtain the schedule weights of *galvanized* plates or sheets, add 0·134 cwt. to the weights given in the above table; this extra amount provides for galvanizing both sides of 100 feet super.

Note.—The above weights are exact.

TABLE V.

Brass, Copper, and Phosphor Bronze.

Thickness.		Brass.		Copper and Phosphor Bronze.		No. of S.W.G.
No. of S.W.G.	Decimals of an inch.	Schedule Weight of 100 feet superficial.	No. of Feet superficial to 1 Ton, approximate.	Schedule Weight of 100 feet superficial.	No. of Feet superficial to 1 Ton, approximate.	
			Plates.			
		Cwt.		Cwt.		
7/0	·500	20·578	97	21·797	92	7/0
6/0	·464	19·097	105	20·228	99	6/0
5/0	·432	17·780	112	18·833	106	5/0
4/0	·400	16·463	121	17·438	115	4/0
3/0	·372	15·310	131	16·217	123	3/0
2/0	·348	14·322	140	15·171	132	2/0
0	·324	13·335	150	14·124	142	0
1	·300	12·347	162	13·078	153	1
2	·276	11·359	176	12·032	166	2
3	·252	10·371	193	10·986	182	3
4	·232	9·548	209	10·114	198	4
5	·212	8·725	229	9·242	216	5
6	·192	7·902	253	8·37	239	6
			Sheets.			
7	·176	7·244	276	7·673	261	7
8	·160	6·585	304	6·975	287	8
9	·144	5·926	337	6·278	319	9
10	·128	5·268	380	5·58	358	10
11	·116	4·774	419	5·057	396	11
12	·104	4·280	467	4·534	441	12
13	·092	3·786	528	4·011	499	13
14	·080	3·293	607	3·488	573	14
15	·072	2·963	675	3·139	637	15
16	·064	2·634	759	2·79	717	16
17	·056	2·305	868	2·441	819	17
18	·048	1·976	1,012	2·093	956	18
19	·040	1·646	1,215	1·744	1,147	19
20	·036	1·482	1,350	1·569	1,274	20
21	·032	1·317	1,519	1·395	1,434	21
22	·028	1·152	1,736	1·221	1,639	22
23	·024	·988	2,025	1·046	1,912	23
24	·022	·905	2,209	·959	2,085	24
25	·020	·823	2,430	·872	2,294	25
26	·018	·741	2,700	·785	2,549	26
27	·0164	·675	2,963	·715	2,797	27
28	·0148	·609	3,283	·645	3,100	28
29	·0136	·560	3,573	·593	3,373	29
30	·0124	·510	3,919	·541	3,700	30

Note.—The above weights are correct to the nearest third place of decimals.

TABLE VI.

Zinc and Naval Brass.

Thickness.		Zinc.		Naval Brass.		No. of S. W. G.
No. of S. W. G.	Decimals of an Inch.	Schedule Weight of 100 Feet superficial.	No. of Feet superficial to 1 Ton, approximate.	Schedule of Weight of 100 Feet superficial.	No. of Feet superficial to 1 ton, approximate.	
		Plates.				
		Cwt.		Cwt.		
7/0	·500	17·578 ($\frac{27}{64}$)	114	20·977	95	7/0
6/0	·464	16·313 ($\frac{5}{16}$)	123	19·466	103	6/0
5/0	·432	15·188 ($\frac{9}{16}$)	132	18·124	110	5/0
4/0	·400	14·063 ($\frac{9}{16}$)	142	16·781	119	4/0
3/0	·372	13·078 ($\frac{5}{64}$)	153	15·607	128	3/0
2/0	·348	12·234 ($\frac{15}{64}$)	163	14·600	137	2/0
0	·324	11·391 ($\frac{25}{64}$)	176	13·593	148	0
1	·300	10·547 ($\frac{35}{64}$)	190	12·586	159	1
2	·276	9·703 ($\frac{45}{64}$)	206	11·579	173	2
3	·252	8·859 ($\frac{55}{64}$)	226	10·572	189	3
4	·232	8·156 ($\frac{5}{32}$)	245	9·733	205	4
5	·212	7·453 ($\frac{29}{64}$)	268	8·894	225	5
6	·192	6·75	296	8·055	248	6
		Sheets.				
7	·176	6·188 ($\frac{3}{16}$)	323	7·384	271	7
8	·160	5·625	356	6·713	298	8
9	·144	5·063 ($\frac{1}{16}$)	395	6·041	331	9
10	·128	4·5	444	5·37	372	10
11	·116	4·078 ($\frac{5}{64}$)	490	4·867	411	11
12	·104	3·656 ($\frac{21}{32}$)	547	4·363	458	12
13	·092	3·234 ($\frac{15}{64}$)	618	3·860	518	13
14	·080	2·813 ($\frac{13}{16}$)	711	3·356	596	14
15	·072	2·531 ($\frac{17}{32}$)	79c	3·021	662	15
16	·064	2·25	889	2·685	745	16
17	·056	1·969 ($\frac{31}{32}$)	1,016	2·349	851	17
18	·048	1·688 ($\frac{11}{16}$)	1,185	2·014	993	18
19	·040	1·406 ($\frac{13}{32}$)	1,422	1·678	1,192	19
20	·036	1·266 ($\frac{17}{64}$)	1,580	1·510	1,324	20
21	·032	1·125	1,778	1·343	1,490	21
22	·028	·984 ($\frac{63}{64}$)	2,032	1·175	1,703	22
23	·024	·844 ($\frac{27}{32}$)	2,370	1·007	1,986	23
24	·022	·773	2,586	·923	2,167	24
25	·020	·703	2,844	·839	2,384	25
26	·018	·633	3,160	·755	2,648	26
27	·0164	·577	3,469	·688	2,907	27
28	·0148	·520	3,844	·621	3,221	28
29	·0136	·478	4,182	·571	3,505	29
30	·0124	·436	4,587	·520	3,845	30

Note.—The above weights are correct to the nearest third place of decimals. In the case of zinc, from 7/0 S. W. G. to 23 S. W. G., the exact binary fractions are added after the decimals that are not exact.

TABLE VII.

Corrugated Iron Sheets.

Corrugated Iron Sheets.

Corrugations.				Width.		Schedule Weights, in Cwt. and Decimals, of 100 feet *Lineal of Galvanized* Corrugated Iron Sheets.								Deduct if Sheets are required black, *i.e.*, not Galvanised.	Reference Letter.
Reference Letter.	Width.	Depth.	No.	To cover.	In the Flat before Corrugating.	14 S.W.G.	15 S.W.G.	16 S.W.G.	17 S.W.G.	18 S.W.G.	19 S.W.G.	20 S.W.G.	21 S.W.G.	22 S.W.G.	23 S.W.G.	24 S.W.G.	25 S.W.G.		
	Inch.	Inch.		Ft. In.	Ft. In.													Cwt.	
A	2	½	12	2 0	2 5	—	—	—	—	—	—	3·586	3·224	2·861	2·499	2·317	2·136	0·324	A
B			8	2 2	2 2	—	—	—	5·492	4·796*	4·017	3·648	3·279	2·911	2·542	2·358	2·173	0·329	B
C		⅝	9	2 3	2 5	—	—	—	6·097	5·278	4·459	4·050	3·641	3·232	2·822	2·617	2·413	0·366	C
D	3		10	2 6	2 8	—	—	—	6·702	5·802	4·902	4·452	4·002	3·552	3·102	2·877	2·652	0·402	D
E		¾	11	2 9	2 11	—	—	—	7·354	6·367	5·379	4·885	4·391	3·897	3·405	3·157	2·910	0·441	E
F			12	3 0	3 2	—	—	—	8·029	6·930	5·872	5·333	4·794	4·255	3·715	3·446	3·177	0·482	F
G	4	1	6	2 2	2 3	—	—	—	5·078	4·916	4·153	3·772	3·390	3·009	—	—	—	0·341	G
H			7	2 4	2 6	—	—	—	5·641	5·516	4·766	4·329	3·891	3·454	—	—	—	0·391	H
I			8	2 8	2 10	—	—	—	7·391	6·367	5·379	4·885	4·391	3·897	—	—	—	0·441	I
K			9	3 0	3 2	—	—	—	8·341	7·354	6·992	5·442	4·891	4·341	—	—	—	0·491	K
L	5	1	5	2 1	2 3	—	—	—	9·291	8·192	7·092	5·442	4·891	4·341	—	—	—	0·491	L
M			6	2 6	2 8	—	—	—	6·441	5·678	4·916	4·153	3·772	3·390	3·009	—	—	0·341	M
N			7	2 11	3 1	—	—	—	7·602	6·702	5·802	4·902	4·452	4·002	3·552	—	—	0·402	N
P			8	3 3	3 5	—	—	—	8·763	7·726	6·688	5·651	5·132	4·614	4·095	—	—	0·463	P
Q	5	1¼	5	2 6	2 8	—	—	—	6·863	6·050	5·238	4·425	4·019	—	—	—	—	0·363	Q
R			6	2 11	3 1	—	—	—	8·077	7·121	6·165	5·209	4·731	—	—	—	—	0·427	R
S			7	3 3	3 5	—	—	—	9·291	8·192	7·092	5·992	5·442	—	—	—	—	0·491	S
T	5	1½	5	2 6	2 8	—	—	—	7·180	6·330	5·480	4·630	4·205	—	—	—	—	0·380	T
V			6	2 11	3 1	—	—	—	8·447	7·447	6·447	5·447	4·947	—	—	—	—	0·447	V
			7	3 2	3 4	—	—	—	9·714	8·564	7·414	6·264	5·689	—	—	—	—	0·514	

Note.—The sizes marked B, C, D, P, and S are those in ordinary use.
E, F, I, K, N, Q, R, T and V are "extra" sizes.
Ordinary lengths are 7 to 8 feet. Maximum length is 12 feet.
The following particulars should be given in demands :—
(i) Size of corrugations.
(ii) Either number of corrugations, or the width from out to out.
(iii) Numbers and lengths of sheets.
(iv) Schedule weight.
(v) Include either "black" or "galvanised" in description.

TABLE VIII.

Corrugated Iron Sheets.

APPROXIMATE NO. OF FEET *Lineal* TO 1 TON—*Galvanized* SHEETS ONLY.

Reference Letter.	Corrugations. Width.	Corrugations. Depth.	Corrugations. No.	Width. To Cover.	Width. Out to Out.	Width. In the flat before corrugation.	14 S. W. G.	15 S. W. G.	16 S. W. G.	17 S. W. G.	18 S. W. G.	19 S. W. G.	20 S. W. G.	21 S. W. G.	22 W. G.	23 S. W. G.	24 W. G.	25 S. W. G.	Reference Letter.
	Inches.	Inches.		Ft. In.	Ft. In.	Ft. In.													
A	2	⅓	12	2 0	2 1	2 5	—	—	—	—	—	—	558	620	699	800	863	936	A
B			8	2 0	2 2	2 5⅜	—	—	321	364	417	498	548	616	687	787	848	920	B
C	3	¾	9	2 3	2 5	2 8	—	—	289	328	379	449	494	549	619	709	764	829	C
D			10	2 6	2 8	2 11	—	—	263	298	345	408	449	500	563	645	695	754	D
E			11	2 9	2 11	3 2	—	—	240	272	314	372	409	455	513	587	634	687	E
F			12	3 0	3 2	3 7⅜	—	—	220	249	288	340	375	417	470	538	580	630	F
G			6	2 2	2 3½	2 6⅝	—	—	311	352	407	482	530	590	665	—	—	—	G
H			7	2 4	2 5⅝	2 8⅝	—	—	271	307	355	419	462	514	579	—	—	—	H
I			8	2 8	2 10½	3 1⅜	—	—	240	272	314	372	409	455	513	—	—	—	I
K	4	1	9	3 0	3 2⅝	3 4⅜	—	—	215	244	282	334	368	409	461	—	—	—	K
L			5	2 6	2 8⅜	2 11⅜	278	311	352	407	482	530	590	665	—	—	—	—	L
M			6	2 11	3 1¼	3 3⅝	235	263	298	345	408	449	500	563	—	—	—	—	M
N			7	2 11	3 2⅝	3 5⅞	204	228	259	299	354	390	433	488	—	—	—	—	N
P	5	1¼	5	2 6	2 9	3 0⅛	261	291	331	382	452	498	—	—	—	—	—	—	P
Q			6	2 11	3 2	3 4⅜	221	248	281	324	384	423	—	—	—	—	—	—	Q
R			7	3 0	3 4⅜	3 7⅝	192	215	244	282	334	368	—	—	—	—	—	—	R
S	5	1½	5	2 1	2 4	2 6⅝	249	279	316	365	432	476	—	—	—	—	—	—	S
T			6	2 6	2 9	3 0⅛	212	237	269	310	367	404	—	—	—	—	—	—	T
V			7	2 11	3 2	3 4⅜	184	206	234	270	320	351	—	—	—	—	—	—	V

NOTE.—For "Black" sheets the number of feet lineal to 1 ton may be found by dividing the number of feet superficial, given for the corresponding thickness of iron in Table IV., by the width in the flat before corrugation.

TABLE IX.

Decimals of a Cwt. reduced to Quarters and Pounds.

Decimal.	Qr.	Lb.	Decimal.	Qr.	Lb.	Decimal.	Qr.	Lb.	Decimal.	Qr.	Lb.
·009	0	1	·259	1	1	·509	2	1	·759	3	1
·018	0	2	·268	1	2	·518	2	2	·768	3	2
·027	0	3	·277	1	3	·527	2	3	·777	3	3
·036	0	4	·286	1	4	·536	2	4	·786	3	4
·045	0	5	·295	1	5	·545	2	5	·795	3	5
·054	0	6	·304	1	6	·554	2	6	·804	3	6
·063	0	7	·313	1	7	·563	2	7	·813	3	7
·071	0	8	·321	1	8	·571	2	8	·821	3	8
·080	0	9	·330	1	9	·580	2	9	·830	3	9
·089	0	10	·339	1	10	·589	2	10	·839	3	10
·098	0	11	·348	1	11	·598	2	11	·848	3	11
·107	0	12	·357	1	12	·607	2	12	·857	3	12
·116	0	13	·366	1	13	·616	2	13	·866	3	13
·125	0	14	·375	1	14	·625	2	14	·875	3	14
·134	0	15	·384	1	15	·634	2	15	·884	3	15
·143	0	16	·393	1	16	·643	2	16	·893	3	16
·152	0	17	·402	1	17	·652	2	17	·902	3	17
·161	0	18	·411	1	18	·661	2	18	·911	3	18
·170	0	19	·420	1	19	·670	2	19	·920	3	19
·179	0	20	·429	1	20	·679	2	20	·929	3	20
·188	0	21	·438	1	21	·688	2	21	·938	3	21
·196	0	22	·446	1	22	·696	2	22	·946	3	22
·205	0	23	·455	1	23	·705	2	23	·955	3	23
·214	0	24	·464	1	24	·714	2	24	·964	3	24
·223	0	25	·473	1	25	·723	2	25	·973	3	25
·232	0	26	·482	1	26	·732	2	26	·982	3	26
·241	0	27	·491	1	27	·741	2	27	·991	3	27
·25	1	0	·5	2	0	·75	3	0			

TABLE X.

Areas in Duodecimals (12ths and 144ths of a foot) reduced to decimals of a foot super.

No. of 12ths.	Equivalent decimal.	No. of 144ths.	Equivalent decimal.
1	·083	1	·007
2	·167	2	·014
3	·25	3	·021
4	·333	4	·028
5	·417	5	·035
6	·5	6	·042
7	·583	7	·049
8	·667	8	·056
9	·75	9	·063
10	·833	10	·069
11	·917	11	·076

Example, 151·7·11 (in duodecimals) = 151 + ·583 + ·076 = 151·66 (in decimals).

TABLE XI.

Dimensions in Lineal Inches reduced to decimals of a foot.

Ins.	0	1	2	3	4	5	6	7	8	9	10	11	Ins.
						Decimals of a Foot.							
0	—	·083	·167	·25	·333	·417	·5	·583	·667	·75	·833	·917	0
1/16	·005	·089	·172	·255	·339	·422	·505	·589	·672	·755	·839	·922	1/16
1/8	·010	·094	·177	·26	·344	·427	·510	·594	·677	·760	·844	·927	1/8
3/16	·016	·099	·182	·266	·349	·432	·516	·599	·682	·766	·849	·932	3/16
1/4	·021	·104	·188	·271	·354	·438	·521	·604	·688	·771	·854	·938	1/4
5/16	·026	·109	·193	·276	·359	·443	·526	·609	·693	·776	·859	·943	5/16
3/8	·031	·115	·198	·281	·365	·448	·531	·615	·698	·781	·865	·948	3/8
7/16	·036	·120	·203	·286	·370	·453	·536	·620	·703	·786	870	·953	7/16
1/2	·042	·125	·208	·292	·375	·458	·542	·625	·708	·792	·875	·958	1/2
9/16	·047	·130	·214	·297	·380	·464	·547	·630	·714	·797	·880	·964	9/16
5/8	·052	·135	·219	·302	·385	·469	·552	·635	·719	·802	·885	·969	5/8
11/16	·057	·141	·224	·307	·391	·474	·557	·641	·724	·807	·891	·974	11/16
3/4	·063	·146	·229	·313	·396	·479	·563	·646	·729	·813	·896	·979	3/4
13/16	·068	·151	·234	·318	·401	·484	·568	·651	·734	·818	·901	·984	13/16
7/8	·073	·156	·240	·323	·406	·490	·573	·656	·740	·823	·906	·990	7/8
15/16	·078	·161	·245	·328	·411	·495	·578	·661	·745	·828	·911	·995	15/16

The above figures are correct to the nearest third place of decimals.

This table is intended to facilitate the calculation of areas in feet super and decimals from dimensions such as 2 ft. $3\frac{7}{16}$ in. × 5 ft. $1\frac{11}{16}$ in.

TABLE XII.

Tin Sheets.

List of Marks, usual Sizes, Weights, &c.

Mark.	Size.	No. in a Box.	Standard weight. Per Box.	Standard weight. Per Sheet.	Mark.	Size.	No. in a Box.	Standard weight. Per Box.	Standard weight. Per Sheet.
	Inches.		Lbs.	Lbs. oz.		Inches.		Lbs.	Lbs. oz.
IC, IX	14×10	225	112	0 8	DC, DX	17×25	50	98	1 15⅜
			140	0 10				126	2 8¼
IXX, IXXX, IXXXX			161	0 11⅛	DXX, DXXX, DXXXX			147	2 15
			182	0 13				168	3 5¾
			203	0 14½				189	3 12½
IC, IX, IXX, IXXX, IXXXX	14×20	112	112	1 0	DC, DX, DXX, DXXX, DXXXX	34×25	25	98	3 14¾
			140	1 4				126	5 0⅝
			161	1 7				147	5 14
			182	1 10				168	6 11½
			203	1 13				189	7 9
IC, IX, IXX, IXXX, IXXXX	28×20	56	112	2 0	SDC, SDX, SDXX, SDXXX, SDXXXX	15×11	200	168	0 13½
			140	2 8				189	0 15⅛
			161	2 14				210	1 0¾
			182	3 4				231	1 2½
			203	3 10				252	1 4⅛
DC, DX, DXX, DXXX, DXXXX	17×12½	100	98	0 15¾	SDC, SDX, SDXX, SDXXX, SDXXXX	15×22	100	168	1 10⅞
			126	1 4⅜				189	1 14¼
			147	1 7½				210	2 1½
			168	1 10⅞				231	2 5
			189	1 14¼				252	2 8⅛

IC=Common No. 1. IXX=Two Cross No. 1. DX=Cross Doubles.
IX=Cross No. 1. DC=Common Doubles. SDC=Small Common Doubles.
Each X after the first X adds 21 lbs. to the weight of a box.

The following variations from standard weights are allowed, *viz.*:—

Per box, at the rate of 2 oz. in 7 lbs. ... ... } up or down,
Per sheet, at the rate of 1 oz. in 1 lb. ... ... }

i. e., for IC 14 ins. × 20 in., the weight per box must not be less than 110 lbs. nor more than 114 lbs., and no sheet may weigh less than 15 oz. nor more than 17 oz.

There are two qualities, *viz.*, "Charcoal finish" and "Coke finish," the former being the better. The marks, sizes, and qualities required should be specified in demands and, when trade sizes will suit, the quantities should be stated by numbers of boxes rather than by numbers of sheets. Sizes other than the trade sizes can be supplied, but the marks must be specified, as they indicate the substance, and the quantities should be stated by numbers of sheets. When tin sheets are demanded by marks only, the following sizes are supplied:—

IC, IX, &c. ... ... 14 ins. × 20 ins.
DC, DX, &c. ... ... 17 ins. × 12½ ins.
SDC, SDX, &c. ... ... 15 ins. × 11 ins.

If no quality is specified, "Charcoal finish" is understood to be required.

The weights per foot super and the *approximate* Standard Wire Gauge thicknesses of the different marks are as follows :—

Mark.	Weight.	S. W. G.	Mark.	Weight.	S. W. G.	Mark.	Weight.	S. W. G.
	Lbs.			Lbs.			Lbs.	
IC	·514	30	DC	·664	27	SDC	·733	26
IX	·643	27	DX	·854	24	SDX	·825	25
IXX	·739	26	DXX	·996	23	SDXX	·916	24
IXXX	·836	25	DXXX	1·138	22	SDXXX	1·008	23
IXXXX	·932	23	DXXXX	1·281	21	SDXXXX	1·100	22

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