IS 1863 (1979): rolled steel bulb flats - [CED 7: Structural Engineering and structural sections]

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IS : 1863 - 1979
(Reaffirmed 2004)

Indian Standard
SPECIFICATION FOR ROLLED STEEL BULB FLATS
(First Revision)

UDC 669·14-423·9-122·4 : 006·78

INDIAN STANDARDS INSTITUTION
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Indian Standard
SPECIFICATION FOR ROLLED STEEL BULB FLATS
(First Revision)

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Indian Standard
SPECIFICATION FOR ROLLED STEEL BULB FLATS
(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 30 April 1979, after the draft finalized by the Structural Sections Sectional Committee had been approved by the Structural and Metals Division Council.

0.2 This standard was first published in 1961 as a part of steel economy programme of ISI. In this revision, the standard has been brought in line with ISO/DIS 4974 Dimensions of hot-rolled steel sections — bulb flats (metric series) — dimensions, sectional properties and tolerances.

0.3 Table 1A covers bulb flats which are supplementary to the range of sizes not covered in ISO/DIS 4974. These may be available by mutual arrangement with the supplier.

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

1. SCOPE

1.1 This standard specifies dimensions, sectional properties and dimensional tolerances of hot-rolled steel bulb flats.

2. MATERIAL

2.1 The bulb flats may be manufactured from steel conforming to IS : 226-1975†, IS : 961-1975‡, IS : 2062-1969§ or IS : 3039-1965|| as appropriate.

NOTE — As these sections are intended mainly to be used in shipbuilding, the steel shall, when so required, conform to the specification quoted by the purchaser.

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*Rules for rounding off numerical values (*revised*).

†Specification for structural steel (standard quality) (*fifth revision*).

‡Specification for structural steel (high tensile) (*second revision*).

§Specification for structural steel (fusion welding quality) (*first revision*).

||Specification for structural steel (shipbuilding quality).

3. DESIGNATION

3.1 The bulb flats shall be designated by the width (b) and thickness (t).

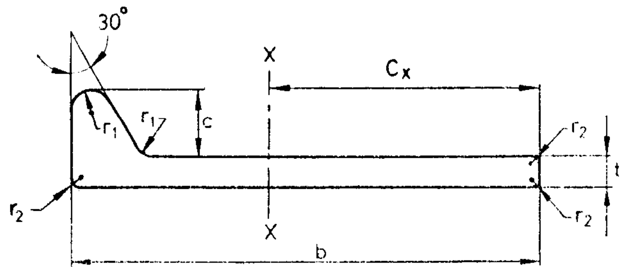
Example: 200 × 10

4. DIMENSIONS

4.1 The dimensions of bulb flats shall be as given in Tables 1 and 1A.

TABLE 1 BULB FLATS — DIMENSIONS AND SECTIONAL PROPERTIES ABOUT XX AXIS

(*Clauses* 4.1 *and* 5.5)



Designation	Mass	Sectional Area	Dimensions b	Dimensions t	Dimensions c	Dimensions r_1	Surface Area	Centroid C_x	Sectional Properties I_x	Sectional Properties Z_x
	kg/m	cm²	mm	mm	mm	mm	m²/m	mm	cm⁴	cm³
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
80 × 6	4·87	6·20	80	6	14	4	0·192	4·78	39·0	8·15
7	5·50	7·00		7	14	4	0·194	4·69	43·3	9·24
100 × 7	6·86	8·74	100	7	15·5	4·5	0·236	5·87	85·3	14·5
8	7·65	9·74		8	15·5	4·5	0·238	5·78	94·3	16·3
120 × 7	8·25	10·5	120	7	17	5	0·278	7·07	148	21·0
8	9·19	11·7		8	17	5	0·280	6·96	164	23·6
140 × 7	9·74	12·4	140	7	19	5·5	0·320	8·31	241	29·0
8	10·8	13·8		8	19	5·5	0·322	8·18	268	32·5
160 × 7	11·4	14·6	160	7	22	6	0·365	9·66	373	38·6
8	12·7	16·2		8	22	6	0·367	9·49	411	43·3
9	14·0	17·8		9	22	6	0·369	9·36	448	47·9

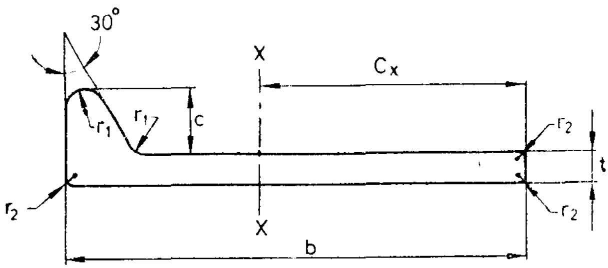
(*Continued*)

TABLE 1 BULB FLATS — DIMENSIONS AND SECTIONAL PROPERTIES ABOUT XX AXIS — *Contd*

Designation	Mass	Sectional Area	Dimensions				Surface Area	Centroid	Sectional Properties	
			b	t	c	r_1		C_x	I_x	Z_x
	kg/m	cm²	mm	mm	mm	mm	m²/m	mm	cm⁴	cm³
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
180 × 8	14·8	18·9	180	8	25	7	0·411	10·9	609	55·0
9	16·2	20·7		9	25	7	0·413	10·7	663	61·8
10	17·6	22·5		10	25	7	0·415	10·6	717	67·8
200 × 9	18·5	23·6	200	9	28	8	0·457	12·1	841	77·7
10	20·1	25·6		10	28	8	0·459	11·9	1 021	85·0
11·5	22·5	28·6		11·5	28	8	0·462	11·7	1 130	96·2
220 × 10	22·8	29·0	220	10	31	9	0·503	13·4	1 400	105
11·5	25·4	32·3		11·5	31	9	0·506	13·1	1 550	118
240 × 10	25·4	32·4	240	10	34	10	0·547	14·7	1 860	126
11	27·4	34·9		11	34	10	0·549	14·6	2 000	137
12	29·3	37·3		12	34	10	0·551	14·4	2 130	148
260 × 10	28·3	36·1	260	10	37	11	0·593	16·2	2 470	153
11	30·3	38·7		11	37	11	0·593	16·0	2 610	162
12	32·4	41·3		12	37	11	0·595	15·8	2 770	175
280 × 11	33·5	42·6	280	11	40	12	0·637	17·4	3 330	191
12	35·7	45·5		12	40	12	0·639	17·2	3 550	206
300 × 11	36·7	46·7	300	11	43	13	0·681	18·9	4 190	222
12	39·0	49·7		12	43	13	0·683	18·7	4 460	239
13	41·5	52·8		13	43	13	0·685	18·5	4 720	256
320 × 12	42·5	54·2	320	12	46	14	0·728	20·1	5 530	274
13	45·0	57·4		13	46	14	0·730	19·9	5 850	294
340 × 12	46·1	58·8	340	12	49	15	0·772	21·5	6 760	313
14	51·5	65·5		14	49	15	0·776	21·1	7 540	357
370 × 13	54·6	69·6	370	13	53·5	16·5	0·840	23·5	9 470	402
15	60·5	77·0		15	53·5	16·5	0·844	23·0	10 400	455
400 × 14	63·9	81·4	400	14	58	18	0·908	25·5	12 900	507
16	70·2	89·4		16	58	18	0·912	25·0	14 200	568
430 × 15	73·9	94·1	430	15	62·5	19·5	0·976	27·4	17 300	628
17	80·6	103		17	62·5	19·5	0·980	26·9	18 900	700

TABLE 1A SUPPLEMENTARY LIST OF BULB FLATS — DIMENSIONS AND SECTIONAL PROPERTIES ABOUT XX AXIS

(*Clauses* 4.1 *and* 5.5)



Designation	Mass	Sectional Area	Dimensions b	Dimensions t	Dimensions c	Dimensions r_1	Surface Area	Centroid C_x	Sectional Properties I_x	Sectional Properties Z_x
	kg/m	10^3mm^2	mm	mm	mm	mm	m^2/m	mm	10^6mm^4	10^3mm^3
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
120 × 6	7·83	9·3	120	6	17	5	0·276	7·20	133	18·4
140 × 10	13·1	16·6	140	10	19	5·5	0·326	7·92	316	39·8
160 × 10	15·3	18·4	160	10	22	6	0·371	9·23	485	52·5
180 × 11	19·0	18·9	180	11	25	7	0·417	10·5	771	73·5
220 × 9	21·0	26·8	220	9	31	9	0·50	13·6	1 300	95·3
280 × 10	30·3	39·8	280	10	40	12	0·635	17·8	3 130	178
13	48·4	48·4		13	40	12	0·641	17·0	3 760	221
320 × 14	47·5	60·6	320	14	46	14	0·732	19·7	6 170	313
340 × 13	48·8	62·2	340	13	49	15	0·774	21·3	7 160	335
15	54·2	69·2		15	49	15	0·778	20·9	7 920	379
370 × 16	63·5	80·7	370	16	53·5	16·5	0·886	22·8	11 000	481
400 × 15	67·8	85·4	400	15	58	18	0·910	25·2	13 600	537
430 × 14	70·6	89·1	430	15	62·5	19·5	0·975	27·3	16 500	594
20	90·8	115		17	62·5	19·5	0·986	26·3	21 200	804

NOTE — The sections included in Table 1A are not covered in ISO/DIS 4974. These may be available by mutual arrangement with the supplier.

5. TOLERANCES

5.1 Width and Thickness — Tolerances on width and thickness shall be as given in Table 2.

TABLE 2 TOLERANCES ON WIDTH AND THICKNESS

Width, b		Thickness, t		Tolerance on Width	Tolerance on Thickness	
Over	Up to and Including	Including and Over	Up to and Including		Over	Under
mm	mm	mm	mm	mm	mm	mm
(1)	(2)	(3)	(4)	(5)	(6)	(7)
—	120	6·0	8·0	± 1·5	+ 0·7	− 0·3
120	180	7·0	11·0	± 2·0	+ 1·0	− 0·3
180	300	9·0	13·0	± 3·0	+ 1·0	− 0·4
300	430	12·0	20·0	± 4·0	+ 1·2	− 0·4

5.2 Radius at Corner — The radius of curvature r_2 at corners shall be within the limits given in Table 3.

TABLE 3 RADIUS AT CORNER

Thickness		Radius of Curvature r_2 *Max*
Over	Up to and Including	
mm	mm	mm
(1)	(2)	(3)
—	6	1·5
6	9	2·0
9	13	3·0
13	17	4·0

5.3 Straightness — The maximum permissible variation in straightness when measured over the entire length shall be 0·003 5 × length.

5.4 Length — The cutting tolerance on length shall be $^{+100}_{-0}$ mm. The bulb flats may be supplied to tighter length tolerances subject to agreement between the purchaser and the supplier.

5.5 Weight — The tolerance on weight shall be ± 2·5 percent of the mass per unit length of sections given in Table 1.

INDIAN STANDARDS

ON

STRUCTURAL SHAPES

IS:

808 (Part I)-1973 Dimensions for hot rolled steel sections: Part I MB series (*second revision*)

808 (Part II)-1978 Dimensions for hot rolled steel sections: Part II Column — SC series (*second revision*)

808 (Part V)-1976 Dimensions for hot rolled steel sections: Part V Equal leg angles (*second revision*)

808 (Part VI)-1976 Dimensions for hot rolled steel sections: Part VI Unequal leg angles (*second revision*)

811-1965 Cold formed light gauge structural steel sections (*revised*)

1173-1978 Hot rolled and slit steel, tee bars (*second revision*)

1252-1958 Rolled steel sections, bulb angles

1730 (Part I)-1974 Dimensions for steel plate, sheet and strip for structural and general engineering purposes: Part I Plate (*first revision*)

1730 (Part II)-1974 Dimensions for steel plate, sheet and strip for structural and general engineering purposes: Part II Sheet (*first revision*)

1730 (Part III)-1974 Dimensions for steel plate, sheet and strip for structural and general engineering purposes: Part III Strip (*first revision*)

1731-1971 Dimensions for steel flats for structural and general engineering purposes (*first revision*)

1732-1971 Dimensions for round and square steel bars for structural and general engineering purposes (*first revision*)

1852-1973 Rolling and cutting tolerances for hot-rolled steel products (*second revision*)

1863-1979 Rolled steel bulb flats (*first revision*)

2314-1963 Steel sheet piling sections

2713-1969 Tubular steel poles for overhead power lines (*first revision*)

3443-1966 Crane rail sections

3908-1966 Aluminium equal leg angles

3909-1966 Aluminium unequal leg angles

3921-1966 Aluminium channels

3954-1966 Hot rolled steel channel sections for general engineering purposes

3964-1967 Light rails

5384-1969 Aluminium I beam

5488-1969 Dimensions for hot rolled steel plates for ship's hull structures

6445-1971 Aluminium tee sections

6449-1971 Aluminium bulb angles for marine use

6475-1971 Aluminium tee bars for marine use

6476-1971 Aluminium bulb plates for marine use

SP: 6 (1)-1964 ISI Handbook for structural engineers, No. 1 Structural steel sections (*revised*)

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	*Unit*	*Symbol*
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	*Unit*	*Symbol*
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	*Unit*	*Symbol*	*Definition*
Force	newton	N	1 N = 1 kg. m/s^2
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2

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