

Translated English of Chinese Standard: GB/T706-2016

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NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA

ICS 77.140.70

H 44

GB/T 706-2016

Replacing GB/T 706-2008

Hot rolled section steel

热轧型钢

Issued on: December 30, 2016

Implemented on: September 1, 2017

**Issued by: General Administration of Quality Supervision, Inspection and
Quarantine of the People's Republic of China;**

**Standardization Administration of the People's Republic of
China.**

Table of Contents

Foreword.....	3
1 Scope.....	5
2 Normative references.....	5
3 Order contents	6
4 Dimension, shape, weight and allowable deviation.....	6
5 Technical requirements	12
6 Test methods.....	13
7 Inspection rules.....	13
8 Packaging, marking and quality certificate.....	13
Annex A (normative) Cross-sectional dimension, cross-sectional area, theoretical weight and cross-section characteristics of section steels.....	14

Foreword

This Standard is drafted in accordance with the rules given in GB/T 1.1-2009.

This Standard replaces GB/T 706-2008 “Hot rolled section steel”. Compared with GB/T 706-2008, main technical changes of this Standard are as follows:

- DELETE relevant contents of hot rolled L-shape section steels (see Table 3, Table 5 and Table A.5 of 2008 edition);
- ADD order contents (see Clause 3);
- ADJUST parts of dimension, shape and allowable deviation (see Table 1 and Table 2 of this Standard, Table 1 and Table 2 of 2008 edition);
- ADJUST the requirements for the allowable deviation of weight (see 4.4 of this Standard, 3.4 of 2008 edition);
- ADD the representing method for specification (see 4.5);
- ADJUST parameters of cross-sectional area, theoretical weight and cross-section characteristics (see Table A.1, Table A.2, Table A.3 and Table A.4).

This Standard is proposed by China Iron and Steel Industry Association.

This Standard is under the jurisdiction of National Technical Committee on Steel of Standardization Administration of China (SCA/TC 183).

Drafting organizations of this Standard: Magang (Group) Holdings Co., Ltd., Hebei Jinxi Iron and Steel Group Co., Ltd., Hebei Iron and Steel Group Tangshan Branch, Shandong Iron and Steel Group Lai Steel Branch, Anshan Baode Iron and Steel Co., Ltd., Rizhao Iron and Steel Holding Group Co., Ltd., Changshu Longteng Special Steel Co., Ltd., China Metallurgical Information and Standardization Institute.

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The previous version of the standard replaced by this Standard are as follows:

- GB/T 706-1965, GB/T 706-1988, GB/T 706-2008;
- GB/T 707-1965, GB/T 707-1988;
- GB/T 9787-1988;

- GB/T 9788-1988;
- GB/T 9946-1988.

Hot rolled section steel

1 Scope

This Standard specifies the order contents, dimension, shape, weight and allowable deviation, technical requirements, test methods, inspection rules, packaging, marking and quality certificate of hot rolled I-beam steels, hot rolled channel steels, hot rolled equal angle steels and hot rolled unequal angle steels.

This Standard applies to hot rolled equal angle steels, hot rolled unequal angle steels and hot rolled I-beam steels and hot rolled channel steels with a slope on the inside of the leg (hereinafter referred to as section steels).

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the dated edition cited applies. For undated references, the latest edition of the referenced document (including all amendments) applies.

GB/T 228.1 Metallic materials - Tensile testing - Part 1: Method of test at room temperature

GB/T 229 Metallic materials - Charpy pendulum impact test method

GB/T 232 Metallic materials - Bend test

GB/T 700 Carbon structural steels

GB/T 1591 High strength low alloy structural steels

GB/T 2101 General requirement of acceptance, packaging, marking, and certification for section steel

GB/T 2975 Steel and steel products - Location and preparation of test pieces for mechanical testing

YB/T 4427 General requirements for surface condition of hot-rolled sections

3 Order contents

The contract ordered in accordance with this Standard shall contain the following technical contents:

- a) product name;
- b) standard number;
- c) grade;
- d) model, specification;
- e) delivery length;
- f) weight and quantity;
- g) other special requirements of the demand party.

4 Dimension, shape, weight and allowable deviation

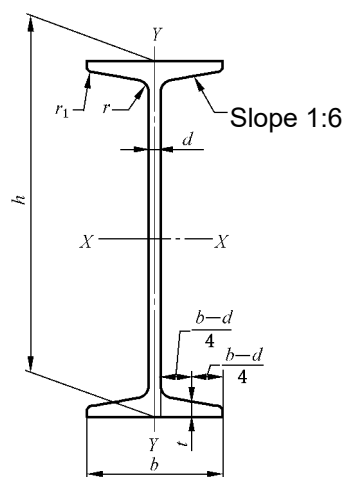
4.1 Dimension and representing method

4.1.1 Schematic diagrams and marked symbols of cross-section of section steels are as shown in Figure 1 to Figure 4.

4.1.2 Parameters of cross-sectional dimension, cross-sectional area, theoretical weight and cross-section characteristics of section steels shall comply with the specifications of Tables A.1 to A.4 of Annex A.

4.2 Dimension, shape and allowable deviation

4.2.1 Dimension, shape and allowable deviation of section steels shall comply with the specifications of Table 1 to Table 2. According to the requirements of the demand party, dimension, shape and allowable deviation of section steels can also be specified in accordance with the agreement between supply and demand parties.



Key:

h - height

b - leg width;

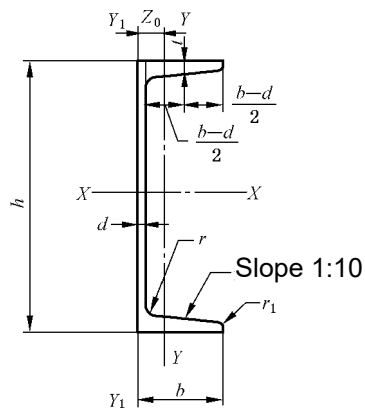
d - waist thickness;

t - middle leg thickness;

r - inner arc radius;

r_1 - arc radius of leg end.

Figure 1 -- Cross-section diagram of I-beam steel



Key:

h - height

b - leg width;

d - waist thickness;

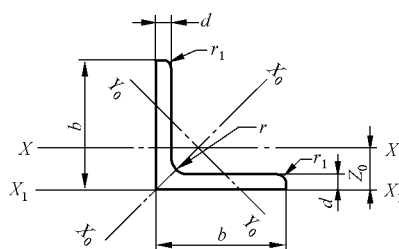
t - middle leg thickness;

r - inner arc radius;

r_1 - arc radius of leg end.

Z_0 - distance of center of gravity.

Figure 2 -- Cross-section diagram of channel steel



Key:

b - leg width;

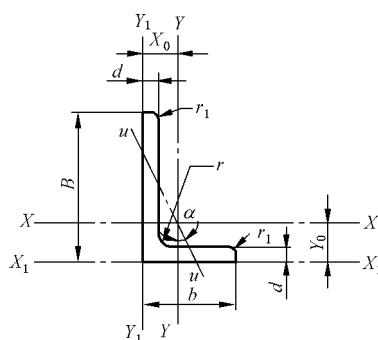
d - waist thickness;

r - inner arc radius;

r_1 - edge arc radius;

Z_0 - distance of center of gravity.

Figure 3 -- Cross-section diagram of equal angle steel



Key:

B - long side width;

b - short side width;

d - waist thickness;

r - inner arc radius;

r_1 - edge arc radius;

X_0 - distance of center of gravity;

Y_0 - distance of center of gravity.

Figure 4 -- Cross-section diagram of unequal angle steel

4.2.2 Passivation of leg end edge of I-beam steels and passivation of leg end edge and shoulder of channel steels shall be such that a round bar with a diameter of $0.18t$ can not pass through; passivation of corner angle and vertex angle of angle steels shall be such that a round bar with a diameter of $0.18d$ can not pass through.

4.2.3 Slope of outer edge and bending deflection I-beam steels and channel steels, and top right angle of angle steels shall be inspected at where with a distance of not less than 750 mm from the end.

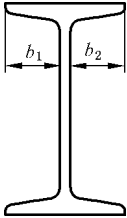
4.2.4 Allowable deviation of leg thickness (t) of I-beam steels and channel steels is $\pm 0.06t$.

4.2.5 Section steels shall not be significantly reversed.

Table 1 -- Dimension, shape and allowable deviation of I-beam steels and channel steels

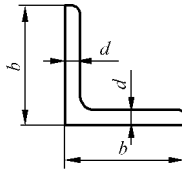
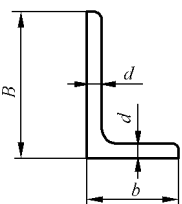
In millimeters

Items		Allowable deviation	Schematic diagram
Height (h)	$h < 100$	± 1.5	
	$100 \leq h < 200$	± 2.0	
	$200 \leq h < 400$	± 3.0	
	$h \geq 400$	± 4.0	
Leg width (b)	$h < 100$	± 1.5	
	$100 \leq h < 150$	± 2.0	
	$150 \leq h < 200$	± 2.5	
	$200 \leq h < 300$	± 3.0	
	$300 \leq h < 400$	± 3.5	
	$h \geq 400$	± 4.0	
Waist thickness (d)	$h < 100$	± 0.4	
	$100 \leq h < 200$	± 0.5	
	$200 \leq h < 300$	± 0.7	
	$300 \leq h < 400$	± 0.8	
	$h \geq 400$	± 0.9	
Slope of outer edge (T_1 and T_2)		T_1 and $T_2 \leq 1.5 \% b$ $T_1 + T_2 \leq 2.5 \% b$	
Bending deflection (W)		$W \leq 0.15d$	
Curvature	I-beam steel	Curvature per meter ≤ 2 mm Total curvature $\leq$ 0.20 % of total length	Applicable to the upper and lower, left and right bending

	Channel steel		Curvature per meter ≤ 3 mm Total curvature $\leq 0.30\%$ of total length	
Center deviation (S)	I-beam steel	$h < 100$	± 1.5	 $S = (b_1 - b_2)/2$
		$100 \leq h < 150$	± 2.0	
		$150 \leq h < 200$	± 2.5	
		$200 \leq h < 300$	± 3.0	
		$300 \leq h < 400$	± 3.5	
		$h \geq 400$	± 4.0	

NOTE: Measurement positions of dimension and shape are as shown in schematic diagrams.

Table 2 -- Dimension, shape and allowable deviation of angle steels In millimeters

Items		Allowable deviation		Schematic diagram
		Equal angle steel	Unequal angle steel	
Side width (B, b)	$b^a \leq 56$	± 0.8	± 0.8	
	$56 < b^a \leq 90$	± 1.2	± 1.5	
	$90 < b^a \leq 140$	± 1.8	± 2.0	
	$140 < b^a \leq 200$	± 2.5	± 2.5	
	$b^a > 200$	± 3.5	± 3.5	
Side thickness (d)	$b^a \leq 56$	± 0.4		
	$56 < b^a \leq 90$	± 0.6		
	$90 < b^a \leq 140$	± 0.7		
	$140 < b^a \leq 200$	± 1.0		
	$b^a > 200$	± 1.4		
Top right angle		$\alpha \leq 50'$		
Curvature		Curvature per meter ≤ 3 mm Total curvature $\leq 0.30\%$ of total length		Applicable to the upper and lower, left and right bending

NOTE: Measurement positions of dimension and shape are as shown in schematic diagrams

^a For unequal angle steels, this is the long side length B .

NOTE: Measurement positions of dimension and shape are as shown in schematic diagrams.

^a For unequal angle steels, this is the long side length B.

4.3 Length and allowable deviation

The delivery length of section steels shall be indicated in the contract and the allowable deviation of length shall comply with the specifications of Table 3.

Table 3 -- Allowable deviation of length of section steels In millimeters

Length	Allowable deviation
≤ 8000	+50 0
> 8000	+80 0

4.4 Weight and allowable deviation

4.4.1 Section steels shall be delivered in theoretical weight and the theoretical weight shall be calculated at a density of 7.85 g/cm³. Negotiated by both supply and demand parties and indicated in the contract, section steels can also be delivered in actual weight.

4.4.2 The allowable deviation of weight of section steels shall not exceed $\pm 5\%$. The weight deviation (%) is calculated according to equation (1). The allowable deviation of weight is applicable to a batch of the same dimension and the weight exceeds 1 ton, and is also applicable to a batch of the same dimension and the weight is not more than 1 ton but the number is greater than 10.

$$\text{Weight deviation} = \frac{\text{Actual weight} - \text{theoretical weight}}{\text{Theoretical weight}} \times 100 \% \quad \dots\dots\dots (1)$$

4.4.3 Calculation equations of cross-sectional area of section steels are as shown in Table 4.

Table 4 -- Calculation methods of cross-sectional area

Type of section steel	Calculation equation
I-beam steel	$hd + 2t(b - d) + 0.577(r^2 - r_1^2)$
Channel steel	$hd + 2t(b - d) + 0.339(r^2 - r_1^2)$
Equal angle steel	$d(2b - d) + 0.215(r^2 - 2r_1^2)$
Unequal angle steel	$d(B + b - d) + 0.215(r^2 - 2r_1^2)$

4.5 Representing method of specification

I-beam steels: “I” and height $\times$ leg width $\times$ waist thickness;

e.g.: I450 $\times$ 150 $\times$ 11.5 (abbreviated as I45a).

Channel steels: “[” and height $\times$ leg width $\times$ waist thickness;

e.g.: [200 $\times$ 75 $\times$ 9 (abbreviated as [20b].

Equal angle steels: “ $\angle$ ” and side width $\times$ side width $\times$ edge thickness;

e.g.: $\angle$ 200 $\times$ 200 $\times$ 24 (abbreviated as $\angle$ 200 $\times$ 24).

Unequal angle steels: “∠” and long side width × short side width × edge thickness;

e.g.: ∠160 × 100 × 16.

5 Technical requirements

5.1 Grades and chemical composition

Steel grades and chemical composition (smelting analysis) shall comply with the relevant specifications of GB/T 700 or GB/T 1591. According to the requirements of the demand party, through the agreement between the supply and demand parties, steels of other grades and chemical composition can also be supplied.

5.2 Mechanical properties

Mechanical properties of section steels shall comply with the relevant specifications of GB/T 700 or GB/T 1591. According to the requirements of the demand party, through the agreement between the supply and demand parties, steels of other mechanical property indicators can also be supplied.

5.3 Delivery status

The steel is delivered in hot rolled state.

5.4 Surface quality

5.4.1 Surface of section steels shall not have cracks, folding, scarring, stratification and inclusions.

5.4.2 Surface of section steels allows existence of defects such as local hairlines, pits, dots, scratches and iron oxide presses, but these defects shall not exceed the allowable deviation of dimension of section steels.

5.4.3 Defects on the surface of section steels are allowed to be cleared, which shall be smooth without edges, but horizontal clearance is not allowed. The clearance width shall not be less than five times the clearance depth; after clearance, the dimension of section steels shall not exceed the allowable deviation of dimension.

5.4.4 Ends of section steels shall not have burrs greater than 5 mm.

5.4.5 According to the agreement between supply and demand parties, the surface quality can also be implemented in accordance with the specifications of YB/T 4427.

6 Test methods

Inspection items, sampling quantity, sampling methods and test methods of each batch of steel shall comply with the specifications of Table 5.

Table 5 -- Test items, sampling quantity, sampling methods and test methods

No.	Test item	Sampling quantity	Sampling method	Test method
1	Chemical composition (smelting analysis)	According to the provisions of the corresponding grade standards		
2	Tensile test	1/batch	GB/T 2975 ^a	GB/T 228.1
3	Bend test	1/batch		GB/T 232
4	Impact test	3/batch		GB/T 229
5	Surface quality	one by one	—	Visual, measuring tools
6	Dimension, shape	one by one	—	Measuring tools
7	Weight deviation	4.4.2	4.4.2	Weigh

^a I-beam steel and channel steel are sampled in the waist.

7 Inspection rules

7.1 Inspection and acceptance of section steels is carried out by technical quality supervision departments of the supply party. The demand party shall have the right to inspect and accept any of the inspection items specified in this Standard or the contract.

7.2 Batching of section steels is in accordance with the specifications of GB/T 700, GB/T 1591 and the corresponding standards.

7.3 Re-inspection and acceptance rules of section steels shall comply with the specifications of GB/T 2101.

8 Packaging, marking and quality certificate

Packing, marking and quality certificate of section steels shall comply with the specifications of GB/T2101.

Annex A

(normative)

Cross-sectional dimension, cross-sectional area, theoretical weight and cross-section characteristics of section steels

Table A.1 -- Cross-sectional dimension, cross-sectional area, theoretical weight and cross-section characteristics of I-beam steels

A	B						C	D	E	F		G		H	
	<i>h</i>	<i>b</i>	<i>d</i>	<i>t</i>	<i>r</i>	<i>r₁</i>				<i>I_x</i>	<i>I_y</i>	<i>i_x</i>	<i>i_y</i>	<i>W_x</i>	<i>W_y</i>
10	100	68	4.5	7.6	6.5	3.3	14.33	11.3	0.432	245	33.0	4.14	1.52	49.0	9.72
12	120	74	5.0	8.4	7.0	3.5	17.80	14.0	0.493	436	46.9	4.95	1.62	72.7	12.7
12.6	126	74	5.0	8.4	7.0	3.5	18.10	14.2	0.505	488	46.9	5.20	1.61	77.5	12.7
14	140	80	5.5	9.1	7.5	3.8	21.50	16.9	0.553	712	64.4	5.76	1.73	102	16.1
16	160	88	6.0	9.9	8.0	4.0	26.11	20.5	0.621	1 130	93.1	6.58	1.89	141	21.2
18	180	94	6.5	10.7	8.5	4.3	30.74	24.1	0.681	1 660	122	7.36	2.00	185	26.0
20a	200	100	7.0	11.4	9.0	4.5	35.55	27.9	0.742	2 370	158	8.15	2.12	237	31.5
20b		102	9.0				39.55	31.1	0.746	2 500	169	7.96	2.06	250	33.1
22a	220	110	7.5	12.3	9.5	4.8	42.10	33.1	0.817	3 400	225	8.99	2.31	309	40.9
22b		112	9.5				46.50	36.5	0.821	3 570	239	8.78	2.27	325	42.7
24a	240	116	8.0	13.0	10.0	5.0	47.71	37.5	0.878	4 570	280	9.77	2.42	381	48.4
24b		118	10.0				52.51	41.2	0.882	4 800	297	9.57	2.38	400	50.4
25a	250	116	8.0				48.51	38.1	0.898	5 020	280	10.2	2.40	402	48.3
25b		118	10.0				53.51	42.0	0.902	5 280	309	9.94	2.40	423	52.4
27a	270	122	8.5	13.7	10.5	5.3	54.52	42.8	0.958	6 550	345	10.9	2.51	485	56.6
27b		124	10.5				59.92	47.0	0.962	6 870	366	10.7	2.47	509	58.9
28a	280	122	8.5				55.37	43.5	0.978	7 110	345	11.3	2.50	508	56.6
28b		124	10.5				60.97	47.9	0.982	7 480	379	11.1	2.49	534	61.2
30a	300	126	9.0	14.4	11.0	5.5	61.22	48.1	1.031	8 950	400	12.1	2.55	597	63.5
30b		128	11.0				67.22	52.8	1.035	9 400	422	11.8	2.50	627	65.9
30c		130	13.0				73.22	57.5	1.039	9 850	445	11.6	2.46	657	68.5
32a	320	130	9.5	15.0	11.5	5.8	67.12	52.7	1.084	11 100	460	12.8	2.62	692	70.8
32b		132	11.5				73.52	57.7	1.088	11 600	502	12.6	2.61	726	76.0
32c		134	13.5				79.92	62.7	1.092	12 200	544	12.3	2.61	760	81.2
36a	360	136	10.0	15.8	12.0	6.0	76.44	60.0	1.185	15 800	552	14.4	2.69	875	81.2
36b		138	12.0				83.64	65.7	1.189	16 500	582	14.1	2.64	919	84.3
36c		140	14.0				90.84	71.3	1.193	17 300	612	13.8	2.60	962	87.4

Key:

A - Model;

B - Cross-sectional dimension/mm;
C - Cross-sectional area/cm²;
D - Theoretical weight/(kg/m);
E - Outer surface area/(m²/m);
F - Moment of inertia/cm⁴;
G - Inertia radius/cm;
H - Section modulus/cm³.

Table A.1 (continued)

A	B						C	D	E	F		G		H	
	h	b	d	t	r	r_1				I_x	I_y	i_x	i_y	W_x	W_y
40a	400	142	10.5	16.5	12.5	6.3	86.07	67.6	1.285	21 700	660	15.9	2.77	1 090	93.2
40b		144	12.5				94.07	73.8	1.289	22 800	692	15.6	2.71	1 140	96.2
40c		146	14.5				102.1	80.1	1.293	23 900	727	15.2	2.65	1 190	99.6
45a	450	150	11.5	18.0	13.5	6.8	102.4	80.4	1.411	32 200	855	17.7	2.89	1 430	114
45b		152	13.5				111.4	87.4	1.415	33 800	894	17.4	2.84	1 500	118
45c		154	15.5				120.4	94.5	1.419	35 300	938	17.1	2.79	1 570	122
50a	500	158	12.0	20.0	14.0	7.0	119.2	93.6	1.539	46 500	1 120	19.7	3.07	1 860	142
50b		160	14.0				129.2	101	1.543	48 600	1 170	19.4	3.01	1 940	146
50c		162	16.0				139.2	109	1.547	50 600	1 220	19.0	2.96	2 080	151
55a	550	166	12.5	21.0	14.5	7.3	134.1	105	1.667	62 900	1 370	21.6	3.19	2 290	164
55b		168	14.5				145.1	114	1.671	65 600	1 420	21.2	3.14	2 390	170
55c		170	16.5				156.1	123	1.675	68 400	1 480	20.9	3.08	2 490	175
56a	560	166	12.5	21.0	14.5	7.3	135.4	106	1.687	65 600	1 370	22.0	3.18	2 340	165
56b		168	14.5				146.6	115	1.691	68 500	1 490	21.6	3.16	2 450	174
56c		170	16.5				157.8	124	1.695	71 400	1 560	21.3	3.16	2 550	183
63a	630	176	13.0	22.0	15.0	7.5	154.6	121	1.862	93 900	1 700	24.5	3.31	2 980	193
63b		178	15.0				167.2	131	1.866	98 100	1 810	24.2	3.29	3 160	204
63c		180	17.0				179.8	141	1.870	102 000	1 920	23.8	3.27	3 300	214
NOTE: Data of r and r_1 in the table are for hole design, not for delivery condition.															

Key:

A - Model;

B - Cross-sectional dimension/mm;

C - Cross-sectional area/cm²;

D - Theoretical weight/(kg/m);

E - Outer surface area/(m²/m);F - Moment of inertia/cm⁴;

G - Inertia radius/cm;

H - Section modulus/cm³.

Table A.2 -- Cross-sectional dimension, cross-sectional area, theoretical weight and cross-section characteristics of channel steels

A	B						C	D	E	F			G		H		I
	h	b	d	t	r	r_1				I_x	I_y	I_{y1}	i_x	i_y	W_x	W_y	
5	50	37	4.5	7.0	7.0	3.5	6.925	5.44	0.226	26.0	8.30	20.9	1.94	1.10	10.4	3.55	1.35
6.3	63	40	4.8	7.5	7.5	3.8	8.446	6.63	0.262	50.8	11.9	28.4	2.45	1.19	16.1	4.50	1.36
6.5	65	40	4.3	7.5	7.5	3.8	8.292	6.51	0.267	55.2	12.0	28.3	2.54	1.19	17.0	4.59	1.38
8	80	43	5.0	8.0	8.0	4.0	10.24	8.04	0.307	101	16.6	37.4	3.15	1.27	25.3	5.79	1.43
10	100	48	5.3	8.5	8.5	4.2	12.74	10.0	0.365	198	25.6	54.9	3.95	1.41	39.7	7.80	1.52
12	120	53	5.5	9.0	9.0	4.5	15.36	12.1	0.423	346	37.4	77.7	4.75	1.56	57.7	10.2	1.62
12.6	126	53	5.5	9.0	9.0	4.5	15.69	12.3	0.435	391	38.0	77.1	4.95	1.57	62.1	10.2	1.59

Key:

A - Model;

B - Cross-sectional dimension/mm;

C - Cross-sectional area/cm²;

D - Theoretical weight/(kg/m);

E - Outer surface area/(m²/m);F - Moment of inertia/cm⁴;

G - Inertia radius/cm;

H - Section modulus/cm³;

I - Distance of center of gravity/mm.

Table A.2 (continued)

A	B						C	D	E	F			G		H		I
	<i>h</i>	<i>b</i>	<i>d</i>	<i>t</i>	<i>r</i>	<i>r</i> ₁				<i>I</i> _x	<i>I</i> _y	<i>I</i> _{y1}	<i>i</i> _x	<i>i</i> _y	<i>W</i> _x	<i>W</i> _y	
14a	140	58	6.0	9.5	9.5	4.8	18.51	14.5	0.480	564	53.2	107	5.52	1.70	80.5	13.0	1.71
14b		60	8.0				21.31	16.7	0.484	609	61.1	121	5.35	1.69	87.1	14.1	1.67
16a	160	63	6.5	10.0	10.0	5.0	21.95	17.2	0.538	866	73.3	144	6.28	1.83	108	16.3	1.80
16b		65	8.5				25.15	19.8	0.542	935	83.4	161	6.10	1.82	117	17.6	1.75
18a	180	68	7.0	10.5	10.5	5.2	25.69	20.2	0.596	1 270	98.6	190	7.04	1.96	141	20.0	1.88
18b		70	9.0				29.29	23.0	0.600	1 370	111	210	6.84	1.95	152	21.5	1.84
20a	200	73	7.0	11.0	11.0	5.5	28.83	22.6	0.654	1 780	128	244	7.86	2.11	178	24.2	2.01
20b		75	9.0				32.83	25.8	0.658	1 910	144	268	7.64	2.09	191	25.9	1.95
22a	220	77	7.0	11.5	11.5	5.8	31.83	25.0	0.709	2 390	158	298	8.67	2.23	218	28.2	2.10
22b		79	9.0				36.23	28.5	0.713	2 570	176	326	8.42	2.21	234	30.1	2.03
24a	240	78	7.0	12.0	12.0	6.0	34.21	26.9	0.752	3 050	174	325	9.45	2.25	254	30.5	2.10
24b		80	9.0				39.01	30.6	0.756	3 280	194	355	9.17	2.23	274	32.5	2.03
24c		82	11.0				43.81	34.4	0.760	3 510	213	388	8.96	2.21	293	34.4	2.00
25a	250	78	7.0				34.91	27.4	0.722	3 370	176	322	9.82	2.24	270	30.6	2.07
25b		80	9.0				39.91	31.3	0.776	3 530	196	353	9.41	2.22	282	32.7	1.98
25c		82	11.0				44.91	35.3	0.780	3 690	218	384	9.07	2.21	295	35.9	1.92
27a	270	82	7.5	12.5	12.5	6.2	39.27	30.8	0.826	4 360	216	393	10.5	2.34	323	35.5	2.13
27b		84	9.5				44.67	35.1	0.830	4 690	239	428	10.3	2.31	347	37.7	2.06
27c		86	11.5				50.07	39.3	0.834	5 020	261	467	10.1	2.28	372	39.8	2.03
28a	280	82	7.5				40.02	31.4	0.846	4 760	218	388	10.9	2.33	340	35.7	2.10
28b		84	9.5				45.62	35.8	0.850	5 130	242	428	10.6	2.30	366	37.9	2.02
28c		86	11.5				51.22	40.2	0.854	5 500	268	463	10.4	2.29	393	40.3	1.95
30a	300	85	7.5	13.5	13.5	6.8	43.89	34.5	0.897	6 050	260	467	11.7	2.43	403	41.1	2.17
30b		87	9.5				49.89	39.2	0.901	6 500	289	515	11.4	2.41	433	44.0	2.13
30c		89	11.5				55.89	43.9	0.905	6 950	316	560	11.2	2.38	463	46.4	2.09
32a	320	88	8.0	14.0	14.0	7.0	48.50	38.1	0.947	7 600	305	552	12.5	2.50	475	46.5	2.24
32b		90	10.0				54.90	43.1	0.951	8 140	336	593	12.2	2.47	509	49.2	2.16
32c		92	12.0				61.30	48.1	0.955	8 690	374	643	11.9	2.47	543	52.6	2.09
36a	360	96	9.0	16.0	16.0	8.0	60.89	47.8	1.053	11 900	455	818	14.0	2.73	660	63.5	2.44
36b		98	11.0				68.09	53.5	1.057	12 700	497	880	13.6	2.70	703	66.9	2.37
36c		100	13.0				75.29	59.1	1.061	13 400	536	948	13.4	2.67	746	70.0	2.34

Key:

A - Model;

B - Cross-sectional dimension/mm;

C - Cross-sectional area/cm²;

D - Theoretical weight/(kg/m);
E - Outer surface area/(m²/m);
F - Moment of inertia/cm⁴;
G - Inertia radius/cm;
H - Section modulus/cm³;
I - Distance of center of gravity/mm.

Table A.2 (continued)

A	B						C	D	E	F			G		H		I
	h	b	d	t	r	r_1				I_x	I_y	I_{y1}	i_x	i_y	W_x	W_y	
40a	400	100	10.5	18.0	18.0	9.0	75.04	58.9	1.144	17 600	592	1 070	15.3	2.81	879	78.8	2.49
40b		102	12.5				83.04	65.2	1.148	18 600	640	1 140	15.0	2.78	932	82.5	2.44
40c		104	14.5				91.04	71.5	1.152	19 700	688	1 220	14.7	2.75	986	86.2	2.42
NOTE: Data of r and r_1 in the table are for hole design, not for delivery condition.																	

Key:

A - Model;

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C - Cross-sectional area/cm²;

D - Theoretical weight/(kg/m);

E - Outer surface area/(m²/m);F - Moment of inertia/cm⁴;

G - Inertia radius/cm;

H - Section modulus/cm³;

I - Distance of center of gravity/mm.

Table A.3 -- Cross-sectional dimension, cross-sectional area, theoretical weight and cross-section characteristics of equal angle steels

A	B			C	D	E	F				G			H			I
	<i>b</i>	<i>d</i>	<i>r</i>				<i>I_x</i>	<i>I_{x1}</i>	<i>I_{x0}</i>	<i>I_{y0}</i>	<i>i_x</i>	<i>i_{x0}</i>	<i>i_{y0}</i>	<i>W_x</i>	<i>W_{x0}</i>	<i>W_{y0}</i>	
2	20	3	3.5	1.132	0.89	0.078	0.40	0.81	0.63	0.17	0.59	0.75	0.39	0.29	0.45	0.20	0.60
		4		1.459	1.15	0.077	0.50	1.09	0.78	0.22	0.58	0.73	0.38	0.36	0.55	0.24	0.64
2.5	25	3		1.432	1.12	0.098	0.82	1.57	1.29	0.34	0.76	0.95	0.49	0.46	0.73	0.33	0.73
		4		1.859	1.46	0.097	1.03	2.11	1.62	0.43	0.74	0.93	0.48	0.59	0.92	0.40	0.76
3.0	30	3	4.5	1.749	1.37	0.117	1.46	2.71	2.31	0.61	0.91	1.15	0.59	0.68	1.09	0.51	0.85
		4		2.276	1.79	0.117	1.84	3.63	2.92	0.77	0.90	1.13	0.58	0.87	1.37	0.62	0.89
3.6	36	3		2.109	1.66	0.141	2.58	4.68	4.09	1.07	1.11	1.39	0.71	0.99	1.61	0.76	1.00
		4		2.756	2.16	0.141	3.29	6.25	5.22	1.37	1.09	1.38	0.70	1.28	2.05	0.93	1.04
		5		3.382	2.65	0.141	3.95	7.84	6.24	1.65	1.08	1.36	0.7	1.56	2.45	1.00	1.07
4	40	3	5	2.359	1.85	0.157	3.59	6.41	5.69	1.49	1.23	1.55	0.79	1.23	2.01	0.96	1.09
		4		3.086	2.42	0.157	4.60	8.56	7.29	1.91	1.22	1.54	0.79	1.60	2.58	1.19	1.13
		5		3.792	2.98	0.156	5.53	10.7	8.76	2.30	1.21	1.52	0.78	1.96	3.10	1.39	1.17
4.5	45	3		2.659	2.09	0.177	5.17	9.12	8.20	2.14	1.40	1.76	0.89	1.58	2.58	1.24	1.22
		4		3.486	2.74	0.177	6.65	12.2	10.6	2.75	1.38	1.74	0.89	2.05	3.32	1.54	1.26
		5		4.292	3.37	0.176	8.04	15.2	12.7	3.33	1.37	1.72	0.88	2.51	4.00	1.81	1.30
		6		5.077	3.99	0.176	9.33	18.4	14.8	3.89	1.36	1.70	0.80	2.95	4.64	2.06	1.33
5	50	3	5.5	2.971	2.33	0.197	7.18	12.5	11.4	2.98	1.55	1.96	1.00	1.96	3.22	1.57	1.34
		4		3.897	3.06	0.197	9.26	16.7	14.7	3.82	1.54	1.94	0.99	2.56	4.16	1.96	1.38
		5		4.803	3.77	0.196	11.2	20.9	17.8	4.64	1.53	1.92	0.98	3.13	5.03	2.31	1.42
		6		5.688	4.46	0.196	13.1	25.1	20.7	5.42	1.52	1.91	0.98	3.68	5.85	2.63	1.46

Key:

A - Model;

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E - Outer surface area/(m²/m);F - Moment of inertia/cm⁴;

G - Inertia radius/cm;

H - Section modulus/cm³;

I - Distance of center of gravity/mm.

Table A.3 (continued)

A	B			C	D	E	F				G			H			I
	b	d	r				I_x	I_{x1}	I_{x0}	I_{y0}	i_x	i_{x0}	i_{y0}	W_x	W_{x0}	W_{y0}	
5.6	56	3	6	3.343	2.62	0.221	10.2	17.6	16.1	4.24	1.75	2.20	1.13	2.48	4.08	2.02	1.48
		4		4.39	3.45	0.220	13.2	23.4	20.9	5.46	1.73	2.18	1.11	3.24	5.28	2.52	1.53
		5		5.415	4.25	0.220	16.0	29.3	25.4	6.61	1.72	2.17	1.10	3.97	6.42	2.98	1.57
		6		6.42	5.04	0.220	18.7	35.3	29.7	7.73	1.71	2.15	1.10	4.68	7.49	3.40	1.61
		7		7.404	5.81	0.219	21.2	41.2	33.6	8.82	1.69	2.13	1.09	5.36	8.49	3.80	1.64
		8		8.367	6.57	0.219	23.6	47.2	37.4	9.89	1.68	2.11	1.09	6.03	9.44	4.16	1.68
6	60	5	6.5	5.829	4.58	0.236	19.9	36.1	31.6	8.21	1.85	2.33	1.19	4.59	7.44	3.48	1.67
		6		6.914	5.43	0.235	23.4	43.3	36.9	9.60	1.83	2.31	1.18	5.41	8.70	3.98	1.70
		7		7.977	6.26	0.235	26.4	50.7	41.9	11.0	1.82	2.29	1.17	6.21	9.88	4.45	1.74
		8		9.02	7.08	0.235	29.5	58.0	46.7	12.3	1.81	2.27	1.17	6.98	11.0	4.88	1.78
6.3	63	4	7	4.978	3.91	0.248	19.0	33.4	30.2	7.89	1.96	2.46	1.26	4.13	6.78	3.29	1.70
		5		6.143	4.82	0.248	23.2	41.7	36.8	9.57	1.94	2.45	1.25	5.08	8.25	3.90	1.74
		6		7.288	5.72	0.247	27.1	50.1	43.0	11.2	1.93	2.43	1.24	6.00	9.66	4.46	1.78
		7		8.412	6.60	0.247	30.9	58.6	49.0	12.8	1.92	2.41	1.23	6.88	11.0	4.98	1.82
		8		9.515	7.47	0.247	34.5	67.1	54.6	14.3	1.90	2.40	1.23	7.75	12.3	5.47	1.85
		10		11.66	9.15	0.246	41.1	84.3	64.9	17.3	1.88	2.36	1.22	9.39	14.6	6.36	1.93
7	70	4	8	5.570	4.37	0.275	26.4	45.7	41.8	11.0	2.18	2.74	1.40	5.14	8.44	4.17	1.86
		5		6.876	5.40	0.275	32.2	57.2	51.1	13.3	2.16	2.73	1.39	6.32	10.3	4.95	1.91
		6		8.160	6.41	0.275	37.8	68.7	59.9	15.6	2.15	2.71	1.38	7.48	12.1	5.67	1.95
		7		9.424	7.40	0.275	43.1	80.3	68.4	17.8	2.14	2.69	1.38	8.59	13.8	6.34	1.99
		8		10.67	8.37	0.274	48.2	91.9	76.4	20.0	2.12	2.68	1.37	9.68	15.4	6.98	2.03
7.5	75	5	9	7.412	5.82	0.295	40.0	70.6	63.3	16.6	2.33	2.92	1.50	7.32	11.9	5.77	2.04
		6		8.797	6.91	0.294	47.0	84.6	74.4	19.5	2.31	2.90	1.49	8.64	14.0	6.67	2.07
		7		10.16	7.98	0.294	53.6	98.7	85.0	22.2	2.30	2.89	1.48	9.93	16.0	7.44	2.11
		8		11.50	9.03	0.294	60.0	113	95.1	24.9	2.28	2.88	1.47	11.2	17.9	8.19	2.15
		9		12.83	10.1	0.294	66.1	127	105	27.5	2.27	2.86	1.46	12.4	19.8	8.89	2.18
		10		14.13	11.1	0.293	72.0	142	114	30.1	2.26	2.84	1.46	13.6	21.5	9.56	2.22
8	80	5	9	7.912	6.21	0.315	48.8	85.4	77.3	20.3	2.48	3.13	1.60	8.34	13.7	6.66	2.15
		6		9.397	7.38	0.314	57.4	103	91.0	23.7	2.47	3.11	1.59	9.87	16.1	7.65	2.19
		7		10.86	8.53	0.314	65.6	120	104	27.1	2.46	3.10	1.58	11.4	18.4	8.58	2.23
		8		12.30	9.66	0.314	73.5	137	117	30.4	2.44	3.08	1.57	12.8	20.6	9.46	2.27
		9		13.73	10.8	0.314	81.1	154	129	33.6	2.43	3.06	1.56	14.3	22.7	10.3	2.31
		10		15.13	11.9	0.313	88.4	172	140	36.8	2.42	3.04	1.56	15.6	24.8	11.1	2.35

Key:

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F - Moment of inertia/cm⁴;
G - Inertia radius/cm;
H - Section modulus/cm³;
I - Distance of center of gravity/mm.

Table A.3 (continued)

A	B			C	D	E	F				G			H			I
	b	d	r				I_x	I_{x1}	I_{x0}	I_{y0}	i_x	i_{x0}	i_{y0}	W_x	W_{x0}	W_{y0}	
9	90	6	10	10.64	8.35	0.354	82.8	146	131	34.3	2.79	3.51	1.80	12.6	20.6	9.95	2.44
		7		12.30	9.66	0.354	94.8	170	150	39.2	2.78	3.50	1.78	14.5	23.6	11.2	2.48
		8		13.94	10.9	0.353	106	195	169	44.0	2.76	3.48	1.78	16.4	26.6	12.4	2.52
		9		15.57	12.2	0.353	118	219	187	48.7	2.75	3.46	1.77	18.3	29.4	13.5	2.56
		10		17.17	13.5	0.353	129	244	204	53.3	2.74	3.45	1.76	20.1	32.0	14.5	2.59
		12		20.31	15.9	0.352	149	294	236	62.2	2.71	3.41	1.75	23.6	37.1	16.5	2.67
10	100	6	12	11.93	9.37	0.393	115	200	182	47.9	3.10	3.90	2.00	15.7	25.7	12.7	2.67
		7		13.80	10.8	0.393	132	234	209	54.7	3.09	3.89	1.99	18.1	29.6	14.3	2.71
		8		15.64	12.3	0.393	148	267	235	61.4	3.08	3.88	1.98	20.5	33.2	15.8	2.76
		9		17.46	13.7	0.392	164	300	260	68.0	3.07	3.86	1.97	22.8	36.8	17.2	2.80
		10		19.26	15.1	0.392	180	334	285	74.4	3.05	3.84	1.96	25.1	40.3	18.5	2.84
		12		22.80	17.9	0.391	209	402	331	86.8	3.03	3.81	1.95	29.5	46.8	21.1	2.91
		14		26.26	20.6	0.391	237	471	374	99.0	3.00	3.77	1.94	33.7	52.9	23.4	2.99
		16		29.63	23.3	0.390	263	540	414	111	2.98	3.74	1.94	37.8	58.6	25.6	3.06
11	110	7	12	15.20	11.9	0.433	177	311	281	73.4	3.41	4.30	2.20	22.1	36.1	17.5	2.96
		8		17.24	13.5	0.433	199	355	316	82.4	3.40	4.28	2.19	25.0	40.7	19.4	3.01
		10		21.26	16.7	0.432	242	445	384	100	3.38	4.25	2.17	30.6	49.4	22.9	3.09
		12		25.20	19.8	0.431	283	535	448	117	3.35	4.22	2.15	36.1	57.6	26.2	3.16
		14		29.06	22.8	0.431	321	625	508	133	3.32	4.18	2.14	41.3	65.3	29.1	3.24
12.5	125	8	14	19.75	15.5	0.492	297	521	471	123	3.88	4.88	2.50	32.5	53.3	25.9	3.37
		10		24.37	19.1	0.491	362	652	574	149	3.85	4.85	2.48	40.0	64.9	30.6	3.45
		12		28.91	22.7	0.491	423	783	671	175	3.83	4.82	2.46	41.2	76.0	35.0	3.53
		14		33.37	26.2	0.490	482	916	764	200	3.80	4.78	2.45	54.2	86.4	39.1	3.61
		16		37.74	29.6	0.489	537	1 050	851	224	3.77	4.75	2.43	60.9	96.3	43.0	3.68
14	140	10	14	27.37	21.5	0.551	515	915	817	212	4.34	5.46	2.78	50.6	82.6	39.2	3.82
		12		32.51	25.5	0.551	604	1 100	959	249	4.31	5.43	2.76	59.8	96.9	45.0	3.90
		14		37.57	29.5	0.550	689	1 280	1 090	284	4.28	5.40	2.75	68.8	110	50.5	3.98
		16		42.54	33.4	0.549	770	1 470	1 220	319	4.26	5.36	2.74	77.5	123	55.6	4.06
15	150	8	14	23.75	18.6	0.592	521	900	827	215	4.69	5.90	3.01	47.4	78.0	38.1	3.99
		10		29.37	23.1	0.591	638	1 130	1 010	262	4.66	5.87	2.99	58.4	95.5	45.5	4.08
		12		34.91	27.4	0.591	749	1 350	1 190	308	4.63	5.84	2.97	69.0	112	52.4	4.15
		14		40.37	31.7	0.590	856	1 580	1 360	352	4.60	5.80	2.95	79.5	128	58.8	4.23
		15		43.06	33.8	0.590	907	1 690	1 440	374	4.59	5.78	2.95	84.6	136	61.9	4.27
		16		45.74	35.9	0.589	958	1 810	1 520	395	4.58	5.77	2.94	89.6	143	64.9	4.31

Key:

A - Model;

B - Cross-sectional dimension/mm;

C - Cross-sectional area/cm²;
D - Theoretical weight/(kg/m);
E - Outer surface area/(m²/m);
F - Moment of inertia/cm⁴;
G - Inertia radius/cm;
H - Section modulus/cm³;
I - Distance of center of gravity/mm.

Table A.3 (continued)

A	B			C	D	E	F				G			H			I
	<i>b</i>	<i>d</i>	<i>r</i>				I_x	I_{x1}	I_{x0}	I_{y0}	i_x	i_{x0}	i_{y0}	W_x	W_{x0}	W_{y0}	
16	160	10	16	31.50	24.7	0.630	780	1 370	1 240	322	4.98	6.27	3.20	66.7	109	52.8	4.31
		12		37.44	29.4	0.630	917	1 640	1 460	377	4.95	6.24	3.18	79.0	129	60.7	4.39
		14		43.30	34.0	0.629	1 050	1 910	1 670	432	4.92	6.20	3.16	91.0	147	68.2	4.47
		16		49.07	38.5	0.629	1 180	2 190	1 870	485	4.89	6.17	3.14	103	165	75.3	4.55
18	180	12	18	42.24	33.2	0.710	1 320	2 330	2 100	543	5.59	7.05	3.58	101	165	78.4	4.89
		14		48.90	38.4	0.709	1 510	2 720	2 410	622	5.56	7.02	3.56	116	189	88.4	4.97
		16		55.47	43.5	0.709	1 700	3 120	2 700	699	5.54	6.98	3.55	131	212	97.8	5.05
		18		61.96	48.6	0.708	1 880	3 500	2 990	762	5.50	6.94	3.51	146	235	105	5.13
20	200	14	18	54.64	42.9	0.788	2 100	3 730	3 340	864	6.20	7.82	3.98	145	236	112	5.46
		16		62.01	48.7	0.788	2 370	4 270	3 760	971	6.18	7.79	3.96	164	266	124	5.54
		18		69.30	54.4	0.787	2 620	4 810	4 160	1 080	6.15	7.75	3.94	182	294	136	5.62
		20		76.51	60.1	0.787	2 870	5 350	4 550	1 180	6.12	7.72	3.93	200	322	147	5.69
		24		90.66	71.2	0.785	3 340	6 460	5 290	1 380	6.07	7.64	3.90	236	374	167	5.87
22	220	16	21	68.67	53.9	0.866	3 190	5 680	5 060	1 310	6.81	8.59	4.37	200	326	154	6.03
		18		76.75	60.3	0.866	3 540	6 400	5 620	1 450	6.79	8.55	4.35	223	361	168	6.11
		20		84.76	66.5	0.865	3 870	7 110	6 150	1 590	6.76	8.52	4.34	245	395	182	6.18
		22		92.68	72.8	0.865	4 200	7 830	6 670	1 730	6.73	8.48	4.32	267	429	195	6.26
		24		100.5	78.9	0.864	4 520	8 550	7 170	1 870	6.71	8.45	4.31	289	461	208	6.33
		26		108.3	85.0	0.864	4 830	9 280	7 690	2 000	6.68	8.41	4.30	310	492	221	6.41
25	250	18	24	87.84	69.0	0.985	5 270	9 380	8 370	2 170	7.75	9.76	4.97	290	473	224	6.84
		20		97.05	76.2	0.984	5 780	10 400	9 180	2 380	7.72	9.73	4.95	320	519	243	6.92
		22		106.2	83.3	0.983	6 280	11 500	9 970	2 580	7.69	9.69	4.93	349	564	261	7.00
		24		115.2	90.4	0.983	6 770	12 500	10 700	2 790	7.67	9.66	4.92	378	608	278	7.07
		26		124.2	97.5	0.982	7 240	13 600	11 500	2 980	7.64	9.62	4.90	406	650	295	7.15
		28		133.0	104	0.982	7 700	14 600	12 200	3 180	7.61	9.58	4.89	433	691	311	7.22
		30		141.8	111	0.981	8 160	15 700	12 900	3 380	7.58	9.55	4.88	461	731	327	7.30
		32		150.5	118	0.981	8 600	16 800	13 600	3 570	7.56	9.51	4.87	488	770	342	7.37
		35		163.4	128	0.980	9 240	18 400	14 600	3 850	7.52	9.46	4.86	527	827	364	7.48

NOTE: $r_1=1/3d$ in the cross-section diagram and data of r in the table are for hole design, not for delivery condition.

Key:

A - Model;

B - Cross-sectional dimension/mm;

C - Cross-sectional area/cm²;

D - Theoretical weight/(kg/m);

E - Outer surface area/(m²/m);

F - Moment of inertia/cm⁴;

G - Inertia radius/cm;

H - Section modulus/cm³;

I - Distance of center of gravity/mm.

Table A.4 -- Cross-sectional dimension, cross-sectional area, theoretical weight and cross-section characteristics of unequal angle steels

A	B				C	D	E	F					G			H			tan α	I	
	B	b	d	r				I_x	I_{x1}	I_y	I_{y1}	I_u	i_x	i_y	i_u	W_x	W_y	W_u		X_0	Y_0
2.5/1.6	25	16	3	3.5	1.162	0.91	0.080	0.70	1.56	0.22	0.43	0.14	0.78	0.44	0.34	0.43	0.19	0.16	0.392	0.42	0.86
			4		1.499	1.18	0.079	0.88	2.09	0.27	0.59	0.17	0.77	0.43	0.34	0.55	0.24	0.20	0.381	0.46	0.90
3.2/2	32	20	3	4	1.492	1.17	0.102	1.53	3.27	0.46	0.82	0.28	1.01	0.55	0.43	0.72	0.30	0.25	0.382	0.49	1.08
			4		1.939	1.52	0.101	1.93	4.37	0.57	1.12	0.35	1.00	0.54	0.42	0.93	0.39	0.32	0.374	0.53	1.12
4/2.5	40	25	3	4	1.890	1.48	0.127	3.08	5.39	0.93	1.59	0.56	1.28	0.70	0.54	1.15	0.49	0.40	0.385	0.59	1.32
			4		2.467	1.94	0.127	3.93	8.53	1.18	2.14	0.71	1.36	0.69	0.54	1.49	0.63	0.52	0.381	0.63	1.37
4.5/2.8	45	28	3	5	2.149	1.69	0.143	4.45	9.10	1.34	2.23	0.80	1.44	0.79	0.61	1.47	0.62	0.51	0.383	0.64	1.47
			4		2.806	2.20	0.143	5.69	12.1	1.70	3.00	1.02	1.42	0.78	0.60	1.91	0.80	0.66	0.380	0.68	1.51
5/3.2	50	32	3	5.5	2.431	1.91	0.161	6.24	12.5	2.02	3.31	1.20	1.60	0.91	0.70	1.84	0.82	0.68	0.404	0.73	1.60
			4		3.177	2.49	0.160	8.02	16.7	2.58	4.45	1.53	1.59	0.90	0.69	2.39	1.06	0.87	0.402	0.77	1.65
5.6/3.6	56	36	3	6	2.743	2.15	0.181	8.88	17.5	2.92	4.7	1.73	1.80	1.03	0.79	2.32	1.05	0.87	0.408	0.80	1.78
			4		3.590	2.82	0.180	11.5	23.4	3.76	6.33	2.23	1.79	1.02	0.79	3.03	1.37	1.13	0.408	0.85	1.82
			5		4.415	3.47	0.180	13.9	29.3	4.49	7.94	2.67	1.77	1.01	0.78	3.71	1.65	1.36	0.404	0.88	1.87
6.3/4	63	40	4	7	4.058	3.19	0.202	16.5	33.3	5.23	8.63	3.12	2.02	1.14	0.88	3.87	1.70	1.40	0.398	0.92	2.04
			5		4.993	3.92	0.202	20.0	41.6	6.31	10.9	3.76	2.00	1.12	0.87	4.74	2.07	1.71	0.396	0.95	2.08
			6		5.908	4.64	0.201	23.4	50.0	7.29	13.1	4.34	1.96	1.11	0.86	5.59	2.43	1.99	0.393	0.99	2.12
			7		6.802	5.34	0.201	26.5	58.1	8.24	15.5	4.97	1.98	1.10	0.86	6.40	2.78	2.29	0.389	1.03	2.15
7/4.5	70	45	4	7.5	4.553	3.57	0.226	23.2	45.9	7.55	12.3	4.40	2.26	1.29	0.98	4.86	2.17	1.77	0.410	1.02	2.24
			5		5.609	4.40	0.225	28.0	57.1	9.13	15.4	5.40	2.23	1.28	0.98	5.92	2.65	2.19	0.407	1.06	2.28
			6		6.644	5.22	0.225	32.5	68.4	10.6	18.6	6.35	2.21	1.26	0.98	6.95	3.12	2.59	0.404	1.09	2.32
			7		7.658	6.01	0.225	37.2	80.0	12.0	21.8	7.16	2.20	1.25	0.97	8.03	3.57	2.94	0.402	1.13	2.36

Key:

A - Model;

B - Cross-sectional dimension/mm;

C - Cross-sectional area/cm²;

D - Theoretical weight/(kg/m);

E - Outer surface area/(m²/m);

F - Moment of inertia/cm⁴;

G - Inertia radius/cm;

H - Section modulus/cm³;

I - Distance of center of gravity/mm.

Table A.4 (continued)

A	B				C	D	E	F					G			H			tan α	I	
	B	b	d	r				I_x	I_{x1}	I_y	I_{y1}	I_u	i_x	i_y	i_u	W_x	W_y	W_u		X_0	Y_0
7.5/5	75	50	5	8	6.126	4.81	0.245	34.9	70.0	12.6	21.0	7.41	2.39	1.44	1.10	6.83	3.3	2.74	0.435	1.17	2.40
			6		7.260	5.70	0.245	41.1	84.3	14.7	25.4	8.54	2.38	1.42	1.08	8.12	3.88	3.19	0.435	1.21	2.44
			8		9.467	7.43	0.244	52.4	113	18.5	34.2	10.9	2.35	1.40	1.07	10.5	4.99	4.10	0.429	1.29	2.52
			10		11.59	9.10	0.244	62.7	141	22.0	43.4	13.1	2.33	1.38	1.06	12.8	6.04	4.99	0.423	1.36	2.60
8/5	80	50	5		6.376	5.00	0.255	42.0	85.2	12.8	21.1	7.66	2.56	1.42	1.10	7.78	3.32	2.74	0.388	1.14	2.60
			6		7.560	5.93	0.255	49.5	103	15.0	25.4	8.85	2.56	1.41	1.08	9.25	3.91	3.20	0.387	1.18	2.65
			7		8.724	6.85	0.255	56.2	119	17.0	29.8	10.2	2.54	1.39	1.08	10.6	4.48	3.70	0.384	1.21	2.69
			8		9.867	7.75	0.254	62.8	136	18.9	34.3	11.4	2.52	1.38	1.07	11.9	5.03	4.16	0.381	1.25	2.73
9/5.6	90	56	5	9	7.212	5.66	0.287	60.5	121	18.3	29.5	11.0	2.90	1.59	1.23	9.92	4.21	3.49	0.385	1.25	2.91
			6		8.557	6.72	0.286	71.0	146	21.4	35.6	12.9	2.88	1.58	1.23	11.7	4.96	4.13	0.384	1.29	2.95
			7		9.881	7.76	0.286	81.0	170	24.4	41.7	14.7	2.86	1.57	1.22	13.5	5.70	4.72	0.382	1.33	3.00
			8		11.18	8.78	0.286	91.0	194	27.2	47.9	16.3	2.85	1.56	1.21	15.3	6.41	5.29	0.380	1.36	3.04
10/6.3	100	63	6	10	9.618	7.55	0.320	99.1	200	30.9	50.5	18.4	3.21	1.79	1.38	14.6	6.35	5.25	0.394	1.43	3.24
			7		11.11	8.72	0.320	113	233	35.3	59.1	21.0	3.20	1.78	1.38	16.9	7.29	6.02	0.394	1.47	3.28
			8		12.58	9.88	0.319	127	266	39.4	67.9	23.5	3.18	1.77	1.37	19.1	8.21	6.78	0.391	1.50	3.32
			10		15.47	12.1	0.319	154	333	47.1	85.7	28.3	3.15	1.74	1.35	23.3	9.98	8.24	0.387	1.58	3.40
10/8	100	80	6	10	10.64	8.35	0.354	107	200	61.2	103	31.7	3.17	2.40	1.72	15.2	10.2	8.37	0.627	1.97	2.95
			7		12.30	9.66	0.354	123	233	70.1	120	36.2	3.16	2.39	1.72	17.5	11.7	9.60	0.626	2.01	3.00
			8		13.94	10.9	0.353	138	267	78.6	137	40.6	3.14	2.37	1.71	19.8	13.2	10.8	0.625	2.05	3.04
			10		17.17	13.5	0.353	167	334	94.7	172	49.1	3.12	2.35	1.69	24.2	16.1	13.1	0.622	2.13	3.12

Key:

A - Model;

B - Cross-sectional dimension/mm;

C - Cross-sectional area/cm²;

D - Theoretical weight/(kg/m);

E - Outer surface area/(m²/m);

F - Moment of inertia/cm⁴;

G - Inertia radius/cm;

H - Section modulus/cm³;

I - Distance of center of gravity/mm.

Table A.4 (continued)

A	B				C	D	E	F					G			H			tan α	I	
	B	b	d	r				I_x	I_{x1}	I_y	I_{y1}	I_u	i_x	i_y	i_u	W_x	W_y	W_u		X_0	Y_0
11/7	110	70	6	10	10.64	8.35	0.354	133	266	42.9	69.1	25.4	3.54	2.01	1.54	17.9	7.90	6.53	0.403	1.57	3.53
			7		12.30	9.66	0.354	153	310	49.0	80.8	29.0	3.53	2.00	1.53	20.6	9.09	7.50	0.402	1.61	3.57
			8		13.94	10.9	0.353	172	354	54.9	92.7	32.5	3.51	1.98	1.53	23.3	10.3	8.45	0.401	1.65	3.62
			10		17.17	13.5	0.353	208	443	65.9	117	39.2	3.48	1.96	1.51	28.5	12.5	10.3	0.397	1.72	3.70
12.5/8	125	80	7	11	14.10	11.1	0.403	228	455	74.4	120	43.8	4.02	2.30	1.76	26.9	12.0	9.92	0.408	1.80	4.01
			8		15.99	12.6	0.403	257	520	83.5	138	49.2	4.01	2.28	1.75	30.4	13.6	11.2	0.407	1.84	4.06
			10		19.71	15.5	0.402	312	650	101	173	59.5	3.98	2.26	1.74	37.3	16.6	13.6	0.404	1.92	4.14
			12		23.35	18.3	0.402	364	780	117	210	69.4	3.95	2.24	1.72	44.0	19.4	16.0	0.400	2.00	4.22
14/9	140	90	8	12	18.04	14.2	0.453	366	731	121	196	70.8	4.50	2.59	1.98	38.5	17.3	14.3	0.411	2.04	4.50
			10		22.26	17.5	0.452	446	913	140	246	85.8	4.47	2.56	1.96	47.3	21.2	17.5	0.409	2.12	4.58
			12		26.40	20.7	0.451	522	1 100	170	297	100	4.44	2.54	1.95	55.9	25.0	20.5	0.406	2.19	4.66
			14		30.46	23.9	0.451	594	1 280	192	349	114	4.42	2.51	1.94	64.2	28.5	23.5	0.403	2.27	4.74
15/9	150	90	8	12	18.84	14.8	0.473	442	898	123	196	74.1	4.84	2.55	1.98	43.9	17.5	14.5	0.364	1.97	4.92
			10		23.26	18.3	0.472	539	1 120	149	246	89.9	4.81	2.53	1.97	54.0	21.4	17.7	0.362	2.05	5.01
			12		27.60	21.7	0.471	632	1 350	173	297	105	4.79	2.50	1.95	63.8	25.1	20.8	0.359	2.12	5.09
			14		31.86	25.0	0.471	721	1 570	196	350	120	4.76	2.48	1.94	73.3	28.8	23.8	0.356	2.20	5.17
			15		33.95	26.7	0.471	764	1 680	207	376	127	4.74	2.47	1.93	78.0	30.5	25.3	0.354	2.24	5.21
			16		36.03	28.3	0.470	806	1 800	217	403	134	4.73	2.45	1.93	82.6	32.3	26.8	0.352	2.27	5.25
16/10	160	100	10	13	25.32	19.9	0.512	669	1 360	205	337	122	5.14	2.85	2.19	62.1	26.6	21.9	0.390	2.28	5.24
			12		30.05	23.6	0.511	785	1 640	239	406	142	5.11	2.82	2.17	73.5	31.3	25.8	0.388	2.36	5.32
			14		34.71	27.2	0.510	896	1 910	271	476	162	5.08	2.80	2.16	84.6	35.8	29.6	0.385	2.43	5.40
			16		39.28	30.8	0.510	1 000	2 180	302	548	183	5.05	2.77	2.16	95.3	40.2	33.4	0.382	2.51	5.48

Key:

A - Model;

B - Cross-sectional dimension/mm;

C - Cross-sectional area/cm²;

D - Theoretical weight/(kg/m);

E - Outer surface area/(m²/m);

F - Moment of inertia/cm⁴;

G - Inertia radius/cm;

H - Section modulus/cm³;

I - Distance of center of gravity/mm.

Table 4 (continued)

A	B				C	D	E	F					G			H			tanα	I	
	B	b	d	r				I _x	I _{x1}	I _y	I _{y1}	I _u	i _x	i _y	i _u	W _x	W _y	W _u		X ₀	Y ₀
18/11	180	110	10	14	28.37	22.3	0.571	956	1 940	278	447	167	5.80	3.13	2.42	79.0	32.5	26.9	0.376	2.44	5.89
			12		33.71	26.5	0.571	1 120	2 330	325	539	195	5.78	3.10	2.40	93.5	38.3	31.7	0.374	2.52	5.98
			14		38.97	30.6	0.570	1 290	2 720	370	632	222	5.75	3.08	2.39	108	44.0	36.3	0.372	2.59	6.06
			16		44.14	34.6	0.569	1 440	3 110	412	726	249	5.72	3.06	2.38	122	49.4	40.9	0.369	2.67	6.14
20/12.5	200	125	12		37.91	29.8	0.641	1 570	3 190	483	788	286	6.44	3.57	2.74	117	50.0	41.2	0.392	2.83	6.54
			14		43.87	34.4	0.640	1 800	3 730	551	922	327	6.41	3.54	2.73	135	57.4	47.3	0.390	2.91	6.62
			16		49.74	39.0	0.639	2 020	4 260	615	1 060	366	6.38	3.52	2.71	152	64.9	53.3	0.388	2.99	6.70
			18		55.53	43.6	0.639	2 240	4 790	677	1 200	405	6.35	3.49	2.70	169	71.7	59.2	0.385	3.06	6.78
NOTE: r ₁ =1/3d in the cross-section diagram and data of r in the table are for hole design, not for delivery condition.																					

Key:

A - Model;

B - Cross-sectional dimension/mm;

C - Cross-sectional area/cm²;

D - Theoretical weight/(kg/m);

E - Outer surface area/(m²/m);F - Moment of inertia/cm⁴;

G - Inertia radius/cm;

H - Section modulus/cm³;

I - Distance of center of gravity/mm.

_____ END _____