UDC 669.14-462-131.2 : 693.8 : 621.753.1 July 1978

Hollow Sections for Structural Steel Engineering

Cold Formed Welded Square and Rectangular Steel Tubes

Dimensions, Weights, Permissible Deviations, Static Values

DIN 59 411

Hohlprofile für den Stahlbau; Kaltgefertigte geschweisste quadratische und rechteckige Stahlrohre; Masse, Gewichte, zulässige Abweichungen, statische Werte

For connection with the Draft of the International Standard ISO/DIS 4019, see Explanations.

Dimensions in mm

1 Scope

This Standard applies to cold formed, welded, square and rectangular hollow steel sections in the dimensions according to Tables 1 and 2, made of the steels quoted in Section 4, used primarily for structural steel engineering.

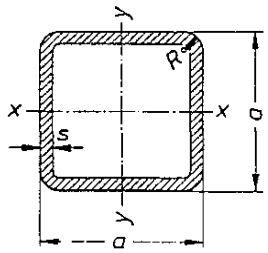

Figure 1.

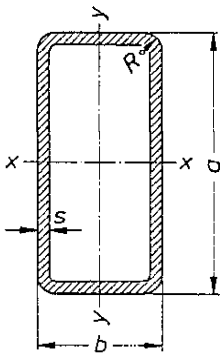

Figure 2.

2 Designation

2.1 Standard designation

2.1.1 The standard designation should, in accordance with DIN 820 Part 27, specify the following in the sequence given:

The denomination (hollow section),

DIN number of the dimension standard,

Code number or material number of the steel grade,

All nominal dimensions for the side lengths (a x a or a x b) and the wall thickness.

2.1.2 Examples of standard designation

a) Designation of a hollow section made of steel St 37-2 (material number 1.0037 *)), square, with side lengths a = 70 mm and wall thickness s = 40 mm:

Hollow section
DIN 59 411 – St 37-2 – 70 x 70 x 4
or Hollow section
DIN 59 411 – 1.0037 – 70 x 70 x 4

b) Designation of a hollow section made of steel St 52-3 (material number 1.0570 *)), rectangular, with side lengths a = 100 mm and b = 60 mm as well as wall thickness s = 5 mm:

Hollow section
DIN 59 411 – St 52-3 – 100 x 60 x 5
or Hollow section
DIN 59 411 – 1.0570 – 100 x 60 x 5

*) New material numbers that have been adopted in the successor issue of DIN 17 100 as well as in the planned technical conditions of delivery for hollow sections.

2.2 Designation in order

2.2.1 To ensure satisfactory processing of orders, the standard designation should be supplemented by the following information:

a) Ordered quantity or number of pieces (information given in front of the standard designation)

b) Length or range of lengths in accordance with Table 4 (information given after the standard designation)

2.2.2 Examples of designation in order

a) 20 t of hollow sections with the standard designation according to Section 2.1.2a) in manufacturing lengths of 8000 to 10 000 mm:

20 t Hollow section DIN 59 411 – St 37-2 – 70 x 70 x 4 in manufacturing lengths 8000 to 10 000

or **20 t Hollow section DIN 59 411 – 1.0037 – 70 x 70 x 4 in manufacturing lengths 8000 to 10 000**

b) 100 pieces of hollow sections with standard designation according to Section 2.1.2b) in exact lengths of 6000 mm:

100 pieces Hollow section DIN 59 411 – St 52-3 – 100 x 60 x 5 in exact length 6000 mm

or **100 pieces Hollow section DIN 59 411 – 1.0570 – 100 x 60 x 5 in exact length 6000 mm.**

3 Dimensions and permissible deviations on dimension and form

3.1 Cross-section

3.1.1 The dimensions stipulated in this Standard are given in Table 1 for square hollow sections and in Table 2 for rectangular hollow sections.

3.1.2 Tables 1 and 2 give the permissible deviations from the side lengths a and b – including any camber on the sides. These deviations as well as the permissible deviations from wall thickness should be taken into account in determining the internal dimensions of hollow sections.

Continued on pages 2 to 7
Explanations on page 7

Table 1. **Cold formed square hollow steel sections; dimensions, permissible deviations from the side length, static values**

Nominal dimensions			Cross-section	Weight	Surface area	Static values 1) for bending axis 2) x–x = y–y			for torsion 3)	
Side length a	Perm. dev.	Wall thickness s				I_x	W_x	i_x	I_t	W_t
			cm²	kg/m	m²/m	cm⁴	cm³	cm	cm⁴	cm³
20	± 0,3	1,6	1,11	0,87	0,074	0,61	0,61	0,74	1,03	1,07
		2	1,34	1,05	0,073	0,69	0,69	0,72	1,20	1,27
30	± 0,3	1,6	1,75	1,38	0,114	2,31	1,54	1,15	3,76	2,57
		2	2,14	1,68	0,113	2,72	1,81	1,13	4,51	3,10
		2,6	2,68	2,10	0,111	3,26	2,18	1,10	5,50	3,84
40	± 0,4	1,6	2,39	1,88	0,154	5,79	2,90	1,56	9,25	4,70
		2	2,94	2,31	0,153	6,94	3,47	1,54	11,2	5,74
		2,6	3,72	2,92	0,151	8,45	4,23	1,51	14,0	7,21
		3,2	4,45	3,49	0,149	9,72	4,86	1,48	16,4	8,54
		4	5,35	4,20	0,146	11,1	5,54	1,44	19,2	10,1
50	± 0,5	1,6	3,03	2,38	0,194	11,7	4,68	1,97	18,5	7,48
		2	3,74	2,93	0,193	14,2	5,66	1,95	22,6	9,18
		2,6	4,76	3,73	0,191	17,5	6,99	1,92	28,4	11,6
		3,2	5,73	4,50	0,189	20,4	8,16	1,89	33,7	13,9
		4	6,95	5,45	0,186	23,7	9,50	1,85	40,1	16,7
		5	8,14	6,38	0,178	25,7	10,3	1,77	46,2	19,4
60	± 0,6	2	4,54	3,56	0,233	25,2	8,38	2,35	39,7	13,4
		2,6	5,80	4,55	0,231	31,3	10,5	2,32	50,3	17,1
		3,2	7,00	5,50	0,229	36,9	12,3	2,30	60,1	20,5
		4	8,55	6,71	0,226	43,6	14,5	2,26	72,2	24,8
		5	10,1	7,96	0,218	48,6	16,2	2,18	85,2	29,4
70	± 0,6	2,6	6,84	5,37	0,271	51,1	14,6	2,73	81,2	23,6
		3,2	8,29	6,51	0,269	60,6	17,3	2,70	97,6	28,4
		4	10,1	7,97	0,266	72,1	20,6	2,67	118	34,6
		5	12,1	9,52	0,258	82,0	23,4	2,59	141	41,4
80	± 0,7	2,6	7,88	6,18	0,311	77,7	19,4	3,14	122	31,1
		3,2	9,57	7,51	0,309	92,7	23,2	3,11	148	37,6
		4	11,8	9,22	0,306	111	27,8	3,07	180	46,0
		5	14,1	11,1	0,298	128	32,0	3,00	217	55,4
		6,3	17,2	13,5	0,292	149	37,1	2,94	259	66,7
90	± 0,75	3,2	10,9	8,51	0,349	135	29,9	3,52	213	48,1
		4	13,4	10,5	0,346	162	36,0	3,48	260	58,9
		5	16,1	12,7	0,338	189	41,9	3,41	316	71,4
		6,3	19,7	15,5	0,332	221	49,1	3,35	380	85,6
100	± 0,8	3,2	12,1	9,52	0,389	187	37,5	3,93	295	59,8
		4	15,0	11,7	0,386	226	45,3	3,89	361	73,5
		5	18,1	14,2	0,378	266	53,1	3,82	440	89,4
		6,3	22,3	17,5	0,372	314	62,8	3,76	533	109
120	± 0,9	3,2	14,7	11,5	0,469	331	55,2	4,75	518	87,2
		4	18,2	14,3	0,466	402	67,1	4,71	636	107
		5	22,1	17,4	0,458	478	79,6	4,64	780	131
		6,3	27,3	21,4	0,452	572	95,3	4,58	952	161
		8	33,6	26,4	0,445	677	113	4,49	1156	197
140	± 1,0	4	21,4	16,8	0,546	652	93,1	5,52	1022	148
		5	26,1	20,5	0,538	780	111	5,46	1259	181
		6,3	32,3	25,4	0,532	941	134	5,39	1545	224
		8	40,0	31,4	0,525	1127	161	5,30	1892	275
		10	47,7	37,5	0,508	1268	181	5,15	2245	327
150	± 1,2	4	23,0	18,0	0,586	808	108	5,93	1264	170
		5	28,1	22,1	0,578	970	129	5,87	1558	209
		6,3	34,9	27,4	0,572	1174	156	5,80	1917	258
		8	43,2	33,9	0,565	1412	188	5,71	2355	319
		10	51,7	40,6	0,548	1602	214	5,56	2811	381

1), 2), 3) see page 3

Table 1. (continued)

Nominal dimensions Side length a	Perm. dev.	Wall thickness s	Cross-section	Weight	Surface area	Static values [1] for bending axis [2] x–x = y–y			for torsion [3]	
						I_x	W_x	i_x	I_t	W_t
			cm²	kg/m	m²/m	cm⁴	cm³	cm	cm⁴	cm³
160	± 1,2	4	24,6	19,3	0,626	987	123	6,34	1540	194
		5	30,1	23,7	0,618	1189	149	6,27	1901	239
		6,3	37,4	29,3	0,612	1442	180	6,21	2344	296
		8	46,4	36,5	0,605	1741	218	6,12	2887	366
		10	55,7	43,7	0,588	1990	249	5,97	3464	439
180	± 1,3	4	27,8	21,8	0,706	1422	158	7,16	2209	248
		5	34,1	26,8	0,698	1719	191	7,09	2732	305
		6,3	42,4	33,3	0,692	2096	233	7,03	3377	378
		8	52,8	41,5	0,685	2546	283	6,94	4177	470
		10	63,7	50,0	0,668	2945	327	6,79	5051	567
		12,5	77,0	60,5	0,655	3406	379	6,65	6010	680
200	± 1,3	5	38,1	29,9	0,778	2389	239	7,91	3774	379
		6,3	47,5	37,3	0,772	2922	292	7,85	4676	471
		8	59,2	46,5	0,765	3567	357	7,75	5803	586
		10	71,7	56,3	0,748	4162	416	7,61	7055	711
		12,5	87,0	68,3	0,735	4859	486	7,47	8456	858
220	± 1,4	5	42,1	33,1	0,858	3212	292	8,73	5052	461
		6,3	52,5	41,2	0,852	3940	358	8,66	6270	574
		8	65,6	51,5	0,845	4828	439	8,57	7801	716
		10	79,7	62,6	0,828	5675	516	8,43	9524	871
		12,5	97,0	76,2	0,815	6674	607	8,29	11 480	1055
250	± 1,5	5	48,1	37,8	0,978	4771	382	9,96	7463	599
		6,3	60,1	47,1	0,972	5873	470	9,89	9282	747
		8	75,2	59,1	0,965	7229	578	9,80	11 580	934
		10	91,7	72,0	0,948	8568	685	9,67	14 200	1141
		12,5	112	88,0	0,935	10 160	813	9,52	17 240	1389
260	± 1,5	5	50,1	39,4	1,02	5386	414	10,4	8410	649
		6,3	62,6	49,1	1,01	6635	510	10,3	10 470	809
		8	78,4	61,6	1,01	8178	629	10,2	13 070	1012
		10	95,7	75,1	0,988	9715	747	10,1	16 050	1239
		12,5	117	91,9	0,975	11 550	888	9,93	19 490	1510
280	± 1,6	6,3	67,6	53,1	1,09	8352	597	11,1	13 130	942
		8	84,8	66,6	1,09	10 320	737	11,0	16 420	1180
		10	104	81,4	1,07	12 310	879	10,9	20 200	1447
		12,5	127	99,7	1,06	14 690	1049	10,8	24 700	1768
300	± 1,8	6,3	72,7	57,0	1,17	10 340	689	11,9	16 210	1085
		8	91,2	71,6	1,17	12 800	853	11,8	20 290	1361
		10	112	87,7	1,15	15 320	1021	11,7	25 000	1671
		12,5	137	108	1,14	18 350	1223	11,6	30 530	2045
320	± 1,8	6,3	77,7	61,0	1,25	12 630	789	12,8	19 730	1238
		8	97,6	76,6	1,25	15 650	978	12,7	24 730	1554
		10	120	94,0	1,23	18 790	1174	12,5	30 520	1911
		12,5	147	115	1,22	22 570	1411	12,4	37 330	2343
350	± 2,0	6,3	85,3	66,9	1,37	16 440	951	14,0	25 930	1487
		8	107	84,2	1,37	20 680	1182	13,9	32 530	1868
		10	132	103	1,35	24 920	1424	13,8	40 210	2301
		12,5	162	127	1,34	30 040	1717	13,6	49 310	2827
400	± 2,5	8	123	96,8	1,57	31 270	1563	15,9	48 910	2455
		10	152	119	1,55	37 870	1893	15,8	60 570	3031
		12,5	187	147	1,54	45 880	2294	15,7	74 500	3733

[1] The static values were calculated with the following rounding radius R: $2.0 \cdot s$ for $s \leq 4$ mm, $2.5 \cdot s$ for $s > 4 \leq 8$ mm and $3.0 \cdot s$ for $s > 8$ mm.

[2] I = moment of inertia, W = section modulus, i = radius of gyration

[3] I_t = St.-Venant twist inertia, W_t = torsional moment of resistance

Table 2. **Cold formed rectangular hollow steel sections; dimensions, permissible deviations from side lengths, static values**

Nominal dimensions: Side length a	b	Perm. dev.	Wall thickness s	Cross-section cm²	Weight kg/m	Surface area m²/m	Static values 1) for bending axis 2): x–x I_x cm⁴	x–x W_x cm³	x–x i_x cm	y–y I_y cm⁴	y–y W_y cm³	y–y i_y cm	for torsion 3): I_t cm⁴	for torsion 3): W_t cm³
40	20	± 0,3	1,6	1,75	1,38	0,114	3,43	1,72	1,40	1,15	1,15	0,81	2,87	2,25
			2	2,14	1,68	0,113	4,05	2,03	1,38	1,34	1,34	0,79	3,42	2,71
			2,6	2,68	2,10	0,111	4,81	2,40	1,34	1,57	1,57	0,77	4,11	3,32
50	30	± 0,5	1,6	2,39	1,88	0,154	7,96	3,18	1,82	3,60	2,40	1,23	8,02	4,38
			2	2,94	2,31	0,153	9,54	3,81	1,80	4,29	2,86	1,21	9,72	5,34
			2,6	3,72	2,92	0,151	11,6	4,65	1,78	5,22	3,48	1,18	12,0	6,69
			3,2	4,45	3,49	0,149	13,4	5,35	1,73	5,93	3,95	1,15	14,0	7,90
			4	5,35	4,20	0,146	15,3	6,10	1,69	6,69	4,46	1,12	16,2	9,32
60	40	± 0,6	1,6	3,03	2,38	0,194	15,2	5,07	2,24	8,15	4,08	1,64	16,9	7,16
			2	3,74	2,93	0,193	18,4	6,14	2,22	9,83	4,92	1,62	20,7	8,78
			2,6	4,76	3,73	0,191	22,8	7,59	2,19	12,1	6,05	1,59	25,9	11,1
			3,2	5,73	4,50	0,189	26,6	8,87	2,15	14,1	7,03	1,57	30,7	13,3
			4	6,95	5,45	0,186	31,0	10,3	2,11	16,3	8,14	1,53	36,3	15,9
			5	8,14	6,39	0,178	33,4	11,1	2,03	17,6	8,79	1,47	41,5	18,4
80	40	± 0,7	2	4,54	3,56	0,233	37,4	9,34	2,87	12,7	6,36	1,67	30,8	11,8
			2,6	5,80	4,55	0,231	46,6	11,7	2,83	15,7	7,87	1,65	38,8	15,0
			3,2	7,00	5,50	0,229	54,9	13,7	2,80	18,4	9,21	1,62	46,0	18,0
			4	8,55	6,71	0,226	64,8	16,2	2,75	21,5	10,7	1,59	54,8	21,6
			5	10,1	7,96	0,218	71,6	17,9	2,66	23,8	11,9	1,53	63,6	25,4
90	50	± 0,75	2,6	6,84	5,37	0,271	72,6	16,1	3,26	29,2	11,7	2,06	67,5	21,5
			3,2	8,29	6,51	0,269	86,3	19,2	3,23	34,4	13,8	2,04	80,8	25,9
			4	10,2	7,97	0,266	103	22,8	3,18	40,7	16,3	2,00	97,2	31,4
			5	12,1	9,52	0,258	116	25,8	3,09	46,0	18,4	1,93	115	37,4
100	60	± 0,8	2,6	7,88	6,18	0,311	107	21,3	3,68	48,5	16,2	2,48	107	29,0
			3,2	9,57	7,51	0,309	127	25,5	3,65	57,6	19,2	2,45	128	35,1
			4	11,8	9,22	0,306	153	30,5	3,60	68,7	22,9	2,42	156	42,8
			5	14,1	11,1	0,298	175	35,1	3,52	78,9	26,3	2,36	187	51,4
			6,3	17,2	13,5	0,292	203	40,7	3,44	90,9	30,3	2,30	221	61,7
110	70	± 0,8	3,2	10,9	8,51	0,349	179	32,6	4,06	89,2	25,5	2,88	191	45,5
			4	13,4	10,8	0,346	216	39,3	4,02	107	30,6	2,83	233	55,7
			5	16,1	12,7	0,338	251	45,6	3,94	124	35,5	2,77	281	67,4
			6,3	19,7	15,5	0,332	294	53,5	3,86	145	41,4	2,71	337	81,5
120	60	± 0,9	3,2	10,9	8,51	0,349	200	33,3	4,29	67,9	22,7	2,50	165	42,3
			4	13,4	10,5	0,346	241	40,1	4,25	81,3	27,1	2,47	200	51,8
			5	16,1	12,7	0,338	279	46,5	4,15	94,1	31,3	2,41	241	62,4
			6,3	19,7	15,5	0,332	327	54,4	4,07	109	36,4	2,35	287	75,2
120	80	± 0,9	3,2	12,1	9,52	0,389	244	40,6	4,48	130	32,6	3,28	271	57,3
			4	15,0	11,7	0,386	295	49,1	4,44	157	39,3	3,24	330	70,3
			5	18,1	14,2	0,378	345	57,6	4,36	184	46,1	3,18	402	85,4
			6,3	22,3	17,5	0,372	409	68,1	4,28	217	54,3	3,12	485	104
140	80	± 1,0	3,2	13,4	10,5	0,429	354	50,6	5,14	149	37,3	3,34	336	67,1
			4	16,6	13,0	0,426	430	61,4	5,09	180	45,1	3,30	413	82,7
			5	20,1	15,8	0,418	506	72,4	5,01	212	53,1	3,24	509	100
			6,3	24,8	19,4	0,412	603	86,1	4,93	251	62,9	3,19	605	122
150	100	± 1,2	3,2	15,3	12,0	0,489	488	65,1	5,64	262	52,5	4,14	538	90,8
			4	19,0	14,9	0,486	595	79,3	5,60	319	63,7	4,10	661	112
			5	23,1	18,2	0,478	707	94,3	5,52	379	75,7	4,04	810	137
			6,3	28,6	22,4	0,472	848	113	5,45	453	90,5	3,98	988	168
			8	35,2	27,7	0,465	1008	134	5,35	536	107	3,90	1198	206
160	80	± 1,2	3,2	14,7	11,5	0,469	491	61,4	5,78	168	42,1	3,38	403	76,9
			4	18,2	14,3	0,466	598	74,7	5,74	204	50,9	3,35	493	94,6
			5	22,1	17,4	0,458	708	88,5	5,65	241	60,2	3,29	601	115
			6,3	27,3	21,4	0,452	846	106	5,57	286	71,4	3,24	729	141
			8	33,6	26,4	0,445	1001	125	5,46	335	83,7	3,16	875	172

1), 2), 3) see Table 1, page 3

Table 2. (continued)

Nominal dimensions Side length a	b	Perm. dev.	Wall thickness s	Cross-section	Weight	Surface area	Static values 1) for bending axis 2) x-x I_x	W_x	i_x	y-y I_y	W_y	i_y	for torsion 3) I_t	W_t
				cm²	kg/m	m²/m	cm⁴	cm³	cm	cm⁴	cm³	cm	cm⁴	cm³
180	100	± 1,3	4	21,4	16,8	0,546	926	103	6,59	374	74,8	4,18	853	135
			5	26,1	20,5	0,538	1107	123	6,51	446	89,3	4,13	1046	165
			6,3	32,3	25,4	0,532	1335	148	6,43	536	107	4,07	1279	203
			8	40,0	31,4	0,525	1598	178	6,32	637	127	3,99	1556	250
			10	47,7	37,5	0,508	1787	199	6,12	714	143	3,87	1828	295
200	100	± 1,3	4	23,0	18,0	0,586	1200	120	7,23	411	82,6	4,23	984	150
			5	28,1	22,1	0,578	1438	144	7,14	492	98,3	4,17	1208	184
			6,3	34,9	27,4	0,572	1739	174	7,06	591	118	4,12	1478	227
			8	43,2	34,0	0,565	2091	209	6,95	705	141	4,04	1801	279
			10	51,7	40,6	0,548	2355	236	6,75	795	159	3,92	2122	331
200	120	± 1,3	4	24,6	19,3	0,626	1353	135	7,42	618	103	5,02	1344	182
			5	30,1	23,7	0,618	1628	163	7,34	742	124	4,96	1656	223
			6,3	37,4	29,3	0,612	1976	198	7,27	898	150	4,90	2035	276
			8	46,4	36,5	0,605	2386	239	7,17	1079	180	4,82	2497	341
			10	55,7	43,7	0,588	2717	272	6,98	1230	205	4,70	2978	407
220	140	± 1,3	4	27,8	21,8	0,706	1893	172	8,26	948	135	5,84	1986	235
			5	34,1	26,8	0,698	2287	208	8,19	1145	164	5,79	2453	289
			6,3	42,4	33,3	0,692	2789	254	8,11	1392	199	5,73	3027	358
			8	52,8	41,5	0,685	3389	308	8,01	1685	241	5,65	3734	444
			10	63,7	50,0	0,668	3910	355	7,83	1945	278	5,53	4497	535
250	150	± 1,5	5	38,1	29,9	0,778	3270	262	9,26	1496	199	6,26	3293	354
			6,3	47,4	37,3	0,772	4001	320	9,18	1825	243	6,20	4071	440
			8	59,2	46,5	0,765	4886	391	9,08	2219	296	6,12	5038	546
			10	71,7	56,3	0,748	5687	455	8,91	2584	345	6,00	6098	661
			12,5	87,0	68,3	0,735	6633	531	8,73	3002	400	5,87	7269	795
260	180	± 1,6	5	42,1	33,1	0,858	4085	314	9,85	2332	259	7,44	4707	445
			6,3	52,5	41,2	0,852	5013	386	9,77	2856	317	7,38	5837	554
			8	65,6	51,5	0,845	6145	473	9,68	3493	388	7,30	7253	690
			10	79,7	62,6	0,828	7214	555	9,51	4102	456	7,17	8837	839
			12,5	97,0	76,2	0,815	8482	653	9,35	4812	535	7,04	10 630	1015
300	200	± 1,8	5	48,1	37,8	0,978	6193	413	11,3	3393	334	8,33	6853	574
			6,3	60,1	47,1	0,972	7624	508	11,3	4104	410	8,27	8515	715
			8	75,2	59,1	0,965	9389	626	11,2	5042	504	8,19	10 610	894
			10	91,7	72,0	0,948	11 110	741	11,0	5969	597	8,07	12 990	1091
			12,5	112	88,0	0,935	13 180	879	10,9	7060	706	7,94	15 710	1327
320	200	± 1,8	6,3	62,6	49,1	1,01	8905	557	11,9	4340	434	8,33	9236	764
			8	78,4	61,6	1,01	10 980	686	11,8	5337	534	8,24	11 630	955
			10	95,7	75,1	0,988	13 020	814	11,7	6330	633	8,13	14 240	1167
			12,5	117	91,9	0,975	15 480	967	11,5	7500	750	8,00	17 240	1420
360	200	± 2,0	6,3	67,6	53,1	1,09	11 850	658	13,2	4813	481	8,44	10 980	862
			8	84,8	66,6	1,09	14 640	813	13,1	5927	593	8,35	13 690	1078
			10	104	81,4	1,07	17 420	967	13,0	7053	705	8,24	16 780	1319
			12,5	127	99,7	1,06	20 780	1154	12,8	8380	838	8,12	20 350	1608
400	200	± 2,5	6,3	72,6	57,0	1,17	15 330	766	14,5	5290	529	8,53	12 660	959
			8	91,2	71,6	1,17	18 970	949	14,4	6520	652	8,45	15 800	1201
			10	112	87,7	1,15	22 650	1132	14,2	7780	778	8,34	19 380	1471
			12,5	137	108	1,14	27 100	1355	14,1	9260	926	8,22	23 520	1795
450	250	± 2,5	6,3	85,3	66,9	1,37	23 610	1049	16,6	9620	769	10,6	21 720	1361
			8	107	84,2	1,37	29 340	1304	16,5	11 920	953	10,5	27 200	1708
			10	132	103	1,35	35 290	1569	16,4	14 330	1150	10,4	33 520	2101
			12,5	162	127	1,34	42 540	1890	16,2	17 220	1380	10,3	40 970	2577
500	300	± 2,5	8	123	96,8	1,57	42 810	1712	18,6	19 620	1308	12,6	42 740	2295
			10	152	119	1,55	51 780	2071	18,5	23 730	1582	12,5	52 840	2831
			12,5	187	147	1,54	62 730	2509	18,3	28 690	1912	12,4	64 860	3483

1), 2), 3) see Table 1, page 3

3.1.3 The permissible deviations from wall thickness s (see also Sections 7.1 and 7.2) are
± 10% of the nominal value for $s \leqq 5$ mm,
± 0.5 mm for $s > 5$ mm.

3.1.4 The deviation from the rectangularity may not exceed ± 1°.

3.1.5 The values in Table 3 apply for the rounding radius R. These values must be complied with within a permissible deviation of ± 20%.
The values for R occurring within a given cross-section need not be the same.

Table 3. **Rounding radius R**

Wall thickness s >	Wall thickness s ≦	Rounding radius R 4)
–	4	2,0 · s
4	8	2,5 · s
8	12,5	3,0 · s

4) See Section 3.1.5

3.2 Straightness

The deviation from straightness q may not exceed 0.002 · l (see Section 7.3).

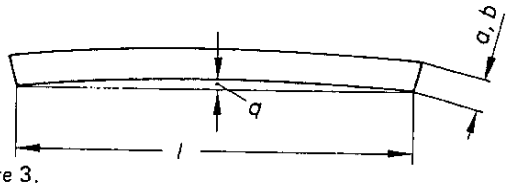

Figure 3.

3.3 Twist

The twist v may not exceed 2 mm (+ 0.5 mm per 1000 mm product length).

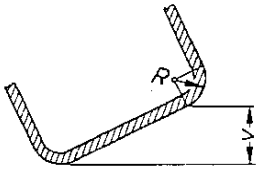

Figure 4.

4 Material

A standard with technical conditions of delivery and information on the steel grades that should be used for preference for cold formed hollow sections is in preparation. The required steel grade should be specified in the designation.

5 Weight

The weight given in Tables 1 and 2 has been calculated from the nominal dimensions for the cross-section on the basis of a density of 7.85 kg/dm³.

6 Mode of delivery

6.1 The length data according to Table 4 apply for delivery of hollow sections according to this Standard.

6.2 Where hollow sections are ordered in fixed lengths, short lengths of at least 2000 mm may be supplied up to a total of 5% of the delivered weight.

6.3 The hollow sections according to this Standard should as far as possible be cut square at the ends. A burr, dependent on the method of cutting and the cross-section of the hollow sections, is permissible.

Table 4. **Length and permissible deviations**

Type of length	Length: Range	Length: Perm. dev.	Details of order for the length
Manufacturing length	6000 to 16000 5)	5)	5)
Fixed length	≧ 4000 6)	+ 100 0	Required fixed length in mm
Exact length	≦ 5000	+ 5 0	Required exact length in mm
	> 5000 ≦ 10000	+ 10 0	
	> 10000	+ 1 0 for each 1000 mm started	

5) The required range of manufacturing lengths should be agreed when ordering. 90% of the hollow sections supplied must fall within this length range; 10% may be shorter but must not be less than 75% of the agreed lower limit of the length range.
6) Unless otherwise agreed, fixed lengths of 6000 mm shall be supplied (see Section 6.2).

7 Testing for accuracy to size

7.1 The dimensions shall be tested with suitable measuring instruments at a distance of about 100 mm from the ends of the hollow section.

7.2 The wall thickness s shall be tested outside the range of the rounding radius R as well as outside the range of the weld.

7.3 The dimension q shall be measured over the total length of the hollow section for testing the straightness according to Fig. 3.

7.4 The twist v shall be determined according to the data in Fig. 4. It may be measured at any point of the hollow section with the latter lying under its own weight on a flat surface.

Further standards

DIN 59410 Hollow sections for structural steel engineering; hot formed square and rectangular steel tubes; dimensions, weights, permissible deviations, static values.

Stahl-Eisen-Lieferbedingung (Steel iron condition of delivery) 065-67 [7] Electrically welded precision tubes of rectangular or square cross-section made of unalloyed mild steels; quality and dimension specifications

[7] Obtainable from Verlag Stahleisen mbH, Postfach 8229, 4000 Düsseldorf 1

Explanations

Following the publication as early as 1974 of a DIN Standard (DIN 59410) giving information on dimensions for hot formed hollow steel sections, DIN 59411 now provides for the first time a corresponding dimension standard for cold formed welded square and rectangular hollow sections.

The publication was delayed because there were initially considerable differences of opinion among the German specialists involved over the scope and the most useful series of nominal dimensions. There was finally agreement to include only hollow sections for structural steel engineering, manufactured for preference from general structural steels or comparable materials with established minimum values for the yield point. An appropriate technical condition of delivery is being prepared for these products. It is intended to cover cold formed hollow sections for other applications (e.g. for the motor industry, furniture industry etc.) in separate dimension standards, e.g. the DIN Standard deriving from Stahl-Eisen-Lieferbedingung 065-67.

Although at the present time in Germany hollow sections with round values for the wall thickness (e.g. 3, 4, 5, 6, 8 mm) are the predominant ones used for structural steel engineering, a majority of those involved in the discussions were in favour of arranging the values on the basis of the planned ISO Standard (at present ISO/DIS 4019 "Cold finished steel structural hollow sections – dimensions and sectional properties" of July 1976) on the assumption that in future most orders for hollow sections will be for those with internationally standardized wall thicknesses. By way of amendment to the October 1974 Draft of DIN 59411 therefore, in the present definitive issue, wall thicknesses 1.6; 2; 2.6; 3.2; 4; 5; 6.3; 8; 10 and 12.5 mm have been adopted and these are also to be found in dimension standard DIN 2458 for welded steel tubes. The interval between any two neighbouring values is about 25%.

The Tables 1 and 2 contain 103 square and 108 rectangular hollow sections, i.e. a total of 211. The series of nominal dimensions are in good agreement with ISO Draft 4019 however, wall thicknesses 1.2 and 7.1 mm additionally proposed for the international standard have not been included in the DIN Standard for reasons connected with the Building Inspectorates or because they are not needed. Moreover, square hollow sections with side lengths 115, 135, 175, 285 and 325 have not been adopted nor have rectangular hollow sections with sidelengths 140 x 90, 350 x 220 and 400 x 250. On the other hand, DIN 59411 contains side lengths 280 and 320 (square) and 110 x 70, 140 x 80 and 360 x 200 (rectangular) hollow sections which are not contained in the ISO Draft.

It should also be mentioned that hollow sections of larger cross-section (side lengths over 280 mm) are ordered and produced at the present time only in limited quantities. Enquiries should therefore be made with the manufacturer as to whether these products can be supplied.

There were lengthy discussions over the values to be used for the rounding radii R of cold formed hollow sections. The values given in Section 3.1.5 and in Table 3 are not in accordance with the provisions for welding in the cold formed ranges in the December 1968 issue of DIN 4100 – Welded structural steel work with predominantly static loading, design and structural details. In issuing DIN 59411 the assumption was however made that DIN 4100 would soon be revised and that when this was done there would be a reduction in the permissible bending radii according to Section 6.3 of this Standard so that the information in the present dimension standard would not be in conflict with any future provisions in DIN 4100.