IS 1161:1998 specifies requirements for steel tubes for structural purposes, including dimensions and mechanical properties used to select tubular elements for structural applications.

Scope of this extract: original 1998 tables as printed; later amendments are excluded at your request.

Table 1 | Sizes and Properties of Steel Tubes for Structural Purposes

Clauses 3.1, 6.1, 6.1.1 and 6.1.2 | Weight, values and classes follow the printed base table.

Nominal bore mm	Outside diameter mm	Class	Thickness mm	Weight kg/m	Cross section cm2	Internal volume cm3/m	External surface cm3/m*	Internal surface cm3/m*	Moment of inertia cm4	Section modulus cm3	Radius of gyration cm	Radius of gyration² cm2
15	21.3	Light	2.0	0.947	1.21	235	669	543	0.57	0.54	0.69	0.47
15	21.3	Medium	2.6	1.21	1.53	203	669	506	0.69	0.64	0.66	0.44
15	21.3	Heavy	3.2	1.44	1.82	174	669	468	0.75	0.70	0.55	0.42
20	26.9	Light	2.3	1.38	1.78	390	845	700	1.36	1.01	0.87	0.76
20	26.9	Medium	2.6	1.56	1.98	370	845	681	1.48	1.10	0.86	0.74
20	26.9	Heavy	3.2	1.87	2.38	330	845	644	1.70	1.26	0.84	0.71
25	33.7	Light	2.6	1.98	2.54	638	1059	895	3.09	1.83	1.10	1.21
25	33.7	Medium	3.2	2.41	3.06	585	1059	857	3.61	2.14	1.08	1.17
25	33.7	Heavy	4.0	2.93	3.73	518	1059	807	4.19	2.48	1.05	1.11
32	42.4	Light	2.6	2.54	3.25	1086	1332	1168	6.47	3.05	1.41	1.98
32	42.4	Medium	3.2	3.10	3.94	1017	1332	1130	7.62	3.59	1.39	1.93
32	42.4	Heavy	4.0	3.79	4.82	929	1332	1080	8.99	4.24	1.36	1.86
40	48.3	Light	2.9	3.23	4.13	1418	1517	1335	10.70	4.43	1.61	2.59
40	48.3	Medium	3.2	3.56	4.53	1378	1517	1316	11.59	4.80	1.59	2.54
40	48.3	Heavy	4.0	4.37	5.56	1275	1517	1265	13.77	5.70	1.57	2.47
50	60.3	Light	2.9	4.08	5.23	2332	Not shown	1711	21.59	7.16	2.03	4.13
50	60.3	Medium	3.6	5.03	6.41	2213	Not shown	1667	25.88	8.58	2.00	4.02
50	60.3	Heavy	4.5	6.19	7.88	2066	Not shown	1611	30.90	10.2	1.98	3.92
65	76.1	Light	3.2	5.71	7.32	3814	2391	2189	48.79	12.82	2.58	6.66
65	76.1	Medium	3.6	6.42	8.20	3727	2391	2163	54.02	14.20	2.57	6.60
65	76.1	Heavy	4.5	7.93	10.1	3534	2391	2107	65.12	17.1	2.54	6.43

Source: supplied IS 1161:1998, printed pages 2-4. Base tables only; amendments excluded.

Steel Tubes for Structural Purposes | IS 1161:1998

Nominal bore mm	Outside diameter mm	Class	Thickness mm	Weight kg/m	Cross section cm2	Internal volume cm3/m	External surface cm3/m*	Internal surface cm3/m*	Moment of inertia cm4	Section modulus cm3	Radius of gyration cm	Radius of gyration² cm2
80	88.9	Light	3.2	6.72	8.61	5343	2793	2591	79.23	17.82	3.03	9.19
80	88.9	Medium	4.0	8.36	10.7	5138	2793	2540	96.36	21.68	3.00	9.00
80	88.9	Heavy	4.8	9.90	12.7	4936	2793	2490	112.52	25.31	2.98	8.88
90	101.6	Light	3.6	8.70	11.1	6995	3192	2964	133.27	26.23	3.47	12.03
90	101.6	Medium	4.0	9.63	12.3	6877	3192	2939	146.32	28.80	3.45	11.91
90	101.6	Heavy	4.8	11.5	14.6	6644	3192	2889	171.44	33.75	3.43	11.76
100	114.3	Light	3.6	9.75	12.5	9004	3591	3363	192.03	33.60	3.92	15.36
100	114.3	Medium	4.5	12.2	15.5	8704	3591	3306	234.3	41.0	3.89	15.10
100	114.3	Heavy	5.4	14.5	18.5	8409	3591	3250	274.5	48.0	3.85	14.86
110	127.0	Light	4.5	13.6	17.3	10930	3990	3705	325.3	51.2	4.33	18.78
110	127.0	Medium	4.8	14.5	18.4	10819	3990	3686	344.58	54.27	4.32	18.69
110	127.0	Heavy	5.4	16.2	20.6	10599	3990	3649	382.0	60.2	4.30	18.52
125	139.7	Light	4.5	15.0	19.1	13410	4389	4104	437.2	62.6	4.78	22.87
125	139.7	Medium	4.8	15.9	20.3	13287	4389	4085	463.44	66.35	4.77	22.76
125	139.7	Heavy	5.4	17.9	22.8	13043	4389	4047	514.5	73.7	4.75	22.58
135	152.4	Light	4.5	16.4	20.9	16142	4788	4503	572.2	75.1	5.23	27.37
135	152.4	Medium	4.8	17.5	22.2	16008	4788	4484	606.92	79.65	5.22	27.25
135	152.4	Heavy	5.4	19.6	25.0	15740	4788	4446	674.5	88.5	5.20	27.05
150	165.1	Light	4.5	17.8	22.7	19128	5187	4902	732.6	88.7	5.68	32.27
150	165.1	Medium	4.8	18.9	24.2	18981	5187	4883	777.32	94.16	5.67	32.14
150	165.1	Heavy	5.4	21.3	27.1	18690	5187	4845	864.7	105.0	5.65	31.92
150	168.3	Light	4.5	18.2	23.1	19921	5287	5002	777.2	92.4	5.79	33.56
150	168.3	Medium	4.8	19.4	24.7	19771	5287	4983	824.78	98.01	5.78	33.42
150	168.3	Heavy 1	5.4	21.7	27.6	19473	5287	4946	917.7	109.0	5.76	33.21

Source: supplied IS 1161:1998, printed pages 2-4. Base tables only; amendments excluded.

Nominal bore mm	Outside diameter mm	Class	Thickness mm	Weight kg/m	Cross section cm2	Internal volume cm3/m	External surface cm3/m*	Internal surface cm3/m*	Moment of inertia cm4	Section modulus cm3	Radius of gyration cm	Radius of gyration² cm2
150	168.3	Heavy 2	6.3	25.2	32.0	19030	5287	4889	1053	125.0	5.73	32.85
175	193.7	Light	4.8	22.4	28.5	26606	6085	5781	1271.71	131.31	6.68	44.63
175	193.7	Medium	5.4	25.1	32.0	26260	6085	5743	1417	146	6.66	44.36
175	193.7	Heavy	5.9	27.3	34.8	25974	6085	5712	1535.2	158.65	6.64	41.11
200	219.1	Light	4.8	25.4	32.3	34454	6883	6578	1856.51	169.47	7.58	57.45
200	219.1	Medium	5.6	29.5	37.5	33930	6883	6528	2141	195	7.55	57.02
200	219.1	Heavy	5.9	31.0	39.5	33734	6883	6509	2247	205	7.54	56.86
225	244.5	Heavy	5.9	34.7	44.2	42507	7681	7307	3149	258	8.44	71.21
250	273.0	Heavy	5.9	38.9	49.5	53557	8578	8202	4412	323	9.45	89.30
300	323.9	Heavy	6.3	49.3	62.8	76073	10177	9775	7992	493	11.2	125.44
350	355.6	Heavy	8.0	68.6	87.3	90533	11173	10663	13111	737	12.3	151.29

Source note: the printed base table does not show an external surface value for 60.3 mm outside diameter. Those entries are marked Not shown. *Surface units are printed as cm3/m in the source; confirm the intended units.

Table 2 | Tensile Properties of Steel Tubes for Structural Purposes

Clauses 3.1 and 11.2

Grade	Tensile strength min (MPa)	Yield stress min (MPa)	Elongation on gauge length 5.65 x sqrt(S0), min (%)
YSt 210	330	210	20
YSt 240	410	240	17
YSt 310	450	310	14

Notes: 1 MPa = 1 N/mm² = 0.102 kgf/mm². For tubes up to and including 25 mm nominal bore, minimum elongation is 12 percent for all grades.