

DIN 2445 Part-1 SEAMLESS STEEL TUBES FOR DYNAMIC LOADS HOT FINISHED TUBES NOMINAL PRESSURES 100 TO 400

1. General information

This Standard includes a summary of hot finished seamless steel tubes for dynamic loads, which are preferably used in hydraulic high-pressure installations. It applies to straight tubes. For details relating to the bending of tubes, see the Supplement to DIN 2445. The outside diameters of the tubes and the wall thicknesses are taken from International Standard ISO 336 or DIN 2448.

The design of dynamically loaded high-pressure installations is based on the nominal pressure of the pump or accumulator systems. To this pressure, for purposes of calculating the pipes, should be added the increase in pressure from the dynamic load, and allowance made for the actual load alternation (see DIN 2413, July 1972 edition, Scope III). The tubes included in Tables 2 to 6 are calculated for continuous pulsating fatigue strength. Under special operation conditions tubes calculated for pulsating fatigue strength over a period are permissible (for details see Supplement to DIN 2445).

Table 1. Correlation of the pressures
All pressures are overpressures in bars

Nominal pressure of the installation (design pressure)* PA	Pressure change taken as a basis for calculation, for water hydraulic installations with $l = 30 \text{ m}$ $w = 10 \text{ m/s}$ $T_y = 0.1 \text{ s}$ $\pm \Delta p^{**}$)	Maximum applicable pressure (calculated pressure for tubes) p	Nominal pressure of pipeline components (e.g. flanges and fitted appliances) PN
100	60	160	160
160	60	220	250
250	60	310	320
320	60	380	400
400	60	460	500

2. Designation

Designation of a seamless steel tube of 88.9 mm outside diameter and 11 mm wall thickness of St 52.4 with delivery test according to DIN 1629 Part 4:
Tube 88.9 X 11 DIN 2448 - St 52.4

3. Dimensions and weights

The dimensions and weights given in the Tables for pipes with wall thicknesses of up to 25 mm comply with DIN 2448 and for pipes with greater wall thicknesses with ISO

Recommendation R 336.

*) Designated in DIN 24312 (at present in draft form) with PN

**) If the pipeline length l , rate of flow w and closing time T_s vary considerably from those indicated in Table 1, the pressure surges Δp can be varied and taken from the straight-line graph. The pressure surges must then not be greater than $\Delta p = 60$ bar

Table 2. Normal pressure of the installation (design pressure) = 100 bar

Maximum applicable pressure (calculated pressure for tubes) = 160 bar = 16 N/mm²

Nominal width (NW)	Outside diameter of tube	Wall thickness	Inside diameter of tube	Cross-section of flow cm ²	Weight kg/m
10	17,2	3,6	10	0,785	1,21
12	21,3	3,6	14,1	1,56	1,59
16	21,3	3,6	14,1	1,56	1,59
20	26,9	3,6	19,7	3,05	2,09
25	33,7	3,6	26,5	5,52	2,69
32	42,4	3,6	35,2	9,73	3,47
40	48,3	3,6	41,1	13,3	4,00
50	60,3	4,5	51,3	20,7	6,52
65	76,1	4,5	67,1	35,4	7,92
80	88,9	6,3	76,7	46,2	12,9
100	114,3	8,8	96,7	73,4	22,8
125	139,7	10	119,7	113	32,0
150	168,3	12,5	143,3	161	48,4
200	219,1	16	187,1	275	79,8
250	273	20	233	426	125
300	355,6	25	305,6	731	203

Table 3. Nominal pressure of the installation (design pressure) = 160 bar

Maximum applicable pressure (calculated pressure for tubes) = 220 bar = 22N/mm²

Nominal width (NW)	Outside diameter of tube	Wail thickness	Inside diameter of tube	Cross-section of flow cm ²	Weight kg/m
10	17,2	3,6	10	0,785	1,21
12	21,3	3,6	14,1	1,56	1,59
16	21,3	3,6	14,1	1,56	1,59
20	26,9	3,6	19,7	3,05	2,09
25	33,7	3,6	26,5	5,52	2,69
32	42,4	3,6	37,2	10,9	3,47
40	48,3	4	40,3	12,8	4
50	60,3	5	50,3	19,9	6,82
65	76,1	6,3	63,3	31,7	10,9
80	101,6	8,8	84	55,4	20,1
100	114,3	10	94,3	69,8	25,7
125	152,4	12,5	127	127	43,4
150	177,8	16	146	167	63,6
200	244,5	20	204	328	111
250	298,5	25	248	485	170
300	355,6	30	296	685	241

Table 4. Nominal pressure of the installation (design pressure) = 250 bar
Maximum applicable pressure (calculated pressure for tubes) = 310 bar = 31 N/mm²

Nominal width (NW)	Outside diameter of tube	Wail thickness	Inside diameter of tube	Cross-section of flow cm ²	Weight kg/m
10	17,2	3,6	10	0,785	1,21
12	21,3	3,6	14,1	1,56	1,59
16	21,3	3,6	14,1	1,56	1,59

20	26,9	3,6	19,7	3,05	2,09
25	33,7	4,5	24,7	4,79	3,23
32	42,4	5,6	31,2	7,64	5,07
40	60,3	8	44,3	15,4	10,3
50	70	8,8	52,4	21,6	13,2
65	88,9	11	66,9	35,2	21,2
80	101,6	12,5	76,6	46,1	27,6
100	139,7	17,5	105	86,1	52,7
125	168,3	20	128,3	129	73,1
150	193,7	25	144	162	105
200	273	36	201	317	211
250	323,9	40	244	467	280
300	406,4	50	306	735	439

Table 5. Nominal pressure of the installation (design pressure) = 320 bar
Maximum applicable pressure (calculated pressure for tubes) = 380 bar = 38N/mm²

Nominal width (NW)	Outside diameter of tube	Wall thickness	Inside diameter of tube	Cross-section of flow cm ²	Weight kg/m
10	17,2	3,6	10	0,785	1,21
12	21,3	3,6	14,1	1,56	1,59
16	26,9	4,5	17,9	2,52	2,48
20	33,7	5,6	22,5	3,97	3,87
25	42,4	7,1	28,2	6,25	6,19
32	48,3	8	32,3	8,20	7,93
40	60,3	10	40,3	12,8	12,4
50	76,1	12,5	51,1	20,5	19,7
65	101,6	16	69,6	38,1	33,7

80	114,3	17,5	79,3	49,4	41,7
100	136,7	22,2	95,3	71,3	71,7
125	193,7	30	134	140	121
150	219,1	36	147	170	163
200	298,5	45	208	341	281
250	355,6	55	246	473	408
300					

Table 6. Nominal pressure of the installation (design pressure) = 400 bar
Maximum applicable pressure (calculated pressure for tubes) = 460 bar = 46 N/mm²

Nominal width (NW)	Outside diameter of tube	Wall thickness	Inside diameter of tube	Cross-section of flow cm ²	Weight kg/m
10	17,2	3,6	10	0,785	1,21
12	21,3	4,0	13,2	1,37	1,72
16	26,9	5,6	15,7	1,94	2,94
20	33,7	6,3	21,1	3,49	4,27
25	42,4	8	26,4	5,47	6,76
32	60,3	12,5	35,3	9,78	14,8
40	70	14,2	41,6	13,6	19,1
50	88,9	17,5	53,9	22,8	30,8
65	101,6	20	61,6	29,8	40,2
80	139,7	28	83,7	55	77
100	168,3	32	104	85,4	108
125	219,1	45	129	131	193
150	244,5	50	144	164	240
200	323,9	65	194	295	415
250	406,4	75**)	256	515	613

300					
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**) This wall thickness is not included in either DIN 2448 or ISO 336

4. Material

St 52.4 according to DIN 1629 Part 4.

The publication of the Draft Standards

DIN 2445	Part 1 Seamless steel tubes for dynamic loads; hot-finished tubes, nominal pressures 100 to 400
	Part 2 -; precision steel tubes, nominal pressures 64 to 400
	Supplement -; bases of calculation for straight tubes

Tube o. d. mm	Wall thickness mm	Tube i. d. mm	Deign pressure's bar	Weight kg/m	Tube o. d. mm	Wall thickness mm	Tube i. d. mm	Deign pressure's bar	Weight kg/m
4	0.5	3	313	0.043	20	1.58	17	212	0.684
4	0.75	2.5	409	0.063	20	2	16	282	0.888
4	1	2	522	0.074	20	2.5	15	353	1.079
5	0.75	3.5	376	0.083	20	3	14	373	1.258
5	1	3	432	0.099	20	3.5	13	426	1.424
6	0.75	4.5	333	0.103	20	4	12	478	1.578
6	1	4	389	0.123	22	1	20	128	0.518
6	1.5	3	549	0.166	22	1.5	19	192	0.758
6	2	2	692	0.197	22	2	18	256	0.986
6	2.25	1.5	757	0.208	22	2.5	17	320	1.202
8	1	6	333	0.173	22	3	16	385	1.406
8	1.5	5	431	0.240	25	2	21	226	1.134
8	2	4	549	0.296	25	2.5	20	282	1.387
8	2	4	549	0.296	25	3	19	338	1.628

8	2	4	549	0.296	25	4	17	394	2.072
8	2.5	3	658	0.339	25	4.5	16	432	2.275
10	1	8	282	0.222	25	5	15	478	2.466
10	1.5	7	373	0.341	28	1.5	25	151	0.980
10	2	6	478	0.395	28	2	24	201	1.282
10	2.5	5	576	0.462	28	2.5	23	252	1.572
10	3	4	666	0.518	28	3	22	302	1.850
12	1	10	235	0.271	28	4	21	403	2.368
12	1.5	9	353	0.383	28	5	18	434	2.836
12	2	8	409	0.493	30	2	26	188	1.381
12	2.5	7	495	0.586	30	2.5	25	235	1.695
12	3	6	576	0.665	30	3	24	282	1.998
12	3.5	5	69	0.734	30	4	22	376	2.565
14	1	12	20	0.321	30	5	20	409	3.083
14	1.5	11	302	0.462	35	2	31	161	1.628
14	2	10	403	0.592	35	2.5	30	201	2.004
14	2.5	9	434	0.709	35	3	29	242	2.367
14	3	8	507	0.814	35	4	27	322	3.058
14	3.5	7	576	0.906	35	5	25	403	3.699
14	4	6	64	0.986	35	6	23	419	4.291
15	1	13	188	0.345	38	2.5	33	186	2.189
15	1.5	12	282	0.499	38	3	32	223	2.589
15	2	11	376	0.641	38	4	30	297	3.354
15	2.5	10	409	0.771	38	5	28	371	4.069
15	3	9	478	0.888	38	6	26	390	4.735
16	1	14	176	0.370	38	7	24	446	5.352
16	1.5	13	264	0.536	42	2	38	134	1.973
16	2	12	353	0.691	42	3	36	201	2.885
16	2.5	11	386	0.832	42	4	34	269	3.749

16	3	10	452	0.962	50	6	38	338	6.511
18	1	16	157	0.419	50	9	32	437	9.103
18	1.5	15	236	0.610	65	8	49	347	11.246
18	2	14	313	0.789	80	10	60	353	17.263
18	2.5	13	392	0.956					
18	3	12	409	1.110					