

Copper Wrought Alloy Tubes
Seamless Drawn
Preferred Dimensions for General Purposes

DIN

1755

Sheet 2

Rohre aus Kupfer-Knetlegierungen, nahtlosgezogen,
Vorzugsmaße für allgemeine Verwendung

Dimensions in mm

1. Scope

On the basis of the provisions in DIN 1755 Sheet 1, this Standard applies for preferred dimensions of seamless tubes to coordination of tolerance A *) of outside diameter from 3 to 315 mm and wall thickness from 0.5 to 10 mm.

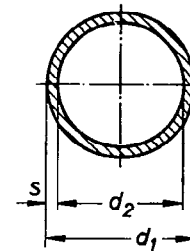
Tubes to this Standard are manufactured from the materials of material groups I, II and III quoted in Section 4; the restrictions mentioned should be observed.

For other dimensions and coordination of tolerances than those in this Standard, DIN 1755 Sheet 1 applies.

2. Designation

Designation of a seamless tube of outside diameter $d_1 = 20$ mm and wall thickness $s = 2$ mm in the material with the symbol CuZn40 F42 (formerly Ms60 F41) or the material number 2.0360.26:

Tube 20 × 2 DIN 1755 - CuZn40 F42
or Tube 20 × 2 DIN 1755 - 2.0360.26
formerly Tube 20 × 2 DIN 1755 - Ms60 F41



3. Dimensions and permissible variations

3.1. Outside diameter and wall thickness

The permissible variations on outside diameter and wall thickness are given in Tables 1 to 6 as shown in the schedule (see page 2).

For tubes in the soft condition of the material concerned, designated by the appended number .10 after the material number (see DIN 17671 Sheet 1) only the permissible variations for the mean diameter ($d_{1\text{mean}}$) given in Tables 1 to 6 apply, since the permissible variations on the diameter including out-of-roundness ($d_{1\text{tot}}$) cannot be guaranteed for these tubes.

*) See "Coordination of tolerances for cross-section dimensions of non-ferrous metal tubes", DIN-Mitt. Vol. 45 (1966) No. 11 pp. 597-603. Obtainable as special publication D-346 from Beuth-Vertrieb GmbH, Berlin 30 and Köln.

Continued on pages 2 to 11
Explanations on page 12

Schedule showing the distribution of the permissible variations on outside diameter and wall thickness corresponding to material groups I, II and III in Tables 1 to 6

Outside diameter d_1	Wall thickness s													Outside diameter d_1
	0,5	0,75	1	1,5	2	2,5	3	3,5	4	5	6	8	10	
3	<p>Material groups I and II: see Table 1, page 3</p> <p>Material groups I and II: see Table 2, pages 4 and 5</p> <p>Material groups I and II: see Table 3, page 5</p> <p>Material group III: see Table 4, page 6</p> <p>Material group III: see Table 5, pages 7 and 8</p> <p>Material group III: see Table 6, page 8</p>													3
4														4
5														5
6														6
8														8
10														10
12														12
14														14
15														15
16														16
18														18
20														20
22														22
25														25
28														28
30														30
32														32
35														35
38														38
40														40
42														42
44,5	44,5													
50	50													
55	55													
57	57													
60	60													
63	63													
70	70													
76	76													
80	80													
85	85													
89	89													
100	100													
108	108													
114	114													
125	125													
133	133													
159	159													
160	160													
168	168													
194	194													
200	200													
219	219													
250	250													
267	267													
273	273													
315	315													
	Wall thickness s													
	0,5	0,75	1	1,5	2	2,5	3	3,5	4	5	6	8	10	

Table 1. Material groups I and II

Outside diameter d_1	Wall thickness s																			
	0.5				0.75				1				1.5				2			
	Perm. + var. for d_1 total mean \bar{d}_1	Perm. + var. for mean \bar{s}	Weight kg/m U	Min. wall thickness s_{min}	Perm. + var. for mean \bar{s}	Weight kg/m U	Min. wall thickness s_{min}	Perm. + var. for mean \bar{s}	Weight kg/m U	Min. wall thickness s_{min}	Perm. + var. for mean \bar{s}	Weight kg/m U	Min. wall thickness s_{min}	Perm. + var. for mean \bar{s}	Weight kg/m U	Min. wall thickness s_{min}	Perm. + var. for mean \bar{s}	Weight kg/m U	Min. wall thickness s_{min}	
3	0.07	0.05	0.03	0.42	0.03	0.08	0.64	0.03	0.09	0.06	0.88	0.88	0.03	0.09	0.06	0.88	0.03	0.09	0.06	0.88
4	0.07	0.05	0.03	0.42	0.03	0.08	0.64	0.03	0.09	0.06	0.88	0.88	0.03	0.09	0.06	0.88	0.03	0.09	0.06	0.88
5	0.07	0.05	0.03	0.42	0.03	0.08	0.64	0.03	0.09	0.06	0.88	0.88	0.03	0.09	0.06	0.88	0.03	0.09	0.06	0.88
6	0.07	0.05	0.03	0.42	0.03	0.08	0.64	0.03	0.09	0.06	0.88	0.88	0.03	0.09	0.06	0.88	0.03	0.09	0.06	0.88
8	0.09	0.06	0.03	0.42	0.03	0.08	0.64	0.03	0.09	0.06	0.88	0.88	0.03	0.09	0.06	0.88	0.03	0.09	0.06	0.88
10	0.09	0.06	0.03	0.42	0.03	0.08	0.64	0.03	0.09	0.06	0.88	0.88	0.03	0.09	0.06	0.88	0.03	0.09	0.06	0.88
12	0.12	0.08	0.03	0.42	0.03	0.08	0.64	0.03	0.09	0.06	0.88	0.88	0.03	0.09	0.06	0.88	0.03	0.09	0.06	0.88
14	0.12	0.08	0.03	0.42	0.03	0.08	0.64	0.03	0.09	0.06	0.88	0.88	0.03	0.09	0.06	0.88	0.03	0.09	0.06	0.88
15	0.12	0.08	0.04	0.41	0.04	0.08	0.63	0.04	0.10	0.07	0.86	0.86	0.04	0.10	0.07	0.86	0.04	0.10	0.07	0.86
16	0.12	0.08	0.04	0.41	0.04	0.08	0.63	0.04	0.10	0.07	0.86	0.86	0.04	0.10	0.07	0.86	0.04	0.10	0.07	0.86
18	0.12	0.08	—	—	0.04	0.08	0.63	0.04	0.10	0.07	0.86	0.86	0.04	0.10	0.07	0.86	0.04	0.10	0.07	0.86
20	0.18	0.12	—	—	0.05	0.08	0.40	0.05	0.10	0.05	0.53	0.85	0.05	0.10	0.05	0.53	0.05	0.10	0.05	0.53
22	0.18	0.12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
25	0.18	0.12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
28	0.18	0.12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
30	0.18	0.12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
32	0.24	0.15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
35	0.24	0.15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
38	0.24	0.15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
40	0.24	0.15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
42	0.24	0.15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
44.5	0.24	0.15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
50	0.24	0.15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
55	0.30	0.20	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
57	0.30	0.20	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
60	0.30	0.20	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
63	0.40	0.20	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
70	0.40	0.20	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
76	0.40	0.20	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
80	0.40	0.20	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
85	0.50	0.25	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
89	0.50	0.25	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
100	0.50	0.25	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
125	n. V.	0.50	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
160	n. V.	0.50	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
200	n. V.	0.50	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Footnotes 1) to 6) see page 5, key to colour coding see page 8

Table 2. Material groups I and II

Outside diameter d_1	2,5				3				3,5				4				5			
	Perm. + var. for		Min. wall thickness	Weight kg/m	Perm. + var. for		Min. wall thickness	Weight kg/m	Perm. + var. for		Min. wall thickness	Weight kg/m	Perm. + var. for		Min. wall thickness	Weight kg/m	Perm. + var. for		Min. wall thickness	Weight kg/m
	d_{tot}	d_{mean}			s_{mean}	U			s_{mean}	U			s_{mean}	U			s_{mean}	U		
10	0,09	0,06	0,04	0,23	0,52	2,23	0,24	0,59	2,71	—	—	—	—	—	—	—	—	—	—	
12	0,12	0,08	0,05	0,23	0,66	2,22	0,24	0,75	2,70	0,08	0,27	0,83	0,32	0,89	3,60	—	—	—	—	
14	0,12	0,08	0,05	0,23	0,80	2,22	0,24	0,92	2,70	0,08	0,27	1,03	0,32	1,12	3,50	—	—	—	—	
15	0,12	0,08	0,07	0,23	0,87	2,20	0,24	1,01	2,68	0,09	0,27	1,13	0,32	1,23	3,59	—	—	—	—	
16	0,12	0,08	0,07	0,23	0,94	2,20	0,24	1,09	2,68	0,09	0,27	1,22	0,32	1,34	3,59	—	—	—	—	
18	0,12	0,08	—	—	—	—	0,24	1,26	2,68	—	—	—	—	—	—	—	—	—	—	
20	0,18	0,12	—	—	—	—	0,27	1,43	2,63	—	—	—	—	—	—	—	—	—	—	
22	0,18	0,12	—	—	—	—	0,27	1,59	2,63	—	—	—	—	—	—	—	—	—	—	
25	0,18	0,12	0,08	0,23	1,57	2,19	0,27	1,85	2,63	—	—	—	—	—	—	—	—	—	—	
28	0,18	0,12	0,08	0,23	1,78	2,19	0,27	2,10	2,63	—	—	—	—	—	—	—	—	—	—	
30	0,24	0,15	0,10	0,23	1,92	2,17	0,27	2,26	2,63	—	—	—	—	—	—	—	—	—	—	
32	0,24	0,15	0,10	0,23	2,06	2,17	0,27	2,43	2,61	—	—	—	—	—	—	—	—	—	—	
35	0,24	0,15	0,10	0,23	2,27	2,17	0,27	2,68	2,61	—	—	—	—	—	—	—	—	—	—	
38	0,24	0,15	0,10	0,23	2,48	2,17	0,27	2,94	2,61	—	—	—	—	—	—	—	—	—	—	
40	0,24	0,15	—	—	—	—	0,27	3,10	2,61	—	—	—	—	—	—	—	—	—	—	
42	0,24	0,15	0,10	0,23	2,76	2,17	—	—	—	—	—	—	—	—	—	—	—	—	—	
44,5	0,24	0,15	0,10	0,23	2,94	2,17	0,12	3,48	2,61	—	—	—	—	—	—	—	—	—	—	
50	0,30	0,20	—	—	—	—	0,12	3,94	2,61	—	—	—	—	—	—	—	—	—	—	
55	0,30	0,20	—	—	—	—	0,14	4,36	2,59	—	—	—	—	—	—	—	—	—	—	
57	0,30	0,20	0,12	0,25	3,81	2,13	0,14	4,53	2,59	0,15	0,32	5,24	0,15	0,36	6,28	0,15	0,36	7,38	0,15	
60	0,30	0,20	—	—	—	—	0,14	4,78	2,59	—	—	—	—	—	—	—	—	—	—	
63	0,30	0,20	—	—	—	—	0,14	5,03	2,59	—	—	—	—	—	—	—	—	—	—	
70	0,30	0,20	—	—	—	—	0,14	5,62	2,59	—	—	—	—	—	—	—	—	—	—	
76	0,30	0,20	0,12	0,25	5,14	2,13	0,14	6,12	2,59	0,15	0,32	7,09	0,15	0,36	8,50	0,15	0,36	10,49	0,15	
80	0,30	0,20	—	—	—	—	0,14	6,46	2,59	—	—	—	—	—	—	—	—	—	—	
85	0,40	0,25	—	—	—	—	0,16	6,88	2,57	—	—	—	—	—	—	—	—	—	—	
89	0,40	0,25	—	—	—	—	0,16	7,21	2,57	—	—	—	—	—	—	—	—	—	—	
100	0,40	0,25	—	—	—	—	0,16	8,14	2,57	—	—	—	—	—	—	—	—	—	—	
108	0,50	0,25	0,15	0,25	7,37	2,10	0,16	8,81	2,57	0,17	0,32	10,2	0,17	0,36	12,1	0,17	0,36	14,6	0,17	
114	0,50	0,25	0,15	0,25	7,79	2,10	0,16	9,31	2,57	0,17	0,32	10,8	0,17	0,36	12,8	0,17	0,36	15,6	0,17	
125	0,75	0,50	—	—	—	—	0,20	10,2	2,50	—	—	—	—	—	—	—	—	—	—	
133	0,75	0,50	0,18	0,25	9,12	2,07	0,20	10,9	2,50	0,22	0,35	12,7	0,22	0,40	15,2	0,22	0,40	18,3	0,22	
159	1,0	0,50	0,18	0,25	10,9	2,07	0,20	13,1	2,50	0,22	0,35	15,2	0,22	0,40	18,3	0,22	0,40	22,8	0,22	
160	1,0	0,50	—	—	—	—	0,20	13,2	2,50	—	—	—	—	—	—	—	—	—	—	
168	1,0	0,50	0,18	0,25	11,6	2,07	0,20	13,8	2,50	0,22	0,35	16,1	0,22	0,40	19,6	0,22	0,40	24,1	0,22	
194	1,0	0,50	0,18	0,25	13,4	2,07	0,20	16,0	2,50	0,22	0,35	18,6	0,22	0,40	22,8	0,22	0,40	28,3	0,22	
200	1,0	0,50	—	—	—	—	0,20	16,5	2,50	—	—	—	—	—	—	—	—	—	—	

Footnotes 1) to 6) see page 5, key to colour coding see page 8

Continuation of Table 2

Outside diameter d_1	2.5			3			3.5			4			5		
	Perm. \pm var. for d_1 total mean	Perm. \pm var. for mean	Min. wall thickness kg/m	Perm. \pm var. for mean	Min. wall thickness kg/m	Weight kg/m	Perm. \pm var. for mean	Min. wall thickness kg/m	Weight kg/m	Perm. \pm var. for mean	Min. wall thickness kg/m	Weight kg/m	Perm. \pm var. for mean	Min. wall thickness kg/m	Weight kg/m
219	1.5 n.v.	0.75	—	0.24	0.36	18.1	0.26	2.40	21.1	0.26	3.26	24.0	0.26	3.26	28.2
250	1.5 n.v.	0.75	—	0.24	0.36	20.7	0.26	2.40	24.1	0.26	3.26	27.5	0.26	3.26	28.2
267	n.v.	0.75	—	0.24	0.36	22.1	0.26	2.40	23.8	0.26	3.26	29.4	0.26	3.26	36.6
273	n.v.	0.75	—	0.24	0.36	22.6	0.26	2.40	26.4	0.26	3.26	30.1	0.26	3.26	37.4
315	n.v.	0.75	—	—	—	—	—	—	—	0.26	3.26	34.8	0.26	3.26	43.4

Table 3. Material groups I and II

Outside diameter d_1	6			8			10		
	Perm. \pm var. for d_1 total mean	Perm. \pm var. for mean	Min. wall thickness kg/m	Perm. \pm var. for mean	Min. wall thickness kg/m	Weight kg/m	Perm. \pm var. for mean	Min. wall thickness kg/m	Weight kg/m
18	0.12	0.08	0.11	0.48	2.01	5.41	—	—	—
20	0.18	0.12	0.12	0.48	2.35	5.40	—	—	—
22	0.18	0.12	0.12	0.48	2.68	5.40	—	—	—
25	0.18	0.12	0.12	0.48	3.19	5.40	—	—	—
28	0.18	0.12	0.12	0.48	3.68	5.40	0.13	0.64	4.47
30	0.18	0.12	0.12	0.48	4.03	5.40	0.13	0.64	4.92
32	0.24	0.15	0.14	0.48	4.36	5.38	0.15	0.64	5.37
35	0.24	0.15	0.14	0.48	4.87	5.38	0.15	0.64	6.04
38	0.24	0.15	0.14	0.48	5.37	5.38	0.15	0.64	6.71
40	0.24	0.15	0.14	0.48	5.70	5.38	0.15	0.64	7.16
50	0.24	0.15	0.14	0.48	7.39	5.38	0.15	0.64	9.40
55	0.30	0.20	0.16	0.54	8.23	5.30	0.17	0.72	10.5
60	0.30	0.20	0.16	0.54	9.07	5.30	0.17	0.72	11.6
63	0.30	0.20	0.16	0.54	9.56	5.30	0.17	0.72	12.3
70	0.30	0.20	0.16	0.54	10.7	5.30	0.17	0.72	13.9
80	0.30	0.20	0.16	0.54	12.4	5.30	0.17	0.72	16.1
85	0.40	0.25	0.18	0.54	14.3	5.28	0.20	0.72	17.2
100	0.40	0.25	0.18	0.54	15.8	5.28	0.20	0.72	20.6
125	0.75	0.50	0.24	0.54	20.9	5.22	0.26	0.72	26.2
160	0.75	0.50	0.24	0.54	25.8	5.22	0.26	0.72	34.0
200	0.75	0.50	0.24	0.54	32.6	5.22	0.26	0.72	42.9
250	1.2	0.75	0.30	0.72	41.0	4.98	0.32	0.96	54.1
315	1.5 n.v.	0.75	0.30	0.72	51.9	4.98	0.32	0.96	68.7

Footnotes 1) to 6) see page 5, key to colour coding see page 8

- 1) Permissible variations on the diameter d_{1total} is the diameter including out-of-roundness. Each measured diameter must lie within the permissible variations.
- 2) Permissible variations on the mean diameter d_{1mean}
The mean diameter is the arithmetic mean of the maximum and minimum diameter measured in the same plane perpendicular to the axis of the tube. When the diameters are measured, a distance of a minimum of d_1 and a maximum of 100 mm from either end of the tube must be ignored.
- 3) Permissible variations on the mean wall thickness s_{mean}
The mean wall thickness is the arithmetic mean of the maximum and minimum wall thickness measured in the same plane perpendicular to the axis of the tube.
- 4) Permissible thickness variation
The thickness variation U is the variation of the maximum or minimum wall thickness from the mean wall thickness, determined in the same plane perpendicular to the axis of the tube.
- 5) Calculated with a density of 8.90 kg/dm³. For materials with a different density, the weights should be calculated using the conversion factors in Tables 8 to 10 (see also Section 6).
- 6) The minimum wall thicknesses given in this column may occur within one delivery and should therefore only be used as a basis for design calculations.

Table 5. Material group III

d ₁	Outside diameter		Wall thickness s											
	Perm. + var. for d ₁ mean		2.5		3		3.5		4		5			
	d ₁ (1)	d ₁ (2)	Perm. + var. for mean	Weight kg/m	Min. wall thickness s	Perm. + var. for mean	Weight kg/m	Min. wall thickness s	Perm. + var. for mean	Weight kg/m	Min. wall thickness s	Perm. + var. for mean	Weight kg/m	Min. wall thickness s
10	0.15	0.10	0.07	0.52	2.20	0.09	0.59	2.67	—	—	—	—	—	—
12	0.20	0.15	0.09	0.66	2.18	0.11	0.75	2.65	0.14	0.83	3.09	0.14	0.89	3.54
14	0.20	0.15	0.09	0.80	2.18	0.11	0.92	2.65	0.14	0.27	3.09	0.14	1.12	3.54
15	0.20	0.15	0.13	0.87	2.14	0.14	1.01	2.62	0.16	1.13	3.07	0.16	1.23	3.52
16	0.20	0.15	0.13	0.94	2.14	0.14	1.09	2.62	0.16	1.22	3.07	0.16	1.34	3.52
18	0.20	0.15	—	—	—	0.14	1.26	2.62	—	—	—	0.16	1.57	3.52
20	0.30	0.20	—	—	—	0.18	1.43	2.55	—	—	—	0.18	1.79	3.46
22	0.30	0.20	—	—	—	0.18	1.59	2.55	—	—	—	0.18	2.01	3.46
25	0.30	0.20	0.14	0.23	2.13	0.18	1.85	2.55	—	—	—	0.18	2.35	3.46
28	0.30	0.20	0.14	0.23	1.78	0.18	2.10	2.55	—	—	—	0.18	2.68	3.46
30	0.30	0.20	0.14	0.23	1.92	0.18	2.26	2.55	—	—	—	0.18	2.91	3.46
32	0.38	0.25	0.18	0.23	2.06	0.22	2.43	2.51	—	—	—	0.22	3.13	3.42
35	0.38	0.25	0.18	0.23	2.27	0.22	2.68	2.51	—	—	—	0.22	3.47	3.42
38	0.38	0.25	0.18	0.23	2.48	0.22	2.94	2.51	—	—	—	0.22	3.80	3.42
40	0.38	0.25	—	—	—	0.22	3.10	2.51	—	—	—	0.22	4.03	3.42
42	0.38	0.25	0.18	0.23	2.76	0.22	3.48	2.51	—	—	—	—	—	—
44.5	0.38	0.25	0.18	0.23	2.94	0.22	3.94	2.51	—	—	—	0.22	5.14	3.42
50	0.38	0.25	—	—	—	0.25	4.36	2.48	—	—	—	0.24	5.70	3.37
55	0.45	0.30	—	—	—	0.25	4.53	2.48	—	—	—	—	—	—
57	0.45	0.30	0.22	0.25	3.81	0.25	4.78	2.48	0.27	0.32	5.24	0.27	6.26	3.37
60	0.45	0.30	—	—	—	0.25	5.03	2.48	—	—	—	0.27	6.60	3.37
63	0.45	0.30	—	—	—	0.25	5.62	2.48	—	—	—	0.27	7.38	3.37
70	0.45	0.30	—	—	—	0.25	6.12	2.48	—	—	—	—	—	—
76	0.45	0.30	0.22	0.25	5.14	0.25	8.14	2.42	0.27	0.32	7.09	0.27	10.7	3.33
80	0.45	0.30	—	—	—	0.25	8.81	2.48	—	—	—	0.27	10.49	3.37
85	0.40	0.40	—	—	—	0.29	9.31	2.42	—	—	—	0.31	11.18	3.33
89	0.40	0.40	—	—	—	0.29	10.2	2.42	—	—	—	—	—	—
100	0.40	0.40	—	—	—	0.29	10.9	2.42	—	—	—	0.31	13.3	3.33
108	0.80	0.40	0.27	0.25	7.37	0.29	13.1	2.42	0.31	0.32	10.2	0.31	16.8	3.20
114	0.80	0.40	0.27	0.25	7.79	0.29	13.2	2.42	0.31	0.32	10.8	0.31	17.9	3.20
125	1.2	0.75	—	—	—	0.36	16.5	2.50	—	—	—	0.40	21.5	3.20
133	1.2	0.75	0.32	0.25	9.12	0.36	16.5	2.34	0.40	0.35	12.7	0.40	21.7	3.20
159	1.5	0.75	0.32	0.25	10.9	0.36	16.5	2.34	0.40	0.35	15.2	0.40	22.8	3.20
160	1.5	0.75	—	—	—	0.36	16.5	2.34	—	—	—	0.40	26.4	3.20
168	1.5	0.75	0.32	0.25	11.6	0.36	16.5	2.34	0.40	0.35	16.1	0.40	27.3	3.20
194	1.5	0.75	0.32	0.25	13.4	0.36	16.5	2.34	0.40	0.35	18.6	0.40	—	—
200	1.5	0.75	—	—	—	0.36	16.5	2.34	—	—	—	0.40	—	—

Footnotes 1) to 6) see page 5, key to colour coding see page 8

Continuation of Table 5

Outside diameter d_1	2,5					3					3,5					4					5					
	Perm. + var. for d_1 mean		Perm. + var. for s mean		U		Weight kg/m		Min. wall thickness		Perm. + var. for s mean		U		Weight kg/m		Min. wall thickness		Perm. + var. for s mean		U		Weight kg/m		Min. wall thickness	
	1)	2)	3)	4)	5)	6)	7)	8)	9)	10)	11)	12)	13)	14)	15)	16)	17)	18)	19)	20)	21)	22)	23)	24)	25)	26)
219	2,4	1,2	—	—	—	0,43	0,36	18,1	2,21	2,21	0,47	0,42	21,1	2,61	2,61	0,47	0,48	24,0	3,05	0,50	0,60	29,9	3,90	3,90	—	—
250	2,4	1,2	—	—	—	0,43	0,36	20,7	2,21	2,21	0,47	0,42	24,1	2,61	2,61	0,47	0,48	27,5	3,05	0,50	0,60	34,2	3,90	3,90	—	—
267	n.V.	1,2	—	—	—	0,43	0,36	22,1	2,21	2,21	0,47	0,42	25,8	2,61	2,61	0,47	0,48	29,4	3,05	0,50	0,60	36,6	3,90	3,90	—	—
273	n.V.	1,2	—	—	—	0,43	0,36	22,6	2,21	2,21	0,47	0,42	26,4	2,61	2,61	0,47	0,48	30,1	3,05	0,50	0,60	37,4	3,90	3,90	—	—
315	n.V.	1,2	—	—	—	—	—	—	—	—	—	—	—	—	—	0,47	0,48	34,8	3,05	0,50	0,60	43,4	3,90	3,90	—	—

Table 6. Material group III

Outside diameter d_1	6					8					10								
	Perm. + var. for d_1 mean		Perm. + var. for s mean		U		Weight kg/m		Min. wall thickness		Perm. + var. for s mean		U		Weight kg/m		Min. wall thickness		
	1)	2)	3)	4)	5)	6)	7)	8)	9)	10)	11)	12)	13)	14)	15)	16)	17)	18)	
18	0,20	0,15	0,19	0,48	2,01	5,33	—	—	—	—	—	—	—	—	—	—	—	—	
20	0,30	0,20	0,22	0,48	2,35	5,30	—	—	—	—	—	—	—	—	—	—	—	—	
22	0,30	0,20	0,22	0,48	2,68	5,30	—	—	—	—	—	—	—	—	—	—	—	—	
25	0,30	0,20	0,22	0,48	3,19	5,30	—	—	—	—	—	—	—	—	—	—	—	—	
28	0,30	0,20	0,22	0,48	3,68	5,30	0,23	0,64	4,47	7,13	—	—	—	—	—	—	—	—	
30	0,30	0,20	0,22	0,48	4,03	5,30	0,23	0,64	4,92	7,13	—	—	—	—	—	—	—	—	
32	0,38	0,25	0,25	0,48	4,36	5,27	0,27	0,64	5,37	7,09	—	—	—	—	—	—	—	—	
35	0,38	0,25	0,25	0,48	4,87	5,27	0,27	0,64	6,04	7,09	—	—	—	—	—	—	—	—	
38	0,38	0,25	0,25	0,48	5,37	5,27	0,27	0,64	6,71	7,09	—	—	—	—	—	—	—	—	
40	0,38	0,25	0,25	0,48	5,70	5,27	0,27	0,64	7,16	7,09	0,27	0,80	8,39	8,93	—	—	—	—	
50	0,38	0,25	0,25	0,48	7,39	5,27	0,27	0,64	9,40	7,09	0,27	0,80	11,2	8,93	—	—	—	—	
55	0,45	0,30	0,29	0,54	8,23	5,17	0,31	0,72	10,5	6,97	0,32	0,80	12,6	8,88	—	—	—	—	
60	0,45	0,30	0,29	0,54	9,07	5,17	0,31	0,72	11,6	6,97	0,32	0,80	14,0	8,88	—	—	—	—	
63	0,45	0,30	0,29	0,54	9,56	5,17	0,31	0,72	12,3	6,97	0,32	0,80	14,8	8,88	—	—	—	—	
70	0,45	0,30	0,29	0,54	10,7	5,17	0,31	0,72	13,9	6,97	0,32	0,80	16,8	8,88	—	—	—	—	
80	0,45	0,30	0,29	0,54	12,4	5,17	0,31	0,72	16,1	6,97	0,32	0,80	19,6	8,88	—	—	—	—	
85	0,60	0,40	0,32	0,54	14,3	5,14	0,36	0,72	17,2	6,92	0,40	0,80	20,9	8,80	—	—	—	—	
100	0,60	0,40	0,32	0,54	15,8	5,14	0,36	0,72	20,6	6,92	0,40	0,80	25,2	8,60	—	—	—	—	
125	1,2	0,75	0,43	0,54	20,9	5,03	0,47	0,72	26,2	6,81	0,47	0,90	32,2	8,63	—	—	—	—	
160	1,2	0,75	0,43	0,54	25,8	5,03	0,47	0,72	34,0	6,81	0,47	0,90	41,9	8,63	—	—	—	—	
200	1,2	0,75	0,43	0,54	32,6	5,03	0,47	0,72	42,9	6,81	0,47	0,90	53,1	8,63	—	—	—	—	
250	1,8	1,2	0,54	0,72	41,0	4,74	0,58	0,86	54,1	6,46	0,63	1,20	67,1	8,17	—	—	—	—	
315	2,4	1,2	0,54	0,72	51,9	4,74	0,58	0,86	68,7	6,46	0,63	1,20	85,3	8,17	—	—	—	—	
n.V.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Key to colour coding of the ratios

d_1 : s in the Tables 1 to 6:

no colour

d_1 : s to 30

full surface d_1 : s above 30 to 50

with screen d_1 : s above 50

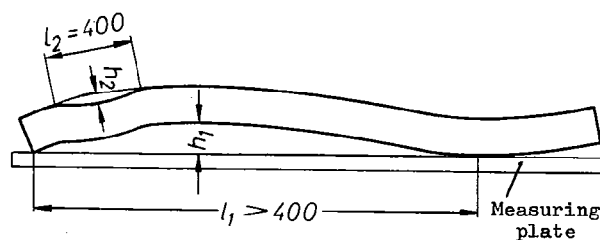
3.2. Permissible variation from straightness

For tubes of outside diameter d_1 over 10 mm in manufacturing, approximate and fixed lengths (except tubes in the soft condition) the permissible variations in Table 7 apply.

d_1 is the permissible variation per metre, increasing linearly for measured lengths l_1 over 400 mm. Over any length $l_2 = 400$ mm, the permissible variation must not however exceed h_2 , see diagram.

Table 7

Ratio $d_1 : s$		Permissible variation	
above	up to	per metre h_1	each 400 mm h_2
—	5	2	0,8
5	10	3	1,2
10	20	4	1,6
20	40	5	2,0
40	—	6	2,5

4. Materials and strength properties
(to be stated when ordering)

Copper wrought alloys according to DIN 17671 Sheet 1

Tubes to this Standard cannot be supplied in all dimensions in all the materials quoted. Where necessary therefore, agreement should be reached on the required material.

Material groups I, II and III take account of the differing working characteristics of the alloys according to their composition (see symbols in Tables 8 to 10).

Table 8. Material group I

Denomination	Symbols		Material number	Density kg/dm ³	Conversion factor
	new	former			
Low alloy, copper wrought alloys	CuSP	—	2.1498	8,9	1
	CuTeP	SF-CuTe	2.1546	8,9	1
Copper-zinc alloys (brass)	CuZn36Pb1	Ms63Pb	2.0330	8,5	0,955
	CuZn36Pb3	—	2.0375	8,5	0,955
	CuZn38Pb1	Ms60Pb	2.0370	8,4	0,944
	CuZn39Pb3	Ms58 *)	2.0401	8,5	0,955
	CuZn40Pb2		2.0402	8,4	0,944

*) In view of the splitting up of the previous Ms58, in this issue of the standard, by way of exception, the following information is included on the use of the individual alloys (see DIN 17660):
 CuZn39Pb3: Principal alloy for working on automatic machines;
 CuZn40Pb2: Alloy for all machining operations.

Table 9. Material group II

Denomination	Symbols		Material number	Density kg/dm ³	Conversion factor
	new	former			
Copper-zinc alloys (brass and special brass)	CuZn5	(Ms95)	2.0220	8,9	1
	CuZn10	Ms90	2.0230	8,8	0,989
	CuZn15	Ms85	2.0240	8,8	0,989
	CuZn20	Ms80	2.0250	8,7	0,977
	CuZn28	(Ms72)	2.0261	8,6	0,966
	CuZn30	Ms70	2.0265	8,5	0,955
	CuZn33	Ms67	2.0280	8,5	0,955
	CuZn36	Ms63	2.0335	8,4	0,944
	CuZn37		2.0321	8,4	0,944
	CuZn40	Ms60	2.0360	8,4	0,944
	CuZn30Al	—	2.0515	7,5	0,943
	CuZn31Si	SoMs68	2.0490	8,4	0,944
Copper-tin alloys (tin bronze)	CuSn2	SnBz2	2.1010	8,9	1
	CuSn6	SnBz6	2.1020	8,8	0,989
	CuSn8	SnBz8	2.1030	8,8	0,989
Copper-nickel alloys	CuNi5Fe		2.0862	8,9	1
	CuNi10Fe		2.0872	8,9	1
	CuNi30Fe		2.0882	8,9	1
Low alloy, copper wrought alloys	CuAsP	SB-Cu	2.1491	8,9	1
	CuMn2		2.1363	8,8	0,989
	CuMn5		2.1366	8,6	0,966
	CuSi2Mn		2.1522	8,7	0,977
	CuSi3Mn		2.1525	8,5	0,955
	CuBe2		2.1247	8,3	0,932
	CuCr		2.1291	8,9	1
	CuNi1,5Si		2.0853	8,8	0,989
	CuNi2Si		2.0855	8,8	0,989
	CuNi3Si		2.0857	8,8	0,989

Table 10. Material group III

Denomination	Symbols		Material number	Density kg/dm ³	Conversion factor
	new	former			
Copper-zinc alloys (special brass)	CuZn20Al	SoMs76	2.0460	8,3	0,932
	CuZn35Ni	SoMs59	2.0540	8,3	0,932
	CuZn37Al	SoMs58Al1	2.0510	8,3	0,932
	CuZn40Al		2.0561	8,2	0,921
	CuZn40Ni	SoMs58	2.0571	8,3	0,932
	CuZn40Mn		2.0572	8,3	0,932
	CuZn40MnPb	SoMs58Pb	2.0580	8,2	0,921
Copper-aluminium alloys (aluminium-bronze)	CuAl5	AlBz5	2.0916	8,2	0,921
	CuAl8	AlBz8	2.0920	7,7	0,865
Copper-nickel-zinc alloys (nickel silver)	CuNi12Zn24	Ns6512	2.0730	8,7	0,977
	CuNi18Zn20	Ns6218	2.0740	8,7	0,977

5. Finish

According to the Technical conditions of delivery DIN 17671 Sheet 2

6. Weights and permissible variations

The weights given in Tables 1 to 6 are calculated from the nominal dimensions of the outside diameter and the wall thickness of the tubes concerned and the density of the material. For conversion factors see Tables 8 to 10.

The permissible variation on weight is obtained from the permissible variations on the nominal dimensions and the permissible variations on the composition of the alloy.

7. Mode of delivery7.1. Tubes in manufacturing lengths: from 2000 to 8000 mm

Supply of short lengths of at least 1000 mm is permissible up to 10 % of the delivered weight.

7.2. Tubes in approximate lengths: up to 8000 mm

Approximate lengths must be specially agreed when ordering. For the purpose of marking, the word "approximate" should then be added after the length.

The permissible variation on the ordered length is $\pm 10\%$.

For tubes of diameter up to 100 mm, short lengths of at least 1000 mm may be supplied up to 10 % of the delivered weight. For tubes of diameter over 100 mm, the permissible short lengths must be specially agreed.

7.3. Tubes in fixed lengths

Fixed lengths must be specially agreed when ordering. For the purpose of marking, the word "fixed" should then be added after the length. For fixed lengths, the permissible variations in Table 11 apply. With fixed lengths, saw cuts may vary from a right angle only by half the permissible variation given in Table 11.

Table 11

Outside diameter d_1		Permissible plus variations for fixed lengths above							
		-	100	250	500	1000	2000	4000	
above	to	up to							
		100	250	500	1000	2000	4000	-	
-	10	by agreement							by agreement
10	50	1	1,5	2	3	4	5		
50	120	1,5	2	3	4	5	6		
120	250	2	3	4	5	6	7		
250	450	3	4	5	6	7	8		

7.4. Example of order

2 t seamless drawn tubes of outside diameter $d_1 = 20$ mm, wall thickness $s = 2$ mm to coordination of tolerance A in manufacturing lengths in the material with the symbol CuZn40 F 42 (formerly Ms60 F41) or the material number 2.0360.26

2 t Tubes 30 x 2 DIN 1755 - CuZn40 F42

or 2 t Tubes 30 x 2 DIN 1755 - 2.0360.26

formerly 2 t Tubes 30 x 2 DIN 1755 - Ms60 F41

Explanations

This issue of the standard takes account of the fact that only two of the cross-section dimensions of a tube should be subject to a tolerance, see coordination of tolerances A, B and C. With the introduction of this coordination of tolerances the previous redundancy of dimensioning, i.e. simultaneous stipulation of permissible variations on outside diameter, inside diameter and wall thickness, is avoided.

For further details reference should be made to the comments of F. Ballas⁷⁾ and those of H.J. Fischer and R.M. Zollinger⁸⁾. Here, the only point that need be made is that the permissible variations are influenced both by the tool and the manufacturing process. For this reason, a distinction is now made between dimension tolerances dependent on the tool, i.e. the permissible variations from the mean diameter or the mean wall thickness and variations in shape dependent on the manufacturing process, i.e. the permissible variations in the diameter including out-of-roundness or the permissible wall thickness variation (eccentricity).

With agreement having been reached on the new system of tolerances, it was then necessary to make the standards both more universal on the one hand and more specialized on the other, than previously, i.e. to provide tolerances to the standard for intermediate dimensions by quoting dimension ranges and also to stipulate preferred dimensions for particular applications e.g. for pipelines.

These aims were achieved by dividing up the previous standard DIN 1755 into a number of Sheets as follows:

Sheet 1: Dimension ranges and coordination of tolerances

The dimension ranges enable the permissible variation applicable in any particular case to be read off or calculated for any required dimension. This is particularly important for tubes to coordination of tolerances B and C for which it was not possible to stipulate any preferred dimensions.

Sheet 2: Preferred dimensions for general application

Since in general, tubes to coordination of tolerance A are used, this Standard stipulates preferred dimensions for outside diameter and wall thickness arranged according to preferred numbers and including dimensions corresponding to the international range of diameters for pipelines.

On the basis of the provisions of Sheet 1, for each dimension, the permissible variations on outside diameter and wall thickness are given. In addition, the minimum possible wall thickness for the given tube cross-section and the weight are calculated in order to provide the user of the standard with some essential design data.

Sheet 3: Preferred dimensions for pipelines

The preferred dimensions for the outside diameter were deliberately brought into line with the series which has been internationally adopted for pipelines. This harmonization was necessary since all joints e.g. unions and flanges, are matched to these outside diameters. For the rest of the contents of this Standard the same principles apply as for Sheet 2.

Because of this subdivision, it was decided to present each Sheet in such a manner as to enable it to be used independently of the other Sheets. It is thus possible, according to requirements, to alter, i.e. to delete and/or add to the preferred dimensions in Sheet 2 and/or Sheet 3.

In the course of revision, it was also necessary to provide for a division of the materials into several groups to take account of the working characteristics of the alloys.

⁷⁾ See DIN-Mitt. Vol. 41 (1962) No. 8/9, pp. 357-362

⁸⁾ See DIN-Mitt. Vol. 45 (1966) No. 11, pp. 597-603