

## GOST 14162-69 CAPILLARY STEEL TUBES

Small size capillary tubes of carbon and corrosion-resistant steels and alloys are delivered in the size range given in Table 1.

Tubes shall have random length not shorter than 0.3 m; specified not over 7 m with limit tolerance +15 mm; multiple not over 7 m with 5 mm allowance per cut and total allowance +15 mm per tube length. Tubes can be delivered in coils of total length not over 160 m.

Tube curvature per any meter length except those with the outside diameter under 1 mm and coiled tubes shall be under 1.5 mm for normal accuracy and 3.0 mm for improved accuracy.

On agreement tubes can be delivered without straightening.

On the customer's request tube ends can be flattened on 10 to 15 mm length to avoid ingress of dust and moisture.

Technical requirements.

Tubes shall be manufactured of carbon and corrosion-resistant steel grades.

Mechanical properties of heat-treated tubes are given in Table 3.

Other requirements.

Tubes can be delivered with ground or pickled outside surface, which shall be bright and smooth, without cracks, laps, pinholes and pickle marks.

Table 1 Size range of capillary tubes of carbon and corrosion-resistant steels and alloys.

Outside diameter, mm	Inside diameter and limit tolerances for it for different wall thickness, mm				
	0.1	0.12	0.16	0.20	0.22
0.30	0.10±0.05	-	-	-	-
0.32	0.12±0.05	-	-	-	-
0.36	0.16±0.05	0.12±0.05	-	-	-
0.40	0.20±0.05	0.16±0.05	-	-	-
0.45	0.25±0.05	0.21±0.05	0.15±0.05	0.13±0.05	-
0.50	0.30±0.05	0.26±0.05	0.20±0.05	0.18±0.05	0.14±0.05
0.55	0.35±0.05	0.31±0.05	0.25±0.05	0.23±0.05	0.19±0.05
0.60	0.40±0.05	0.36±0.05	0.30±0.05	0.28±0.05	0.24±0.05
0.70	0.50±0.05	0.46±0.05	0.40±0.05	0.38±0.05	0.34±0.05
0.80	0.60±0.05	0.56±0.05	0.50±0.05	0.48±0.05	0.44±0.05
0.90	0.70	0.66	0.60	0.58±0.05	0.54±0.05
1.00	0.80	0.76	0.70	0.68	0.64
1.20	1.00	0.96	0.90	0.88	0.84
1.40	1.20	1.16	1.10	1.08	1.04
1.50	1.30	1.26	1.20	1.18	1.14
1.60	1.40	1.36	1.30	1.28	1.24
1.80	1.60	1.56	1.50	1.48	1.44
2.00	1.80	1.76	1.70	1.68	1.64
2.20	2.00	1.96	1.90	1.88	1.84
2.40	2.20	2.16	2.10	2.08	2.04
2.50	2.30	2.26	2.20	2.18	2.14
2.80	2.60	2.56	2.50	2.48	2.44
3.00	2.80	2.76	2.70	2.68	2.64
3.20	3.00	2.96	2.90	2.88	2.84
3.40	3.20	3.16	3.10	3.08	3.04
3.50	3.30	3.26	3.20	3.18	3.14
3.60	3.40	3.36	3.30	3.28	3.24
3.80	3.60	3.56	3.50	3.48	3.44
4.00	3.80	3.76	3.70	3.68	3.64
4.20	4.00	3.96	3.90	3.88	3.84
4.50	4.30	4.26	4.20	4.18	4.14
4.80	4.60	4.56	4.50	4.48	4.44
5.00	4.80	4.76	4.70	4.68	4.64

Table 1 (contd.)

Outside diameter, mm	Inside diameter and limit tolerances for it for different wall thickness, mm				
	0.20	0.22	0.25	0.28	0.30
0.30	-	-	-	-	-
0.32	-	-	-	-	-
0.36	-	-	-	-	-
0.40	-	-	-	-	-
0.45	-	-	-	-	-
0.50	0.10±0.05	-	-	-	-
0.55	0.15±0.05	0.11±0.05	-	-	-
0.60	0.20±0.05	0.16±0.05	0.10±0.05	-	-
0.70	0.30±0.05	0.26±0.05	0.20±0.05	0.14±0.05	-
0.80	0.40±0.05	0.36±0.05	0.30±0.05	0.24±0.05	0.20±0.05
0.90	0.50±0.05	0.46±0.05	0.40±0.05	0.34±0.05	0.30±0.05
1.00	0.60±0.05	0.56±0.05	0.50±0.05	0.44±0.05	0.40±0.05
1.20	0.80	0.76	0.70	0.64	0.60±0.05
1.40	1.00	0.96	0.90	0.84	0.80
1.50	1.10	1.06	1.00	0.94	0.90
1.60	1.20	1.16	1.10	1.04	1.00
1.80	1.40	1.36	1.30	1.24	1.20
2.00	1.60	1.56	1.50	1.44	1.40
2.20	1.80	1.76	1.70	1.64	1.60
2.40	2.00	1.96	1.90	1.84	1.80
2.50	2.10	2.06	2.00	1.94	1.90
2.80	2.40	2.36	2.30	2.24	2.20
3.00	2.60	2.56	2.50	2.44	2.40
3.20	2.80	2.76	2.70	2.64	2.60
3.40	3.00	2.96	2.90	2.84	2.80
3.50	3.10	3.06	3.00	2.94	2.90
3.60	3.20	3.16	3.10	3.04	3.00
3.80	3.40	3.36	3.30	3.24	3.20
4.00	3.60	3.56	3.50	3.44	3.40
4.20	3.80	3.76	3.70	3.64	3.60
4.50	4.10	4.06	4.00	3.94	3.90
4.80	4.40	4.36	4.30	4.24	4.20
5.00	4.60	4.56	4.50	4.44	4.40

Table 1 (contd.)

Outside diameter, mm	Inside diameter and limit tolerances for it for different wall thickness, mm				
	0.32	0.35	0.36	0.38	0.40
0.30	-	-	-	-	-
0.32	-	-	-	-	-
0.36	-	-	-	-	-
0.40	-	-	-	-	-
0.45	-	-	-	-	-
0.50	-	-	-	-	-
0.55	-	-	-	-	-
0.60	-	-	-	-	-
0.70	-	-	-	-	-
0.80	0.16±0.05	-	-	-	-
0.90	0.26±0.05	0.20±0.05	0.18±0.05	-	-
1.00	0.36±0.05	0.30±0.05	0.28±0.05	0.24±0.05	0.20±0.05
1.20	0.56±0.05	0.50±0.05	0.40±0.05	0.44±0.05	0.40±0.05
1.40	0.76	0.70	0.68	0.64	0.60±0.05
1.50	0.86	0.80	0.78	0.74	0.70
1.60	0.96	0.90	0.88	0.84	0.80
1.80	1.16	1.10	1.08	1.04	1.00
2.00	1.36	1.30	1.28	1.24	1.20
2.20	1.56	1.50	1.48	1.44	1.40
2.40	1.76	1.70	1.68	1.64	1.60
2.50	1.86	1.80	1.78	1.74	1.70
2.80	2.16	2.10	2.08	2.04	2.00
3.00	2.36	2.30	2.28	2.24	2.20
3.20	2.56	2.50	2.48	2.44	2.40
3.40	2.76	2.70	2.68	2.64	2.60
3.50	2.86	2.80	2.78	2.74	2.70
3.60	2.96	2.90	2.88	2.84	2.80
3.80	3.16	3.10	3.08	3.04	3.00
4.00	3.36	3.30	3.28	3.24	3.20
4.20	3.56	3.50	3.48	3.44	3.40
4.50	3.86	3.80	3.78	3.74	3.70
4.80	4.16	4.10	4.08	4.04	4.00
5.00	4.36	4.30	4.28	4.24	4.20

Table 1 (contd.)

Outside diameter, mm	Inside diameter and limit tolerances for it for different wall thickness, mm				
	0.45	0.50	0.55	0.60	0.70
0.30	-	-	-	-	-
0.32	-	-	-	-	-
0.36	-	-	-	-	-
0.40	-	-	-	-	-
0.45	-	-	-	-	-
0.50	-	-	-	-	-
0.55	-	-	-	-	-
0.60	-	-	-	-	-
0.70	-	-	-	-	-
0.80	-	-	-	-	-
0.90	-	-	-	-	-
1.00	0.10±0.05	-	-	-	-
1.20	0.30±0.05	0.20±0.05	0.10±0.05	-	-
1.40	0.50±0.05	0.40±0.05	0.30±0.05	0.20±0.05	-
1.50	0.60	0.50±0.05	0.40±0.05	0.30±0.05	-
1.60	0.70	0.60±0.05	0.50±0.05	0.40±0.05	0.20±0.05
1.80	0.90	0.80	0.70	0.60±0.05	0.40±0.05
2.00	1.10	1.00	0.90	0.80	0.60±0.04
2.20	1.30	1.20	1.10	1.00	0.80
2.40	1.50	1.40	1.30	1.20	1.00
2.50	1.60	1.50	1.40	1.30	1.10
2.80	1.90	1.80	1.70	1.60	1.40
3.00	2.10	2.00	1.90	1.80	1.60
3.20	2.30	2.20	2.10	2.00	1.80
3.40	2.50	2.40	2.30	2.20	2.00
3.50	2.60	2.50	2.40	2.30	2.10
3.60	2.70	2.60	2.50	2.40	2.20
3.80	2.90	2.80	2.70	2.60	2.40
4.00	3.10	3.00	2.90	2.80	2.60
4.20	3.30	3.20	3.10	3.00	2.80
4.50	3.60	3.50	3.40	3.30	3.10
4.80	3.90	3.80	3.70	3.60	3.40
5.00	4.10	4.00	4.90	3.80	3.60

Table 1 (contd.)

Outside diameter, mm	Inside diameter and limit tolerances for it for different wall thickness, mm				
	0.80	0.90	1.00	1.10	1.20
0.30	-	-	-	-	-
0.32	-	-	-	-	-
0.36	-	-	-	-	-
0.40	-	-	-	-	-
0.45	-	-	-	-	-
0.50	-	-	-	-	-
0.55	-	-	-	-	-
0.60	-	-	-	-	-
0.70	-	-	-	-	-
0.80	-	-	-	-	-
0.90	-	-	-	-	-
1.00	-	-	-	-	-
1.20	-	-	-	-	-
1.40	-	-	-	-	-
1.50	-	-	-	-	-
1.60	-	-	-	-	-
1.80	0.20±0.05	-	-	-	-
2.00	0.40±0.04	0.20±0.04	-	-	-
2.20	0.60±0.04	0.40±0.04	0.20±0.04	-	-
2.40	0.80	0.60	0.40±0.04	-	-
2.50	0.90	0.70	0.50±0.04	0.30±0.04	0.10±0.04
2.80	1.20	1.00	0.80	0.60±0.04	0.40±0.04
3.00	1.40	1.20	1.00	0.80	0.60±0.04
3.20	1.60	1.40	1.20	1.00	0.80
3.40	1.80	1.60	1.40	1.20	1.00
3.50	1.90	1.70	1.50	1.30	1.10
3.60	2.00	1.80	1.60	1.40	1.20
3.80	2.20	2.00	1.80	1.60	1.40
4.00	2.40	2.20	2.00	1.80	1.60
4.20	2.60	2.40	2.20	2.00	1.80
4.50	2.90	2.70	2.50	2.30	2.10
4.80	3.20	3.00	2.80	2.60	2.40
5.00	3.40	3.20	3.00	2.80	2.60

Table 1 (contd.)

Outside diameter, mm	Inside diameter and limit tolerances for it for different wall thickness, mm			
	1.30	1.40	1.50	1.60
0.30	-	-	-	-
0.32	-	-	-	-
0.36	-	-	-	-
0.40	-	-	-	-
0.45	-	-	-	-
0.50	-	-	-	-
0.55	-	-	-	-
0.60	-	-	-	-
0.70	-	-	-	-
0.80	-	-	-	-
0.90	-	-	-	-
1.00	-	-	-	-
1.20	-	-	-	-
1.40	-	-	-	-
1.50	-	-	-	-
1.60	-	-	-	-
1.80	-	-	-	-
2.00	-	-	-	-
2.20	-	-	-	-
2.40	-	-	-	-
2.50	-	-	-	-
2.80	-	-	-	-
3.00	0.40±0.05	0.2±0.04	-	-
3.20	0.60	0.4±0.04	-	-
3.40	0.80	0.6±0.04	0.4±0.04	0.2±0.04
3.50	0.90	0.70	0.5±0.04	0.3±0.04
3.60	1.00	0.80	0.6±0.04	0.4±0.04
3.80	1.20	1.00	0.8±0.04	0.6±0.04
4.00	1.40	1.20	1.00	0.80
4.20	1.60	1.40	1.20	1.00
4.50	1.90	1.70	1.50	1.30
4.80	2.20	2.00	1.80	1.60
5.00	2.40	2.20	2.00	1.80

Limit tolerances for diameter and wall thickness are given in Table 2.

Table 2 Limit tolerances for size of capillary tubes, mm

Size, mm	Accuracy	
	Normal	Improved
Наружный диаметр: Outside diameter:		
< 1.0	$\pm 0,03$	$\pm 0.02$
> 1.0-2.0	$\pm 0.04$	$\pm 0.02$
> 2.0	$\pm 0.05$	$\pm 0.03$
Толщина стенки: Wall thickness:		
< 0.2	+0.03 -0.02	+0.02 -0.01
> 0.2 & < 0.5	$\pm 0.04$	$\pm 0.03$
> 0.5	$\pm 10^*$	$\pm 8^*$
* - Предельные отклонения в %.      * - Limit tolerances are given in %.		

Tubes shall be visually inspected with a naked eye. Tensile and intercrystalline corrosion tests to GOST 6032-75 are performed.



Table 3 Mechanical properties of capillary tubes

Steel grade	Tensile strength, MPa	Elongation, percent
	not lower	
08	314	24
10	334	24
12X13	По соглашению сторон (On agreement)	
20X13	По соглашению сторон (On agreement)	
12X18H9	По соглашению сторон (On agreement)	
17X18H9	По соглашению сторон (On agreement)	
08X18H10T	530	37
12X18H10T	549	35
08X18H12T	510	26
12X18H12T	510	26
ХН77ТЮР (ЭИ437Б)	785	20
ХН78Т (ЭИ435)	По соглашению сторон (On agreement)	
48НХ (Н48Х, ЭИ693)	392	40