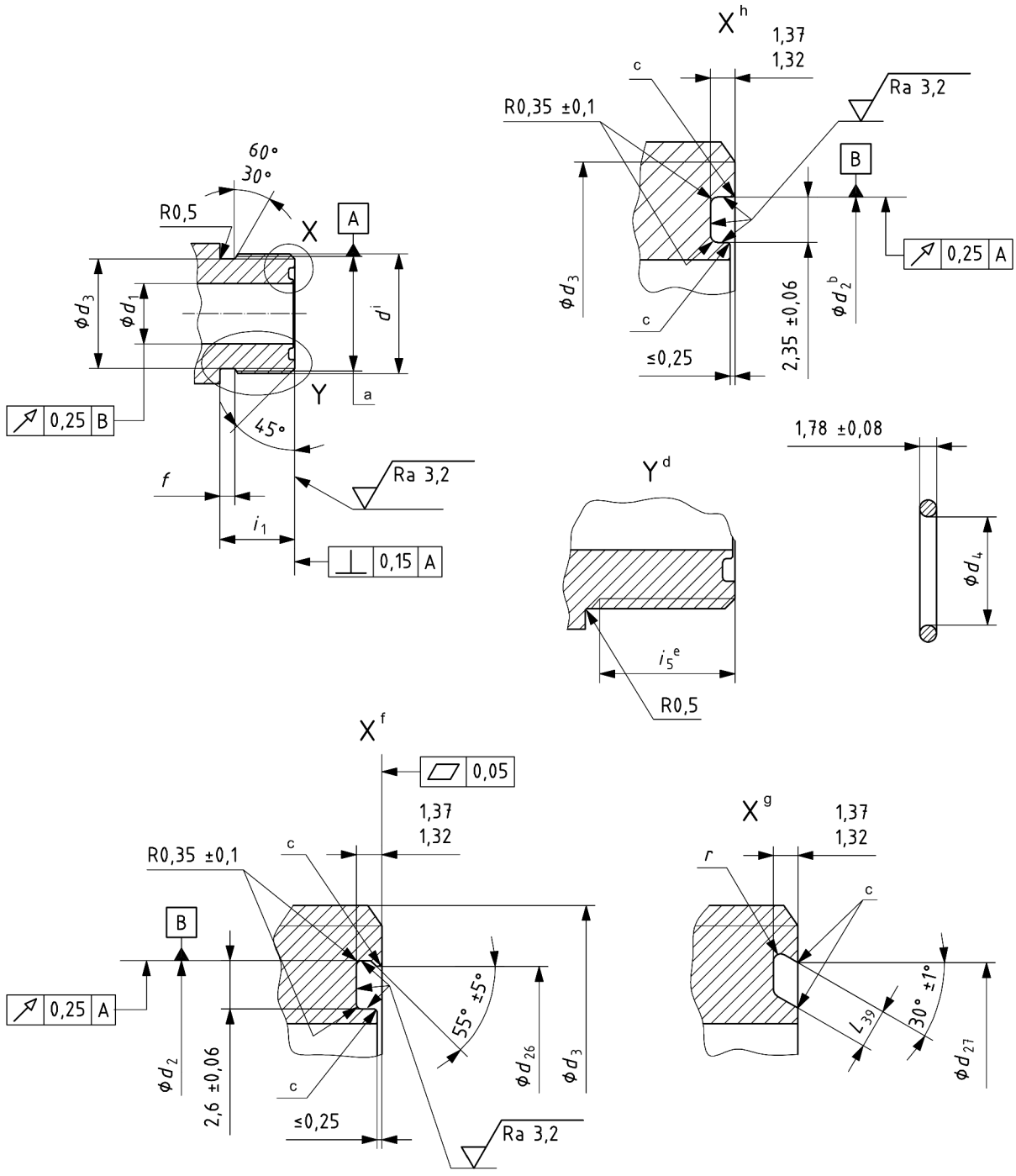
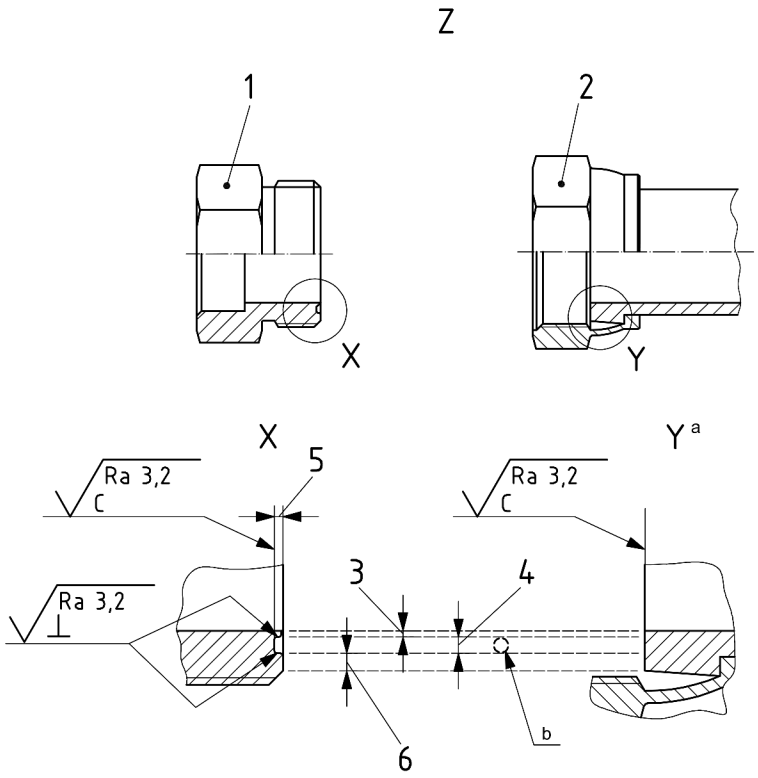
Dimensions in millimetres,
surface roughness in micrometres



a Pitch diameter.
b Groove outside diameter.
c Sharp edge or burr not allowed; break corner 0,15 max.
d Optional construction for shapes and long straights.
e Minimum full thread depth.
f Groove style A – Groove providing improved retention of O-ring – Option 1.
g Groove style A – Groove providing improved retention of O-ring – Option 2.
h Groove style B.
i Screw threads.

Figure 2 — O-ring face seal connections

Surface roughness in micrometres



Key

1 male adapter connector
2 female swivel connector
3 surface A
4 surface B
5 surface C
6 surface D

NOTE 1 Surface roughness: maximum arithmetical average of 3,2 µm on the surfaces.

NOTE 2 Raised extrusions are not permitted on sealing surfaces B and C.

NOTE 3 Annular (circumferential) tool marks up to 3,2 µm Ra maximum are acceptable. Scratches with a width greater than 0,13 mm running perpendicular, radial or spiral to the connector inside diameter on surface B and surface C are not acceptable. Surfaces with no depth or height are acceptable.

NOTE 4 On surfaces A and D, non-continuous surface imperfections are allowed providing they do not inhibit assembly of connectors.

[a] See Table 6 for clarification of the surface location on the female swivel connector that does not have the three distinct surfaces present. The surface inside diameter and outside diameter dimensions represent the total female face area contacted by the O-ring in each male connector O-ring groove.

[b] Area of O-ring placement.

Detail Z — Surface finish acceptance criteria for O-ring face seal connection (typical for all styles)

Figure 2 (*continued*)

Table 6 — Dimensions of O-ring face seal connections

Dimensions in millimetres

Tube outside diameter	d Thread [a]	d_1		d_2		d_3		Option 2				Option 1		
								d_{27}		L_{39}	r	d_{26}	d_2	
		nom.	tol.	nom.	tol.	nom.	tol.	nom.	tol.	± 0,05		± 0,15	nom.	tol.
6	9/16-18 UNF	4,5	± 0,1	11	± 0,08	12,25	± 0,15	10,8	± 0,05	2,25	0,7	10,65	11	± 0,08
8	5/8-18 UNF	5,5	± 0,1	11,85	± 0,08	13,7	± 0,25	11,6	± 0,05	2,2	0,5	11,5	12,07	± 0,08
10	11/16-16 UN	6,5	± 0,2	12,6	± 0,08	15,1	± 0,25	12,4	± 0,05	2,2	0,5	12,25	12,8	± 0,08
12	13/16-16 UN	9,5	± 0,2	15,77	± 0,08	18,25	± 0,25	15,6	± 0,05	2,2	0,5	15,4	15,97	± 0,08
16	1-14 UNS	12,5	± 0,2	19	± 0,08	22,6	± 0,4	18,7	$^{+0,05}_{-0,10}$	2,2	0,5	18,5	19,2	± 0,08
20	1 3/16-12 UN	15,5	± 0,2	22,17	± 0,1	27	± 0,4	21,9	$^{+0,05}_{-0,10}$	2,2	0,5	21,65	22,37	± 0,1
22	1 5/16-12 UN	18	± 0,2	25,35	± 0,1	30,2	± 0,4	24,95	$^{+0,05}_{-0,10}$	2,2	0,5	24,85	25,58	± 0,13
25	1 7/16-12 UN	20,5	± 0,2	26,87	± 0,1	33,35	± 0,4	26,6	$^{+0,05}_{-0,10}$	2,2	0,5	26,4	27,1	± 0,13
30	1 11/16-12 UN	26	± 0,3	33,25	± 0,13	39,7	± 0,4	32,95	$^{+0,05}_{-0,10}$	2,2	0,5	32,75	33,45	± 0,13
38	2-12 UN	32	± 0,3	41,17	± 0,13	47,65	± 0,4	40,8	$^{+0,05}_{-0,10}$	2,2	0,5	40,65	41,37	± 0,13

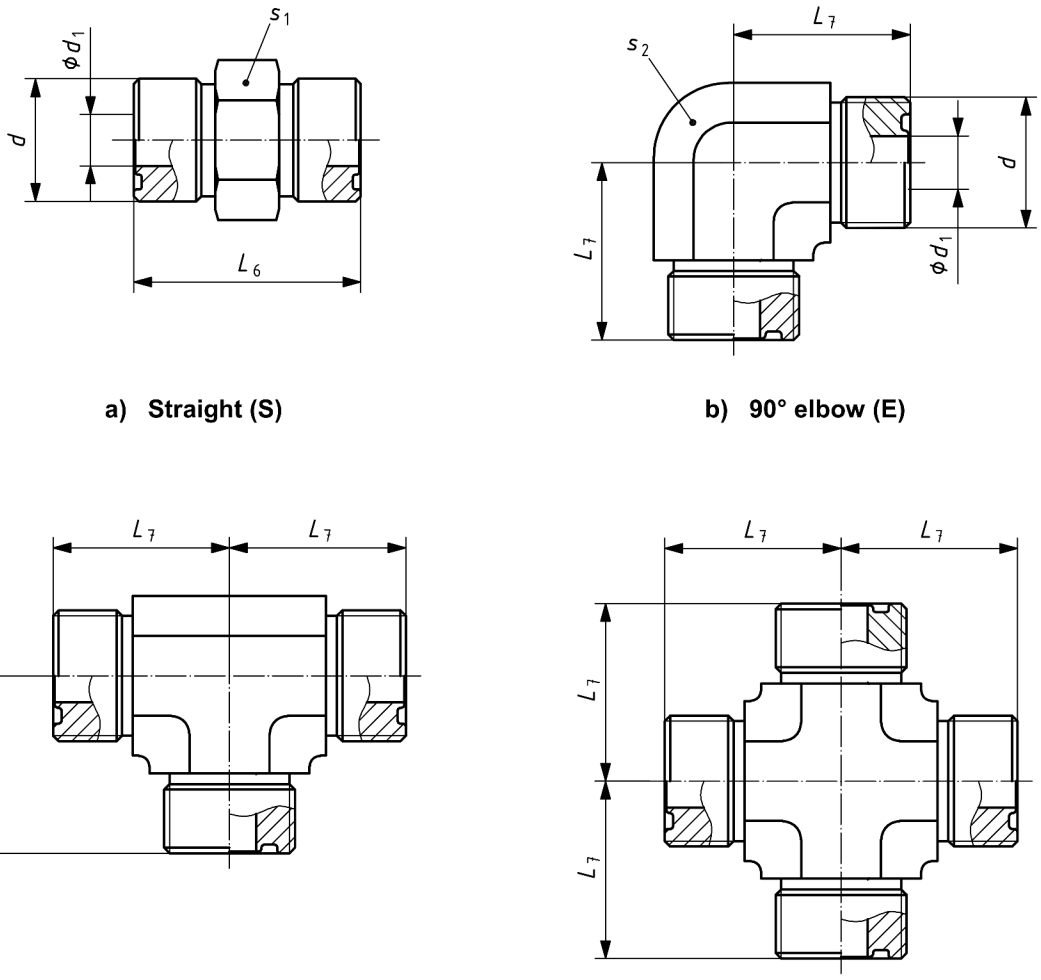
[a] In accordance with ISO 68-2 and ISO 5864:1993, Class 2A, and Annex A, except for 1-14 UNS. See Annex A for 1-14 UNS thread dimensions.

Table 6 (*continued*)

Dimensions in millimetres

Tube outside diameter	d Thread [a]	f		i_1	i_5	O-ring d_4		Surface B Outside diameter	Surface B Inside diameter
		nom.	tol.	± 0,4	min.	nom.	tol.	min.	max.
6	9/16-18 UNF	2,4	± 0,3	10	9	7,65	± 0,16	11,08	6,1
8	5/8-18 UNF	2,4	± 0,3	10	9	8,5	± 0,16	11,93	6,95
10	11/16-16 UN	2,8	± 0,4	11	10,5	9,25	± 0,17	12,68	7,7
12	13/16-16 UN	2,8	± 0,4	13	12	12,42	± 0,19	15,85	10,87
16	1-14 UNS	3,1	± 0,4	15,5	14	15,6	± 0,2	19,08	14,1
20	1 3/16-12 UN	3,7	± 0,5	17	15	18,77	± 0,22	22,27	17,25
22	1 5/16-12 UN	3,7	± 0,5	17,5	15,5	21,95	± 0,23	25,45	20,43
25	1 7/16-12 UN	3,7	± 0,5	17,5	15,5	23,52	± 0,24	26,97	21,95
30	1 11/16-12 UN	3,7	± 0,5	17,5	15,5	29,87	± 0,29	33,38	28,3
38	2-12 UN	3,7	± 0,5	17,5	15,5	37,82	± 0,36	41,3	36,22

[a] In accordance with ISO 68-2 and ISO 5864:1993, Class 2A, and Annex A, except for 1-14 UNS. See Annex A for 1-14 UNS thread dimensions.



a) Straight (S)

b) 90° elbow (E)

c) Tee (T)

d) Cross (K)

For details not shown here, see Figure 2 and Table 6.

Figure 9 — Union connectors

Table 13 — Dimensions of union connectors

Dimensions in millimetres

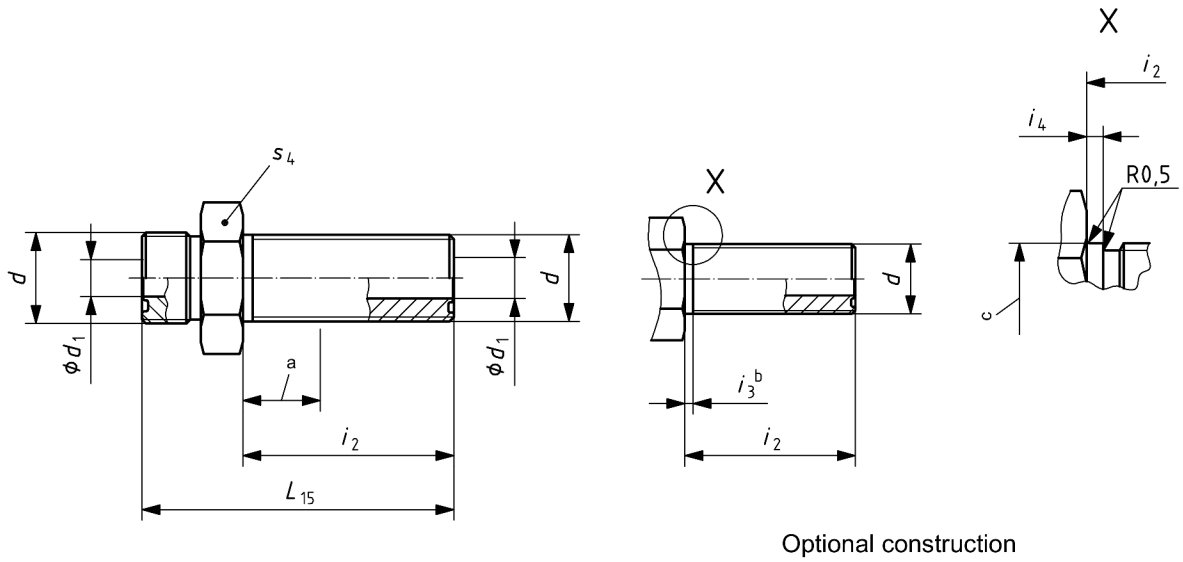
Ordering size code [a]	**Tube outside diameter** [b]	d **Thread** [c]	d_1 ref.	L_6 ± 0,8	L_7 ref.	s_1	s_2 Forged connector min.	s_2 Connector machined from barstock max.
6 × 6	6	9/16-18 UNF	4,5	27,5	21,5	17	14	17
8 × 8	8	5/8-18 UNF	5,5	29	23,5	19	17	22
10 × 10	10	11/16-16 UN	6,5	31	25	19	17	27
12 × 12	12	13/16-16 UN	9,5	35,5	28	22	19	30
16 × 16	16	1-14 UNS	12,5	42,5	33,5	27	24	36
20 × 20	20	1 3/16-12 UN	15,5	47	37,5	32	27	41
22 × 22	22	1 5/16-12 UN	18	47,5	41,5	36	36	46
25 × 25	25	1 7/16-12 UN	20,5	49,5	41,5	41	36	46
30 × 30	30	1 11/16-12 UN	26	51,5	44,5	46	41	55
38 × 38	38	2-12 UN	32	53	49	55	50	60

[a] Code given is for straights and elbows. Add third and fourth sizes for tees and crosses in accordance with Clause 6.

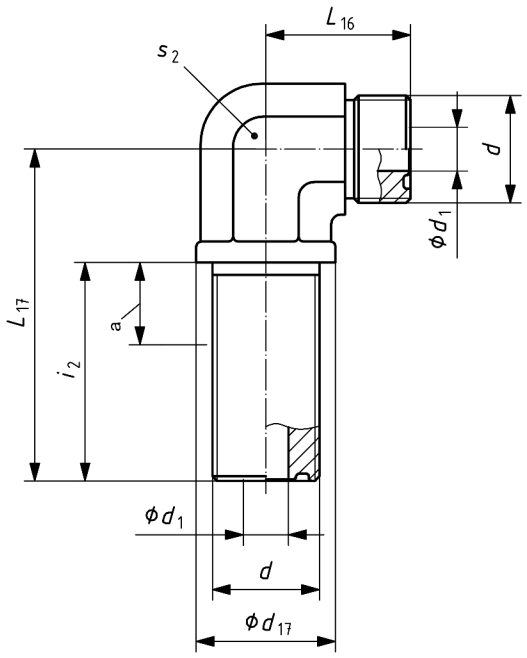
[b] See Table 1 for corresponding inch tube sizes.

[c] In accordance with ISO 68-2 and ISO 5864:1993, Class 2A, and Annex A, except for 1-14 UNS. See Annex A for 1-14 UNS thread dimensions.

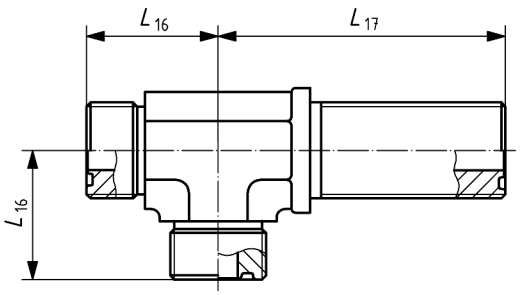
Dimensions in millimetres



a) Bulkhead (straight) (BHS)



b) 90° bulkhead elbow (BHE)



c) Bulkhead run tee (BHRT)

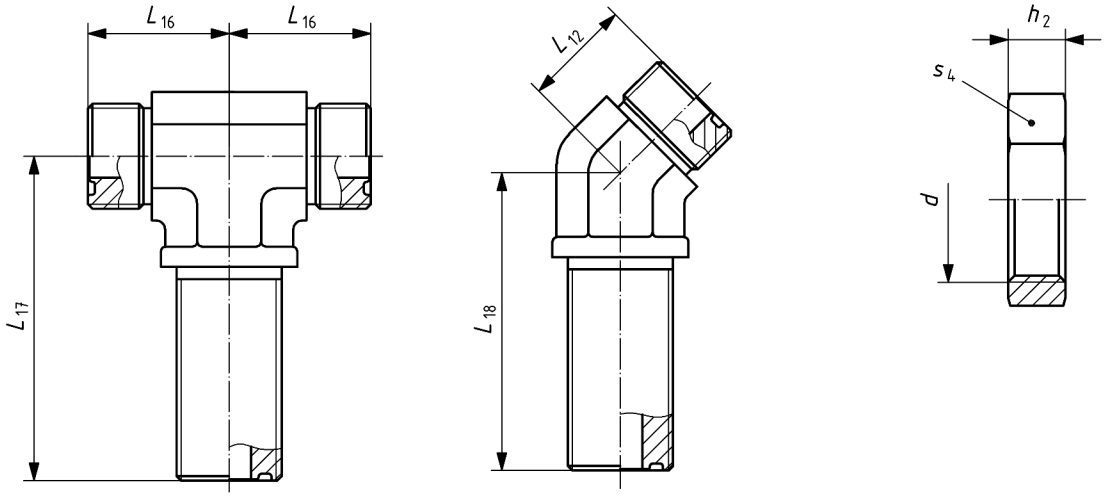
For details not shown here, see Figure 2 and Table 6.

a Maximum bulkhead thickness: 14 mm.

b Distance from last full-form thread to bearing face.

c Pilot diameter equal to thread outside diameter.

Figure 7 — Bulkhead connectors (BH) and corresponding bulkhead locknuts (LN)



d) Bulkhead branch tee (BHBT) **e) 45° bulkhead elbow (BHE45)** **f) Bulkhead locknut (BHLN)**

Figure 7 (*continued*)

Table 11 — Dimensions of bulkhead connectors and corresponding bulkhead locknuts

Dimensions in millimetres

Ordering size code [a]	**Tube outside diameter** [b]	d **Thread** [c]	d_1 ref.	d_{17} min.	h_2 ± 0,8	i_2 ± 0,8	i_3 max.	i_4 ± 0,5	L_{12} ± 1	L_{15} ± 0,8	L_{16} ± 1	L_{17} ± 1	L_{18} ± 1	s_2 Forged connection min.	s_2 Connector machined from barstock max.	s_4
6 × 6	6	9/16-18 UNF	4,5	16,5	7	31,5	3	1,5	16	48	22,5	47	44	14	17	22
8 × 8	8	5/8-18 UNF	5,5	19	7	31,5	3	1,5	18	49,5	25	49,5	46	17	22	22
10 × 10	10	11/16-16 UN	6,5	21	8	34	3	1,5	19	53	26	52	48,5	17	27	27
12 × 12	12	13/16-16 UN	9,5	24,5	9	36,5	3	2,5	20,5	58,5	29	55,5	51	19	30	30
16 × 16	16	1-14 UNS	12,5	29	10,5	40,5	4	2,5	23,5	66,5	34,5	63	56,5	24	36	36
20 × 20	20	1 3/16-12 UN	15,5	34	10,5	41,5	4	3	26	69	38,5	67	60,5	27	41	41
22 × 22	22	1 5/16-12 UN	18	38	10,5	42	4	3	30	70	42,5	71	65	36	46	46
25 × 25	25	1 7/16-12 UN	20,5	40,5	10,5	42	4	3	30	70	42,5	71	65	36	46	46
30 × 30	30	1 11/16-12 UN	26	46,5	10,5	42	4	3	32	70	45,5	75,5	67	41	55	50
38 × 38	38	2-12 UN	32	54,5	10,5	42	4	3	37	70	49,5	79,5	67	50	60	60

[a] Add third end size for tees; the ordering sequence is left, then right, then up, then down, omitting ends when not present.

[b] See Table 1 for corresponding inch tube sizes.

[c] Pilot diameter equal to thread outside diameter.