Designation: C 585 – 90 (Reapproved 1998)

Standard Practice for Inner and Outer Diameters of Rigid Thermal Insulation for Nominal Sizes of Pipe and Tubing (NPS System)[1]

This standard is issued under the fixed designation C 585; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This practice is intended as a dimensional standard for preformed rigid thermal insulation for pipes and tubing.

1.2 This practice covers insulation supplied in cylindrical sections, usually split into half-sections, and lists recommended inner and outer diameters of insulation having nominal wall thicknesses from 1 to 5 in. (25 to 127 mm) to fit over standard sizes of pipe and tubing.

1.3 *This standard does not purport to address the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

1.4 The values stated in inch-pound units are to be regarded as the standard. The values stated in SI units are provided for information only.

2. Referenced Documents

2.1 *ASTM Standards:*

C 168 Terminology Relating to Thermal Insulating Materials[2]

3. Terminology

3.1 *Definitions*—Definitions pertaining to insulation are defined in Terminology C 168C 168.

4. Significance and Use

4.1 The purpose of this practice is to ensure satisfactory fit on standard sizes, to accommodate radial expansion of pipes and tubes which are heated after being insulated, and to minimize the number of insulation sizes and thicknesses to be manufactured and stocked.

4.2 While insulation may be manufactured to these recommended dimensions, care should be exercised in attempting to nest layers of different materials, or layers supplied by different manufacturers. Individual manufacturing processes may operate at slightly different tolerances. While the product will fit the pipe, it may not readily nest as the outer layer between the different materials or with different manufacturers. Care should be exercised to determine these differences before specifying or ordering nesting sizes.

4.3 Dimensions in accordance with this practice permit application of one thickness of pipe insulation over another (Nesting or Simplified Dimensional System), to obtain total thicknesses greater than those manufactured as single layer, or for multilayer application when desired.

5. Procedure

NOTE 1—Suggested tolerances are shown for information purposes only.

5.1 *Measurement*:

5.1.1 Measurement of inner and outer diameters shall be made to the nearest 1/32 in. (0.8 mm) using a steel tape or rule.

5.1.1.1 *Half Sections*—The diameter reported for each half-section shall be the average of six measurements taken at three locations including two near the ends and one near the center (see Fig. 1a and Fig. 2a). Three of the six readings shall be taken in the longitudinal plane of the flat, cut surface: the other three shall each be twice a half-diameter in the longitudinal plane at right angles to that of the first three (see Fig. 1b and Fig. 2b).

5.1.1.2 *Hinged Sections*—The diameter reported for each hinged section shall be the average of four measurements taken at both ends of the section (two per end) (see Fig. 3). The two measurements at each end shall be at right angles.

5.2 *Recommended Inner Diameters*:

5.2.1 Inner diameters and suggested tolerances for nominal sizes of insulation for pipe are shown in Table 1. Iron pipe in sizes for 4½ , 5, 7-in. (113, 125, 175-mm), and larger odd-numbered diameters is not standard, but insulation for these is included for multi-layer purposes.

5.2.2 Inner diameters and suggested tolerances for nominal sizes of tubing through 6 in. (150-mm) are shown in Table 2.

5.3 *Recommended Outer Diameters*:

5.3.1 Nominal outer diameters for nominal sizes of pipe are shown in Table 3 and Table 4 and tubing in Table 5 and Table 6. It should be noted that these values for both pipe and tubing are identical with iron pipe outer diameters as shown in

[1] This practice is under the jurisdiction of ASTM Committee C-16 on Thermal Insulation and is the direct responsibility of Subcommittee C16.20 on Homogeneous Inorganic Thermal Insulations.

Current edition approved June 29, 1990. Published August 1990. Originally published as C 585 – 66 T to replace C 312 and C 521. Last previous edition C 585 – 89.

[2] *Annual Book of ASTM Standards*, Vol 04.06.

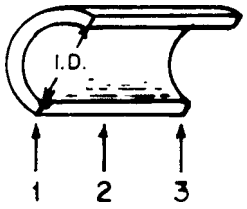

Fig. 1a Three Meaurement Locations

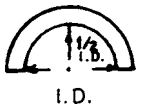

Fig. 1b Diameter and Half-Diameter Measurement Locations

FIG. 1 Inner Diameter Measurement

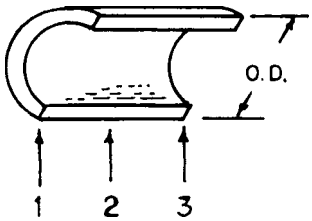

Fig. 2a Three Measurement Locations

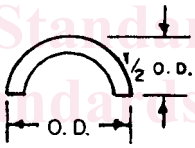

Fig. 2b Diameter and Half-Diameter Measurement Locations

FIG. 2 Outer Diameter Measurement

Columns 2 and 3 of Table 3 and Table 4. Table 3, Table 4, Table 5, and Table 6 are for nesting purposes only. When product is to be nested, it shall be so stated on order.

5.3.2 Suggested maximum outer diameters for nominal sizes of pipe are shown in Table 7 and Table 8 and tubing in Table 9 and Table 10. Table 7, Table 8, Table 9, and Table 10 are for jacketing purposes only.

5.4 *Approximate Insulation Wall Thickness*:

5.4.1 For information purposes, the wall thicknesses of pipe insulation obtained by subtracting inner diameters in Table 1 from corresponding outer diameters in Table 3 and Table 4, and dividing the results by two, are shown in Table 11. Corresponding values for tubing are shown in Table 12.

6. Keywords

6.1 pipe thermal insulation diameter; pipe thermal insulation dimension; pipe thermal insulation thickness; thermal insulation; thermal insulating materials-pipe; thermal insulating materials-rigid; tubing thermal insulation thickness

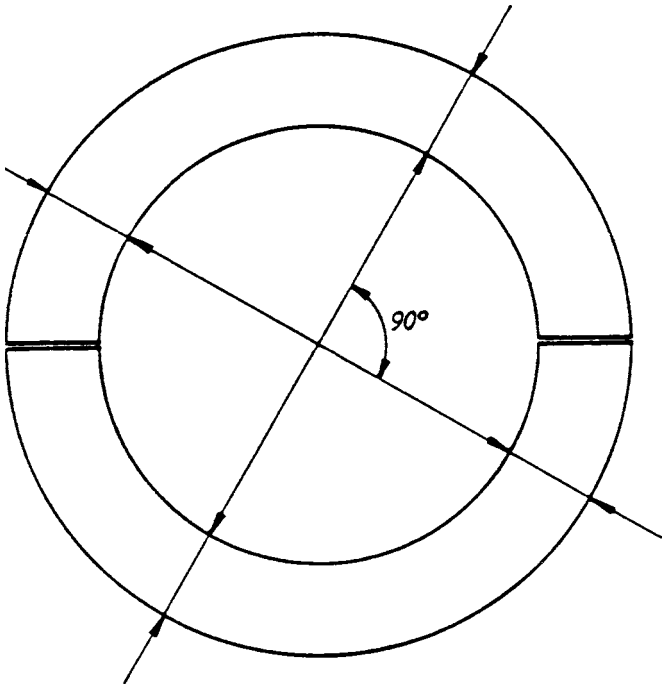

FIG. 3 Hinged Section Measurement Locations

TABLE 1 Inner Diameter of Insulation for Nominal Pipe Size (NPS)

Nominal Size	Pipe				Insulation			
	Outer Diameter		Inner Diameter		Tolerance			
					Minus		Plus	
in.	in.	mm	in.	mm	in.	mm	in.	mm
½	0.840	21.3	0.86	22	0	0	1/16	1.6
¾	1.050	26.7	1.07	27	0	0	1/16	1.6
1	1.315	33.4	1.33	34	0	0	1/16	1.6
1¼	1.660	42.2	1.68	43	0	0	1/16	1.6
1½	1.900	48.3	1.92	49	0	0	1/16	1.6
2	2.375	60.3	2.41	61	0	0	3/32	2.4
2½	2.875	73.0	2.91	74	0	0	3/32	2.4
3	3.500	88.9	3.53	90	0	0	3/32	2.4
3½	4.000	101.6	4.03	102	1/32	0.8	3/32	2.4
4	4.500	114.3	4.53	115	1/32	0.8	3/32	2.4
4½	5.000	127.0	5.03	128	1/32	0.8	3/32	2.4
5	5.563	141.4	5.64	143	1/32	0.8	3/32	2.4
6	6.625	168.3	6.70	170	1/32	0.8	3/32	2.4
7	7.625	193.7	7.70	196	1/32	0.8	3/32	2.4
8	8.625	219.1	8.70	221	1/32	0.8	3/32	2.4
9	9.625	244.5	9.70	246	1/32	0.8	3/32	2.4
10	10.750	273.0	10.83	275	1/32	0.8	3/32	2.4
11	11.750	298.4	11.83	300	1/32	0.8	3/32	2.4
12	12.750	323.8	12.84	326	1/16	1.6	3/32	2.4
14[A]	14.000	355.6	14.09	358	1/16	1.6	5/32	4.0

[A] Larger sizes through 26 in., in 1-in. (25.4-mm) increments.

TABLE 2 Inner Diameter of Insulation Tubes

Tube			Insulation					
Nominal Size	Outer Diameter		Inner Diameter		Tolerance			
					Minus		Plus	
in.	in.	mm	in.	mm	in.	mm	in.	mm
3/8	0.500	12.7	0.52	13	0	0	1/16	1.6
1/2	0.625	15.9	0.64	16	0	0	1/16	1.6
3/4	0.875	22.2	0.89	23	0	0	1/16	1.6
1	1.125	28.6	1.14	29	0	0	1/16	1.6
1 1/4	1.375	34.9	1.39	35	0	0	1/16	1.6
1 1/2	1.625	41.3	1.64	42	0	0	1/16	1.6
2	2.125	54.0	2.16	55	0	0	1/16	1.6
2 1/2	2.625	66.7	2.66	68	0	0	1/16	1.6
3	3.125	79.4	3.16	80	0	0	1/16	1.6
3 1/2	3.625	92.1	3.66	93	0	0	1/16	1.6
4	4.125	104.8	4.16	106	1/32	0.8	3/32	2.4
5	5.125	130.2	5.16	131	1/32	0.8	3/32	2.4
6	6.125	155.6	6.20	157	1/32	0.8	3/32	2.4

TABLE 3 Outer Diameters of Insulation for Nominal Pipe Sizes (NPS), in.

Pipe	Insulation, Nominal Thickness									
Nominal Size	in.	1	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5
	mm	25	38	51	64	76	89	102	114	127
in.	Outer Diameter, in.[A]									
1/2		2.88	4.00	5.00	6.62	7.62	8.62	9.62	10.75	11.75
3/4		2.88	4.00	5.00	6.62	7.62	8.62	9.62	10.75	11.75
1		3.50	4.50	5.56	6.62	7.62	8.62	9.62	10.75	11.75
1 1/4		3.50	5.00	5.56	6.62	7.62	8.62	9.62	10.75	11.75
1 1/2		4.00	5.00	6.62	7.62	8.62	9.62	10.75	11.75	12.75
2		4.50	5.56	6.62	7.62	8.62	9.62	10.75	11.75	12.75
2 1/2		5.00	6.62	7.62	8.62	9.62	10.75	11.75	12.75	14.00
3		5.56	6.62	7.62	8.62	9.62	10.75	11.75	12.75	14.00
3 1/2		6.62	7.62	8.62	9.62	10.75	11.75	12.75	12.75	14.00
4		6.62	7.62	8.62	9.62	10.75	11.75	12.75	14.00	15.00
4 1/2		7.62	8.62	9.62	10.75	11.75	12.75	14.00	14.00	15.00
5		7.62	8.62	9.62	10.75	11.75	12.75	14.00	15.00	16.00
6		8.62	9.62	10.75	11.75	12.75	14.00	15.00	16.00	17.00
7		...	10.75	11.75	12.75	14.00	15.00	16.00	17.00	18.00
8		...	11.75	12.75	14.00	15.00	16.00	17.00	18.00	19.00
9		...	12.75	14.00	15.00	16.00	17.00	18.00	19.00	20.00
10		...	14.00	15.00	16.00	17.00	18.00	19.00	20.00	21.00
11		...	15.00	16.00	17.00	18.00	19.00	20.00	21.00	22.00
12		...	16.00	17.00	18.00	19.00	20.00	21.00	22.00	23.00
14[B]		...	17.00	18.00	19.00	20.00	21.00	22.00	23.00	24.00

[A] These are identical with pipe outer diameters (see Table 1, Columns 2 and 3).
[B] Larger sizes through 36 in., in 1-in. (25.4-mm) increments.