

CAREY AIR CELL PIPE COVERING

Group L - Product Nos. 10107 - 10111

CONFIDENTIAL

Type and Grade - Carey Air Cell Pipe Covering is a laminated asbestos insulating covering designed for low pressure steam and hot water surfaces (100°F. to 300°F.). This product is a corrugated asbestos paper cellular structure, flexibly contained within an asbestos paper wrapper. It shall be manufactured in the following types:

2 Ply - 1/2" thick - Product No. 10107
3 Ply - 3/4" thick - Product No. 10108
4 Ply - 1" thick - Product No. 10109
6 Ply - 1-1/2" thick - Product No. 10110
8 Ply - 2" thick - Product No. 10111

Liner Sheet - The liner sheet shall be an asbestos paper, Product No. 13522 (see specification).

	<u>Min.</u>	<u>Desired Average</u>	<u>Max.</u>
Weight, lb. per 100 sq. ft. (bone dry)	4.5	5.0	5.5
Width of roll, inches	37.0		
Caliper, inches		0.013	

This paper shall be supplied in jumbo rolls, approximately 32" in diameter. Liner sheets are cut into widths varying according to the diameter of the winding shaft which is slightly larger than the outside diameter of the pipe for which the covering is designed. These winder or core diameters for the different pipe sizes are found in Table 1 of the Appendix. Sheets 37" long in the machine direction, are cut into widths corresponding to the pipe sizes shown in Table 1.

Corrugated Asbestos Paper - The corrugated asbestos shall be the 1/4" corrugated type, Product No. 11305 (see specification).

	<u>Min.</u>	<u>Desired Average</u>	<u>Max.</u>
Weight, lb. per 100 sq. ft. (bone dry)	12.5	13.8	15.1
Width, inches	37.0		
Depth of corrugations, inches	0.25		
Pitch of corrugations, inches	0.50		

Corrugated paper shall be supplied in jumbo rolls approximately 36" in diameter. The area of corrugated paper used per section of pipe covering shall be shown in Table 2.

CONFIDENTIAL

000023A

CAREY AIR CELL PIPE COVERING

CONFIDENTIAL

Wrapper - The wrapper shall be an asbestos paper, Product No. 13622 (see specification).

	<u>Min.</u>	<u>Desired Average</u>	<u>Max.</u>
Weight, lb. per 100 sq. ft. (bone dry)	4.5	5.0	5.5
Width, inches	37.0		
Caliper, inches		0.013	

This asbestos paper shall be supplied in jumbo rolls approximately 32" in diameter. Wrapper sheets are cut into widths varying according to the thickness of insulation as indicated in Table 3.

Canvas Jacket - The finished sectional covering shall have an attached canvas jacket known as Regular 10:20 Unbleached Tobacco Cloth 37-1/2" wide and weighing approximately 1-1/2 oz. per square yard. Canvas jackets are cut into sizes depending upon the pipe size and thickness of insulation as shown in Table 4.

General Manufacturing Requirements

(a) Winding - For pipe covering sections up to the 2" pipe size, liner sheets are inserted in a slotted winding shaft, employing no adhesive of any kind on liners. The corrugated paper is wound with corrugations parallel to the longitudinal axis of the section and with the flat base sheet outward. The tips of the corrugated paper are silicated by means of a solid revolving drum. Before the corrugated paper is cut off, paste is applied at the cut-off line to form a bond with the liner of the next section to be wound. The wrapper is silicated on the under side and laps pasted. Coverings for pipe sizes of 2" and larger are wound without employing the slot in the winder. On pipe sizes of 8" and above, the under side of the liner sheet is silicated for additional bond. The silicate referred to shall be 42° Be. sodium silicate (see specification), and the paste used in the winding operation shall have the following formula:

200 lb. Perry Flour
125 gal. Water
15 lb. Alum

(b) Drying Time - All sections shall remain in drying oven until thoroughly dry. Moisture in sections after drying shall not exceed 3%.

CONFIDENTIAL

000023B

CAREY AIR CELL PIPE COVERING

CONFIDENTIAL

(c) Sawing Operation - All sections shall be finished to a 36" length by sawing both ends flush and perpendicular to the longitudinal axis of the section. Sections 6" and over in outside diameter shall be sawed in half lengthwise on a diametrical line. All sections smaller than 6" are sawed on a hinge, allowing one ply and the wrapper to act as hinging material.

(d) Jacket Application - All canvas jackets shall be identified with pipe size and thickness of insulation. This information is stamped in one corner of the canvas, applied long enough in advance of actual application to allow ink to dry. The jacket shall be applied neatly to the pasted and sawed sections, avoiding excessive quantities of paste. Canvas jackets are 1-1/2" longer than the section to provide an end lap of 1-1/2" at one end of the section and be even with the other end of the covering. The placing of the canvas shall begin within 1/2" behind the saw cut. Sections shall again be dried thoroughly before packing. The paste used in the operation shall be starch of the following compositions:

50 lb. Starch (Beater Starch from Asbestos Mill)
125 gal. Water
15 lb. Alum

Dimensions - A tolerance in length and in thickness from the specified dimensions shall be permissible to the following extent:

Length - Minus 1/4", plus 1/4"
Thickness of Insulation - Minus 1/16", plus 1/16"

Appearance of Finished Material - The finished product shall be a firm and uniformly smooth covering without surface irregularities as wrinkles or waves. The covering shall be free of excessive staining or discoloration. Inside and outside circumferences shall be concentric.

Packaging and Marking - Unless otherwise specified, Air Cell covering of all sizes shall be packed in commercial fiber cartons, 13-3/4" x 19-7/8" x 36-1/2". Sections for pipe sizes of 4" and up are opened and nested in the carton. The number of sections packed per carton is shown in Table 2 of the Appendix. Each carton shall be supplied with 2-1/2 black japanned 3/4" steel bands per section. Lengths of bands for respective pipe diameters and thicknesses of insulation are listed in Table 3 of the Appendix.

CONFIDENTIAL

000023C

Manufacturing Specifications
(Continued)

CONFIDENTIAL
Page L-4

CAREY AIR CELL PIPE COVERING

CONFIDENTIAL

All open seams and flaps of cartons shall be sealed with 2-1/2" gummed kraft tape. Each carton, in addition to the printed matter on the carton, shall have stencilled on top and front (a) the type of covering, (b) the number of plies or thickness of insulation, (c) the number of sections, and (d) the pipe size of section.

Only one pipe size and one thickness of covering shall be packed in a carton. The exception to this rule is when orders specify some other type of packing or when quantities specified on an order cannot be packed in full carton lots. In such cases the less than full carton lots of different kinds, sizes and thickness may be packed in mixed cartons. The weight per carton shall not exceed 90 pounds.

When crate shipments are specified on the order, two standard types of wooden crates shall be used, depending upon the shipping weight and upon the most economical packing arrangement, which type is selected. No. 1 crate, 25-1/4" x 36-1/2" x 45" inside dimensions and No. 6 crate, 25-1/4" x 36-1/2" x 36-1/2" inside dimensions shall be used. The construction of these crates shall be in accordance with specifications for the Crate Shop. Pipe sections shall be packed with assorted sizes in each crate and nested whenever possible and when orders permit. The markings on domestic crates shall be the same as those specified for carton markings. For export shipments, crates, linings, markings and special packing shall comply with special shipping instructions furnished on the order.

Finished Weight - The finished weight per section, based on average weights of materials used, is listed in Table 5.

Materials Used per 1000 Linear Feet of Sections - The consumption of materials is found in Tables 6 - 9. These weights are based on a 36" length of section and do not include a trim waste of 1" or 2.77%.

Approved

Manufacturing

Sales

Research

Date

Jan. 17, 1944

Jan 17 1944

Jan 17, 1944

000023D

CONFIDENTIAL

Table 1

Width of Liner Sheets in Inches for Air Cell Covering

<u>Nominal Pipe Size, inches</u>	<u>Width of Liner, inches</u>
1/2	4
3/4	5
1	6
1-1/4	7-1/2
1-1/2	9
2	10-1/2
2-1/2	12
3	13-1/2
3-1/2	15
4	17
4-1/2	19
5	20-1/2
6	25
7	28
8	33
9	38
10	38
11	42
12	42

000023 E

Manufacturing Specifications
(Continued)

Page L-6

CONFIDENTIAL

Table 2

Area in Square Feet of Corrugated Paper
per Section of Air Cell Covering

Nominal Pipe Size, inches	Thickness of Insulation				
	2 Ply	3 Ply	4 Ply	6 Ply	8 Ply
1/2	2.5	4.4	6.0	11.5	18.5
3/4	2.8	4.8	6.7	12.4	19.7
1	3.3	5.5	7.5	13.6	21.2
1-1/4	3.8	6.3	8.8	15.6	23.9
1-1/2	4.2	6.8	9.5	16.6	25.2
2	4.9	7.9	11.1	19.0	28.5
2-1/2	5.7	9.1	12.6	21.3	31.5
3	6.7	10.8	14.6	24.3	35.5
3-1/2	7.5	11.8	16.2	26.7	38.7
4	8.3	12.3	17.7	29.0	41.8
4-1/2	9.0	14.1	19.4	31.5	45.5
5	9.9	15.3	21.3	34.3	48.9
6	11.5	17.9	24.9	39.7	55.9
7	13.0	20.4	27.9	44.2	62.0
8	14.8	22.6	31.0	48.8	68.2
9	16.3	24.9	34.4	53.9	75.2
10	18.0	27.6	37.6	58.7	81.6
11	19.8	30.0	40.7	63.6	87.9
12	21.6	32.3	44.1	68.9	94.2

Table 3

Width of Wrapper Sheets in
Inches for Air Cell Covering

1/2	7.5	9.0	10.5	15	17
3/4	7.5	9	10.5	15	17
1	9	10.5	12	17	19
1-1/4	10.5	12	13.5	17	20.5
1-1/2	10.5	12	13.5	19	20.5
2	12	13.5	15	20.5	23
2-1/2	13.5	15	17	20.5	25
3	15	17	19	23	26
3-1/2	17	19	20.5	23	28
4	19	20.5	23	26	30
4-1/2	20.5	23	25	28	30
5	23	25	28	30	32
6	26	28	30	32	36
7	30	32	34	38	40
8	32	34	36	40	42
9	36	38	40	42	46
10	40	42	42	46	48
11	42	44	46	48	52
12	46	48	50	54	58

000023F

Table 4

Canvas Jacket Widths in Inches
for Air Cell Sections

CONFIDENTIAL

Nominal Pipe Size, inches	Thickness of Insulation				
	2 Ply	3 Ply	4 Ply	5 Ply	6 Ply
1/2	7-3/4	9	11	14-1/2	17-1/2
3/4	8-1/2	10	12	15	17-1/2
1	9	11	12-3/4	15-3/4	19-1/2
1-1/4	10	12-3/4	13-3/4	17	20-1/2
1-1/2	11	13	14-1/2	18	21-1/2
2	12-3/4	14-1/2	14-1/2	19-1/2	23
2-1/2	14-1/2	16	17-1/2	21-1/2	25
3	16	18	19-1/2	23	28
3-1/2	18	20	21-1/2	25	29
4	20	21-1/2	24	28	31
4-1/2	22	23-1/2	25-1/2	29	33
5	23-1/2	25-1/2	28	31	36
6	27	29	31	34	38
7	30	32	34	38	42
8	34	35	38	41	46
9	37	38	41	44	49
10	41	43	44	47	54
11	44	46	47	50	56
12	48	50	52	55	58

Table 5

Average Weights of Air
Cell Sections in Pounds

1/2	.55	.86	1.1	2.1	3.1
3/4	.60	.95	1.3	2.2	3.4
1	.72	1.1	1.4	2.4	3.6
1-1/4	.83	1.2	1.7	2.8	4.1
1-1/2	.90	1.4	1.8	3.0	4.3
2	1.1	1.6	2.1	3.4	4.8
2-1/2	1.2	1.8	2.4	3.8	5.4
3	1.4	2.1	2.7	4.3	6.2
3-1/2	1.6	2.3	3.0	4.7	6.6
4	1.8	2.4	3.3	5.1	7.1
4-1/2	2.0	2.7	3.6	5.5	7.7
5	2.1	3.0	4.0	6.0	8.3
6	2.5	3.5	4.6	6.9	9.4
7	2.8	4.0	5.2	7.7	10.5
8	3.2	4.5	5.7	8.5	11.8
9	3.5	4.9	6.4	9.4	12.8
10	3.8	5.4	6.9	10.2	13.8
11	4.2	5.8	7.5	11.1	14.8
12	4.6	6.2	8.1	12.0	15.8

000023G

Manufacturing Specifications
(Continued)

CONFIDENTIAL
Page 1-8

MATERIALS USED, POUNDS PER 1000
LINEAL FEET OF AIR CELL SECTIONS

CONFIDENTIAL

Table 6

Average Weight of Liner and Wrapper Asbestos
Paper, Pounds per 1000 Ft. of Air Cell Sections

Nominal Pipe Size, inches	2 Ply	3 Ply	4 Ply	6 Ply	8 Ply
1/2	48	53	60	75	86
3/4	52	58	64	80	92
1	63	68	75	100	106
1-1/4	75	83	87	102	112
1-1/2	83	90	97	115	123
2	94	100	107	127	137
2-1/2	108	115	129	138	152
3	118	127	133	152	165
3-1/2	133	139	150	163	180
4	152	156	167	190	197
4-1/2	168	173	177	194	210
5	182	189	202	219	220
6	214	221	230	238	256
7	240	250	258	270	285
8	272	280	288	304	316
9	308	316	324	333	350
10	324	333	333	338	360
11	350	360	368	384	400
12	368	374	384	400	417

Table 7

Average Weight of Corrugated Asbestos Paper,
Pounds per 1000 Lineal Ft. of Air Cell Sections

1/2	115	200	276	529	851
3/4	129	222	308	570	906
1	152	251	345	626	978
1-1/4	174	288	405	718	1100
1-1/2	192	314	437	764	1159
2	226	364	511	874	1311
2-1/2	262	415	580	980	1449
3	308	485	672	1118	1633
3-1/2	344	540	745	1230	1780
4	380	582	814	1334	1923
4-1/2	413	645	892	1448	2090
5	455	705	980	1578	2250
6	528	820	1145	1828	2571
7	595	938	1283	2033	2852
8	680	1040	1426	2245	3140
9	750	1145	1582	2479	3459
10	825	1270	1730	2700	3750
11	900	1380	1870	2926	4043
12	985	1486	2032	3169	4333

000023 H

CONFIDENTIAL

Table 8

Average Weight of Canvas Jacket, Pounds
Per 1000 Lineal Feet of Air Cell Sections

Nominal Pipe Size, inches	Thickness of Insulation				
	2 Ply	3 Ply	4 Ply	6 Ply	8 Ply
1/2	6.8	7.8	9.6	12.5	15.2
3/4	7.3	8.6	10.4	13.0	15.2
1	7.8	9.6	11.2	13.8	17.0
1-1/4	8.6	11.2	12.0	14.8	17.9
1-1/2	9.6	11.4	12.5	15.7	18.8
2	11.2	12.5	12.5	17.0	20.0
2-1/2	12.5	13.9	15.2	18.8	21.8
3	13.9	15.7	17.0	20.0	24.3
3-1/2	15.7	17.4	18.8	21.8	25.2
4	17.4	18.8	20.9	24.3	27.1
4-1/2	19.1	20.5	22.1	25.2	28.6
5	20.5	22.1	24.3	27.1	31.4
6	23.5	24.3	27.1	29.5	33.4
7	26.1	27.9	29.5	33.4	36.8
8	29.5	30.5	33.4	35.4	40.0
9	32.3	33.4	35.4	38.3	42.5
10	35.8	37.6	38.3	40.9	47.0
11	38.3	40.0	40.9	43.5	48.7
12	41.7	43.5	45.2	48.8	50.5

Table 9

Average Weight of 42° Be. Sodium Silicate,
Pounds per 1000 Lin. Ft. of Air Cell Sections*

1/2	28	46	62	120	192
3/4	29	50	70	130	205
1	34	57	78	141	220
1-1/4	40	66	92	162	249
1-1/2	44	71	99	173	262
2	51	82	117	198	296
2-1/2	59	95	131	222	329
3	70	110	152	253	370
3-1/2	78	123	168	278	402
4	87	128	184	301	435
4-1/2	93	148	202	328	474
5	108	160	210	357	510
6	120	186	260	414	580
7	135	212	290	460	645
8	153	235	322	508	710
9	170	260	358	560	785
10	187	286	390	610	850
11	204	312	422	660	910
12	225	336	460	716	960

*These values are for liquid 42° Be. sodium silicate as used in the manufacture of coverings. For computing finished weights of sections, use 50% of these values since the other 50% has been lost during the drying operation.

000023 I