PLAINTIFF'S EXHIBIT RA-2

Carey®

INDUSTRIAL INSULATION MANUAL

THE PHILIP CAREY MFG. COMPANY - LOCKLAND, CINCINNATI 15, OH

Burcolab
DIVISION
BURCOLAB CO. DETROIT
A 4C88

Carey

TABLE OF CONTENTS

industrial insulation

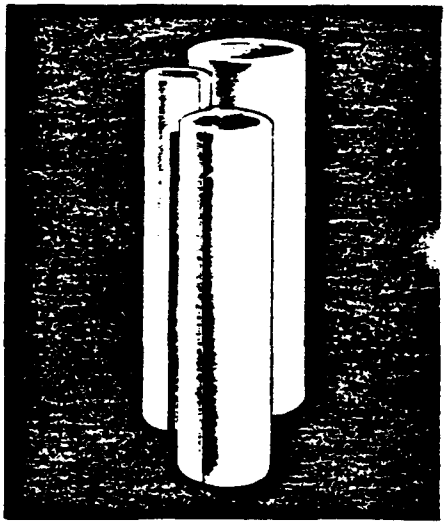
PRODUCT	PAGE
Air Cell Pipe Covering & Block	17
Alltemp Pipe Covering	5-6
Alltemp Block	7-8
Asbestos Millboard	47
Asbestos Paper & Rollboard	45
Asbestos Sheets & Panels	
Asphalt Plyboard	49
Careystone Corrugated	49
Firefoil Board	50
Industrial A-C Board	49
Thermo-Bord	49
Asbestos Sponge Pipe & Block Insulation	21
B.T.U. Cement	42
Careycel Pipe & Block Insulation	15-16
Careytemp Pipe & Block Insulation	4-4A
Cements	
Insulating & Finishing	37
Bonding & Refractory	38
Cork-Cote Mastic	40
Corrugated Asbestos Paper	46
Defendex Pipe & Board Insulation	19

PRODUCT	PAGE
Fireclad Jacketing	43
Flexible Tubing Insulation	22
Hair Felt Insulation	31
Hi-Temp #19 Block	9
Insulation Emulsions	39
Insulation Seal	41
Mineral Wool Industrial Blanket	27
Mineral Wool Industrial Pipe Insulation	29
MW-50 Insulating Cement	33
MW-One Insulating Cement	35-36
Spun Mineral Wool Duct Insulation	51-52
Superbo Pipe Covering	14-14A
Super-Light 85% Magnesia Pipe Covering	1-2
Super-Light 85% Magnesia Block	3
Thermoglas Pipe Covering	23-24
Thermoglas R/F Insulation	25-26
Weatherproof Jacketing Materials	44
Woolfelt Pipe Covering	
Perfecto	11
Impervo	12
Protecto	13

BURROUGHS WELLCOME & CO.
A 4088

Carey SUPER-LIGHT 85% MAGNESIA PIPE COVERING

industrial insulation



Super-Light "Nesting O.D." pipe sections, for temperatures from 100° F. to 600° F.

DESCRIPTION

Super-Light 85% Magnesia is composed of not less than 85% basic hydrated carbonate of magnesia, and 10% to 15% specially selected and prepared long asbestos fibers.

FEATURES

Super-Light 85% Magnesia is strong, moisture resistant, shock resistant and smooth finished. It is a material with low conductivity and high dimensional stability. Super-Light Magnesia has no tendency to induce corrosion on metal surfaces to which it is applied as insulation. Sections will not disintegrate, crack or crumble under normal service conditions...can be removed and reapplied when necessary. Excellent workability makes Super-Light easy and economical to apply.

USES

Super-Light 85% Magnesia pipe covering is a practical, efficient insulation for almost every kind of hot-pipe application. It can be used directly on pipes operating at temperatures up to 600° F., or it can be used as an outer layer over Carey Alltemp where temperatures range from 600° F. to 1600° F.

SPECIFICATIONS

Density—Approximately 10-11 lbs. per cu. ft.

Shrinkage— 0.5% at 500° F.

Conductivity (k)—
At 100° F.—.34
200° F.—.37
400° F.—.43

Moisture Absorption (volume)—
After 6 hours exposure in atmosphere of 120° F. and 90% relative humidity—0.9%.

TABLE OF RECOMMENDED THICKNESSES

Temperature Range—° F	*Pipe Sizes* ½" to 1-½"	2" to 3-½"	4" to 6"	7" to 10"	12" & Larger
100 to 200	1"	1"	1"	1-½"	1-½"
201 to 300	1"	1"	1-½"	1-½"	2"
301 to 400	1"	1-½"	2"	2-½"	2-½"
401 to 500	1-½"	1-½"	2"	2-½"	3"
501 to 600	2"	2"	2-½"	3"	3"

Government Specifications: Super-Light 85% Magnesia meets these government specifications when orders specify this requirement.

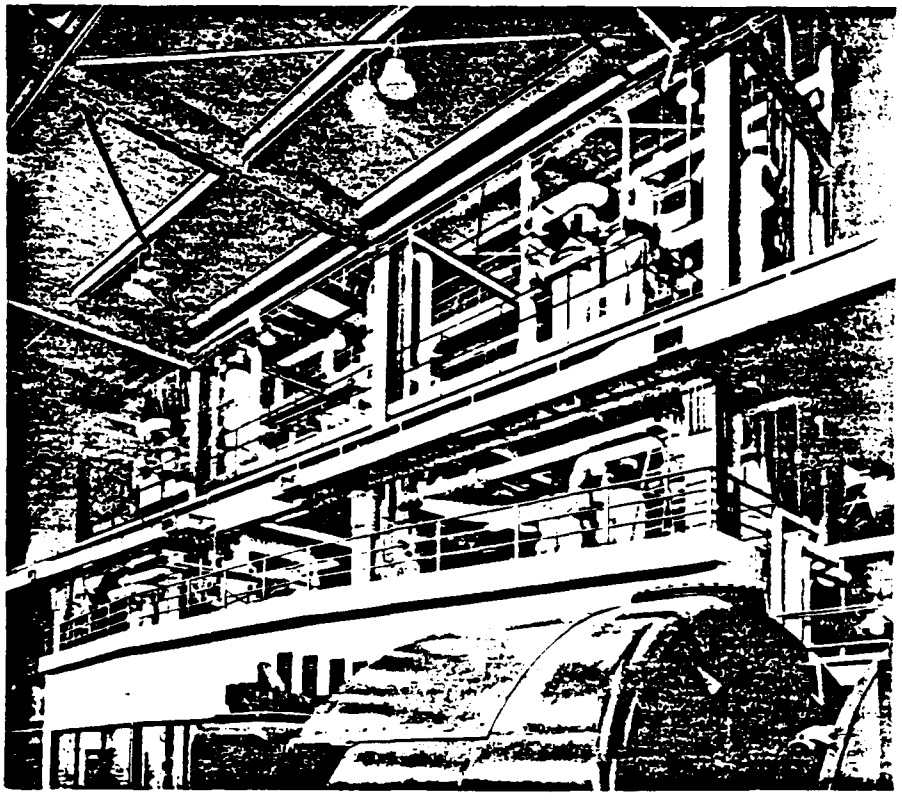
Federal HH-M-61a—Pipe Covering, Blocks and Cement (when ordered, special 3.5 canvas will be supplied to meet certain Federal Specifications.)

MIL-P-2781B—Grade 1, Class b—Pipe Covering (Super-Light). Test Reference EES 1CCT411.

Navy 21Yc—Pipe Covering and Blocks

Navy 32P10B—Cement

AMSC 35—Type H2



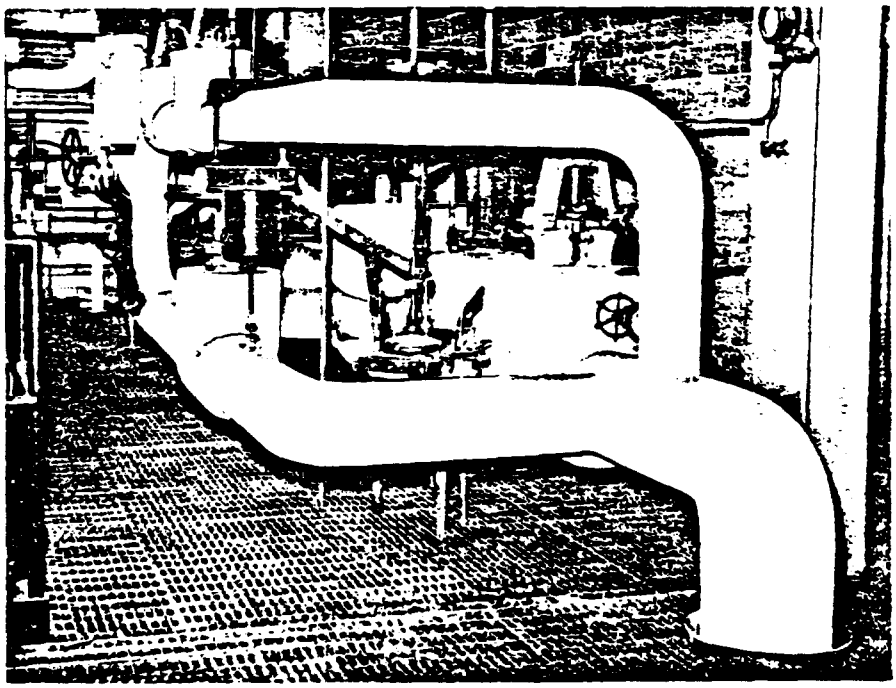
Boiler feed pump room of the Arapboe Station, Public Service Co. of Colorado in Denver. Feed water discharge lines and recirculating lines are insulated with 2" thick Carey 85% magnesia.

APPLICATION

onal pipe coverings are held in place by cementing the canvas laps with cold water paste, along lateral and abutting joints. As additional securement, metal bands can be applied approximately 18" apart on butt joints and in the center of the section.

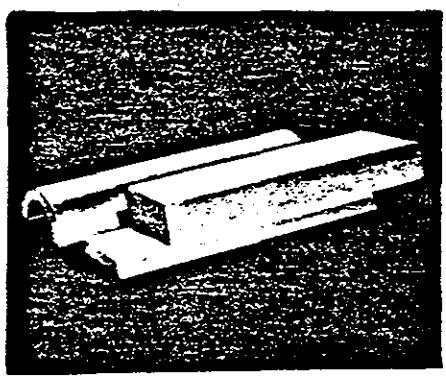
Fittings up to 4" are usually insulated with 85% Magnesia Cement. Larger fittings are usually insulated with small pieces of Super-Light 85% Magnesia Block cemented with fibrous adhesive or secured with wires. Super-Light 85% Magnesia Cement or Carey No. 303 Asbestos Cement should be used to fill cracks at joints and create a smooth surface.

steam line and turbine central ...s at Jamestown, N.Y. power plant are insulated with Carey Super-Light 85% magnesia.



SUPER-LIGHT 85% MAGNESIA BLOCK

Carey — industrial insulation



Super-Light block has smooth surface, uniform thickness and sharp, true edges. Makes tight, efficient joints. Super-Light blocks can be used at temperatures up to 600° F.

DESCRIPTION

Super-Light is composed of not less than 85% basic hydrated carbonate of magnesia, and 10% to 15% specially selected and prepared long asbestos fibers.

FEATURES

Super-Light 85% Magnesia is strong, moisture resistant, shock resistant and smooth finished. It is a material with low conductivity and high dimensional stability. Super-Light Magnesia has no tendency to induce corrosion on metal surfaces to which it is applied as insulation. Blocks will not disintegrate, crack or crumble under normal service conditions....can be removed and reapplied when necessary. Excellent workability makes Super-Light easy and economical to apply.

USES

Super-Light 85% Magnesia block is an efficient insulation for all types of heated equipment in power plants and process industries. It is used on boilers, tanks, kilns, ovens and other equipment having temperatures up to 600° F.; or, it can be used as an outer layer over Carey Alltemp where temperatures range from 600° F. to 1600° F.

SPECIFICATIONS

Density -- Approximately 10 to 11 lbs. per cu. ft.

Flexural Strength -- 40 to 50 lbs. per sq. in. modulus.

Compressive Strength (at 5% deformation) 60-65 lbs. per sq. in.

Impact Strength (blocks 6" wide by 1-½" thick) -- 15 ft. - lbs.

Shrinkage -- 0.5% at 500° F.

Conductivity (k) --

At 100° F.--.33
200° F.--.36
400° F.--.43

Moisture Absorption (volume)--
After 6 hours exposure in atmosphere of 120° F. and 90% relative humidity - 0.9%.

After being boiled in water for 24 hours, Super-Light 85% Magnesia shows no evidence of disintegration or change in shape. Water test reveals unusual stability of Super-Light's chemically "set" monolithic structure.

RECOMMENDED THICKNESS TABLE

Temp. Range -- o F.	*Recommended Thickness--In.*
100 to 200	1-½
201 to 300	2
301 to 400	2-½
401 to 600	3

Sizes: Super-Light block is available in the standard size, 6" wide by 36" long, in thicknesses of 1", 1¼", 1½", 2", 2½" and 3".

Government Specifications: Super-Light 85% Magnesia block meets these government specifications when orders specify this requirement.

Federal HH-M-61a -- Pipe Covering. Blocks and Cement.

MIL-I-2819 -- Blocks

Class a -- Filter Mold. Test Reference EES B-7571.

Class a -- Super-Light. Test Reference EES 1DDT411.

Navy 21Yc -- Pipe Covering and Blocks.

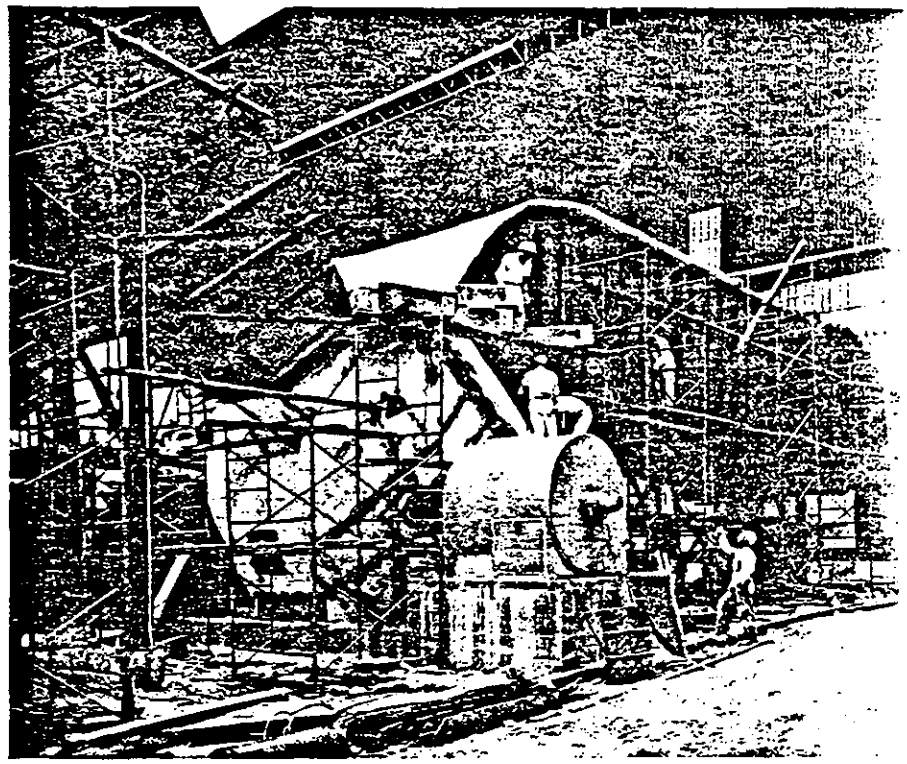
Navy 32P10B -- Cement

AMSC 35 -- Type H2

APPLICATION

Super-Light 85% Magnesia blocks are usually held in place with No. 14 or No. 16 Gauge wire spaced approximately 12" apart. Joints are pointed up with 85% Magnesia or Carey Asbestos Cement. As additional securement, Carey Fibrous Adhesive can be used to adhere blocks to surfaces. Hexagonal wire mesh (1½") is stretched tight over the blocks as a reinforcement for the finish coat of asbestos cement, approximately ½" thick.

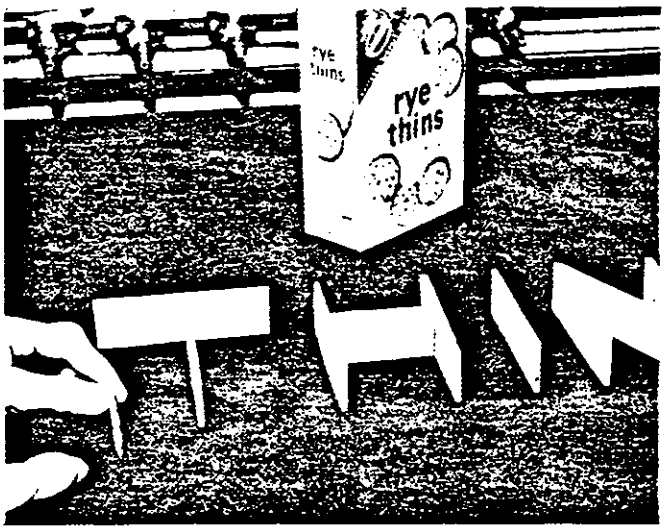
Segmental blocks, for covering large pipes, are applied with No. 16 steel wire loops spaced approximately 12" apart. Loops are pulled tight and imbedded in the surface of the covering. Canvas jackets are then pasted on. Application of metal bands is optional.



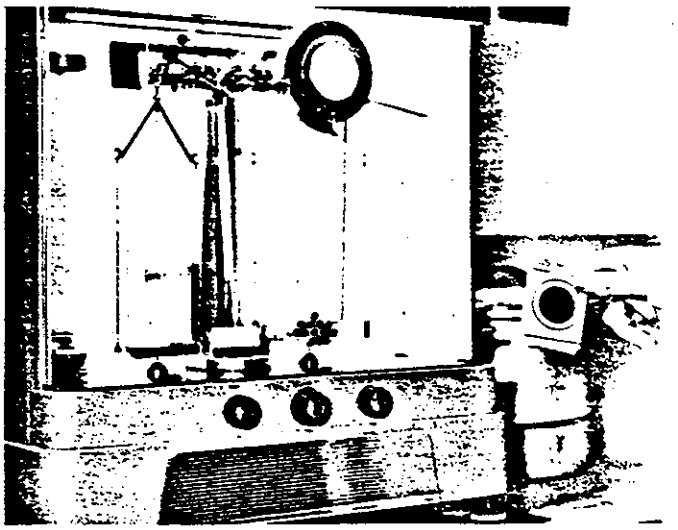
Carey 85% magnesia block insulation being applied on outside connery duct and induced draft fan at Shawnee Steam Plant, Knoxville, Tenn.

CAREYTEMP PIPE AND BLOCK

industrial insulation



Careytemp can be cut cracker-thin without crumbling. Due to precision molding process, edges are neat and square providing tight joints. Careytemp requires no special tools, saves time and costs, simplifies plant clean-up.



Careytemp's exceptional strength and light weight reduces application costs on every job. Analytical balance shows that block of Careytemp, cut to exact dimensions of regular-size cigarette package, weighs as little as 10 cigarettes.

DESCRIPTION

Careytemp is an exceptionally strong, light weight insulation made in both block and pipe form. It is composed of expanded perlite ore, reinforced with an inorganic fibre and with a binder developed especially for this insulation product. The expanded silica (perlite) is an inorganic cellular body consisting of millions of individual vitrified (glassed-in) air cells which retain their structure permanently and thereby resist water penetration.

Careytemp is recommended for temperatures up to 1600°F; thermal conductivity over the entire range is extremely low. This insulation exhibits a high degree of resistance to acids and to corrosion.

USES

Careytemp pipe and block insulation is recommended for all types of installations with operating temperatures up to 1600°F. With the addition of suitable vapor barriers it can be used on equipment or piping operating at sub-zero temperatures.

Careytemp will not contribute to the stress corrosion cracking of austenitic stainless steel. In acid resistance tests Careytemp has withstood complete immersion in both 25% solutions and concentrated aqua regia, hydrochloric and sulfuric acids for 100 hours.

Due to the combination of light weight, low thermal conductivity and low moisture absorption, Careytemp is particularly suitable for process industry and power plant applications.

APPLICATION

Careytemp is applied according to standard insulation industry methods and practices. No special tools or equipment are required.

Standard thicknesses or built-up multiple layers can be applied. Due to extremely low moisture absorption, the use of non-hydraulic setting cements with Careytemp is not recommended. Mineral wool cements provide a superior, rigid cement finish. Carey MW-50 or MW-one are recommended.

Sizes: Pipe insulation is presently available in all copper tube sizes through 3" and in iron pipe sizes through 6". Block is available in widths of 6" and 12", in thicknesses from 1" through 3" and in lengths of 18" and 36".

A current established program to provide sectional pipe insulation through 26" IPS will be completed in the near future.

Jackets: Standard canvas, heavy weight canvas and weatherproof roofing jackets are available.

SPECIFICATIONS

Density: 9 lbs. per cu. ft.

Transverse Strength: 70 lbs. per sq. in.

Compressive Strength: 65 lbs. per sq. in. (with 1% deformation)

Linear Shrinkage: .7% at 1200°F.
1.2% at 1500°F.

Water Absorption: .2% in 24 hours at 90% R.H.

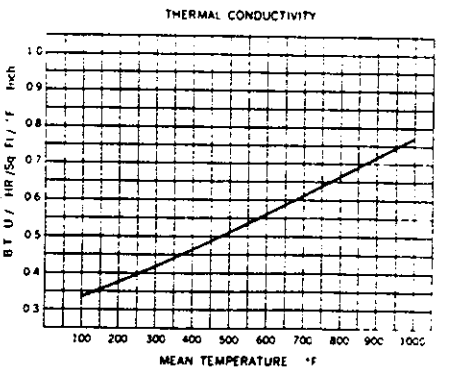
Thermal Shock: Hot and cold cycle test, 400° to 15°F., no damage.

When immersed in liquid Nitrogen at minus 325°F., no damage.

Acid Resistance: When immersed in sulphuric, hydrochloric acid or aqua regia, no damage in 100 hours.

Corrosion Resistance: Non-corrosive. Composed of chemically inert material.

Temperature Range: Up to 1600°F.



DATA - USING RECOMMENDED THICKNESSES

Careytemp — 80°F. Air

Pipe Size

Pipe Temp °F.	Temp. Diff.		2″	3″	4″	6″	8″	10″	12″	18″
380	300	Recom'd Thk.	1″	1″	1½″	1½″	1½″	2″	2″	2″
		*Btu Loss	85	115	103	143	174	165	193	274
		Surface Temp. °F.	122	125	111	115	115	108	109	112
		% Efficiency	86.8	87.6	91.2	91.5	91.9	93.8	93.8	93.7
580	500	Recom'd. Thk.	1½″	2″	2″	2½″	2½″	2½″	3″	3″
		*Btu Loss	122	134	160	184	216	263	265	369
		Surface Temp. °F.	128	120	122	117	117	119	113	118
		% Efficiency	92.1	94.0	94.4	95.5	95.9	96.0	96.5	96.5
780	700	Recom'd Thk.	2½″	2½″	3″	3″	3½″	3½″	3½″	3½″
		*Btu Loss	143	181	191	252	270	322	368	506
		Surface Temp. °F.	122	127	121	125	120	122	124	128
		% Efficiency	95.2	95.8	96.6	96.9	97.4	97.5	97.6	97.6
880	800	Recom'd. Thk.	2½″	3″	3″	3½″	3½″	4″	4″	4″
		*Btu Loss	170	197	229	268	324	353	399	546
		Surface Temp. °F.	129	126	128	125	127	124	126	130
		% Efficiency	95.8	96.6	96.9	97.5	97.7	98.0	98.0	98.0
1080	1000	Recom'd. Thk.	2½″	3″	3½″	4″	4″	4½″	4½″	4½″
		*Btu Loss	235	270	288	339	406	432	506	682
		Surface Temp. °F.	145	142	134	131	134	130	133	138
		% Efficiency	96.5	97.2	97.7	98.1	98.5	98.5	98.5	98.6
1280	1200	Recom'd. Thk.	3″	3½″	4″	4½″	4½″	5″	5″	5½″
		*Btu Loss	279	335	347	416	494	546	595	750
		Surface Temp. °F.	149	143	141	139	143	139	139	141
		% Efficiency	96.9	97.8	98.3	98.6	98.7	98.8	98.9	99.0

*Btu Losses are per Linear Ft.

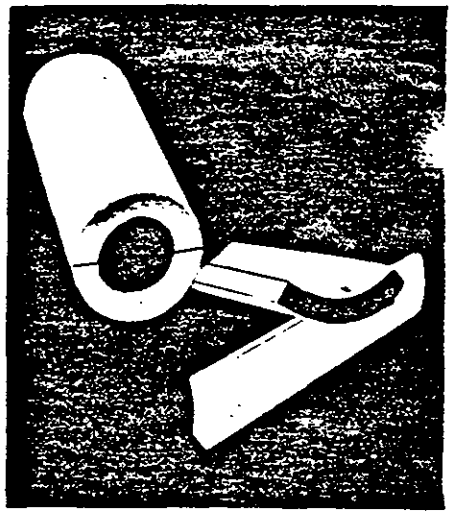
DATA FOR CAREYTEMP BLOCK

Insulation Thickness — 80°F. Air

Inner Surface Temperature °F.		1″	1½″	2″	2½″	3″	3½″	4″	4½″	5″	5½″
380°	*Btu Loss	98	69	**53	42	35	31	...	...	...	...
	Sur. Temp. °F.	134	120	112	106	102	100	...	...	...	...
	% Efficiency	90.1	93.0	94.6	95.8	96.5	96.9				
580°	Btu Loss	184	126	98	81	**67	57	49	44	40	38
	Sur. Temp. °F.	171	147	134	126	119	114	110	107	106	104
	% Efficiency	92.3	94.7	95.9	96.6	97.2	97.6	97.8	98.1	98.3	98.4
780°	Btu Loss	...	200	152	125	106	91	**79	70	63	58
	Sur. Temp. °F.	...	177	158	146	136	130	124	120	117	115
	% Efficiency	...	95.7	96.8	97.3	97.7	98.0	98.3	98.5	98.6	98.7
880°	Btu Loss	...	...	185	148	126	108	95	**84	76	70
	Sur. Temp. °F.	...	...	171	157	146	139	132	128	124	121
	% Efficiency	...	...	97.1	97.6	98.0	98.3	98.5	98.6	98.8	98.9
1080°	Btu Loss	...	...	...	206	172	149	132	117	**106	97
	Sur. Temp. °F.	...	...	...	179	166	156	148	142	136	133
	% Efficiency	...	...	...	98.1	98.4	98.6	98.7	98.9	99.0	99.0
1280°	Btu Loss	...	...	...	...	226	195	172	153	138	**126
	Sur. Temp. °F.	...	...	...	...	186	175	166	158	151	146
	% Efficiency	...	...	...	...	98.7	98.8	99.0	99.1	99.2	99.3

*Btu losses are per hour per square foot.
**Indicates recommended thickness.

Carey ALLTEMP PIPE COVERING industrial insulation



Alltemp Pipe Covering is an all-purpose insulation for temperatures from 100° F. to 1600° F.

DESCRIPTION

Alltemp is a combination of special inorganic silicas and asbestos fibres. Every cubic foot is honeycombed with millions of tiny sealed air cells. Having excellent physical and chemical properties, Alltemp retains its high thermal efficiency and structural strength even when subjected to long and continuous exposure to high temperatures and moisture.

FEATURES

Extremely low thermal conductivity—actually improves after exposure to high temperatures.

Full temperature range—from 100° F. to 1600° F.

Low internal shrinkage—lowest of all tested comparable insulations ... approximately 40% of most 1200° F. insulations. Alltemp retains high efficiency because it does not crack or open up from shrinkage.

Moisture resistance—exposure to high moisture conditions does not deteriorate Alltemp or affect its thermal conductivity.

Easily fitted—workmen can cut and trim Alltemp with a knife, even through canvas covering. They can trim closer and make a truer cut than with other insulation materials. Edges remain neat and square ... make tight, "no-heat-leaking" joints. It is not brittle ... can be cut or shaped to fit irregular areas and around projections.

Easily handled—Alltemp is shock resistant, extremely durable and will withstand packing, shipping and handling with little, if any, breakage. It does not cut, scratch or otherwise irritate applicators' hands and skin.

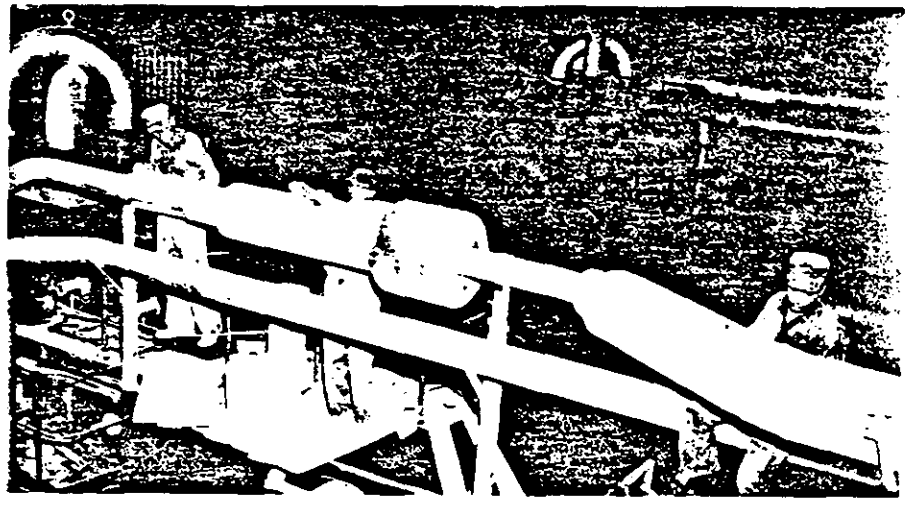
USES

Alltemp Pipe Covering is recommended for all temperatures from 100° F. to 1600° F. It is particularly recommended for irregular surfaces, as well as valves and fittings.

APPLICATION

Alltemp is applied in single-layer or broken-joint double-layer construction. It can also be installed as an inner layer in combination with an outer layer of Super-Light Magnesia. In combination insulation, Alltemp absorbs the initial heat shock of high temperature piping and brings the temperature down to the safe limit of the outer-layer insulation.

Sizes: Alltemp sectional pipe covering is available through 12"; tri-sections and quad-sections available in larger sizes. "Nesting O.D." pipe covering sizes provide accurate tight fits over or into another size. This permits a wide range of assemblies and gives the advantage of building up many thicknesses from a limited number of prime units.



Alltemp is recommended for high-temperature or low-temperature piping systems.

SPECIFICATIONS

TABLE OF NOMINAL THICKNESSES, IN INCHES

Nominal Pipe Size-- Inches	*Temperature Difference*										
	200	*300*	*400*	*500*	*600*	*700*	*800*	*900*	*1000*	*1100*	*1200*
1-½ & Under	1	1	1	1-½	1-½	2	2	2-½	2-½	2-½	3
2	1	1	1-½	1-½	2	2-½	2-½	2-½	2-½	3	3
2-½	1	1	1-½	2	2	2-½	2-½	3	3	3	3-½
3	1	1	1-½	2	2	2-½	3	3	3	3-½	3-½
3-½	1	1-½	1-½	2	2	2-½	3	3	3-½	3-½	3-½
4	1	1-½	1-½	2	2-½	3	3	3	3-½	3-½	4
4-½	1-½	1-½	2	2	2-½	3	3	3-½	3-½	3-½	4
5	1-½	1-½	2	2	2-½	3	3	3-½	3-½	4	4
6	1-½	1-½	2	2-½	2-½	3	3-½	3-½	4	4	4-½
7	1-½	1-½	2	2-½	2-½	3-½	3-½	4	4	4	4-½
8	1-½	1-½	2	2-½	3	3-½	3-½	4	4	4-½	4-½
9	1-½	1-½	2	2-½	3	3-½	3-½	4	4-½	4-½	5
10	1-½	2	2-½	2-½	3	3-½	4	4	4-½	4-½	5
11	1-½	2	2-½	3	3	3-½	4	4	4-½	5	5
12	1-½	2	2-½	3	3	3-½	4	4-½	4-½	5	5
14 & Over	1-½	2	2-½	3	3-½	3-½	4	4-½	4-½	5	5-½

For temperatures above 1200°, consult the Plymouth Meeting Office for recommendations.

FOR COMBINATION INSULATION OF ALLTEMP INNER LAYER AND SUPER-LIGHT 85% MAGNESIA OUTER LAYER

Pipe Temp. of		Pipe Size--Inches									
		1	2	4	6	8	10	12	14	16	18
600°	Recom'd Thk. (Alltemp	2"	1-½"	1-½"	1-½"	1-½"	1-½"	1-½"	1-½"	1-½"	1-½"
	-Inches (Super-Light	None	1"	1"	1-½"	1-½"	1-½"	1-½"	1-½"	1-½"	1-½"
	*BTU Loss	98	111	146	190	196	270	304	340	390	438
	Surface Temp.--° F.	118	116	112	116	111	120	120	122	124	125
	% Efficiency	89.6	93.3	95.2	95.7	96.5	96.1	96.3	96.2	96.2	96.2
700°	Recom'd Thk. (Alltemp	2"	1-½"	1-½"	1-½"	1-½"	1-½"	1-½"	1-½"	1-½"	1-½"
	-Inches (Super-Light	None	1"	1-½"	1-½"	1-½"	1-½"	2"	2"	2"	2"
	*BTU Loss	126	127	184	239	286	341	339	384	419	457
	Surface Temp.--° F.	126	114	119	124	125	128	122	124	125	126
	% Efficiency	90.6	94.6	95.7	96.2	96.4	96.6	97.1	97.0	97.1	97.2
800°	Recom'd Thk. (Alltemp	2"	1-½"	1-½"	1-½"	1-½"	1-½"	1-½"	2"	2"	2"
	-Inches (Super-Light	None	1-½"	1-½"	2"	2"	2"	2-½"	2"	2"	2"
	*BTU Loss	154	154	222	246	295	363	364	421	452	495
	Surface Temp.--° F.	133	121	126	123	125	129	123	126	127	128
	% Efficiency	91.5	95.2	96.2	97.1	97.3	97.3	97.7	97.6	97.7	97.8
900°	Recom'd Thk. (Alltemp	2"	1-½"	1-½"	2"	2"	2"	2"	2-½"	2-½"	2-½"
	-Inches (Super-Light	None	1-½"	1-½"	2"	2"	2"	2"	1-½"	1-½"	1-½"
	*BTU Loss	182	179	260	274	330	388	457	498	557	603
	Surface Temp.--° F.	141	127	134	123	127	129	132	135	136	137
	% Efficiency	92.4	95.7	96.7	97.6	97.7	97.8	97.9	97.9	97.9	98.0
00°	Recom'd Thk. (Alltemp	2"	1-½"	2"	2-½"	2-½"	2-½"	3"	3"	3"	3"
	-Inches (Super-Light	None	1-½"	1-½"	1-½"	2"	2"	1-½"	1-½"	1-½"	1-½"
	*BTU Loss	210	205	276	332	363	422	491	544	586	641
	Surface Temp.--° F.	149	134	133	132	129	131	132	136	137	138
	% Efficiency	93.2	96.3	97.3	97.7	98.1	98.2	98.3	98.2	98.3	98.4
1100°	Recom'd Thk. (Alltemp	2"	2"	2-½"	3"	3"	3"	3-½"	3-½"	3-½"	3-½"
	-Inches (Super-Light	None	1-½"	1-½"	2"	2"	2"	1-½"	1-½"	1-½"	1-½"
	*BTU Loss	238	223	295	329	388	461	533	580	628	693
	Surface Temp.--° F.	156	133	132	127	129	132	135	138	139	140
	% Efficiency	94.0	96.8	97.7	98.3	98.4	98.5	98.5	98.5	98.6	98.6
1200°	Recom'd Thk. (Alltemp	2"	2"	3"	3-½"	3-½"	3-½"	3-½"	3-½"	3-½"	3-½"
	-Inches (Super-Light	None	1-½"	1-½"	1-½"	1-½"	1-½"	1-½"	1-½"	1-½"	1-½"
	*BTU Loss	266	254	315	383	451	540	600	656	724	787
	Surface Temp.--° F.	164	138	131	133	136	140	141	144	146	147
	% Efficiency	94.7	97.1	98.1	98.4	98.5	98.6	98.7	98.7	98.7	98.8

*BTU Losses Are Per Lineal Ft. Per Hr.
80° Ambient Air Temperature
No Interface Temperature Exceeds 575° F.
Performance Data For Other Thicknesses See Bulletin 101 BX
All Recommended Thicknesses Are Nominal

Alltemp is easy to handle, easy to fit ... saves time and labor costs.

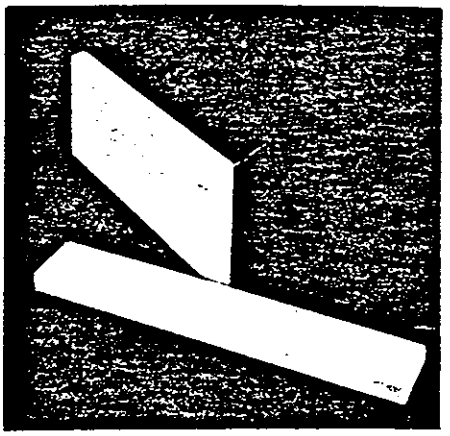




Carey

ALLTEMP BLOCK

industrial insulation



Alltemp block is an all-purpose insulation within the temperature range of 100° F. to 1600° F.

USES

Alltemp Block is recommended for high temperature surfaces such as oil stills, ovens, boiler walls, breechings, furnaces and other equipment whose surfaces are between 100° F. and 1600° F. Alltemp Block is available for flat and curved surfaces. It is particularly recommended for irregular surfaces which require an easy-to-apply insulation.

APPLICATION

Alltemp Block can be applied as a complete insulation or in combination with lower temperature insulations (such as Super-Light 85% Magnesia) to absorb initial heat shock. In combination insulation, Alltemp reduces the temperature to the safe limit of the outer-layer insulation.

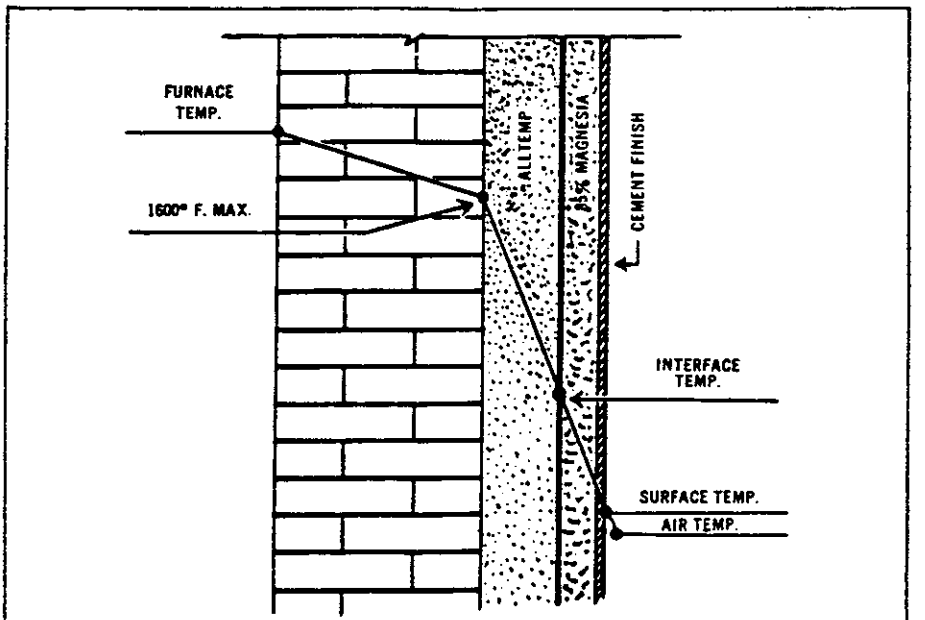


Diagram shows combination of Alltemp inner layer with Super-Light 85% magnesia outer layer.

DESCRIPTION

Alltemp is a combination of special inorganic silicas and asbestos fibres. Every cubic foot is honeycombed with millions of tiny sealed air cells. Having excellent physical and chemical properties, Alltemp retains its high thermal efficiency and structural strength even when subjected to long and continuous exposure to high temperatures and moisture.

FEATURES

Extremely low thermal conductivity--actually improves after exposure to high temperatures.

Full temperature range— from 100° F. to 1600°F.

Low internal shrinkage--lowest of all tested comparable insulations. Alltemp retains high efficiency because it does not crack or open up from shrinkage.

Moisture resistance—exposure to high moisture conditions does not deteriorate Alltemp or affect its thermal conductivity.

Easily fitted—workmen can cut and trim Alltemp with a knife. They can trim closer and make a truer cut than with other insulations. Edges remain neat and square ... make tight, "no-heat-leaking" joints. It is not brittle ... can be cut or shaped to fit irregular areas and around projections.

Easily handled—Alltemp is shock resistant, extremely durable and will withstand packing, shipping and handling with little, if any, breakage. It will not cut, scratch or otherwise irritate applicators' hands and skin.

SPECIFICATIONS

Density—19-21 lbs. per cu. ft.

Conductivity--at 100° F....0.43

at 500° F....0.60

at 1000° F....0.72

Crushing strength (3% deformation)--

Cold ... approx. 58 lbs. per sq. in.

1500° F... approx. 60 lbs. per sq. in.

Heat expansion—none

Heat shrinkage--at 1200° F....0.72%

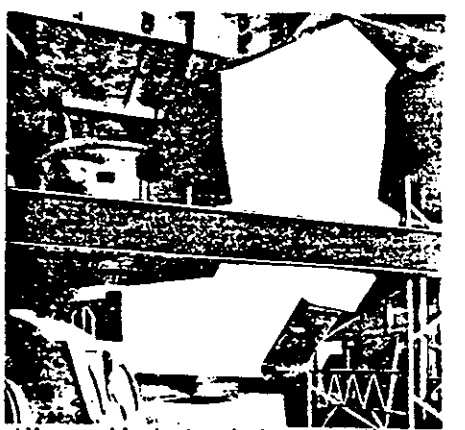
at 1500° F....1.10%

Flexural strength--60 lbs. per sq. in.

Abrasion resistance —

Loss in 1st 10 min. 27%

Loss in 20 min. 55%



Alltemp block insulation installed on airduct.

Packaging: Alltemp blocks are packed in cartons. The same carton packaging data shown under Filter Press 85% Magnesia Blocks also apply to Alltemp blocks except that the weights are approximately 25% heavier.

Data for Combination Insulation of Alltemp Inner Layer and Super-Light 85% Magnesia Outer Layer

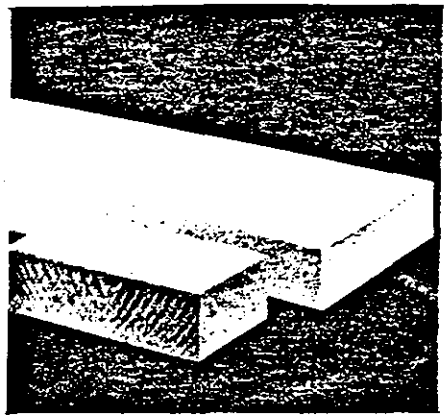
	Inner Surface Temperature° F.						
	600°	*700°*	*800°*	*900°*	*1000°*	*1100°*	*1200°*
Recom'd Thk. (Alltemp	1-½"	1-½"	2"	2-½"	3"	3-½"	4"
(Super-Light	1-½"	2"	2"	1-½"	1-½"	1-½"	1-½"
BTU Loss Per Sq. Ft.	73	78	84	102	108	111	116
Outer Surface Temp.—° F.	123	125	129	135	139	139	142
Efficiency—%	97.2	98.0	98.3	98.4	98.7	99.0	99.2

Based on 80° Ambient Air Temperature
No Interface Temperature Exceeds 565°
Performance Data For Other Thicknesses See Bulletin 101BX

Order Diameter	*No. of 6" Wide Blocks To Cover*	*3" Wide Filler Block*	*External Area Sq. Ft. Per 3 Ft. Length*	
			1-½" to 2" Thick	*Over 2" Thick*
34"	18		28.692	28.980
35"	18	1	29.498	29.785
36"	19		30.286	30.590
37"	19	1	31.083	31.395
38"	20		31.880	32.200
39"	20	1	32.677	33.005
40"	21		33.474	33.810
41"	21	1	34.241	34.615
"	22		35.068	35.420
"	22	1	35.865	36.225
"	23		36.662	37.030
45"	23	1	37.459	37.835
46"	24		38.256	38.640
47"	24	1	39.053	39.445
48"	25		39.850	40.250
49"	25	1	40.647	41.055
50"	26		41.444	41.860
51"	26	1	42.241	42.665
[illegible]"	27	1	43.835	44.275
[illegible]	28		44.632	45.080
54"	28	1	45.429	45.885
55"	29		46.226	46.690
56"	29	1	47.023	47.495
57"	30		47.820	48.300
58"	30	1	48.617	49.105
59"	31		49.414	49.910
60"	31	1	50.211	50.715

Carey HI-TEMP NO. 19 BLOCK

industrial insulation



Hi-Temp No. 19 Block insulation for temperatures up to 1900° F.

DESCRIPTION

Carey Hi-Temp No. 19 Block is made of diatomaceous earth, asbestos fibre and refractory bonding clay molded into block form for greatest use at high temperatures.

FEATURES

- High thermal efficiency--K Factor (conductivity) at 600° F. mean temperature (average between inner and outer surfaces of insulation) is 0.64; at 800° F., 0.68; at 1000° F., 0.69.
- Heat expansion up to 1900° F.—none.
- Incombustible—all mineral.
- Noncorrosive.
- High compressive strength—approximately 95 lbs. per sq. in.
- High bending strength--modulus approximately 75 lbs.
- Small heat shrinkage—0.4% at 1000° F.; 1.00% at 1500° F.; 2.5% at 1900° F.
- High salvage value—broken material can be ground and used as cement.

USES

For use in insulating ovens, furnaces, kilns, lehrs, regenerating chambers, breechings and ducts where the outer surface of the refractories does not exceed 1900° F. In general, blocks are used as a first layer, followed by an outer layer of 85% Magnesia in such combinations that the 85% Magnesia will not be exposed to temperatures higher than 600° F.

APPLICATION

Blocks for insulating refractory brick surfaces are usually laid up with Hi-Temp Cement and supported in place by an outer wall of metal or brick. Blocks for application over superheated steam surfaces are held in place with wire loops or other supporting means as described for 85% Magnesia Blocks. Fibrous adhesive can be used to adhere blocks to surfaces as an additional securement but only when surfaces do not exceed 800° F. For higher temperatures, blocks should be wired to the surface. Consult the Insulation Contract Department or the Plymouth Meeting Office when conventional methods of application cannot be used.

SPECIFICATIONS

Furnished in flat and curved blocks for covering large surfaces. Also furnished as cement to be mixed with water for filling cracks and openings between blocks.

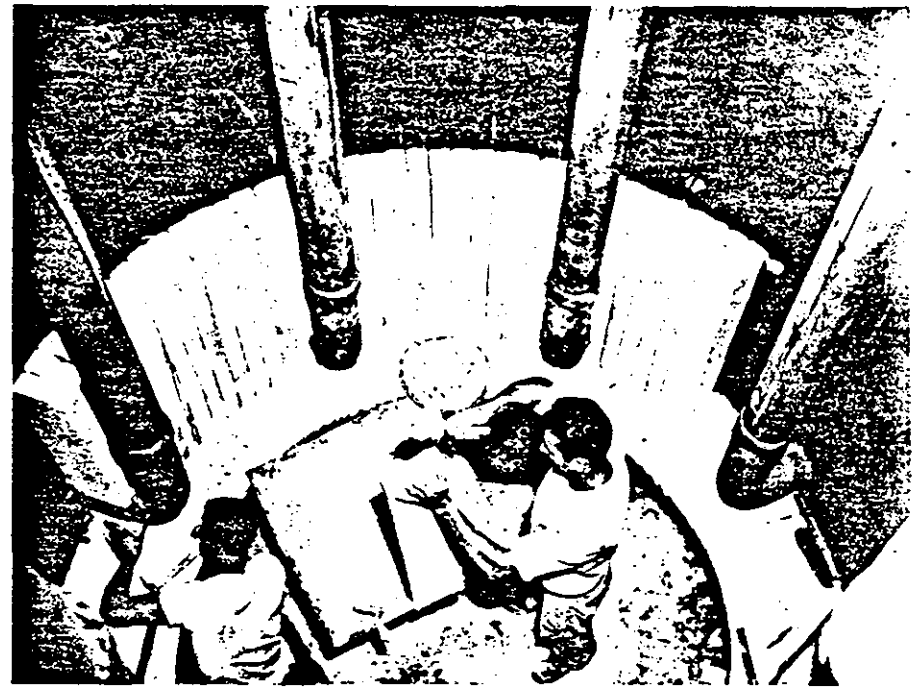
Packaging: Hi-Temp blocks are packed in cartons. The same carton packaging data shown under Filter Press 85% Magnesia blocks also apply to Hi-Temp blocks except that Hi-Temp weights are 50% heavier. Density of Hi-Temp is approximately 24 lbs. per cu. ft.

TABLE OF RECOMMENDED THICKNESSES

Temperature Range—° F.	*Hi-Temp Inner Layer—In.*	*85% Mag. Outer Layer—In.*
1101 to 1200	3-1/2	1-1/2
1001 to 1100	3	2
901 to 1000	2-1/2	2
801 to 900	2	2
701 to 800	1-1/2	2-1/2
550 to 700	1-1/2	2

Standard Sizes: Lengths - 18" and 36".

Width	*Thickness — Inches*
6" Curved	1-1/2, 2, 2-1/2, 3
9", 12" Flat	1-1/2, 2, 2-1/2, 3, 3-1/2, 4
3", 6" Flat	1, 1-1/4, 1-1/2, 2, 2-1/2, 3, 3-1/2, 4

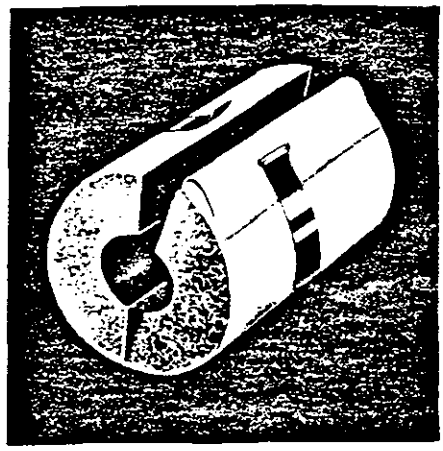


Installing Hi-Temp No. 19 Blocks on Wallingford Steel Co. oven.

WOOL FELT PIPE COVERING
PERFECTO

Carey

industrial insulation



DESCRIPTION

Perfecto is a semi-rigid structure made of multiple layers of indented "dry" insulating felt (wool felt) firmly cemented together. The inner surface is lined with asphalt-saturated organic felt. Carey Perfecto covering is furnished with a white wrapper under the canvas.

USES

Perfecto is an efficient economical pipe insulation for temperatures between 60° F. and 225° F., keeping hot water hot and cold water cold, and preventing sweating of cold water service lines. For service water temperatures between 45° F. and 60° F., integral jackets with properly sealed joints give adequate service for intermittant operation. For continuous operation a water vapor barrier integral jacket should be used. Under such conditions refer to Impervo and Table of Recommended Thicknesses on next page. Perfecto is not designed for dual temperature systems.

Note – In cold or chilled water line piping all conditions such as air temperature, humidity, type of insulation, or any extreme condition must be considered carefully. If proper precautions are not taken in the choice of insulation and in its installation, sweating and condensation can cause extensive damage thruout the building.

SPECIFICATIONS

Perfecto has a very high insulating value, much better than old-type solid wool felt coverings. K-Factor (conductivity) is approximately the same as cork and hair felt - .25 to .30 at 50° F.

Perfecto is finished with 10.2-yards-per-pound cotton cloth jackets. Heavier canvas jackets can be furnished. Perfecto can be finished with roofing jackets, such as the Carey recommended jacket of 45-lb. Surety Roofing.

Recommended Thicknesses –

Temperatures 225° F. to 60° F. – Normally, 3/4" thickness is satisfactory, but for severe humidity conditions double 1/2" thickness is recommended.

Temperatures from 60° F. and 45° F. - Double layer construction is also recommended. Also, see Page 12 (Impervo).

Sizes: Perfecto is furnished only in semi-cylindrical sections 36" long, for pipe sizes up to and including 36". It is available with bands in thicknesses of 1/2", 3/4", 1", double 1/2", double 3/4". Other thicknesses available on special order.

APPLICATION

Note: To insure maximum efficiency pipes and fittings must be installed to allow a full thickness of insulation to be applied throughout.

Single Layer – Sectional Covering shall be applied to the straight run of pipe with all joints brought together firmly. Covering is secured in place by pasting down the lateral and end laps of the factory applied canvas jacket. If additional securement is desired, standard metal bands may be installed over end joints and in the middle of each section.

Fittings in lines covered with single-layer (Perfecto Woolfelt) can usually be insulated with MW-50 cement. The fittings shall be roughed in to a thickness equal to the adjacent insulation and allowed to dry. After the cement is thoroughly dry, fittings should be smoothed off with a second coat of Asbestos Cement and canvassed.

Double Layer – Perfecto shall be applied to the straight runs of pipe with lateral and end joints staggered and brought together firmly. When insulating piping, operating in the lower range of recommended temperatures, joints of the inner layer should be sealed to prevent the infiltration of moisture. Covering shall be secured in place by pasting down the side and end laps of the factory applied canvas jacket. If additional securement is desired, copper staples shall be installed under the canvas lap and over the side joints. Standard metal bands are also used as additional securements. Bands should be placed at end joints and in the middle of each section.

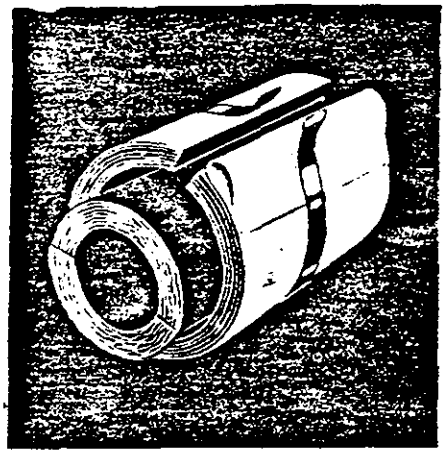
Fittings shall be insulated with one or more layers of Hairfelt built up to a thickness equal to the adjacent pipe insulation. It is recommended that each layer of Hairfelt be sealed with spiral wrapping of insulating tape. Finally, the fitting should receive a smooth coat of Asbestos Cement and a canvas jacket neatly pasted in place. In the lower temperature range we recommend that the outer layer of insulation be stepped back approximately 1-1/2" from the end of the inner layer at fittings, and when insulating over hangers. This will provide the broken joint type construction throughout, which is very important when insulating against condensation.

All piping exposed to the weather should be waterproofed. We recommend that the straight pipe be weatherproofed with 45 lb. Surety Roofing which is an asphalt saturated and coated jacket. Side and end laps should be a minimum of 2" and sealed with lap cement. To insure best results all side laps should face downward to shed water and the jacket held in place with loops of copper clad wire on 6" centers. Fittings exposed to the weather shall be weatherproofed with Carey Insulation Seal and reinforced with Glasfab.



Carey Perfecto is shown installed in Cincinnati, Ohio food plant. Perfecto can be used to insulate service water piping systems down to 45°.

Carey WOOL FELT PIPE COVERING IMPERVO industrial insulation



Impervo is a cold water pipe insulation used to keep water cold and prevent sweating.

DESCRIPTION

Impervo is composed of multiple layers of insulating felt with water resistant felts on the inner and outer surface of each layer. It is furnished in sections three feet long with canvas jacket, for iron and copper pipes from 1/4" to 24", and is regularly made in Double and Double 3/4" thickness. Other thicknesses can be made special to order. Four inch (4") wide collars for sealing end laps, as well as longitudinal flaps on outer water resistant felt will be furnished special on request.

USES

Impervo is used primarily for insulating chilled water and ice water pipe lines operating at temperatures between 40° F. and 60° F. It is specially designed to keep water cold and prevent condensation causing damage from dripping. Recommended for cold service water piping under particularly high humidity conditions such as in laundries, kitchens, bakeries, textile and paper mills.

SPECIFICATIONS

Impervo has a high insulation value, approximately the same as cork and hair felt. Its K Factor (conductivity) is in the range of .25 to .30 at 50° F.

Service Range: Impervo used to proper thicknesses is recommended for cold water service. The table shows the proper thickness to prevent sweating for various differences of temperatures between the surrounding air and water in the pipe and for various degrees of humidity:

Humidity	*Temperature Difference °F. Water To Air*		
	50° F. Max. In.	*60° F. Max. In.*	*70° F. Max. In.*
Up to 70%	1"	1"	1-½"
70-80%	1-½"	2"	2"
80-85%	2"	2-½"	3"

In cases where water temperatures are 50° F. and below and relative humidity exceeds 75%, special precautions must be taken to assure proper vapor sealing of all joints and surfaces to prevent the infiltration of moisture vapor through the insulation. This should include the following:

1. Use of longitudinal flap and 4" collars at all end joints, properly sealed with Carey Insulation Seal No. 830.
2. All fittings to be made from standard hairfelt securely sealed to adjacent layers of covering with insulating tape.
3. Where severe conditions exist, surface of both pipe insulation and fittings must be brush coated with Carey Insulation Seal No. 830 to assure a proper moisture vapor seal.

Impervo is not recommended for the insulation of most dual temperature systems. Consult General Office for recommendation of type of Impervo insulation for dual temperature systems, giving maximum percent of humidity and maximum air temperature.

APPLICATION

All piping and fittings shall be insulated as follows:

Chilled Water Piping Systems: Pipe Insulation - Apply two (2) layers of Carey Impervo. Pipe Covering of thickness in agreement with preceding table, with all butt joints and lateral seams of the second layer staggered with reference to joints and seams of the first layer. Point all joints of inner and outer layers with Carey Insulation Seal No. 830.

All covering must run continuous in full thickness through sleeves and be properly tied in with fittings and vapor sealed.

Covering may be secured in place by peeling back canvas and longitudinal flap (when ordered) and installing 3/4" x 3/4" or larger copper staples over longitudinal seams on 6" centers. Width of staple must be sufficient to extend over joint.

After insulation is secured in place cement down longitudinal flap and collars with Carey Insulation Seal No. 830.

At fittings and valves, step back the outer layer of covering at least 2", making sure that all seams are tight.

Support all insulated lines by Clevis hangers placed on outside of insulation, using a heavy gauge sheet metal saddle through the hanger. Spacing of hangers and size and length of saddles must provide sufficient load distribution to prevent compression of insulation. Saddles should be formed to exact outside diameter of covering and should extend half way around covering. Where other types of hangers are used a perfect seal must be provided, and the insulation carried up the hanger rod for at least 6".

Fittings: Insulate with two (2) layers of Hairfelt, each layer tied on with spiral wrapping of 4-ply hemp twine. Apply the first layer of Hairfelt tight against the butt ends of the inner layer of covering and approximately flush with the outer surface of the inner layer. Apply the second layer of hairfelt tight against the butt ends of the stepped back outer layer of covering and approximately flush with outer surface of covering. Seal each layer of Hairfelt with a spiral wrapping of insulating tape pulled tight, and lapped on itself to give double thickness. Tape should be extended at least 2" over the adjacent pipe insulation. Seal each layer of insulating tape with a heavy brush coat of Insulation Seal. Where pipes are exposed, fittings may be finished over insulating tape with a smooth coat of Asbestos Cement, (omitting Insulation Seal) applying a canvas jacket over the Asbestos Cement with a waterproof adhesive. Outside piping, fittings, hangers and vessels may be weatherproofed with Insulation Seal No. 830 reinforced with Glasfab or equal.

Finish: Thoroughly seal all insulation surfaces with a heavy brush coat of Insulation Seal.

Cold City and Well Water: Apply insulation same as above except the second layer of hairfelt on fittings and the finish vapor barrier coating over the insulation may be omitted.

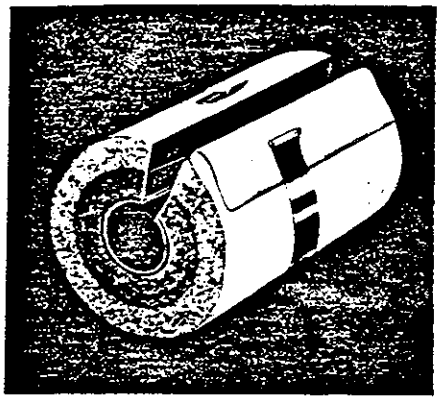
Recommendation for conditions other than described above can be obtained from the Technical Services Department of The Philip Carey Manufacturing Company.

Humidity varies greatly over the United States. At times conditions are unusual and excessive. Data showing these extremes of temperatures and humidity may be obtained from your local Weather Bureau.

Carey

WOOL FELT PIPE COVERING PROTECTO

industrial insulation



Protecto reduces the danger of freezing of exposed piping.

DESCRIPTION

Protecto is a semi-rigid structure made of two inner layers of cattle hair felt (each layer about 1/4" thick) and an outer layer of insulating felt (wool felt) firmly cemented together. The inner surface is lined with asphalt-saturated organic felt.

USES

Protecto is used only to protect water, gas, oil and other pipes from freezing temperatures. It should never be used on ice water pipes to prevent sweating.

SPECIFICATIONS

K-Factor (conductivity) is approximately .25.

Protecto is finished with 10.2-yards-per-pound cotton cloth jackets. Heavier canvas jackets can be furnished. Protecto can be finished with roofing jackets, such as the Carey recommended jacket of 45-lb. Surety Roofing.

Recommended Thicknesses --

Single layer (1-1/4" thickness) is usually satisfactory for latitudes south of Washington, D.C., Cincinnati and St. Louis. Single layer 2" total thickness is recommended for northern latitudes.

Effective Protection: No insulation alone can prevent freezing if the water stands still long enough. Some water must be allowed to run during weekend or idle periods.

PROTECTION PERIOD AGAINST FREEZING
AIR–10° BELOW ZERO F. WATER–52° F.

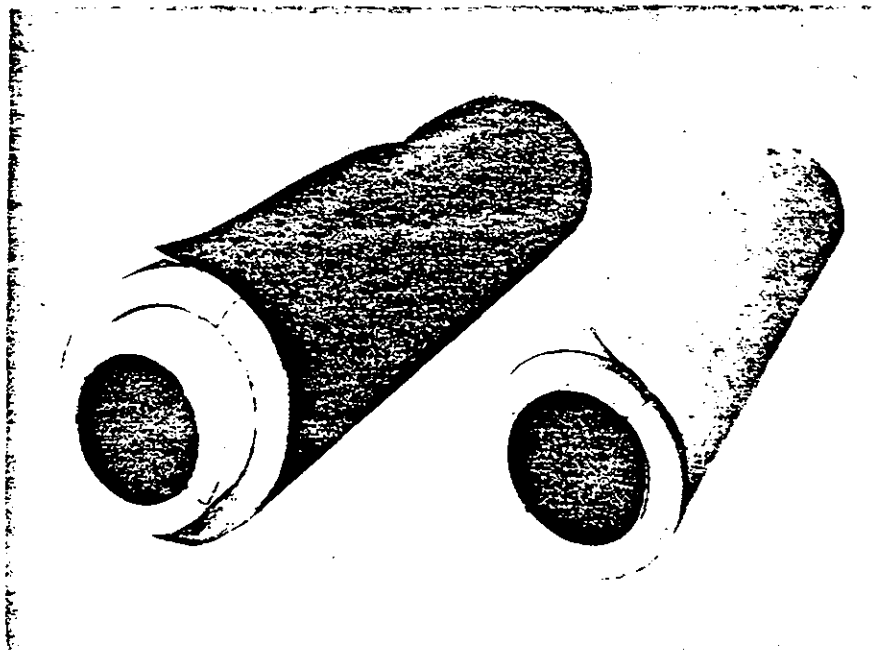
Pipe Size	*Hours of Protection*				*Flow Needed To Prevent Freezing-- lbs of water/lin. ft. of pipe/hr (1 pint = 1 lb)*	
	Before Freezing		*Allowing 1/8" thickness of ice to form*			
	1-¼" Thk. Protecto	*2" Thk. Protecto*	*1-¼" Thk. Protecto*	*2" Thk. Protecto*	*1-¼" Thk. Protecto*	*2" Thk. Protecto*
1"	1.02	1.54	4.94	7.92	.37	.25
2"	2.59	4.2	7.59	12.3	.56	.35
3"	4.23	7.15	9.70	16.40	.75	.45
4"	5.94	10.2	11.65	20.09	.92	.54
6"	9.67	17.4	15.70	28.1	1.33	.72
8"	13.22	24.3	19.47	35.65	1.64	.89
10"	17.16	31.7	23.49	43.45	1.98	1.07
12"	20.95	38.7	27.38	50.75	2.33	1.26

APPLICATION

Protecto sectional covering shall be carefully fitted to the pipe with lateral and butt joints tight. The sections are secured in place by neatly pasting the side and end laps of canvas furnished on the covering. Protecto covering may be additionally secured with standard metal bands placed over end joints and in the centers of each section. Cover the fittings with Hairfelt built up to equal thickness of the adjacent covering and secure in place with a spiral wrapping of jute twine. Fittings may be finished with insulating tape or asbestos cement and a canvas jacket pasted in place.

It is recommended that the insulation be painted with one coat of size and two coats of lead and oil.

Carey SUPERBO PIPE COVERING industrial insulation



Carey Superbo is available with either a white or a black vapor barrier jacket consisting of aluminum foil laminated between two layers of creped Kraft.

DESCRIPTION

Carey Superbo is a rigid pipe insulation made of multiple layers of "dry" insulating felt (wool felt) firmly cemented together. The inner surface is lined with asphalt saturated organic felt. A factory applied white vapor barrier jacket is furnished consisting of aluminum foil laminated between two layers of special creped Kraft paper, bonded with asphalt. This same vapor barrier jacket is also available with a black outer surface.

Superbo is furnished with 4" wide collars of the same vapor barrier material as the jacket.

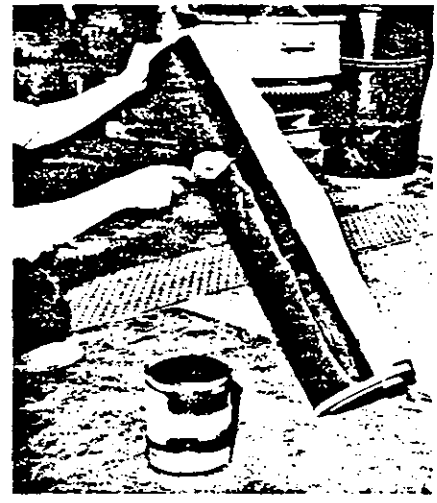
USES

Carey Superbo is a dual temperature pipe insulation for chilled water piping or piping operating at alternating high and low temperature with a service range of from 35° F. (lower limit) on the cooling cycle to 200° F. (maximum) on the heating cycle. The integral vapor barrier jacket properly applied and sealed will protect chilled water lines from condensation or sweating. Thickness requirements vary with the pipe size and conditions of temperature and humidity. Where recommended thickness exceeds 1-1/2" and the pipe size is 6" and over, double thick Superbo construction and broken joint application is required.

APPLICATION

Superbo should be applied over a clean dry surface (wipe off any condensed moisture) with the pipe at ambient temperature. Adjoining sections should be firmly butted, and if multiple layer construction, all joints are to be staggered. The longitudinal flap of the vapor barrier and the collars should be sealed down with a suitable rubber base vapor seal adhesive.

Vapor seal adhesives should be quick tacking. Where the white side of the barrier is exposed a white adhesive should be used.



The longitudinal flap of the vapor barrier should be sealed down with a rubber base vapor seal adhesive.

Flair-door staples or other devices which puncture the vapor barrier must not be used to hold down the flap. Standard bands should be used to hold down the flap until the adhesive sets after which they may be left in place or removed for subsequent painting or canvassing. Joint collars are to be sealed down with vapor barrier adhesive.

Ends of the pipe insulation should be sealed off with a cut back type asphalt mastic, such as Insulation Seal 830, at all flanges, valves and fittings and at intervals of 21 feet on continuous runs of pipe. These moisture seals retard the spread of moisture should barrier puncture or line failure occur.

In erecting the pipe, the use of adjustable clevis type hangers with the insulation passing through the hangers is a preferable mounting, particularly in severe service conditions. The use of saddles, consisting of semi-cylinders of 16-gauge galvanized of a length equal to 4 times the diameter of the pipe insulation is indicated in all cases. In the case of large diameter pipe, where high concentrated loads are expected at the points of support, the use of a short length of rigid type insulation on the lower half of the pipe through the hanger loop is recommended to prevent compression of the insulation.

If direct contact clamp hangers are used, the hanger is to be insulated independently of the straight run covering in the same manner as any valve, flange or other type of fitting by the following method.

1. Hanger rod should be insulated to a minimum height of four times the pipe insulation thickness (or preferably 12" where possible) with insulation similar to that covering the



Vapor seal adhesive should be quick tacking. Bands may be used to hold down the flap until adhesive dries.

pipe, having an I. D. approaching as nearly as possible the diameter of the hanger rod and one-half the insulation thickness used on the pipe proper.

2. The hanger rod insulation, the insulation collar over the clamp, and the area extending 2" beyond the collar on each side should be sealed with 2 coats of a cut back type asphalt mastic (Insulation Seal No. 830) reinforced with saturated glass fabric between coats.

3. The area housing the clamp hanger between the ends of pipe insulation should be closed by a collar of insulation material similar to that used on the pipe, with an I. D. equal to the O. D. of the pipe insulation and half the thickness, and shall extend two inches over the ends of the pipe insulation on each side, and be sealed as described above.

4. The ends of the pipe insulation enclosed by the joint collar should be moisture sealed with a cut back type asphalt mastic (Insulation Seal 830).

5. The voids in the area housing the clamp hanger should be firmly packed with hair felt.

6. The pipe insulation should have barrier laps firmly sealed in the same manner as on the straight runs pipe.

Other fittings such as elbows, tees, flanges and valves shall also be insulated independent of the straight run covering. After the ends of the adjacent covering has been sealed with mastic (Insulation Seal No. 830), the body of the valve, tee, elbow or flange should be neatly covered with hair felt securely tied in place, of a thickness equivalent to the adjacent insulation. The fitting insulation is then shaped by enclosing the hair felt neatly taped with pressure sensitive black vapor barrier tape. If multiple layer broken joint construction is employed, the ends of the insulation should be staggered at the fitting and separate layers of hair felt carried through the fitting insulation with tape between each layer. The taping should be extended a full two inches on each side, on each layer, of the adjacent covering. A final outer vapor seal should be accomplished by two coats of vapor seal mastic (Insulation Seal No. 830) reinforced with saturated glass fabric between layers and carried out two inches on each side on the adjacent covering. If color is a factor, a white form of tape is available, and the final finish coat can be made with coats of white rubber base vapor seal mastic reinforced with an untreated fabric.

All valves, handles, stems or other protuberances on fittings should be erected in an inverted position. Insulation should be carried out continuously through all walls, partitions or other interfering structures.

FINISHES As an indoor surface finish, the barrier surface may be considered adequate with or without bands. The barrier may not be painted directly. Paint the barrier with asphalt base aluminum paint or other asphalt compatible finish. Follow with conventional lead and oil paint. Pigmented PVA emulsions in code colors also serve as highly desirable final finishes.

Insulated piping exposed to the weather should be finished with 45# roofing felt lapped at least 3" at all joints and sealed with lap cement. Edge of the horizontal lap should end slightly below the level of the horizontal axis of the pipe in order to shed water. Final securements should be made with soft aluminum bands on 12" centers or 16-gauge galvanized or copper wire on 8" centers. Wire should not be drawn so tightly as to pierce the jacket.

SPECIFICATIONS

Sizes Available	1/2" through 36" Iron Pipe Size 1/2" through 6-1/8" Copper Tubing Semi-cylindrical sections - 36" in length-hinged
Thickness	1" and 1-1/2" thickness
Jackets	White Vapor Barrier Black Vapor Barrier Collars 4" wide furnished with each section
K Factor	.29 at 50° F.
Vapor Transmission	Vapor barrier jacket has a Perm. rating after flexing of 0.02 Max. at 95% RH at 100° F. Jacket has a 15% stretch characteristic in both directions.

TABLE OF RECOMMENDED THICKNESSES

FOR AMBIENT AIR CONDITIONS OF 90° F. & 90% R. H.

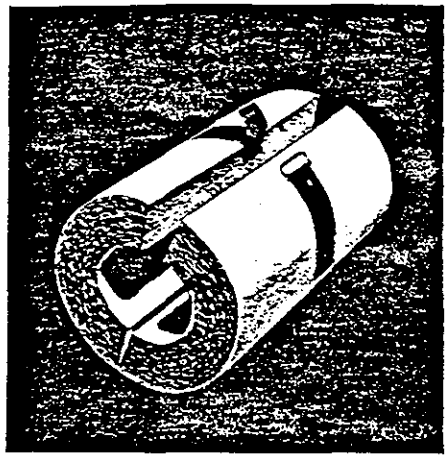
(Based on "K" of .28 @ 40° F. Mean)

IRON PIPE SIZES			COPPER TUBING		
Temperature	35° F	40° F	Temperature	35° F	40° F
Size	Recommended Thickness	Recommended Thickness	Size	Recommended Thickness	Recommended Thickness
1/2"	1-1/2"	1-1/2"	1/2"	1-1/2"	1-1/2"
3/4"	1-1/2"	1-1/2"	5/8"	1-1/2"	1-1/2"
1"	1-1/2"	1-1/2"	3/4"	1-1/2"	1-1/2"
1-1/4"	1-1/2"	1-1/2"	7/8"	1-1/2"	1-1/2"
1-1/2"	2"	1-1/2"	1-1/8"	1-1/2"	1-1/2"
2"	2"	1-1/2"	1-3/8"	2"	1-1/2"
2-1/2"	2"	2"	1-5/8"	2"	1-1/2"
3"	2"	2"	2-1/8"	2"	2"
4"	2"	2"	2-5/8"	2"	2"
5"	2-1/2"	2"	3-1/8"	2"	2"
6"	2-1/2"	2"	3-5/8"	2"	2"
7"	2-1/2"	2"	4-1/8"	2"	2"
8"	2-1/2"	2"	5-1/8"	2-1/2"	2"
9"	2-1/2"	2"	6-1/8"	2-1/2"	2"
10"	2-1/2"	2-1/2"			
11"	2-1/2"	2-1/2"			
12"	2-1/2"	2-1/2"			
14"	2-1/2"	2-1/2"			
16"	3"	2-1/2"			
18"	3"	2-1/2"			
20"	3"	2-1/2"			
24"	3"	2-1/2"			
30"	3"	2-1/2"			
36"	3"	2-1/2"			

Insulation thickness should in all cases be chosen to meet the severest possible conditions of temperature and relative humidity anticipated on the lower end of the cycle when used in dual range or chilled water service.

CAREYCEL PIPE AND BLOCK INSULATION

industrial insulation



Careycel Pipe Covering and Block Insulation has 12 or more layers of preformed asbestos paper per inch of thickness — each layer being an effective heat barrier. This special construction gives Careycel a much lower K Factor than conventional corrugated asbestos insulation, such as Aircell and Excel.

DESCRIPTION

Careycel is designed for temperatures up to 300° F. and is an improved type of asbestos heat insulation for pipes, heaters, and hot or cold air-conditioning ducts. Careycel provides greater insulating efficiency for a given thickness, a feature which is the result of a patented processing method.

Each sheet of asbestos paper is fabricated with innumerable minute indentations that are deep and firm. In forming Careycel, these sheets are laminated to provide any desired thickness. Careycel has 12 or more asbestos layers per inch of thickness, each layer being an effective heat barrier.

FEATURES

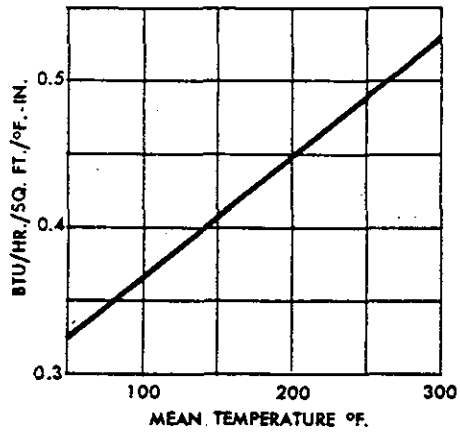
- High insulating efficiency—extremely low K Factor.
- Minimum shrinkage—only .05% (about one-tenth of conventional air-cell types).
- Smooth—no unsightly ridges to catch and hold dust and dirt.
- Firm—easy to handle and install, withstands more abuse.
- Noncombustible.
- Light weight.

USES

For temperatures up to 300° F., Careycel is one of the most efficient, easily installed, permanent and low cost insulations for piping (hot water, steam-heating system, process), duct systems, ovens and kilns, appliances, and hot equipment such as boilers, heaters, and tanks. One-inch thick Careycel covering gives effective insulation for most of these applications.

SPECIFICATIONS

THERMAL CONDUCTIVITY



Careycel Board is especially recommended for a neat and workmanlike appearance on exposed duct work. One-inch thick Careycel is recommended for all applications except air-conditioning ducts in high-humidity surroundings. For a duct passing through a laundry room, kitchen, or where any heated equipment emits large amounts of water vapor, the thickness of Careycel should be selected from the table, choosing the worst conditions of relative humidity and temperature differential, and a vapor barrier must be provided to seal outer surface. All thicknesses specified incorporate a safety factor of 10% to 20% over the indicated thickness actually required to prevent condensation of moisture on the insulation surface.

SIZES:

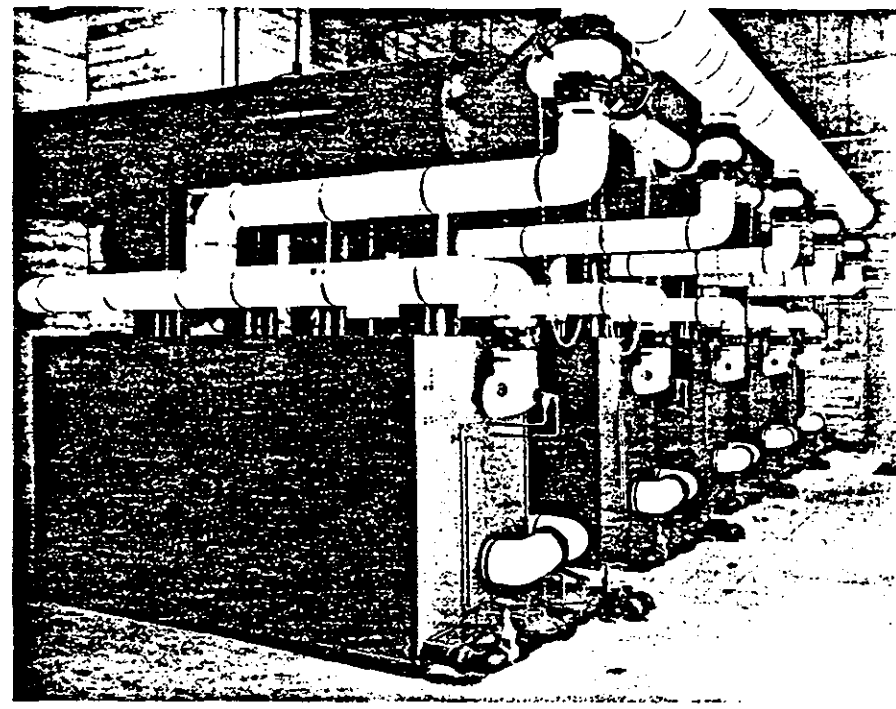
Pipe Coverings: Careycel pipe coverings are furnished in 3-foot split cylindrical sections, in thicknesses of 1", 1-1/2" and 2", for iron pipe or copper tubing. Cotton jackets are attached.

Blocks and Sheets: Flat blocks are furnished in standard 6" x 36" size. Standard sheet or board size is 36" x 36" but special sizes can be furnished up to 36" x 96". Thicknesses: 1/4" to 3" in 1/8" increments.

Packaging: Careycel pipe covering is packed in dirtproof, moistureproof cartons to minimize waste and breakage. Blocks and sheets are also specially packed

Careycel Thickness Required to Prevent Sweating

Relative Humidity	*Temp. Differential—Room Air To Duct Air*						
	20° F	*25° F*	*30° F*	*35° F*	*40° F*	*45° F*	*50° F*
60%	1/4"	1/4"	1/2"	1/2"	3/4"	3/4"	3/4"
70%	1/2"	1/2"	3/4"	3/4"	3/4"	1"	1"
80%	3/4"	1"	1-1/4"	1-1/2"	1-3/4"	1-3/4"	2"
85%	1-1/4"	1-1/2"	1-3/4"	2"	2-1/4"	2-1/2"	2-1/2"
90%	2"	2-1/2"	3"	3-1/2"	4"	4-1/2"	5"



Careycel Pipe insulation installed on steam piping in boiler room of Metro-Goldwyn-Mayer movie studios, Culver City, California.

PLICATION

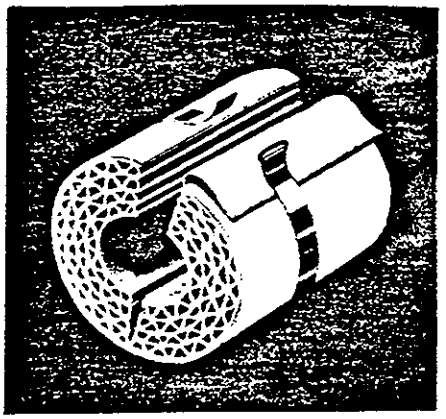
Pipes: Paste down cloth jacket laps and apply metal bands on 18" centers. Insulate fittings and valves with Carey No. 303 Asbestos Cement, bringing the cement surfaces flush with adjacent pipe covering, and finish with pasted cloth jackets. Paint finish can be one coat of cold-water paint with two coats of lead and oil. Use varnish size in the first coat of lead and oil.

Duct Systems: For ducts up to 18" wide, wire boards in place, pulling wires tight and embedding them in the boards. Space wires on approximately nine-inch centers. For ducts over 18" wide, apply boards with sheet metal screws and tin caps, forcing the caps approximately 1/4" below the surface of the board. Space screws so that each one supports approximately two square feet of board.

Fill all cracks and joints with cement composed of a mixture of 1/3 Portland Cement and 2/3 Carey No. 303 Asbestos Cement. Over all edges paste down eight-ounce canvas strips six-inches wide. Where insulation is applied in exposed places eliminate the canvas strips and finish the entire insulated surface with -ounce canvas pasted on. Paint s with two coats of lead and oil p with varnish size in the first coat.

Hot Equipment: Wire Careycel blocks on approximately 12-inch centers. Over the blocks apply one-inch hexagon wire mesh stretched tight. Follow with a 1/2-inch coat of Carey No. 303 Asbestos Cement (or Carey No. 100 Cement for a very hard fir), troweled smooth. Finish with ei ounce canvas jacket pasted on, and paint as specified for Careycel pipe covering.

AIRCELL PIPE COVERING AND BLOCK



Aircell can be used at temperatures up to 300° F.

DESCRIPTION

Aircell is a lightweight asbestos paper structure comprising alternate layers of corrugated and flat asbestos paper firmly cemented together. Corrugations are 1/4" deep, four plies per inch of thickness. Aircell is the most economical incombustible asbestos insulation.

USES

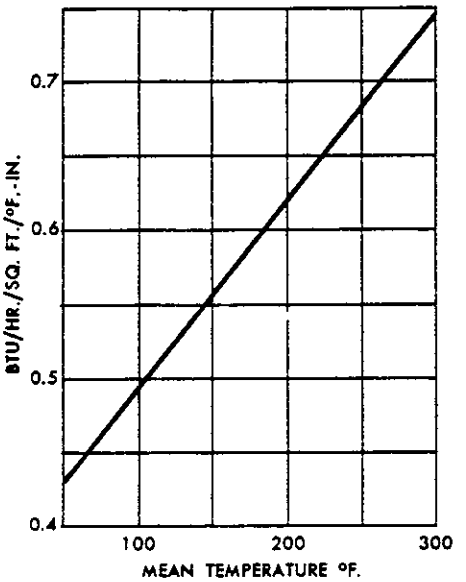
Aircell is designed primarily for indoor heating systems and process piping and equipment where steam does not exceed approximately 70 psi or 300° F. Aircell should be used only where high efficiency, strength and durability are not as important as initial low cost application.

Aircell should not be used for outdoor or underground line because it will not support roofing jackets or withstand water.

SPECIFICATIONS

Aircell pipe coverings are normally furnished with white asbestos paper jackets or cotton jackets (10.2 yards per pound) and metal bands. Heavier canvas jackets can be supplied. Aircell coverings are not furnished with factory-applied roofing jackets.

THERMAL CONDUCTIVITY



Sizes: Semi-cylindrical pipe covering is furnished in sections 36" long for pipe sizes up to 36". Thicknesses: 1/2", 3/4", 1".

Aircell blocks are furnished in standard 6" by 36" size. Standard sheet size is 36" x 36", but special sizes can be furnished up to 36" x 96". Thicknesses: 1/4" to 3" in 1/4" increments.

APPLICATION

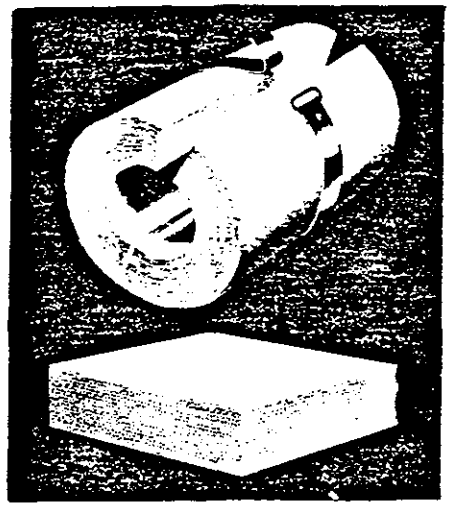
Pipe Covering--Cold water flour paste is used to secure canvas laps along lateral joints and at joints where sections abut. Metal bands are applied approximately 18" apart, usually over butt joints and in the center of sections. Fittings should be insulated with asbestos cement.

Blocks--Blocks are usually held in place with 14-gauge or 16-gauge wire loops spaced approximately 12" apart. Joints are pointed up with asbestos cement. Carey Fibrous Adhesive can be used to adhere blocks to surfaces as an additional securement. Hexagonal wire mesh, 1-1/2-inch, is stretched tight over the blocks as a reinforcement when an asbestos cement finish coat is required.

Carey

DEFENDEX PIPE AND BOARD INSULATION

industrial insulation



Defendex pipe and board insulation is designed for temperatures up to 550° F.

DESCRIPTION

Defendex is a semi-rigid structure comprising approximately 20 to 22 alternating layers of flat and processed asbestos paper per inch of thickness. The processed asbestos paper contains innumerable, very fine indentations, which give proper spacing between succeeding layers. Defendex gives high efficiency at medium price.

USES

Defendex is an economical, high efficiency insulation designed to insulate boilers, pipes, ovens and other apparatus operating at temperatures not exceeding 550° F. It is also furnished in large curved shapes for metal jacketed boilers.

Defendex is especially adapted for insulating steam traced pipes. It can be manufactured in any special shape to cover two or more pipes. These sections can be cut as specified, at the top, bottom or on the side for easy installation.

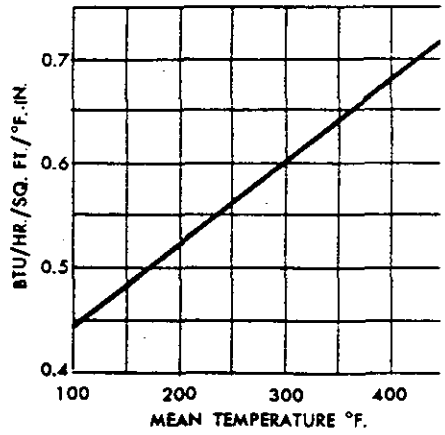
Fireclad or other types of weatherproof jackets can be applied for protection against weather.

SPECIFICATIONS

Sizes: Defendex is furnished in semi-cylindrical pipe covering sections 36" long for pipe sizes up to 36". Pipe coverings are regularly finished with 3.8 ounce cotton duck jackets and bands. Heavier cotton duct or roofing jackets can be furnished.

Defendex is also available in flat blocks and sheets. Blocks: 6" x 36". Sheets: 36" x 36". Special block and sheet sizes made to order. Standard thickness is 1", however, thicknesses up to 2-1/2" can be provided.

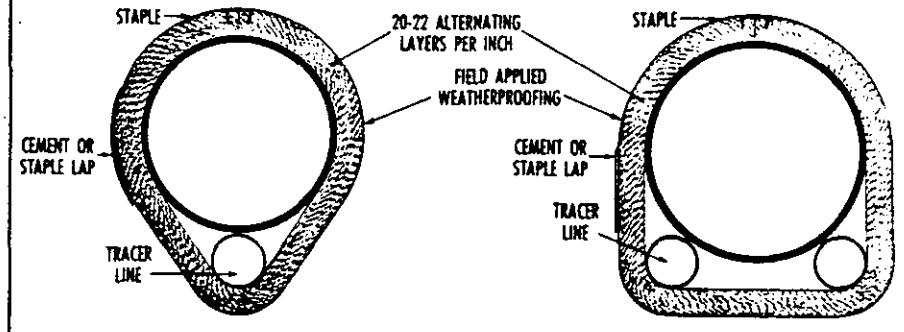
THERMAL CONDUCTIVITY



Comparative Efficiencies

Table Of Comparative Efficiencies Of 1-inch Thick Pipe Coverings On 3-inch Pipe

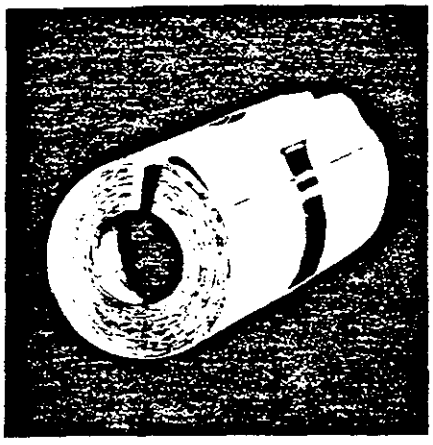
	Steam Pressure and Temperature			
	5 lb. 226.8° F	*50 lb. 297.7° F.*	*100 lb. 339.2° F.*	*200 lb. 387.8° F.*
Defendex	80.2%	82.3%	83.2%	84.2%
85% Magnesia	81.6%	83.9%	84.9%	86.0%



TEAR DROP SECTIONS-FOR TRACED LINES

ASBESTOS SPONGE PIPE AND BLOCK INSULATION

industrial insulation



Asbestos Sponge insulation, for temperatures up to 700° F.

DESCRIPTION

Asbestos Sponge is a firm resilient structure made from a series of laminated asbestos felts, averaging 30 to 35 layers per inch of thickness. Closely held air films, both within and at the surface of the layers, give Asbestos Sponge its excellent insulating efficiency.

Asbestos Sponge construction is substantial, yet flexible enough so that it will not become damaged during shipment or installation. It can be removed from pipe or equipment and reapplied without loss of material.

USES

For surfaces with temperatures up to 700° F. Specifically recommended for use on vibrating lines and underground steam distribution lines because its structure is tough. Cylindrical pipe covering sections can be furnished for large pipe sizes.

Blocks and sheets are designed for use on stills, tanks, boilers and other large surfaces where the insulation must withstand extremely rough service.

SPECIFICATIONS

Pipe covering is regularly furnished with 3.5-ounce canvas to meet Federal Specification HH-1-561c, when so indicated on order. Heavier jackets can be furnished, as can roofing jackets for outside service.

SIZES:

Blocks and Sheets--Standard length: 36". Standard thicknesses: 1", 1-1/4", 1-½", 1-3/4", 2", 2-1/2", 3". Standard widths: 6", 9", 12", 18", 24", 36".

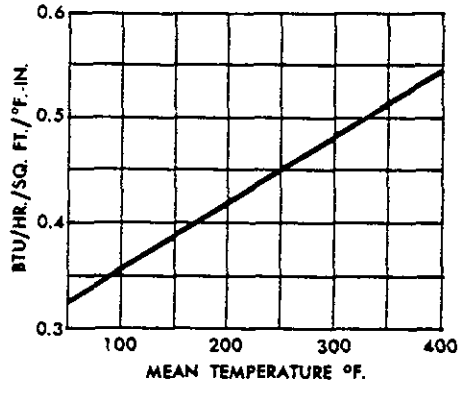
Pipe Covering--Furnished in split cylindrical sections 36" long for pipe sizes up to 36". Standard thicknesses: from 1" to 3-½".

OPTIMUM ECONOMICAL THICKNESSES FOR AVERAGE CONDITIONS

	Pipe Sizes				
Temperature Range - ° F	*½ to 1-½*	*2 to 3-½*	*4 to 6*	*7 to 10*	*12 & over**
550 to 700	2"	2-½"	3"	3"	3-½"
450 to 549	2"	2"	2-½"	3"	3"
350 to 449	1-½"	2"	2"	2-½"	2-½"
250 to 349	1"	1-½"	1-½"	2"	2"
150 to 249	1"	1"	1"	1-½"	1-½"

*This column represents recommended thicknesses also for tanks and equipment.

THERMAL CONDUCTIVITY



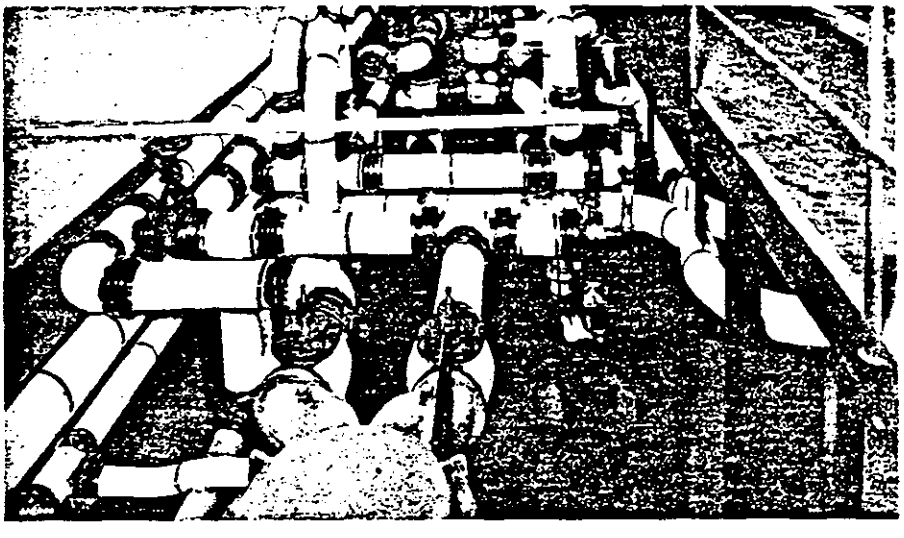
APPLICATION

Pipe Covering: Sponge felt covering is easily applied by placing the sectional covering over pipe, making sure that the lateral and end joints are tight and securing the canvas laps with cold water paste. If additional assurance is desired metal bands may be applied at butt joints and in the center of sections. Covering exposed to the weather should be protected with a roofing jacket, usually 45 lb. Surety. If roofing jacket is applied in the field we recommend that the jacket be applied with a minimum 2" lap at lateral and butt seams and sealed with lap cement. Finally, No. 16 ga. wire loops of copper clad or galvanized wire shall be tied over the roofing jacket on 4" centers.

Fittings should be insulated with MW-One Cement or asbestos cement, flush with adjacent covering and finished with pasted canvas jackets. For outdoor piping, finish with an additional 1/4" wet coat of Thermotex "B" extending two inches over the adjacent roofing jackets. Wet brush to a smooth finish.

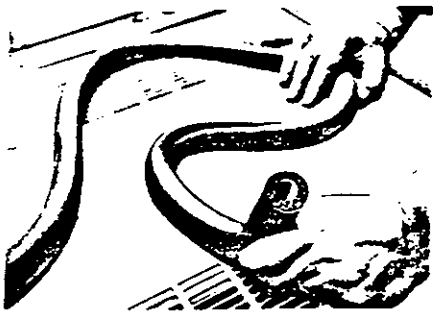
Flanged fittings and pipe fittings larger than four inches should be insulated with a combination of 85% Magnesia blocks and cement.

Blocks: Usually held in place with 14-gauge or 16-gauge wire loops spaced approximately 12" apart. Joints are pointed up with asbestos cement. Carey Fibrous Adhesive is sometimes used to adhere blocks to surfaces as an extra securement. One-inch hexagonal wire mesh is stretched tight over the blocks as a reinforcement when an asbestos cement finishing coat is required.



Tough, rugged Carey Asbestos Sponge insulates and protects piping in Canada Sugar Refining Company plant.

Carey FLEXIBLE TUBING INSULATION industrial insulation



CAREY FLEXIBLE TUBING INSULATION is a tough, flexible, polymeric material constructed of millions of uniform closed cells. It can be used on any line operating between 20° below 0°F. and 200°F.

DESCRIPTION

C[illegible] Flexible Tubing Insulation is made of Hycar man-made rubber, an extremely oil-resistant material. It was developed to overcome the loss in efficiency which can occur with open cell (sponge rubber) tubing, i.e., when used as insulation on cold water lines, hot, humid weather may cause open cell tubing to absorb water vapor which condenses and destroys insulation efficiency. Carey F[illegible]xible Tubing Insulation prevents this [illegible]le. Its millions of tiny cells are non-[illegible]connecting; each one sealed off fr[illegible] its neighbors. It is impervious to water vapor and will not lose its efficiency due to moisture absorption. A highly efficient pipe insulation, it can be applied with remarkable speed and ease to copper tubing and iron pipe. It is so flexible that it can be bent, twisted and formed and yet so resilient that it sp[illegible]s back to its original shape when p[illegible] place. It is made in continuous lengths, in many wall thicknesses, and will withstand temperatures from minus 20°F. to 200°F.

FEATURES

The K factor of Carey Flexible Tubing Insulation is .26. 1/2" wall tubing is recommended for severe conditions while thinner walls may be used under less severe conditions or where economy is of prime importance.

It resists deterioration and moisture absorption, so efficiency remains high in service.

The uniform closed cell structure seals out air and moisture. The result is a water vapor transmission rating of less than 0.1 PERM. Because of its excellent temperature resistance, Carey Flexible [illegible]ng Insulation can be used to insulate carrying hot as well as cold water.

It [illegible]s excellent weather-aging properties. Samples have been exposed in the Atlas Weatherometer for 100 hours (equal to 6 months to a year outdoor aging) with only barely visible cracking. The material is also resistant to the deteriorating action of Ozone.

Carey Flexible Tubing Insulation is flame-resistant and will not support combustion. A standard test is to hold a sample over a 2" Bunsen Burner flame for 30 seconds. After removal from the flame the time of burning is noted -- less than 1/2 minute by this test.

Carey Flexible Tubing Insulation is a strong, tough material. The tensile strength varies, depending on the density and cross section. Pieces of 1/2" cord gave tensiles of 150 PSI and elongation of 200% to 225% at break.

USES

Carey Flexible Tubing Insulation is recommended for insulation of dual temperature lines carrying hot or chilled water from a central system to air conditioning units in hotels, apartments and office buildings. Many of these lines are formed copper tubing and are difficult to insulate, even with semi-rigid materials. When Carey Flexible Tubing Insulation is used, job experience has shown labor-savings of 50% and higher in these applications.

Carey Flexible Tubing Insulation can be used to advantage on any line operating between 20° below 0°F. and 200°F. where flexibility, high insulating value, vapor resistance and ease of application are important.

APPLICATION

There are two practical methods of applying Carey Flexible Tubing Insulation. The faster and easier way is to slip the insulation on pipes or tubing as they are being installed. A factory-applied coating of talc on the inner surface minimizes resistance, and speeds slip-on application. In cases where the piping has been completely assembled, the tubing is split longitudinally, cut into proper lengths and snapped onto the lines. Cut seams are joined together with cement. In all cases, these same adhesives can be used to seal end joints and no other sundry material is required.

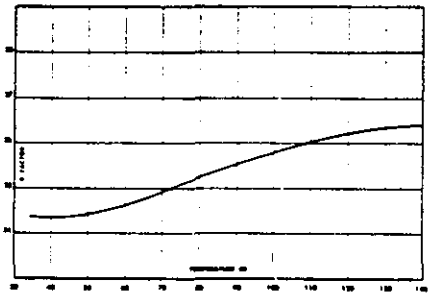
When applied to copper tubing before sweat fittings connections are made, the tubing is pushed back along the pipe and held back with clamps until the joint is soldered. The self-extinguishing properties of Carey Flexible Tubing Insulation made this time-saving application method feasible. Once the fittings have cooled, the clamps may be released and the tubing slipped back to cover the fittings.

SPECIFICATIONS

Density. . . . . 6-12/lbs./cu. ft.
K Factor. 0.26
Water Absorption. . 10% max.
Temperature Range -20° F. to 200°F.
Flame Resistance. Will not support combustion
Weather Aging. . . Excellent
Tensile Strength. . . 150 psi
Fungus & Vermin Resistance . . . . Excellent

2ASTM D1056-53 Method

Thermal Conductivity at Various Temperatures





Application in close quarters is easily done by slipping the insulation on the tubing as it is being installed. A factory applied coating of talc on the inner surface minimizes resistance.

Carey

THERMOGLAS PIPE COVERING

industrial insulation

DESCRIPTION

Thermoglas pipe covering is used on pipes having temperatures up to 350° F. It simply "snaps in place".

Thermoglas is exceptionally lightweight insulation composed of long, fine, blown glass fibers bonded with thermal-setting phenolic resin. It is a strong, semi-rigid and resilient insulation with no coarse fibers to irritate hands or skin.

FEATURES

Lightweight—weighs one-tenth to one-fourth as much as other insulations...less weight on pipe supports.

Easy Application—practically a one-hand operation. Cuts application costs.

Unusual Permanence—will not sag, rot, mold, or otherwise decompose. Resists attack of most acids and alkalies, and is not corrosive to metals. Will not chip, flake, dent; break or crumble, and is unaffected by water and insects.

Very Low Moisture Vapor Pickup

Excellent Workability—cuts easily to fit valves and fittings.

USES

Thermoglas pipe covering is used for pipe temperatures up to 350° F. It is recommended for hot water and low-temperature steam piping in industrial plants, commercial buildings and institutions. Thermoglas can be used as an outside layer over a high-temperature insulation.

Thermoglas is also an excellent cold and dual-temperature insulation when used with a vapor barrier jacket.

Available types of vapor barrier jacketing and weatherproof jacketing:

Angier for Dual Temperature - Black

Angier for Dual Temperature - White

Foil Faced Flame Proof Kraft Jacket

Available Types of Weatherproof Jacketing:

35-lb. Roofing Jacket

45-lb. Roofing Jacket

55-lb. Roofing Jacket

Available with Standard Weight 4-oz., 6-oz., and 8-oz. canvas jackets.

SPECIFICATIONS

TABLE OF RECOMMENDED THICKNESSES* FOR INDUSTRIAL, COMMERCIAL, INSTITUTIONAL PIPING

Pipe Insulation Surface Temperature Under 100° F 80° F Ambient Still Air

Pipe Surface Temp. F.	*150*			*200*			*250*			*300*			*350*		
Temp. Difference, F.	*70*			*120*			*170*			*220*			*270*		
Pipe Size	*Nom. Thick.*	*Heat Loss*	*% Eff.*	*Nom. Thick.*	*Heat Loss*	*% Eff.*	*Nom. Thick.*	*Heat Loss*	*% Eff.*	*Nom. Thick.*	*Heat Loss*	*% Eff.*	*Nom. Thick.*	*Heat Loss*	*% Eff.*
¾	½	9	78.4	½	16	80.4	¾	20	84.5	1	24	87.5	1½	28	89.2
1	½	12	77.2	¾	17	83.3	1	21	86.8	1	28	87.4	1½	30	90.5
1¼	½	13	79.8	¾	18	85.5	1	27	86.4	1½	26	90.9	1½	33	91.3
1½	½	16	78.1	¾	22	84.8	1	27	87.9	1½	29	90.9	1½	34	92.2
2	½	17	80.6	¾	25	85.5	1	32	88.5	1½	33	91.6	1½	43	92.0
2½	½	20	80.8	¾	29	85.9	1	37	88.8	1½	42	91.0	2	45	93.0
3	½	27	78.7	¾	36	85.3	1	43	88.9	1½	44	92.2	2	48	93.7
3½	½	30	79.1	¾	40	85.8	1	41	90.8	1½	55	91.3	2	58	93.3
4	½	32	80.2	¾	44	85.8	1	52	89.4	1½	54	92.5	2	57	94.1
4½	½	26	85.3	¾	47	86.4	1	49	91.0	1½	66	91.7	2	68	93.6
5	½	39	80.0	¾	53	86.3	1½	46	92.4	1½	64	92.7	2	68	94.2
6	½	48	78.9	¾	62	86.1	1½	56	92.1	1½	75	92.6	2	77	94.4
7	½	56	81.0	1	58	88.6	1½	61	92.5	1½	82	93.0	2	87	94.5
8	½	63	78.6	1	62	89.2	1½	68	92.5	1½	91	93.1	2	95	94.6
9	½	64	80.5	1	69	89.1	1½	75	92.6	2	76	94.8	2	100	94.9
10	½	80	77.9	1	80	88.7	1½	80	92.9	2	87	94.6	2	110	94.9
11	1	44	85.0	1	80	89.7	1½	86	92.9	2	94	94.6	2	120	94.9
12	1	48	88.7	1	86	89.6	1½	94	92.9	2	100	94.6	3	95	96.3
14	1	57	87.6	1	105	88.5	1½	110	92.3	2	115	94.5	3	105	96.2
15	1	61	87.6	1	110	88.5	1½	115	92.4	2	120	94.5	3	110	96.2
16	1	65	87.6	1	115	88.5	1½	125	92.4	2	130	94.5	3	120	96.2
17	1	69	87.6	1	125	88.4	1½	130	92.4	2	135	94.5	3	125	96.2
18	1	72	87.6	1	130	88.4	1½	135	92.4	2	145	94.5	3	130	96.3
19	1	76	87.6	1	140	88.4	1½	145	92.4	2	150	94.5	3	140	96.3
20	1	80	87.6	1	145	88.4	1½	150	92.4	2	160	94.5	3	145	96.3
21	1	84	87.6	1	150	88.4	1½	160	92.4	2	165	94.5	3	150	96.3
22	1	88	87.6	1	160	88.4	1½	165	92.4	2	175	94.5	3	155	96.3
23	1	91	87.6	1	165	88.4	1½	170	92.4	2	180	94.5	3	165	96.3
24	1	95	87.6	1	175	88.4	1½	180	92.4	2	185	94.5	3	170	96.3

* Where maximum efficiency is of primary importance

TABLE OF RECOMMENDED THICKNESSES* FOR HOT WATER AND LOW-PRESSURE STEAM

Pipe Insulation Surface Temperature Under 120° F 80° F Ambient Still Air

Pipe Surface Temp--F	*150F*		*200F*		*250F*		*300F*		*350F*	
Pipe Size--In.	*Nom. Thick. Inches*	*% Eff.*	*Nom. Thick. Inches*	*% Eff.*	*Nom. Thick. Inches*	*% Eff.*	*Nom. Thick. Inches*	*% Eff.*	*Nom. Thick. Inches*	*% Eff.*
¼	½	78.2	½	80.4	½	81.9	½	82.9	¾	86.1
1	½	77.0	½	79.2	½	80.6	½	81.4	¾	85.9
1-¼	½	79.6	½	81.8	½	82.9	½	83.9	¾	87.8
1-½	½	77.7	½	79.9	½	81.0	¾	86.6	¾	87.1
2	½	80.2	½	81.8	½	83.2	¾	87.2	¾	87.7
2-½	½	80.5	½	82.2	½	83.3	¾	87.4	¾	87.9
3	½	79.2	½	80.8	½	82.0	¾	87.0	1	90.0
3-½	½	79.2	½	80.8	½	82.0	¾	87.6	1	91.7
4	½	80.0	½	81.5	½	82.6	¾	87.5	1	90.6
4-½	½	85.4	½	86.5	½	87.4	¾	88.2	1	92.0
5	½	80.2	½	81.8	½	83.0	¾	88.0	1	90.6
6	½	78.7	½	80.4	½	81.7	¾	87.8	1	90.3
7	½	78.6	½	80.5	½	81.6	1	90.0	1	90.4
8	½	78.3	½	80.0	1	89.8	1	90.6	1	90.9
9	½	80.4	½	81.7	1	89.9	1	90.5	1	90.9
10	½	77.9	½	79.6	1	89.5	1	90.1	1	90.5
11	1	88.8	1	89.7	1	90.2	1	90.8	1	91.4
12	1	88.8	1	89.6	1	90.2	1	90.8	1	91.4

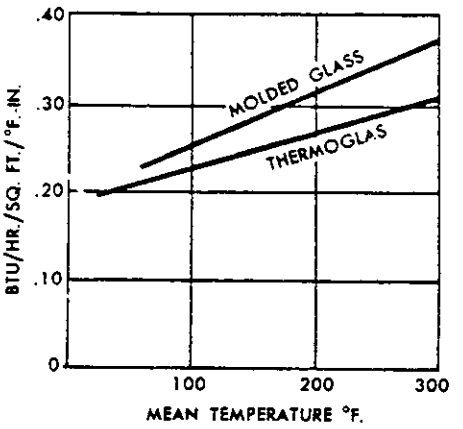
* Where low initial investment is of primary importance.

TABLE OF RECOMMENDED THICKNESSES*
FOR COLD PIPING AND DUAL-TEMP. SERVICE

Service	*Temperature*	*Pipe Sizes*				
		Up to 1¼"	*2" - 3½"*	*4" - 6"*	*7" - 10"*	*11" - 24"*
Chilled Water	Above 50F	1"	1"	1"	1"	1"
Ice Water	50F to 35F	1-½"	1-½"	1-½"	1-½"	1-½"
Brine	34F to 0F	2"	2-½"	2-½"	2-½"	2-½"
Special Brine	0F to -30F	2-½"	2-½"	3"	3"	3-½"

* Based on thicknesses needed to prevent condensation on pipes exposed to ambient conditions of 90° F. and 90% relative humidity.

THERMAL CONDUCTIVITY



APPLICATION

Thermoglas pipe covering is sawed on one side only. To apply, simply pull the section apart at the seam, slip one end over the pipe and run hand up seam so that section snaps in place. Seams can be closed tight with pressure-sensitive mastic tape, staples, string, canvas and paste, metal bands or other standard fastenings.

Thermoglas can be painted if desired.

Sizes: Thermoglas is available in one-piece sections made in 3-foot lengths for small sizes. Medium and large sections are furnished in 6-foot lengths. Canvas jackets in several weights are available.

Carey

HAIR FELT INSULATION

industrial insulation

DESCRIPTION

Standard Hair Felt (Nos. 300 and 301)—Cattle hair felted and pressed to uniform thickness by steam-heated platens. This type of insulation is distinguished by waffle pattern on one surface. No. 301 is 10% lighter than No. 300.

Punched Hair Felt (No. 302)—Cattle hair, felted but not pressed under steam platens. Punched with needles to interlace the hairs and give strength to the felt.

Hair and Jute Felt (No. 303)—Combination of jute fibre and cattle hair, felted and punched to interlace fibres.

USES

Hair Felt is used for insulating cold-water and ice-water fittings, and as a "built-up" insulation on refrigeration pipes and equipment. Particularly suited for covering irregular shapes.

SPECIFICATIONS

Thermal conductivity: 0.24.

RECOMMENDED THICKNESS

Temperature Range	*Multi-Layer Thickness*
50° to 65° F.	1"
15° to 50°	2"
0° to 5°	3"
-20° to 0°	4"
-40° to -20°	5"
-60° to -40°	6"
-80° to -60°	7"
-100° to -80°	8"
-120° to -100°	9"

SIZES AND WEIGHTS

No. 300: Standard Hair Felt, standard weight, available in rolls 3' x 50' and 6' x 50'.

No. 301: Standard Hair Felt, light weight, available in rolls 3' x 50' and 6' x 50'.

No. 302: Punched Hair Felt, standard weight, available in rolls 3' x 50' and 6' x 50'.

No. 305: Punched Hair and Jute, light weight, available in rolls 6' x 50'.

APPLICATION

Applying Hairfelt Covering on surfaces which operate at extremely cold temperatures places the material under very severe conditions and care must be taken to see that all surfaces are dry before insulation is installed.

Hairfelt can be applied in alternate methods.

TABLE OF WEIGHTS

Weight per Square Foot—Ounces

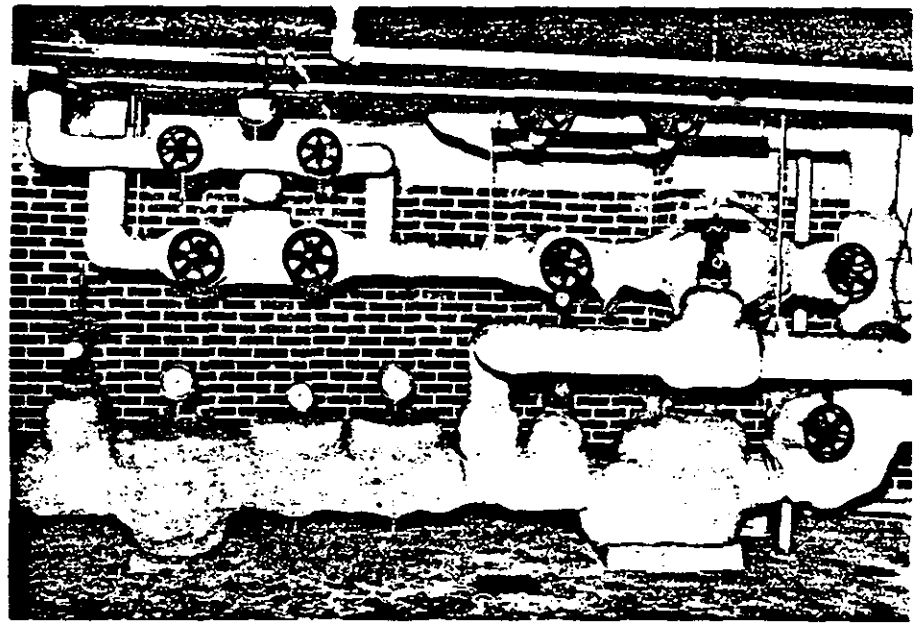
Thickness—In.	*No. 300*	*No. 301*	*No. 302*	*No. 305*
1/4	4	4	4	--
1/2	6-1/4	6	6-1/4	--
3/4	8-1/2	8	8-1/2	—
1	11	10	11	000
1-1/2	16	14	16	—
2	21	18	21	—

Hot Asphalt Method: First a layer of dry 15-lb. Feltex Roofing Paper shall be applied to the pipe and secured by a spiral wrapping of jute twine. Then, alternate layers of 1" thick Hairfelt and 15-lb. Feltex Roofing are built up to the desired thickness. Each layer of Hairfelt and Feltex shall be heavily coated with hot asphalt and placed on the pipe while hot. Layer of Hairfelt shall be additionally secured to the pipe with a spiral wrapping of jute twine on 1" spacings. Canvas, coated with hot asphalt, should be used to seal irregular surfaces. The last layer of Hairfelt is finished with two layers of Feltex applied with hot asphalt, followed by rosin sized paper and canvas jacket.

Insulating Membrane Tape Method: Alternate layers of Hairfelt and Insulating Tape shall be built up to the desired thickness. The Hairfelt shall be cut to the proper length and placed on the pipe dry. Hairfelt to be secured in place with a spiral wrapping of jute twine or light gauge soft annealed wire on 1" spacings. Over each layer of Hairfelt a spiral wrapping of insulation shall be applied lapping the tape at least enough to give double coverage. Each layer of tape shall be painted with a heavy coat of Asphalt sealing paint. Finally, the covering shall be finished with a heavy rosin sized paper and a canvas jacket.

Fittings and valves can be insulated in one of the two methods outlined above. In cutting Hairfelt for irregular surfaces it is important that proper cuts are made to eliminate any overlapping or bulges in the insulation. To insure good results Hairfelt should be applied with all joints staggered. At fittings, Hairfelt should be stepped back 2" from the end of the previous layer. To insulate the fittings the Hairfelt should be cut to fill in these "step-backs" to make the desired broken joint construction. When insulating for below-freezing temperatures, hanger rods must be insulated a minimum of twice the thickness of the required insulation.

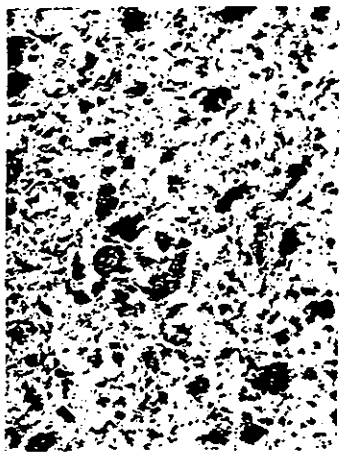
Note: Refrigeration insulation should be applied only by mechanics skilled in this type work.



Carey Hair Felt insulation shows why it's particularly recommended for covering irregular shapes. Hair Felt is also used as a "built-up" insulation on refrigeration pipes and equipment.

MW-50 INSULATING CEMENT

industrial insulation



Cross section through MW-50 Cement showing clean, insulating fiber nodules or pellets bonded only at their surfaces. These numerous and minute air films and air spaces provide high insulation value. MW-50 Cement can be used for temperatures up to 1600° F.

DESCRIPTION

MW-50 Cement is a complete insulating material in itself. Special MW-50 nodular mineral fibers are combined with bonding materials, asbestos fiber and a rust inhibitor to produce a mixture with excellent physical and thermal properties.

FEATURES

High Insulation Value—More than double that of ordinary asbestos cements. MW-50 mineral fiber has remarkably low heat conductivity.

Negligible Shrinkage—Fibrous toughness minimizes cracking and shrinkage in drying.

Highly Adhesive—MW-50 adheres to both warm and cold surfaces.

Economical—One-inch coat of MW-50 Cement insulates as well as a two- or three-inch coat of ordinary asbestos cement. MW-50 goes further, too. One 50-pound bag covers approximately 25 sq. ft. to one-inch thickness. A 100-pound bag of ordinary asbestos cement covers only about 17 sq. ft. to same thickness.

For permanent weather protection, apply Thermotex-B or Insulation Seal over wire mesh or Fiberflex.

USES

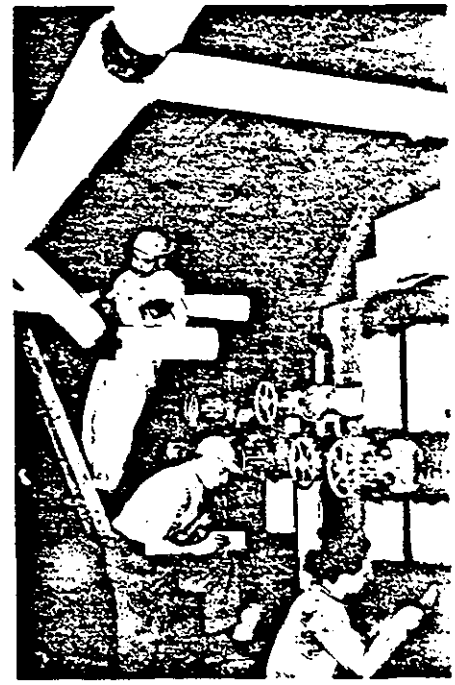
MW-50 Cement is an excellent monolithic insulation for valves, fittings, expansion joints, heaters, exchangers, access doors, water tube boiler walls, tanks, stills, drumheads and other heated equipment operating at temperatures up to 1600° F. It is particularly recommended for irregular surfaces due to ease of application. MW-50 Cement bonds firmly to metal, masonry and all block insulations.

SPECIFICATIONS

RECOMMENDED THICKNESS

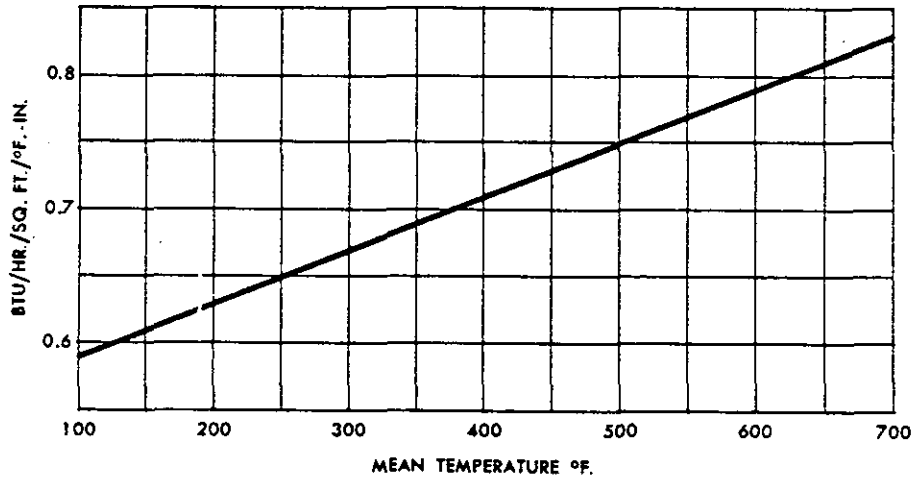
Temp. — ° F	Thickness—Inches
100 to 225	1
225 to 325	1-1/2
325 to 425	2
425 to 525	2-1/2
525 to 625	3
625 to 727	3-1/2
725 to 825	4
825 to 925	4-1/2
925 to 1000	5
Over 1000	Consult Carey

Packaging: MW-50 is furnished in 50-lb. and 100-lb. paper bags.



MW-50 Cement in use at Kansas City Power and Light Co., Kansas City, Mo.. Pipes carry saturated steam at a temperature of 500° to air heaters. Insulation is Carey 85% Magnesia.

THERMAL CONDUCTIVITY



APPLICATION

Add water to MW-50 Cement and mix to a stiff mortar consistency. (This wet mixture can be kept for reuse.) We recommend troweling on layers of approximately 3/4-inch thickness, one at a time. Each layer should be thoroughly dry before successive layers are applied. When layers over 3/4" thick are applied, poultry wire reinforcement should be installed between each layer. Even for normal layer thickness, we recommend one layer of poultry wire before the final coat on large surfaces.

Leave all coats with a rough surface, except the last coat which should be troweled smooth. Paint final coat, if desired.

Carey MW-ONE INSULATING CEMENT

industrial insulation



MW-One Insulating Cement, in 50 pound bags, is available only in white for temperatures to 1000° F.

DESCRIPTION

Carey mineral wool pellets and other ingredients (including rust inhibitor) are combined in MW-One Insulating Cement to form a monolithic, all-purpose, fast-setting finish cement that insulates as well as protects, giving a white surface.

FEATURES

- Quick, easy, single-coat application—saves valuable time and dollars.
- Tough, smooth surface—can be painted.
- Negligible shrinkage (Max. 1%)—no hairline cracks.
- Fast setting—two to three hours.
- Rust inhibitive, noncorrosive.
- Fire-resistant, noncombustible.
- Excellent cohesion—to all types of insulation.
- Many uses inside and out.
- Good workability—fast wetting, easy to mix and spread. Very plastic under trowel.
- Water resistant.

USES

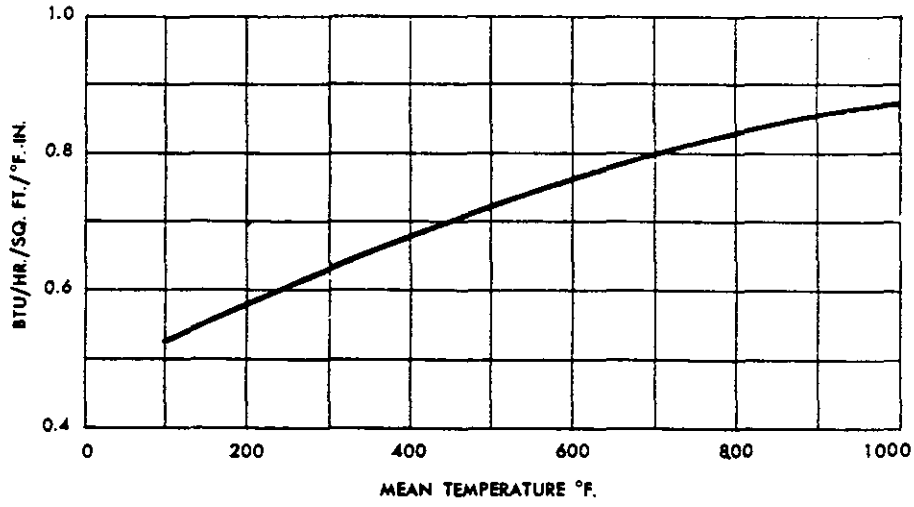
For valves, fittings, tanks, ovens, hot air ducts. MW-One can be applied directly over any insulation, or it can be used as a finishing cement for Carey MW-50.

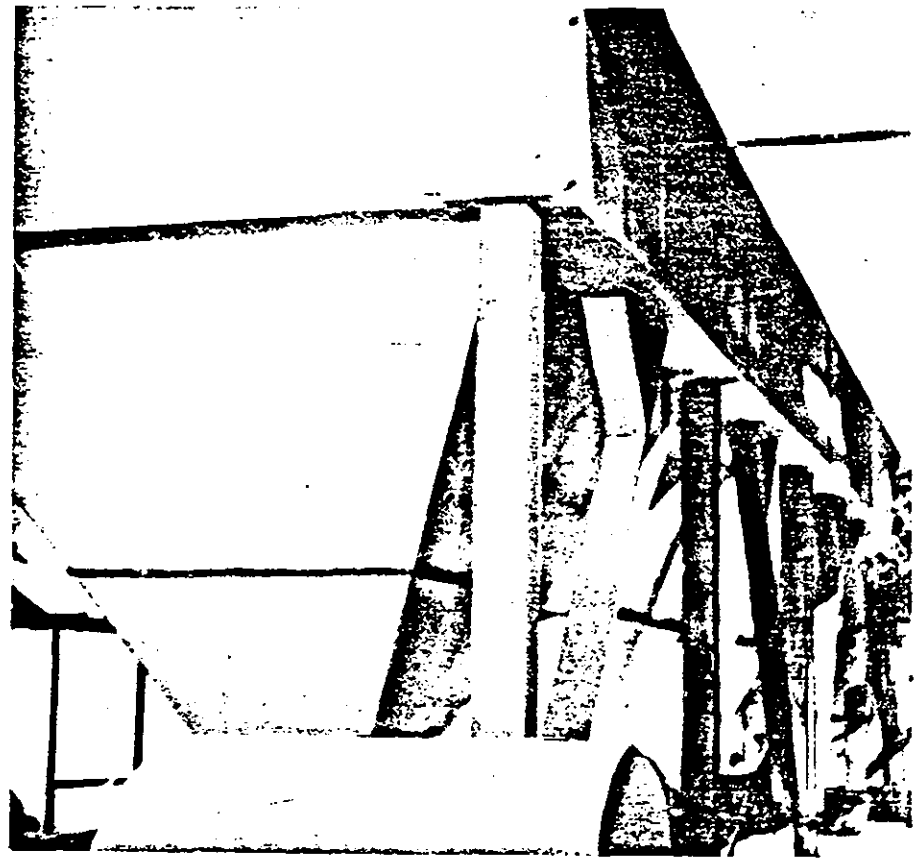
SPECIFICATIONS

Finished coat varies from 1/4" to 1/2" thick. Figure MW-One as a part of total insulation thickness. When making up fittings or insulating irregular surfaces use 1/2" thickness for each 100° F., plus 1/2" additional thickness.

Packaging: MW-One is packaged 50 pounds per multi-wall Kraft bag. Mixing instructions are printed on each bag.

THERMAL CONDUCTIVITY





Carey MW-One Cement's tough, smooth surface resists rust and corrosion. Quick and easy to apply. Cuts labor costs.

PLICATION

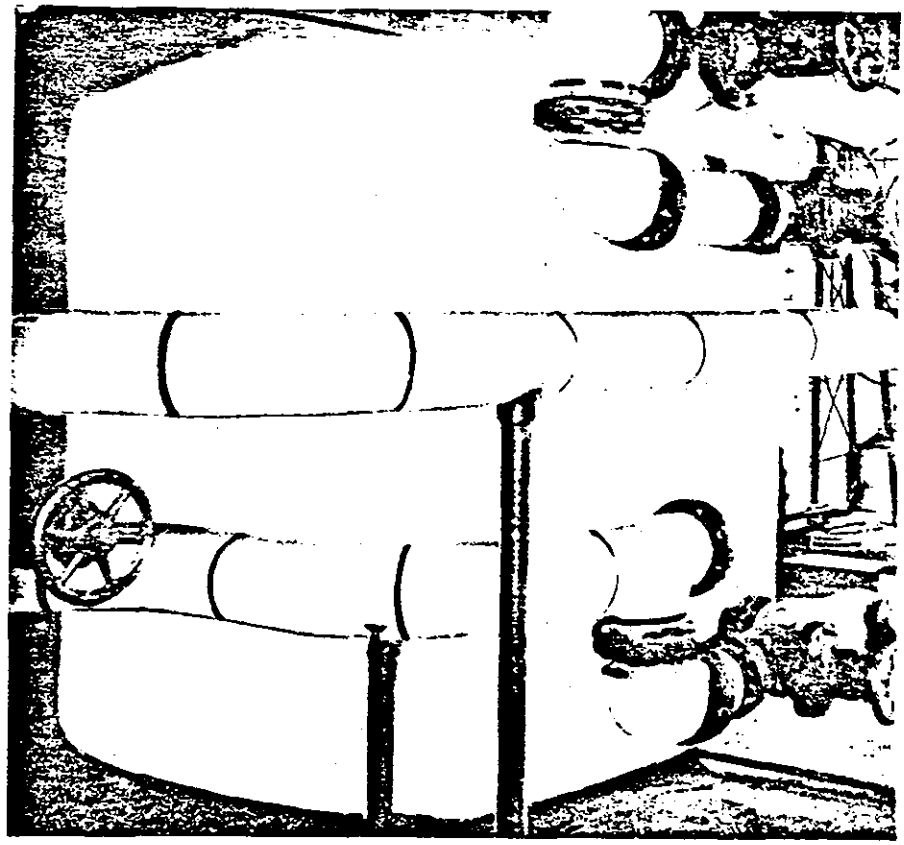
Mix Ratio: 50 pounds MW-One to 8 or 9 gallons water. Dry mix the material, turning the bag end for end several times to eliminate segregation acquired in shipment or storage. MW-One readily combines with water but does not become saturated. Thus MW-One is easily trowelable and retains its high insulating qualities.

Numerous small batches are best and eliminate waste. Clean and rinse the mix box before each batch. Keep the mechanic supplied steadily during application, using sufficient number of clean pails. Surface to receive cement should be free from all dirt, dust, rust, grease, paint or other foreign matter.

One Cement should be applied to ...m surfaces--not hot. After initial set period of 2 - 3 hours, surface temperature can be raised without affecting cement. Don't attempt to salvage unused material that has been mixed for the initial set period of time, or add to a previously mixed batch.

In applying, hard trowel the material in ...der to secure a good, firm "key" with ... blocks or one-inch mesh reinforce- ... Then continue to apply the ma... to the specified thickness required in one coat. Dip trowel frequently in clean water to speed application.

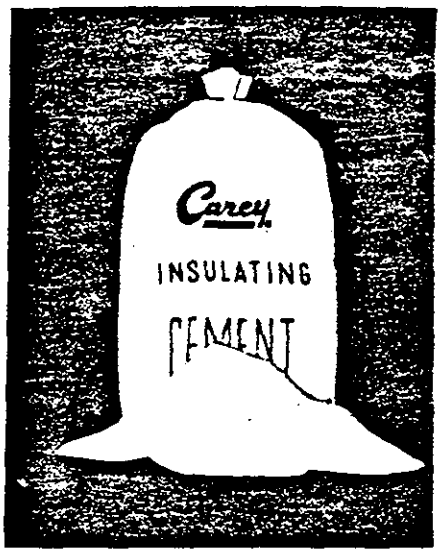
MW-One cement covers approximately 150 sq. ft., 1/4" thick, per 100 lbs.



MW-One has a variety of uses, inside and out. Recommended for valves, fittings, tanks, ovens, hot air ducts where temperatures do not exceed 1000°.

CEMENTS INSULATING AND FINISHING

Carey industrial insulation



INSULATING CEMENT

No. 707 Asbestos Cement: This is a long fiber grade having excellent insulating value. It is recommended for covering fittings, pointing up blocks and pipe covering, and for a finish coat over block work where an exceptionally smooth finish is not required.

This cement is reasonably hard, has superior sticking characteristics, and is effective at temperatures up to 750° F. Its covering capacity is approximately 22 sq. ft., 1" thick, per 100 lbs. Conductivity at 100° F. is 1.00; at 500° F., 1.34.

No. 707 Cement is furnished in 50 and 100 pound bags.

FINISHING CEMENT

LF-20 Asbestos Cement (Long Fiber): This Cement is composed of long asbestos fibers and bonding clays. It is a medium hard finish cement for final surfacing of insulation where expansion strains are severe, such as over boiler water walls. This cement trowels to a smooth white finish and covers approximately 20 sq. ft., 1" thick, per 100 lbs. LF-20 Cement should be mixed with water and applied in layers 1/4" to 1/2" thick. The first layer should be reinforced with hexagonal wire mesh. This cement is intended for finishing only where specifications call for long fiber cement.

Its conductivity at 100° F. is 1.6; at 300° F., 1.8.

LF-20 meets Military Specification MIL-C-2908. Furnished in 50 lb. paper bags and 100 lb. burlap bags.

No. 100 Asbestos Cement (Hard Finish): Composed of asbestos fibers and bonding clays,. No. 100 Cement is specifically designed to give a hard, smooth white finish over block work or other insulation. It should be used only for finish work. No. 100 Cement is mixed with water and trowel-applied in approximately 1/4" layers. The first layer should be reinforced with hexagonal wire mesh.

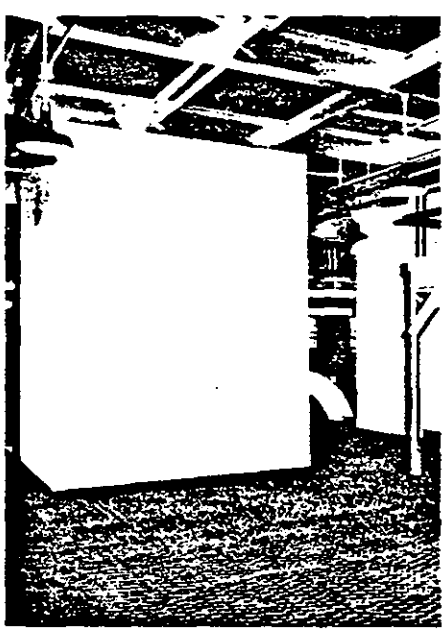
This cement has a minimum of shrinkage. Conductivity at 100° F. is 1.30. It covers approximately 20 sq. ft., 1" thick, per 100 lbs. No. 100 Cement is furnished in 50 lb. paper bags and 100 lb. burlap bags. Meets Specification AMSC 35 Type P1.

No. 303 Asbestos Cement (General Utility): Composed of asbestos fibers and bonding clays, No. 303 Cement is a general utility cement for finishing and pointing up fittings. It sticks to all surfaces and finishes medium hard.

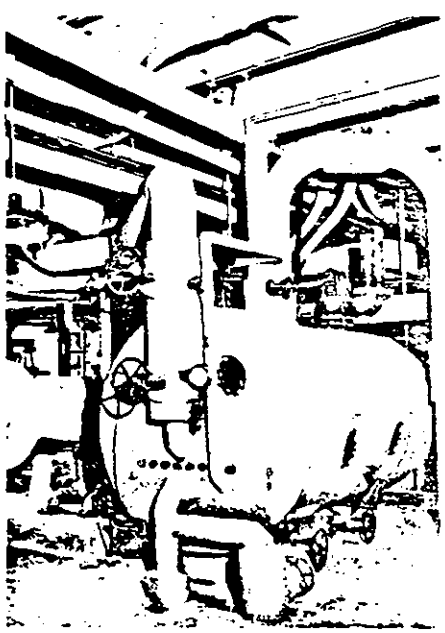
This cement is mixed with water and trowel-applied in approximately 1 4" layers. The first layer should be reinforced with hexagonal wire mesh when this cement is used over other insulation.

Conductivity at 100° F. is 1.4; at 300° F., 1.9. It covers approximately 18 sq. ft., 1" thick, per 100 lbs. No. 303 Cement is furnished in 50 lb. paper bags and 100 lb. burlap bags.

No government specification is issued for No. 303 Cement.



Carey finishing cements trowel to a smooth, white finish. Improve the appearance of every installation.



Carey No. 100 finishing cement provides a hard, smooth surface over block work and other types of insulation.

BONDING CEMENT

Fibrous Adhesive (Bonding): Composed of asbestos fibers, silicate of soda and filler materials, Fibrous Adhesive is a fibrous plastic cement of thin troweling or brushing consistency. It is designed for laying up insulating blocks, and it makes a very strong heatproof bond that is unaffected by temperatures up to 800° F.

Fibrous Adhesive is applied with trowel or brush to approximately 1/8" thickness. It can be applied either in spots or over the entire surface to be insulated. It can be applied on cold or warm surfaces, but not at temperatures above 200° F. After application it should not be heated over 200° F. for three or four days.

Cements must be kept tightly sealed. In partially used containers, a thin film of water should be kept on the surface of the adhesive.

One gallon covers 25 to 30 sq. ft. of block insulation to approximately 1/8" thickness. Fibrous Adhesive is furnished in 1-gal. pails weighing approximately 12 lbs. gross; 5-gal. pails weighing approximately 67 lbs. gross; 55-gal. barrels weighing approximately 670 lbs. gross.

Meets Navy Specification 52-C-22 (INT).



Carey Hi-Temp blocks installed at Ford Motor Company, Detroit, are finished with 3/4" thick Vitricel cement inside boiler breeching.

REFRACTORY CEMENT

Vitricel Cement (Refractory Finishing): Composed of asbestos fibers and bonding materials, Vitricel Cement is a dry, semi-refractory hydraulic setting cement for temperatures up to 1900° F. It is designed for pointing up joints and cracks in stack and breeching lining, covering metal parts exposed to hot corrosive gases, and surfacing block insulation installed inside breechings, ducts, economizers. Vitricel Cement resists moisture and has a very low drying and heat shrinkage.

This cement is mixed with water and applied in layers approximately 1/2" thick. The first layer should be applied over reinforcing mesh, preferably stucco metal lath. Where two coats are required, apply 10 to 12 sq. ft. of the first coat and follow immediately with a second coat before the first one dries. Mix only quantities that can be used within one-half hour. Apply immediately after mixing. Packages must be stored under conditions as dry as for Portland Cement.

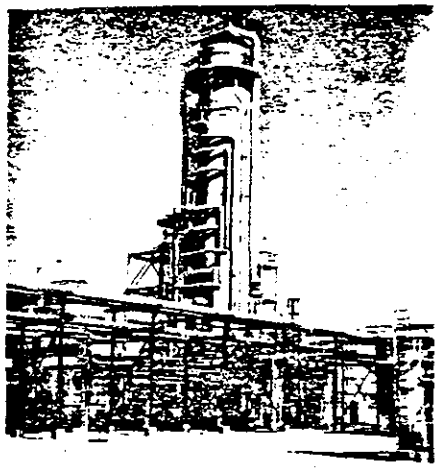
Vitricel Cement covers approximately 17 sq. ft., 1" thick, per 100 lbs. It is furnished in 50-lb. paper bags.

No government specification is issued for Vitricel Cement.

Carey

INSULATION EMULSIONS THERMOTEX B, No. 51 and No. 228 EMULSIONS

industrial insulation



Insulation on vacuum towers and piping is waterproofed with 1/4-inch coat of Thermotex-B.

THERMOTEX B

DESCRIPTION

Thermotex-B is a combination of asbestos fibres, emulsified asphalt and mineral fillers. It forms a cold plastic waterproof coating, which is applied by trowel in one or more coats.

FEATURES

- Excellent elasticity – minimizes surface cracking from temperature changes.
- Non-burning, fire-resistant.
- Shipped ready-to-use – eliminates on-the-job mixing.
- Good coverage – 100 pounds covers approximately 55 square feet, full 1/4-inch thick wet or 1/8-inch thick dry.
- Dries quickly.
- Requires no painting.

USES

Thermotex-B is recommended as a durable, waterproof coating for insulation on hot equipment, ducts, vessels, breechings, tanks, towers, heat exchangers and fittings that are subjected to weather conditions. It is especially suited for oil and chemical plant use because it withstands acid and alkaline conditions and can be installed over insulation that is not completely dry. Thermotex-B is a breathing-type coating. After application over moist insulation, Thermotex-B allows the trapped water vapor to escape, while remaining impervious to surface water.

Thermotex-B is not recommended for equipment operating at temperatures lower than ambient. When the insulated surface temperature is lower than the dew point of the surrounding air, water vapor will form on the surface. This condensation is likely to penetrate the insulation and cause rusting and deterioration. A cut-back type of weatherproof material should be used on all equipment operating below the dew point of the surrounding air.

The following are a few advantages of an emulsion such as Thermotex-B over cut-back materials:

1. Will not blister.
2. Will not run or sag as easily as cut-backs.
3. No odor.
4. Non-flammable.
5. Can be applied over a moist surface.

SPECIFICATIONS

Meets Specification AMSC-35 Type B3.

Packaging: Thermotex-B is furnished in 45-lb. pails, 270-lb. drums, 470-lb. drums. Plastic liner protects Thermotex-B from electro-chemical reaction in drum to assure proper consistency. After drum is open, liner can be re-tied to preserve unused Thermotex-B.

Handling: Thermotex-B should be protected against freezing during storage and during application.

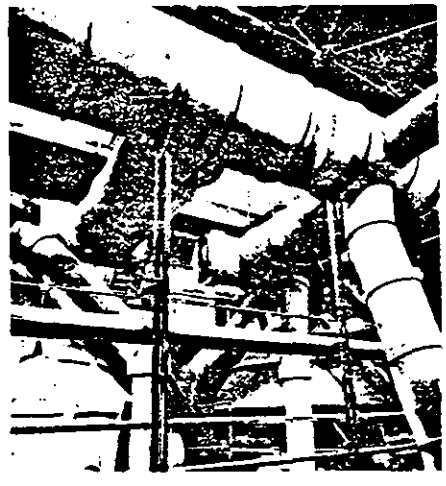
APPLICATION

Thermotex-B should not be applied during wet weather or when temperatures are freezing or near freezing. Temperatures must remain above freezing until Thermotex-B coating is thoroughly dry.

When applying Thermotex-B over a non-porous surface such as steel, a prime coat of Carey Ebontex Primer should be spread thinly over the surface. This should be followed immediately with Thermotex-B.

Primer is not required when Thermotex-B is to be applied over asbestos cement or other absorptive insulations. One-inch mesh poultry wire should be secured over the insulated surface. A skin coat is usually troweled on the wire, followed immediately with the main coat of 1/4" thickness. (After drying, the main coat will shrink to about 1/8" thickness.)

While troweling, brush with water to obtain final smooth surface. For a hard surface, mix two or three parts of clean sand with one part of Thermotex-B.



Head of vacuum distillation unit has Thermotex-B applied over insulation.

NO. 51 EMULSION

DESCRIPTION

An odorless, non-inflammable clay type emulsified asphalt composed of asphalt water and bentonite clay.

CONSISTENCY:

Troweling. If necessary to thin, add small amount of cool, clean water stirring rapidly.

USES

1. As a prime and bond coat for insulation and cold storage vault and other low temperature insulated construction
2. As a bond coat for cementing layers for vapor barrier and aluminum foil to walls and ceilings. Mixes well with Asbestos Fibre and sand to make "on the job" finished coats.
3. Can be used to make asphaltic mortar by mixing 6 parts of No. 51 Emulsion 1 part of Portland Cement and 1 part water.

COVERAGE

1 gallon per 20-25 sq. ft. for bonding insulation.

1 gallon per 100 sq. ft. for priming.

1 gallon per 50 sq. ft. for bonding vapor barrier sheets.

Must be stored at temperatures above freezing.

NO. 228 FIBRATED EMULSION

DESCRIPTION

An odorless, non-inflammable composition of bentonite clay type emulsified asphalt and asbestos fibre similar to Thermotex-B.

CONSISTENCY

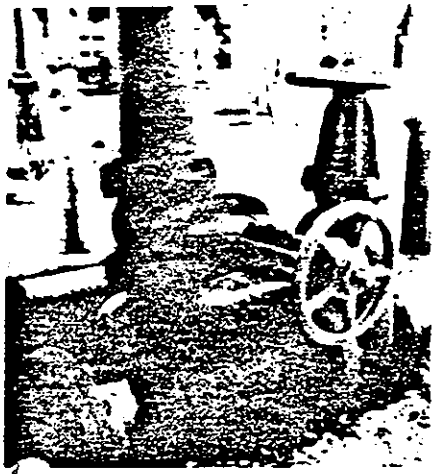
Trowel.

USES

1. Weather proof coating to protect insulation exposed to weather, chemical fumes and liquids, applied to wire mesh stretched over insulation.
2. On insulated air conditioning ducts as a coating or for "running the seams" on rigid duct insulation.
3. Can be used as a protective dampproofing coating on foundation walls and perimeter insulation.
4. Mastic finish coat in cold storage vault construction.

COVERAGE

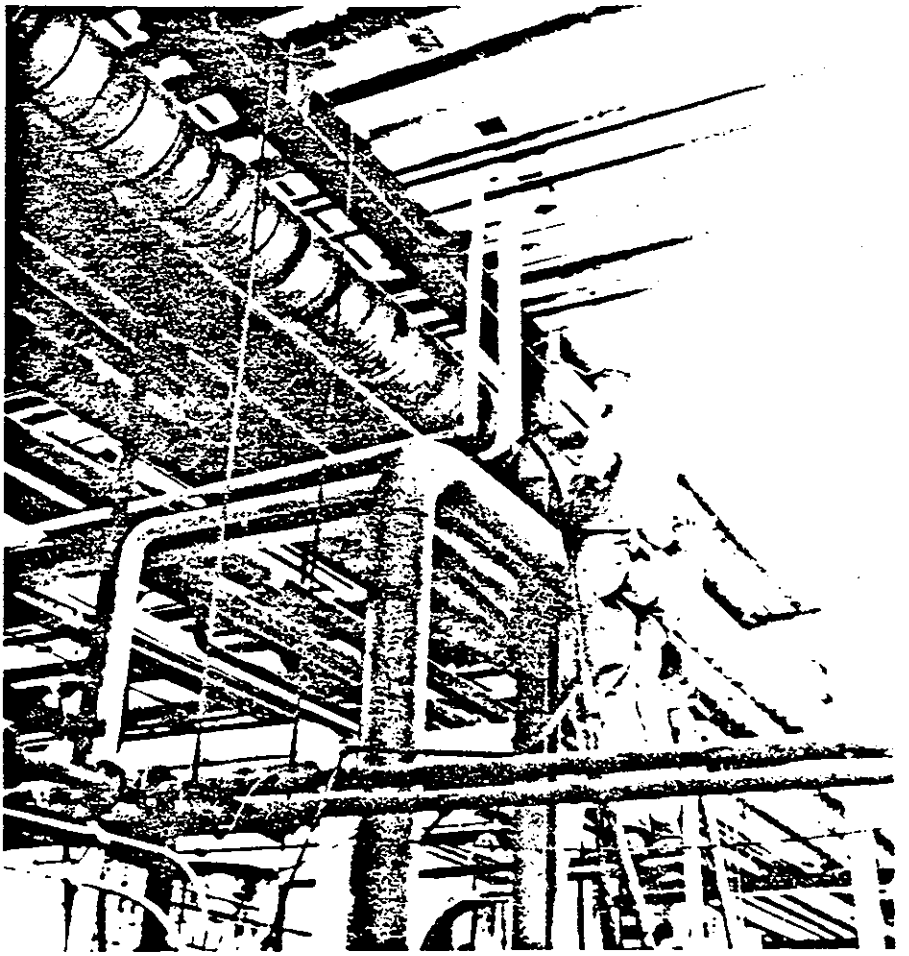
1 gallon per 6 sq. ft. produces a dry thickness of 1/8".



C. A - Cote Mastic is an anti-sweat insulating and weather-resistant coating applied directly to the primed metal surface. Can be troweled, brushed or sprayed.

DESCRIPTION

Carey Cork - Cote Mastic is an asphalt- mastic containing a high percentage anulated cork. It may be applied with a trowel, brush or spray equipment. It is normally applied to a thickness of ⅛" or ¼". The mastic film protects equipment from weather and corrosion and decreases the possibility of condensation forming on the equipment. It also serves as a sound-deadener on ducts and other equipment.



Carey Cork - Cote Mastic being applied on a well water line at American Oil Company's plant in Destrehan, Louisiana.

USES

Carey Cork - Cote Mastic is used by the refinery, chemical and petro-chemical industries as an anti-sweat insulating and weather-resistant coating applied directly to the primed metal surface. It may be used on fractionation towers, oil or water storage tanks, duct and pipes, or on other equipment where an inexpensive coating is needed to help reduce condensation, help prevent corrosion and protect against weather.

PHYSICAL PROPERTIES

Linear Shrinkage: None
Thickness Shrinkage: 10—20%
Averages:
inch . . . . 12 gals per 100 sq. ft.
¼ inch . . . . 20 gals per 100 sq. ft.
Weight Per Gallon: 6.4 lbs.
Flashpoint: 100° F.

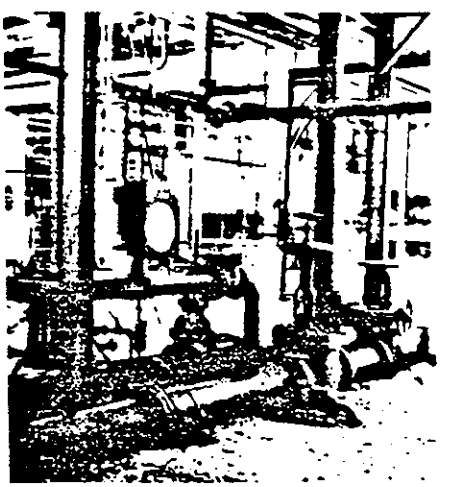
APPLICATION

Temperature of the material during application should be between 50° F. and 80° F. For spray application the operating air pressure on the material should be 20 to 50 lbs. A desired thickness of application must be accomplished in one application.

LIMITATIONS

Storage for periods more than 90 days will cause difficulty in spray application as the consistency increases slowly in storage.

The container should be covered when not in use and kept away from open flame or heat. Ventilation should be provided when working in closed spaces to remove fumes.



Special mastic film protects equipment from weather and corrosion and decreases the possibility of condensation damage.

Carey

INSULATION SEAL

industrial insulation

DESCRIPTION

Insulation Seal is a ready mixed asbestos fibrated bituminous mastic. It is especially compounded for cold application over most types of insulating materials. It protects the insulation against damage and loss of efficiency by the penetration of water and water vapor. Insulation Seal is made in spray (No. 820) consistency or trowel (No. 830) consistency.

USES

Insulation Seal can be used on pipes, curved and flat surfaces of all kinds. It will hold its bond on horizontal, vertical, sloped or inverted surfaces. Insulation Seal is designed for application over insulation such as 85% magnesia, asbestos cement, rock wool base cements, cellular glass, fibre-glass, mineral wool blankets. It remains flexible and will withstand moderate expansion and contraction without cracking on interior or exterior surfaces.

Insulation Seal is specially recommended for (1) systems operating at temperatures below dew point, (2) dual temperature systems, and (3) systems subject to long shutdown periods. It should not be applied to surfaces subject to temperatures in excess of 250° F.

SPECIFICATIONS

Laboratory tests reveal that Insulation Seal is an excellent moisture barrier. Its penetrative moisture vapor per 24 hours per square foot equals only 0.0001 ounce of water. Thickness will shrink 10% to 12% in drying (due to loss of solvents), but there is no lineal shrinkage. One gallon covers about 13 square feet of surface to a finished 1/8-inch thickness.

Packaging: Insulation Seal is packaged in 54-gal. drums, 5-gal. pails, 1-gal. cans.

APPLICATION

All surfaces to be coated with Insulation Seal should be free of moisture, dirt, oil, rust and other foreign matter. During application, temperature should not be above 130° F. for outdoor equipment, and not above 100° F. for indoor equipment. Best results are obtained when surrounding air temperature is between 50° F. and 100° F. Below-freezing applications can be made if surface temperatures are heated to prevent frost.

Fittings of dual temperature systems should be built up with layers of hairfelt and insulating tape and then coated with Insulation Seal.

When applying Insulation Seal over 85% Magnesia blocks and pipe covering, we recommend spraying or troweling a first coat using about 3 to 4 gallons per 100 square feet. Then, a layer of Glass-Fab (asphalt bonded glass fabric) should be imbedded in the Insulation Seal. The second coat should be applied using about 3 to 4 gallons per 100 square feet.

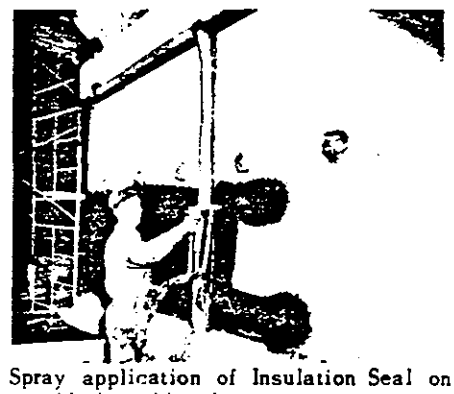
Carey Insulation Seal starts to set immediately after application. It dries uniformly throughout and becomes a tough, firm plastic film in 9 to 10 days on indoor installations. Outdoor installations may take more or less time, depending upon weather conditions.

Caution: Open fires or welding should not be permitted in the area while coating is being applied or drying. Do not use solvents for thinning. For ease of application the best workable temperature range is 50° F. to 100° F., hence it is advantageous to store in warm room during cold weather. Do not heat the container above 100° F.

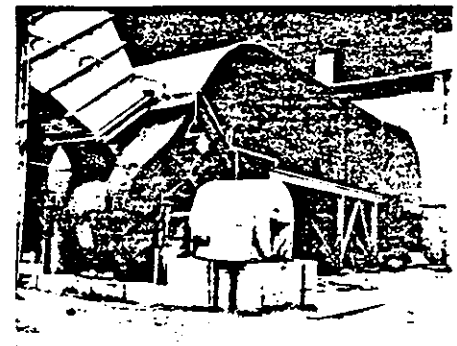
FILM THICKNESS AND COVERAGE

8ths	*16ths*	*32ds*	*64ths*	*Approximate Square Feet per Gallon*	*Approximate Gallons per 100 Sq. Ft.*
			1	103.00	0.97
		1	2	51.2	1.95
			3	35.4	2.82
	1	2	4	25.6	3.90
			5	20.5	4.87
		3	6	17.1	5.84
			7	14.7	6.81
1	2	4	8	12.8	7.79
			9	11.4	8.76
		5	10	10.3	9.74
			11	9.34	10.70
	3	6	12	8.54	11.70
			13	7.87	12.7
		7	14	7.35	13.6
			15	6.85	14.6
2	4	8	16	6.41	15.6
			17	6.02	16.6
		9	18	5.68	17.6
			19	5.40	18.5
	5	10	20	5.13	19.5
			21	4.88	20.5
		11	22	4.65	21.5
			23	4.41	22.4
3	6	12	24	4.27	23.4
			25	4.10	24.4
		13	26	3.94	25.4
			27	3.80	26.3
	7	14	28	3.66	27.3
			29	3.53	28.3
		15	30	3.42	29.2
			31	3.31	30.2
4	8	16	32	3.20	31.2

Note: Shrinkage of 25% can be estimated to obtain dry film thickness.



Spray application of Insulation Seal on outside breeching duct.



Finished breeching duct at TVA steam plant, Paducah, Kentucky.

Carey

BTU CEMENT

industrial insulation

DESCRIPTION

Carey BTU Cement is a ready mixed asbestos fibrated bituminous mastic of a troweling consistency. It is especially compounded for cold application to exterior surfaces of porous masonry walls. It produces a firm, tough, air-impervious plastic film which effects an air-tight seal, preventing infiltration of cold air through mortar joints, porous masonry and structural cracks.

USES

BTU Cement can increase boiler efficiency and save as much as 10% on fuel bills when it is used for sealing the outside walls of brick boiler settings. It can be used in power plants, boiler rooms, factories, apartments, hotels and institutional buildings.

SPECIFICATIONS

Laboratory tests show penetrative moisture vapor per 24 hours per square foot equals 0.0001 ounce of water.

Coverage—40 lbs. to 100 sq. ft., 1/16-inch thick coating. We recommend a heavier coating up to 1/8 inch thick for old and very porous settings.

APPLICATION

Note: Do not use solvents for thinning. For ease of application the best workable temperature range is 50° F. to 100° F., hence it is advantageous to store in warm room during cold weather. Do not heat container above 100° F.

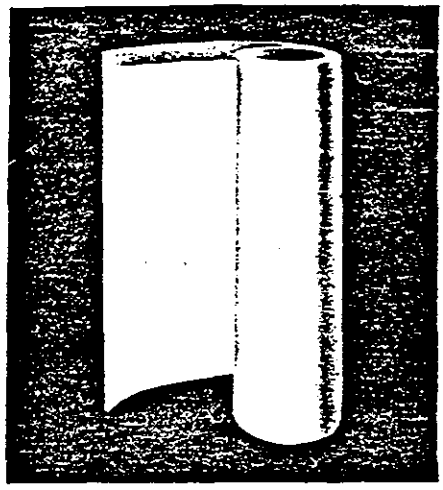
Clean brick or masonry with a stiff broom or wire brush. If necessary, point up all badly defective mortar joints with fresh mortar. Trowel BTU Cement well into all mortar joints and cracks. Point up carefully around cleaning doors, drum heads and openings. During application of the coating, the surface temperature should not be above 130° F. for outdoor equipment and not above 100° F. for indoor equipment.

Caution: Open fires or welding should not be permitted in the area while coating is being applied or drying.

Carey

FIRECLAD JACKETING

industrial insulation



SPECIFICATIONS

PHYSICAL PROPERTIES	PRODUCT "A"*	CAREY FIRECLAD
Weight Per Roll 108 sq. ft.	Approx. 50 lbs.	Approx. 50 lbs.
Tensile Strength, Lb.		
With	49	87
Across	33	52
Tear Strength, W. Grams	1564	3200 plus
Pliability on Mandrel at 77° F.		
Cracks, cm.	6	5
Passes, cm.	7	6
Wire Cutting Test Time to make 3" cut 10 lb. weight, No. 18 wire	41'27"	240'00" plus
Match Test	7 drops	No drops

* Product "A" – A jacketing widely used and generally considered as being most highly fire-resistant.

Carey Fireclad is a durable, weather-resistant jacketing specifically designed for the protection of outdoor insulated pipe lines where the danger of fire must be minimized. Ordinary roofing jackets are not satisfactory, because they burn, spread fire, and drip asphalt, which further contributes to combustion.

DESCRIPTION

Carey Fireclad consists of a tough, substantial sheet of asphalt saturated asbestos felt, over which is cemented on one side an unsaturated asbestos sheet. The complete sheet is reinforced with a fabric of tough, flexible glass threads. This construction combines flexibility with very high tensile strength and extremely great resistance to tearing and cutting from wire or strap fastenings. It offers many "plus" advantages as jacketing for outdoor insulated pipe lines.

USES

Carey Fireclad is recommended for use in the process industries and in oil refineries, where it affords maximum resistance to the spread of fire – and further protects the insulated surface from weather damage.

FEATURES

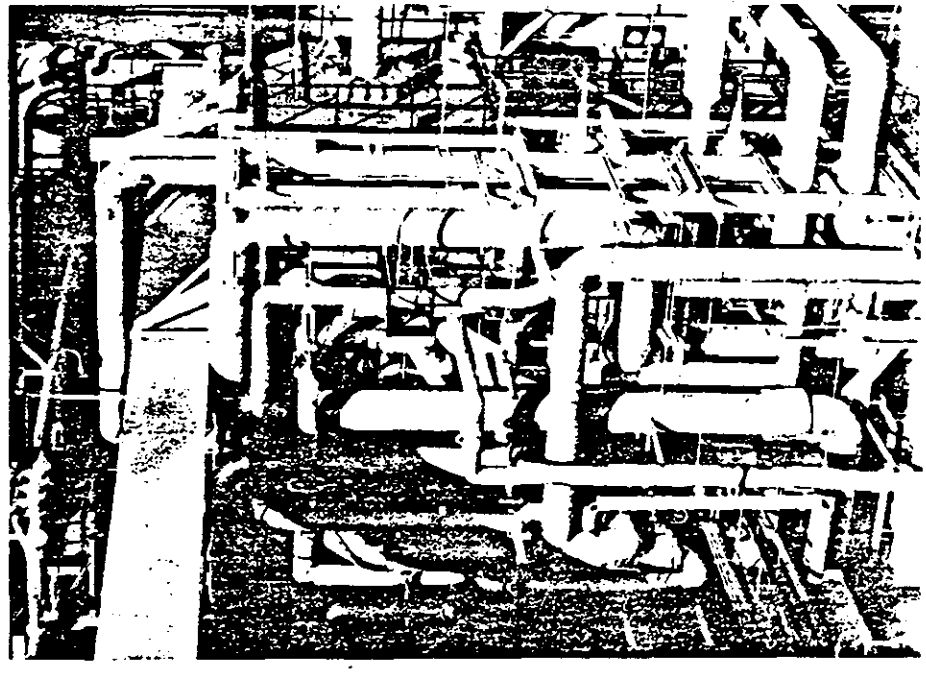
- Will not drip asphalt in the presence of fire nor support combustion.
- Water-repellent white surface assures long life, maximum efficiency.
- Greater width reduces labor cost – means fewer application joints.
- Will not crack when applied over small size pipe covering.
- High tensile strength.
- Reinforced with a fabric of tough, flexible glass threads.

Packaging: Carey Fireclad comes in rolls 38" wide by 34'6" long, containing 108 square feet; and weighs approximately 50 lbs. per roll. When in storage, keep in dry place. Stack on end not over three rolls high.

APPLICATION

Carey Fireclad Jacketing should be applied with the white side out on all straight runs of pipe or expansion bends with at least 3-inch circumferential and lateral laps. On horizontal pipes, the laps should be located on the side of the pipe, turned downward. The jacket may be held securely in place with rings of No. 16 ga. copper weld wire or strapping on not greater than 4 to 6" centers – with one wire ring placed over each circumferential lap. No lap cement should be used.

In cool weather (below 50° F.) store overnight in a warm place before unrolling.



Carey Fireclad is widely used in oil refineries. Resists fire, protects insulated surface from weather damage.

Carey

WEATHERPROOF JACKETING MATERIALS

industrial insulation

ASBESTOS ROOFING FELT

An excellent uncoated asbestos roofing for jacketing high temperature insulated pipe lines where high temperatures may cause running and dripping of a coated roofing. Consists of 2 asphalt saturated asbestos sheets combined with asphalt. Surfaces are black. Has good flexibility to conform to small radius curvatures.

Carries Underwriters' Class "C" label.

Weight – 45 or 55 lbs. per square.

Furnished in rolls 36 in. wide containing 108 sq. ft. (one square).

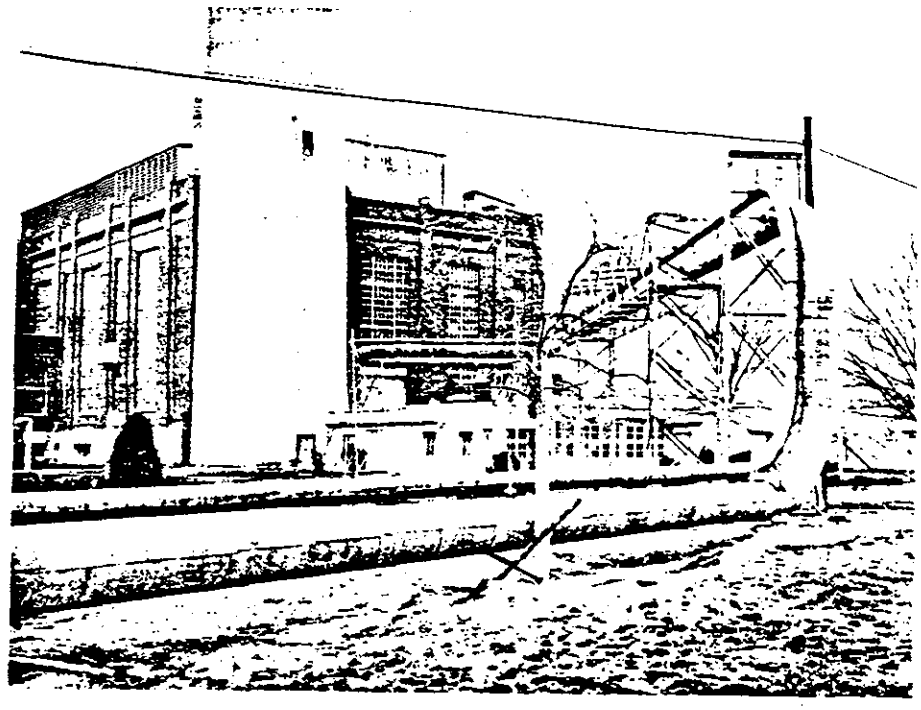
SATURATED ASBESTOS ROOFING FELT

An asphalt saturated asbestos felt recommended for underground pipe coverings. The felt weighs approximately 15 lb. per 100 sq. ft. A double wrap ?-ly construction is recommended. Is available in 20 lb. per 100 sq. ft. ht for application in one layer on the job. Furnished in rolls of 324 sq. ft.

These felts can be factory applied to Asbestos Sponge, Careycel, Impervo and Protecto coverings. They can be furnished with, but not applied to, 85% Magnesia and Alltemp. 6" wide collars covering butt joints and waterproof cement and wire for application will be supplied in each case.

15 lb. Felt meets:
Federal Specification HH-F-185 Class A Type II.
Navy Specification 7 Yg-AA-15.

20 lb. Felt meets:
Federal Specification HH-F-182 Class A.
Navy Specification 7 Yg-AA-20.



Carey Roofing Jacket Covering shown on outdoor pipe lines at Houston, Texas Power and Electric Corp. plant.

ORGANIC ROOFING JACKET COVERINGS

For outdoor pipes. Prepared roofing jackets attached to pipe coverings at the factory are the least expensive form of waterproofing. Multi-Ply, Asbestos-Sponge, Careycel, Impervo and Protecto coverings can be furnished with such roofing jackets attached, including 6-in. wide collars for covering butt joints, and waterproof cement and wire for application. These jackets can be furnished with, but not attached to, 85% Magnesia and Alltemp coverings. For outdoor exposed pipes Carey Surety Roofing jacketed coverings are regularly supplied. For pipes running in closed conduits underground, double layer Saturated Asbestos Roofing jackets are recommended.

All weatherproof jacketing materials can be furnished in bulk unattached to pipe covering, with accessories for applying.

Carey

ASBESTOS MILLBOARD

industrial insulation



Carey Asbestos Millboard is lighter in weight than other millboards...has higher insulation value per pound.

DESCRIPTION

Asbestos Millboard is made from pure Canadian asbestos fiber pulp which is mixed with binding materials and formed in sheets. Commercial Millboard is available in two grades, No. 7 Medium and No. 1 Hard. The No. 7 grade withstands temperatures up to 800° F., and the No. 1 grade withstands temperatures up to 1000° F. Though these two grades satisfy the vast majority of requirements, special grades can be developed by Carey laboratories.

Millboard with pin-point (knurled) finish can also be supplied.

USES

Asbestos Millboard is used extensively in the electric heating field and glass industry. It is recommended for use in fire screens and partitions, as a fireproof lining for ceilings, walls, floors, elevator shafts, moving picture machine booths, ranges, stoves, grates, electric ovens, sterilizers and roasters.

SPECIFICATIONS

Both No. 1 and No. 7 grades of Asbestos Millboard meet Federal Specification HH-M-351a.

Sizes: Asbestos Millboard is furnished in 42" by 48" sheets in thicknesses from 1/32" to 3/4".

Packaging: Asbestos Millboard is packed in 100-lb. cartons unless otherwise specified.

TABLE OF THICKNESSES AND WEIGHTS FOR NO. 7 GRADE*

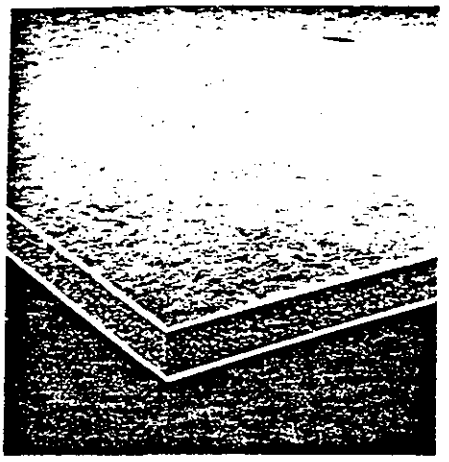
Thickness-- Inches	*Per Sheet Pounds* **	*Per Sq. Ft. Ounces*
1/32	2.0	2.3
3/64	2.8	3.2
1/16	3.85	4.4
5/64	4.8	5.5
3/32	5.82	6.6
1/8	6.93	7.9
5/32	9.0	10.3
3/16	10.35	11.8
1/4	14.01	16.0
5/16	17.5	20.0
3/8	20.28	23.1
1/2	26.53	30.3
5/8	34.3	39.2
3/4	39.8	45.5

* No. 1 grade weighs approximately 10% more than No. 7 grade.
**Correct to ± 10%.

Carey

ASBESTOS SHEETS AND PANELS

industrial insulation

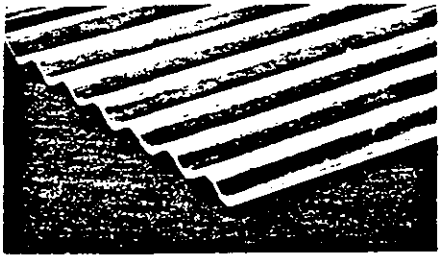


THERMO-BORD

Thermo-Bord is composed of 1/8" asbestos-cement board bonded to both sides of a special asphalt-impregnated type insulation board. The bonding material is moisture resistant, forming a vapor barrier between the asbestos-cement board and insulation board.

Thermo-Bord is recommended for roof decks, outside walls, partitions, and low-temperature ovens (not over 200° F.).

Standard sheets are available 4' wide in lengths of 6', 8', 9', 10' and 12'. Overall thicknesses: 3/4", 1-1/8", 1-9/16" and 2".



4.2 CAREYSTONE CORRUGATED SHEET

Careystone Corrugated is made from Portland cement and asbestos fiber, compressed under enormous hydraulic pressure to form a homogeneous monolithic sheet. Careystone Corrugated actually becomes stronger with age.

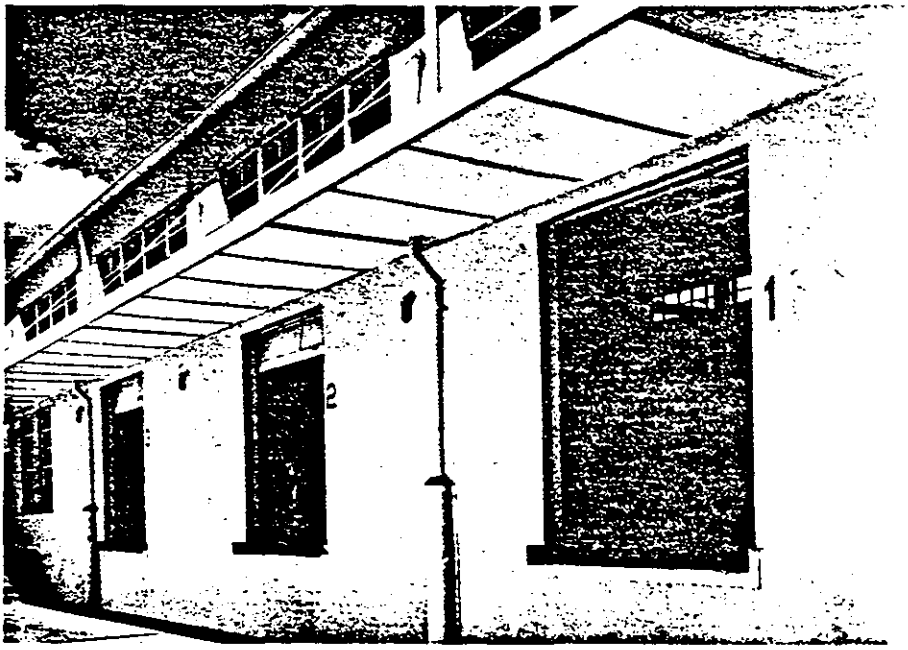
These sheets are excellent for roofing and siding on industrial and commercial buildings. They are also widely used as a decorative building material.

Careystone Corrugated sheets have 10 corrugations in a 42-inch width. Sheets are available in standard lengths from 1' to 12' in multiples of 6". The average thickness is 3/8". Average weight per sq. ft. bulk is 4 lbs.; weight per sq. ft. crated is 4-1/2 lbs.

INDUSTRIAL A-C BOARD

This board is composed solely of Portland cement and asbestos fiber. It is fire-resistant and actually becomes stronger with age. Industrial A-C Board is unaffected by most acids and alkalies, heat and cold. It is rot-proof, vermin-proof, termite-proof, rodent-proof, and it does not corrode. Having a natural cement gray color, Industrial A-C Board does not require protective coatings or paint, although it can be painted if desired. This board withstands temperatures up to 800° F.

Industrial A-C Board is available in standard sheets 42" by 48", 48" by 48", 42" by 96", and 48" by 96" in thicknesses of 1/4", 3/8" and 1/2".



ASPHALT PLYBOARD

Asphalt Plyboard is laminated from alternate layers of asphalt-saturated felt and a specially developed thermoplastic asphaltic material. It replaces wood, plywood, hardboard, metals, plastics, composition boards, fabricated krafts and allied products. This extremely pliable board is easily nailed, cut, stamped or punched.

Asphalt Plyboard is a versatile and inexpensive construction material for basement ceilings, temporary flooring, farm storage bins and animal houses, and auto trunk boards.

Asphalt Plyboard is manufactured in thicknesses from 1/16" to 3/8"; widths up to 60" and lengths up to 120". Facilities are available for special lengths up to 144".



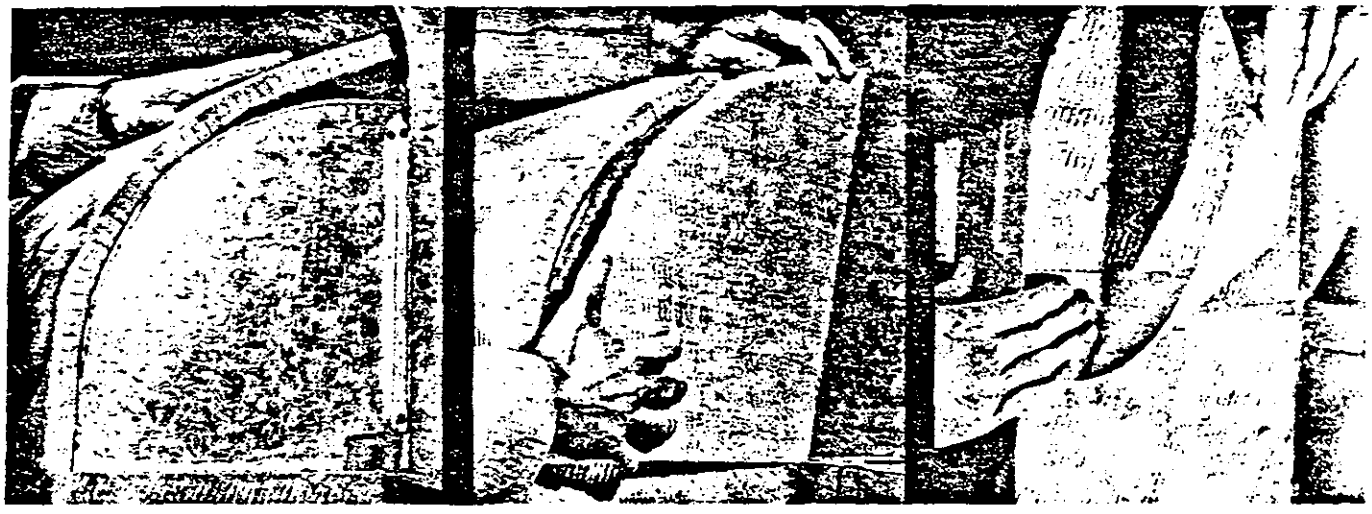
`EFOIL BOARD

r..efoil Board consists of successive plies of corrugated asbestos paper bonded with a special fire-resistant adhesive, treated with a chemical and hardened to make a strong, fire-resistant, water-resistant board. It is easily sawed and drilled with ordinary hand tools.

Firefoil is recommended for interior use only, in such applications as bulkheads, air-conditioning housings, and oven enclosures. Firefoil withstands temperatures up to 1000° F.

Standard sheets are 4' by 8', available in thicknesses from 1/2" to 1" in 1/8" multiples, and from 1" to 3" in 1/4" multiples. Approximate weight is 1 lb. per sq. ft. per 1/2" of thickness.

Carey — SPUN MINERAL WOOL DUCT INSULATION — industrial insulation



Carey Duct Insulation scored and being molded to curved surface of duct.

Carey Duct Insulation cut to shape and being fitted to side of duct.

Joints, after pointing up, being sealed with tape.

DESCRIPTION

Carey Duct Insulation is made in semi-rigid sheets, processed from long fine fibers of spun mineral wool. Light in weight, with a density of approximately seven pounds per cubic foot, this insulation is easily handled and quickly installed. It provides a high degree of thermal efficiency as indicated by the accompanying table.

FEATURES

Moisture Resistant — made of spun mineral wool fibers that will not absorb moisture, Carey Duct Insulation is non-capillary in character. If the surface accidentally becomes wet, it can be dried off rapidly without affecting its original properties and can be applied at once.

Non-Corrosive — this insulation, inorganic in composition, does not cause corrosion of metal duct surfaces.

Workability — Carey Duct Insulation is easy to cut with a knife to conform to irregular flat shapes. For curved surfaces, it can be quickly scored for bending either way to match the contour of the duct.

Non-Irritating to Handle — Carey Duct Insulation has a smooth, clean surface and is free from loose particles. It can be handled with bare hands without discomfort.

Finish — Carey Duct Insulation may be brush or spray-painted, or coated with weatherproofing compounds.

Underwriters' Laboratories — Both plain and coated Carey Duct Insulation have been tested and rated by Underwriters' Laboratories.

USES

Carey Duct Insulation, for air conditioning ducts and heating ducts, is available plain, with factory-applied vapor barrier, neoprene coating or foil-faced.

Carey Duct Insulation with vapor barrier — Recommended for use in warm, humid areas where condensation is a factor. Vapor barrier is applied at the factory and consists of 40 lb. black kraft paper coated with asphalt.

Carey Duct Insulation with neoprene coating — This coating on one side with neoprene compound prevents fiber entrainment. Applied inside of ducts as a lining, it reduces fan noise and prevents its transmission by the moving air into areas served by the system. Where applied to the exterior, the coated side facilitates painting.

Foil-Faced Duct Insulation — This duct insulation is faced on one side with .001 aluminum foil laminated to 50-pound flame-resistant Kraft, 2 x 2 scrim and flame-resistant adhesive. The maximum temperature limit is 250° F. Thermal Conductivity: "K" .24 at 75° F. mean temperature. Permeance to Water-Vapor: Less than .25 perms under ASTME-96-53T Method "C".

SPECIFICATIONS

THERMAL CONDUCTIVITY
(K Factors at Mean Temperature °F.)

	0°	25°	50°	75°	100°	200°
1" Thick	.21	.22	.23	.24	.25	.29

SOUND ABSORPTION COEFFICIENTS
(Frequencies)

	125	250	500	1000	2000	NRC
1" Thick	.32	.58	.70	.93	.95	.80

PACKAGING

	Plain or Coated In Cartons				Vapor Barrier In Paper-Wrapped Bundles			
Thickness	3/4"	1"	1½"	2"	3/4"	1"	1½"	2"
Pieces	16	12	8	6	8	6	4	3
Square Ft.	128	96	64	48	64	48	32	24

Size: 24" x 48".

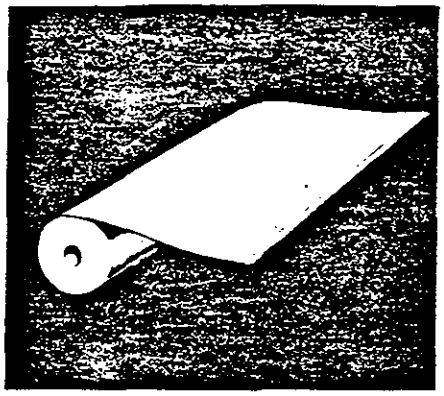
Density: Nominal 7 lb. per cu. ft.

Maximum Temperatures: Plain Carey Duct Insulation is suitable for insulating surfaces up to 450°F. With the vapor barrier it is not normally used in hot areas and naturally should not be used at temperatures in excess of 150°F. because the asphalt may soften.

Carey

ASBESTOS PAPER AND ROLLBOARD

industrial insulation



Asbestos Paper and Rollboard is furnished in many weights to meet varying insulation requirements.

DESCRIPTION

Asbestos Paper and Rollboard is composed of pure Canadian asbestos fiber, which is slurried to a pulpy mass, free from hard, rocky particles. This pure asbestos pulp is mixed with a small quantity of very strong binding material, formed into endless sheets of different weights, thoroughly dried, calendered to a smooth finish and put up in rolls ready for shipment. Asbestos Paper and Rollboard are strong, flexible, fire-resistant sheets.

Asbestos Paper tape, made from standard 12-lb. stock, also is available in 2" and 3" widths.

USES

Commercial Grade Asbestos Paper is entirely satisfactory for most purposes. The 6-pound and 8-pound papers are used extensively in the manufacture of various pipe insulation and electrical insulation. The 10-pound and 12-pound papers are used for wrapping hot air furnace pipes. Heavier weights are used for lining stoves, ovens, gas ranges and for making gaskets, filters and discs.

SPECIFICATIONS

Asbestos Paper and Rollboard is furnished in standard widths of 18", 24", 36" and 37-1/2" in rolls weighing approximately 25, 50 and 100 lbs. For manufacturing purposes, jumbo rolls of 200 to 400 lbs. are furnished. Special sizes can be made to order.

Table of Weights and Thicknesses

Lbs/100 Sq Ft (± 10%)	*Approximate Thickness--In.*
4 lb	.010
6 lb	.015
8 lb	.019
10 lb	.022
12 lb	.027
14 lb	.029
16 lb	.032
1/16" (32 lb)	.0625
3/32" (48 lb)	.093
1/8" (64 lb)	.125





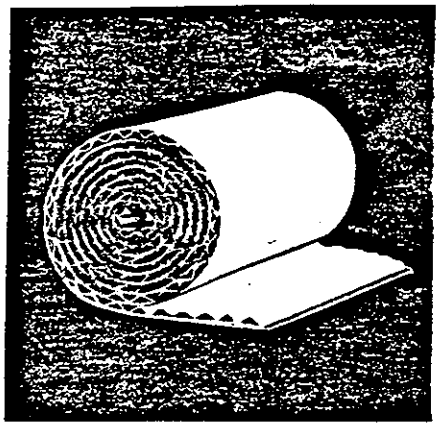


Carey Rollboard used as a tank lining. Rollboard is strong, flexible, easy to install -- fits a variety of installations.

Carey

CORRUGATED ASBESTOS PAPER

industrial insulation



DESCRIPTION

Corrugated Asbestos Paper is made by bonding a sheet of corrugated asbestos paper to a sheet of flat asbestos paper. It is a very light and flexible insulation.

USES

Corrugated Asbestos Paper is recommended as a wrapping for curved surfaces, such as hot air furnace pipes and hot air ducts in blower systems used in heating and ventilating large buildings.

SPECIFICATIONS

Sizes: Corrugated Asbestos Paper is furnished in coarse corrugations 1/4" thick per ply (Aircell), and in fine corrugations 1/6" and 1/8" per ply. Rolls 36" to 37" wide are available in 250 sq. ft. and 500 sq. ft. sizes.

Packaging: Aircell (1/4" deep corrugations) Corrugated Asbestos Paper is packaged in cartons 18" by 18" by 38", weighing approximately 50 lbs. gross. A box car holds approximately 400 cartons.

Carload quantities of 500 sq. ft. rolls can be shipped in bulk. These rolls are protected by a wrapping of Kraft paper secured with gummed tape.

Burcatab

Heat Losses From Horizontal Bare Steel Pipes and Flat Surfaces

In Btu per Sq Ft of Pipe Surface per Hour per °F Temperature Difference Between Pipe and Air

Pipe Size	Lineal Foot Factor*	Temperature Difference °F Between Pipe Surface and Surrounding Air. Air at 80°F.																															
		50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1550	160
⅛"	220	2 12	2 48	2 80	3 10	3 42	3 74	4 07	4 47	4 86	5 28	5 72	6 19	6 69	7 22	7 79	8 39	9 03	9 70	10 42	11 18	11 98	12 82	13 71	14 64	15 62	16 66	17 73	18 87	20 06	21 30	22 59	23 9
¼"	275	2 08	2 43	2 74	3 04	3 35	3 67	4 00	4 40	4 79	5 21	5 65	6 12	6 61	7 15	7 71	8 31	8 95	9 62	10 34	11 09	11 89	12 74	13 62	14 56	15 40	16 57	17 65	18 78	19 97	21 21	22 51	23 8
1"	344	2 04	2 38	2 69	2 99	3 30	3 61	3 94	4 33	4 72	5 14	5 58	6 05	6 54	7 07	7 64	8 23	8 87	9 55	10 26	11 02	11 81	12 66	13 54	14 48	15 46	16 49	17 57	18 70	19 89	21 13	22 42	23
1¼"	435	2 00	2 34	2 64	2 93	3 24	3.55	3 88	4 27	4 66	5 07	5 51	5 97	6 47	7 00	7 56	8.16	8 79	9 47	10 18	10 94	11 73	12 58	13 46	14 39	15 38	16 41	17 49	18 62	19 80	21 04	22 34	23
1½"	497	1 98	2 31	2 61	2 90	3 20	3 52	3 84	4 23	4 62	5 03	5 47	5 93	6 43	6 96	7 52	8 12	8 75	9 43	10.14	10 89	11 69	12 53	13 42	14 35	15 33	16 36	17 44	18 57	19.76	20 99	22 29	23
2"	622	1 95	2 27	2 56	2 85	3 15	3 46	3 78	4 17	4 56	4 97	5 41	5 87	6 37	6 89	7 45	8 05	8 68	9 36	10 07	10 82	11 62	12 46	13 35	14 28	15 26	16 29	17 37	18 50	19 68	20 92	22 21	23
2½"	753	1 92	2 23	2 52	2 81	3 11	3 42	3 74	4 12	4 51	4 92	5 36	5 82	6 31	6 84	7 40	7 99	8 63	9 30	10 01	10 77	11 56	12 40	13 29	14 22	15 20	16 23	17 30	18 44	19 62	20 86	22 15	23
3"	916	1 89	2 20	2 49	2 77	3 07	3 37	3 69	4 08	4 46	4 87	5 31	5 77	6 26	6.79	7 35	7.94	8 57	9 25	9 96	10 71	11 51	12 34	13 23	14 16	15 14	16.17	17 25	18 38	19 56	20 80	22 09	23
3½"	1 047	1 87	2 18	2 46	2 74	3 04	3 34	3 66	4 05	4 43	4 84	5 27	5 73	6 23	6 75	[illegible]	7 91	8 [illegible]	9 21	9 92	10 67	11 47	12 31	13 19	14 12	15 10	16 13	17 21	18 34	19 52	20 76	22 05	23
4"	1 178	1 85	2 16	2 44	2 72	3 01	3 32	3 64	4 02	4 40	4 81	5 25	5 71	6 20	6 72	7 28	7 87	8 51	9 18	9 89	10 64	11 44	12 27	13 16	14 09	15 07	16 09	17.17	18 30	19 49	20 72	22 02	23
4½"	1 309	1 84	2 14	2 42	2 70	2 99	3 30	3 61	4 00	4 38	4 79	5 22	5 68	6 17	6 69	7 25	7 85	8 48	9 15	9 86	10 61	11 41	12 25	13 13	14 06	15 04	16 07	17.14	18 27	19 46	20 69	21 99	23
5"	1 456	1 83	2 13	2 40	2 68	2 97	3 28	3 59	3 97	4 35	4 76	5 20	5 65	6 15	6 68	7 23	7 82	8 45	9 12	9 83	10 58	11 38	12 22	13 10	14 03	15 01	16 04	17 11	18 24	19 43	20 66	21 96	23
6"	1 734	1 80	2 10	2 37	2 65	2 94	3 24	3 55	3 94	4 32	4 72	5 16	5 61	6 10	6 63	7 19	7 78	8 41	9 08	9 79	10 54	11 34	12 17	13 06	13 99	14 96	15 99	17 07	18 20	19 38	20 62	21 91	23
7"	1 996	1 79	2 08	2 35	2 63	2 91	3 21	3 53	3 91	4 29	4 69	5 13	5 58	6.07	6 60	7 15	7 75	8 38	9 05	9 76	10 51	11 30	12.14	13 02	13 95	14 93	15 95	17 03	18 16	19 34	20 59	21 87	23
8"	2 258	1 77	2 06	2 33	2 60	2 89	3 19	3 50	3 88	4 26	4 67	5 10	5 56	6 05	6 57	7.12	7 72	8 35	9 02	9.73	10 48	11 27	12 11	12 99	13 92	14 90	15 92	17 00	18 13	19 31	20 55	21 84	23
9"	2 520	1.76	2 05	2 31	2 59	2 87	3 17	3 48	3 86	4 24	4 65	5 08	5 53	6 02	6 54	7 10	7 69	8 32	8 99	9 70	10.45	11 24	12 08	12 96	13 89	14 87	15 90	16 97	18 10	19 28	20 52	21 81	23
10"	2 814	1 75	2 03	2 30	2 57	2 85	3 15	3 46	3 84	4 22	4 62	5 05	5 51	6-00	6 52	7 08	7 67	8 30	8 97	9 68	10 43	11 22	12 06	12 94	13 87	14 84	15 87	16.95	18 08	19 26	20.49	21 79	23
12"	3 338	1 73	2 01	2 27	2 54	2 83	3 12	3 43	3 81	4 19	4 59	5 02	5 48	5 96	6 48	7 04	7 63	8 26	8 93	9 64	10.39	11 18	12 02	12 90	13 83	14 80	15 83	16 91	18.04	19 22	20 46	21 74	23
14"	3 665	1 72	2 00	2 26	2 53	2 81	3 11	3 41	3 79	4 17	4 57	5 00	5.46	5 94	6 47	7 02	7 61	8 24	8 91	9 62	10 37	11 16	12 00	12 88	13 81	14 78	15 81	16 89	18 01	19 20	20 43	21.72	23
16"	4 189	1 70	1 98	2 24	2 51	2 79	3 08	3 39	3 77	4 14	4 55	4 98	5 43	5 92	6 44	[illegible]	7 59	8 [illegible]	8 88	9 59	10 34	11.13	11 97	12 85	13 78	14 75	15 78	16 86	17 98	17.17	20 40	21 69	23
18"	4 717	1 69	1 96	2 22	2 49	2 77	3 07	3 37	3 75	4 12	4 53	4 96	5 41	5 90	6 42	6 97	7 56	8 19	8 86	9 57	10 32	11 11	11 94	12 83	13 75	14 73	15 75	16 83	17 96	19 14	20 38	21 67	23
20"	5 236	1 68	1 95	2 21	2 47	2 75	3 05	3 36	3 73	4 11	4 51	4 94	5 39	5 88	6 40	6 95	7 54	8 17	8 84	9 55	10 29	11.09	11 92	12 80	13 73	14 71	15.73	16 81	17 94	19 12	20 35	21 64	22
24"	6 283	1 66	1 93	2 19	2 45	2 73	3 02	3 33	3 70	4 07	4 48	4 90	5 36	5.84	6.36	6 92	7 51	8 14	8 80	9 51	10.26	11 05	11 89	12 77	13 69	14 67	15 70	16 77	17 90	19 08	20 31	21 61	22
Vertical Surface		1 84	2 14	2 42	2 70	3 00	3 30	3 62	4 00	4 38	4 79	5 22	5 68	6 17	6 70	7 26	7 85	8 48	9 15	9 86	10 62	11 41	12 25	13 13	14 06	15 04	16 07	17 15	18 28	19 46	20 70	21 99	23
Horizontal Surface Facing Upward		2 03	2 37	2 67	2 97	3 28	3 59	3 92	4 31	4 70	5 12	5 56	6 02	6 52	7.05	7 61	8 21	8 85	9 52	10 24	10 99	11.79	12 63	13 52	14 45	15 43	16 46	17 54	18 67	19 86	21 10	22 39	23
Horizontal Surface Facing Downward		1 61	1 86	2 11	2 36	2 64	2 93	3 23	3 60	3 97	4 37	4 80	5 25	5 73	6 25	6 80	7 39	8 02	8 69	9 39	10 14	10 93	11 76	12 64	13 57	14 55	15 57	16 67	17 77	18 95	20 19	21 48	22

Values are for Flat Surfaces four square feet or more in area

*To secure losses per lineal foot, multiply sq ft losses in table by this factor The losses per sq ft of pipe surface for pipes larger than 24" can be considered the same as the losses for the 24" pipe

HEAT INSULATION
FOR
HIGH TEMPERATURES

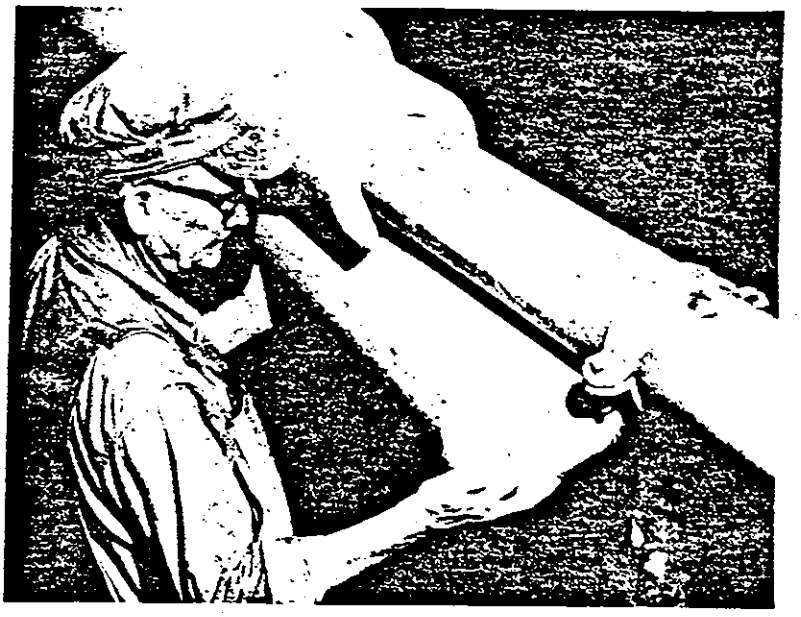
Thermal Tables

BULLETIN 101 BX

Carey

BETTER PRODUCTS FOR INDUSTRY
SINCE 1873

THE PHILIP CAREY MFG. COMPANY
General Offices — LOCKLAND, CINCINNATI, OHIO
Branches In All Principal Cities



Even 48 hours of "soaking heat" at 1600° F...



won't cause undue shrinkage or cracking of new CAREY ALLTEMP insulation!

ALLTEMP is a special combination of inorganic silicas and asbestos fibers, with physical and chemical properties giving excellent efficiency in heat saving and very low shrinkage (up to ⅔ less than many 1200° F - 1500° F insulations). It is non-brittle, easily workable and keeps its high thermal efficiency and strength, even through continuous exposure to excessive heat and moisture.

ALLTEMP is made in sectional, tri-sectional and segmental blocks. In "nesting" pipe covering sizes, a wide range of unusual assemblies can be built-up from a limited number of "prime" units, with application in either single or broken joint double layer construction. Use it for temperatures from 100° to 1600° F for top efficiency in keeping heat on the job.

Other famous insulation products developed by Carey include Super-Light 85% Magnesia, Hi Temp No. 19, Tempchek, MW-50 and MW-One Insulating Cement and a complete line of bonding and finishing cements. There is a Carey-approved contract unit conveniently located to work with you in selecting the insulation most suitable for your needs, and assure its use to best advantage. Consult your telephone directory, or your nearest Carey district office. The Philip Carey Mfg. Company, Lockland, Cincinnati 15, Ohio.

Plants: Cincinnati and Middletown, Ohio; Wilmington, Ill.; Memphis, Tenn.; Perth Amboy, N. J.; Houston, Texas; Plymouth Meeting, Pa.; Lennoxville, P. Q.; East Broughton, P. Q.; Research Center, Cincinnati, Ohio. Subsidiary Companies: General Magnesite & Magnesia Co.; Quebec Asbestos Corporation, Ltd.; The Philip Carey Company, Ltd. The Lehon Company.

can count on **Carey** *diversified products and services for industry, farm and home since 1873*

COMBINATION COVERING FOR 600° F.

* Indicates Recommended Combinations

INNER LAYER CAREY ALLTEMP, OUTER LAYER SUPER-LIGHT 85% MAGNESIA

80° F. Ambient Air Temperature

Pipe Size In.	Inner Layer Thickness Inches	Outer Layer Thickness Inches	Temp. °F. at Inner Magnesia Surface	Canvas Temp. °F. with Air at 80° F.	B. T. U. Loss Per Lin. Ft. Per Hr.		Percent Eff. %
					Covered Pipe	Bare Pipe	
½	2 1/16	None	...	115	79	626	87.3
¾	1 31/32	None	...	118	91	772	88.2
1	2 1/8	None	...	118	98	950	89.6
1¼	1 15/16	None	...	124	115	1,190	90.3
1½	2 5/16	None	...	118	111	1,350	92.0
2	* 1 19/32	1 1/32	298	116	111	1,670	93.3
	1 19/32	1 17/32	329	108	102	1,670	93.8
	1 19/32	2 1/32	357	102	88	1,670	94.7
	1 19/32	2 9/16	380	100	84	1,670	95.0
	1 19/32	3 1/16	393	98	80	1,670	95.2
3	* 1 9/16	1 1/2	343	111	105	2,420	95.6
	1 9/16	2 1/32	376	106	112	2,420	95.4
	1 9/16	2 17/32	394	103	104	2,420	95.7
	1 9/16	3 1/32	409	101	97	2,420	96.0
4	* 1 9/16	1 17/32	356	112	146	3,070	95.2
	1 9/16	2 1/32	382	107	132	3,070	95.7
	1 9/16	2 17/32	403	103	120	3,070	96.0
	1 9/16	3 1/8	421	100	109	3,070	96.4
5	* 1 17/32	1 17/32	368	115	168	3,750	95.5
	1 17/32	2 1/32	396	109	150	3,750	96.0
	1 17/32	2 11/16	422	104	131	3,750	96.5
	1 17/32	3 1/8	470	98	97	3,750	97.4
6	* 1 1/2	1 17/32	378	116	190	4,440	95.7
	1 1/2	2 5/32	399	108	152	4,440	96.5
	1 1/2	2 11/16	429	105	149	4,440	96.6
	1 1/2	3 1/8	443	102	137	4,440	96.9

COMBINATION COVERING FOR 600° F.

* Indicates Recommended Combinations

INNER LAYER CAREY ALLTEMP, OUTER LAYER SUPER-LIGHT 85% MAGNESIA

80° F. Ambient Air Temperature

Pipe Size In.	Inner Layer Thickness Inches	Outer Layer Thickness Inches	Temp. °F. at Inner Magnesia Surface	Canvas Temp. °F. with Air at 80° F.	B. T. U. Loss Per Lin. Ft. Per Hr.		Percent Eff. %
					Covered Pipe	Bare Pipe	
8	* 1 17/32	1 19/32	376	118	230	5,710	95.9
	1 17/32	2 3/32	412	111	196	5,710	96.5
	1 17/32	2 5/8	431	107	176	5,710	96.9
	1 17/32	3 3/32	444	104	164	5,710	97.1
10	* 1 19/32	1½	380	120	270	7,040	96.1
	1 19/32	2	408	114	239	7,040	96.6
	1 19/32	2½	430	109	213	7,040	96.9
	1 19/32	3	446	105	191	7,040	97.2
12	* 1 19/32	1½	386	120	304	8,320	96.3
	1 19/32	2	410	115	274	8,320	96.7
	1 19/32	2½	428	110	247	8,320	97.0
	1 19/32	3	450	107	223	8,320	97.3
14	* 1½	1½	402	122	340	9,050	96.2
	1½	2	424	117	307	9,050	96.6
	1½	2½	446	112	271	9,050	97.0
	1½	3	460	108	245	9,050	97.3
16	* 1½	1½	403	124	390	10,300	96.2
	1½	2	426	118	344	10,300	96.7
	1½	2½	448	113	302	10,300	97.0
	1½	3	462	109	268	10,300	97.4
18	* 1½	1½	404	125	438	11,560	96.2
	1½	2	429	119	373	11,560	96.8
	1½	2½	451	114	330	11,560	97.1
	1½	3	464	109	283	11,560	97.5
Flat	* 1½	1½	414	123	73.1	2,590	97.2
	1½	2	445	117	62.2	2,590	97.6
	1½	2½	466	113	54.2	2,590	97.9
	1½	3	481	109	48.0	2,590	98.1

COMBINATION COVERING FOR 700° F.

* Indicates Recommended Combinations

INNER LAYER CAREY ALLTEMP, OUTER LAYER SUPER-LIGHT 85% MAGNESIA

80° F. Ambient Air Temperature

Pipe Size In.	Inner Layer Thickness Inches	Outer Layer Thickness Inches	Temp. °F. at Inner Magnesia Surface	Canvas Temp. °F. with Air at 80° F.	B. T. U. Loss Per Lin. Ft. Per Hr.		Percent Eff. %
					Covered Pipe	Bare Pipe	
½	2 1/16	None	...	122	102	878	88.4
¾	1 31/32	None	...	126	117	1,080	89.2
1	2 1/8	None	...	126	126	1,340	90.6
1¼	1 15/16	None	...	132	149	1,680	91.1
1½	2 5/16	None	...	126	143	1,900	92.5
2	* 1 19/32	1 1/32	345	123	141	2,350	94.0
	1 19/32	1 17/32	383	114	127	2,350	94.6
	1 19/32	2 1/32	415	108	113	2,350	95.2
	1 19/32	2 9/16	442	105	110	2,350	95.3
	1 19/32	3 1/16	457	101	99	2,350	95.3
3	* 1 9/16	1½	400	118	144	3,400	95.7
	1 9/16	2 1/32	436	112	141	3,400	95.8
	1 9/16	2 17/32	459	108	131	3,400	96.1
	1 9/16	3 1/32	475	104	122	3,400	96.4
4	* 1 9/16	1 17/32	415	119	184	4,320	95.7
	1 9/16	2 1/32	447	113	165	4,320	96.1
	1 9/16	2 17/32	470	109	150	4,320	96.5
	1 9/16	3 1/8	490	104	137	4,320	96.8
5	* 1 17/32	1 17/32	429	122	211	5,300	96.0
	1 17/32	2 1/32	461	115	189	5,300	96.4
	1 17/32	2 11/16	492	109	164	5,300	96.9
	1 17/32	3 1/8	540	102	125	5,300	97.6
6	* 1½	1 17/32	440	124	239	6,270	96.2
	1½	2 5/32	473	115	199	6,270	96.8
	1½	2 11/16	500	111	186	6,270	97.0
	1½	3 1/8	515	107	172	6,270	97.2

COMBINATION COVERING FOR 800° F.

* Indicates Recommended Combinations

INNER LAYER CAREY ALLTEMP, OUTER LAYER SUPER-LIGHT 85% MAGNESIA

80° F. Ambient Air Temperature

Pipe Size In.	Inner Layer Thickness Inches	Outer Layer Thickness Inches	Temp. °F. at Inner Magnesia Surface	Canvas Temp. °F. with Air at 80° F.	B. T. U. Loss Per Lin. Ft. Per Hr.		Percent Eff. %
					Covered Pipe	Bare Pipe	
½	2 1/16	None	...	129	125	1,180	89.4
¾	1 31/32	None	...	134	143	1,460	90.2
1	2 1/8	None	...	133	154	1,820	91.5
1¼	1 15/16	None	...	141	182	2,270	92.0
1½	2 5/16	None	...	133	176	2,580	93.2
2	1 19/32	1 1/32	391	130	171	3,200	94.6
	* 1 19/32	1 17/32	438	121	154	3,200	95.2
	1 19/32	2 1/32	473	114	139	3,200	95.6
	1 19/32	2 9/16	505	110	136	3,200	95.7
	1 19/32	3 1/16	522	105	119	3,200	96.3
3	* 1 9/16	1½	458	125	183	4,640	96.0
	1 9/16	2 1/32	497	117	171	4,640	96.3
	1 9/16	2 17/32	524	113	157	4,640	96.6
	1 9/16	3 1/32	542	108	147	4,640	96.8
4	* 1 9/16	1 17/32	474	126	222	5,920	96.2
	1 9/16	2 1/32	511	119	198	5,920	96.6
	1 9/16	2 17/32	537	114	180	5,920	96.9
	1 9/16	3 1/8	560	109	165	5,920	97.2
5	1 17/32	1 17/32	489	129	254	7,260	96.5
	* 1 17/32	2 1/32	526	122	228	7,260	96.8
	1 17/32	2 11/16	562	114	198	7,260	97.2
	2 1/32	1 17/32	435	124	234	7,260	96.7
6	1½	1 17/32	502	131	289	8,600	96.6
	* 1½	2 5/32	547	123	246	8,600	97.1
	1½	2 11/16	572	117	223	8,600	97.4
	1½	3 1/8	588	113	208	8,600	97.5

PERFORMANCE DATA:

HEAT INSULATION

FOR

TEMPERATURES TO 600°F.

BULLETIN No. 104-A

Carey

THE PHILIP CAREY MFG. COMPANY
GENERAL OFFICES:
LOCKLAND, CINCINNATI 15, OHIO

2-4 INS 104-A-900

FOREWORD

85% Magnesia, with an enviable performance record of over seventy years, stands alone today as the accepted standard of thermal insulation. Men charged with the responsibility of designing and operating the many types of equipment that make up our modern industrial processes specify 85% Magnesia.

It is paramount to select a proven thermal insulation having the greatest resistance to the flow of heat—thus obtaining the maximum in economy. Mechanical properties adaptable to the particular problem must likewise be considered in balancing of savings against cost of insulation.

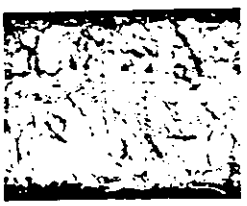
Super-Light 85% Magnesia combines thermal and mechanical characteristics, is a superior product compared to the old style filter molded 85% Magnesia, and has light weight, high strength, low conductivity, great resistance to moisture, smooth finish, accurate fit, shock resistance and high dimensional stability—it will not crack due to internal shrinkage when applied on hot surfaces up to 600° F. It effectively resists handling, shipping, impact and traffic; will not disintegrate, crack or crumble under normal service conditions, and may be removed for inspection of equipment and reapplied when necessary. It has excellent workability and high ductility. Carey Super-Light 85% Magnesia can be subjected to boiling water for hours without disintegration—a quality derived from its chemical "set" monolithic structure.

To assist in engineering calculations of problems in heat balance the data in this bulletin have been assembled. They will save much time. They reflect the care and accuracy of a specialized heat research laboratory, both as to performance of insulating materials and rates of loss from bare surfaces. Conductivity values used are averages from tests made at the Mellon Institute on numerous samples. The values for heat losses from uninsulated surfaces are those developed by R. H. Heilman, Senior Fellow of The Mellon Institute, based upon his experimental work in this field as published in the paper "Surface Heat Transmission," Trans. Am. Soc. Mech. Engrs. Fuel Steam Power, 51, 275, (1929). Since this work represents the most exhaustive research in this field, the data developed are probably the most reliable and give a satisfactory basis for evaluating heat-insulation savings.

Since Super-Light 85% Magnesia is so generally accepted a standard, a complete set of thermal tables is given for this product. A set of BASE THERMAL TABLES to be used in combination with factors is given for other types of insulating materials, making possible the development of similar data for such materials.

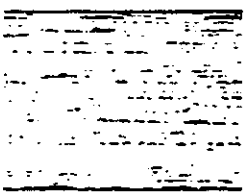
The Philip Carey Mfg. Company offers the services of its engineering organization and laboratories for assistance in individual engineering problems.

DESCRIPTIONS OF CAREY HEAT INSULATIONS



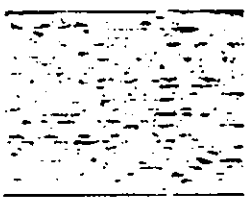
CAREY 85% MAGNESIA

For temperatures up to 600° F. Furnished in semi-cylindrical pipe covering sections for pipe sizes up to 18 inch and in curved blocks for larger pipe sizes. also in flat blocks. A molded composition of Carbonate of Magnesia and Asbestos Fiber. Incombustible, non-corrosive: crushing strength 60 lbs. per square inch: unaffected by water. Combines high efficiency with a very durable structure. Long-lasting—its insulating value improves with age. Structure is rigid but not brittle. Can be easily worked with ordinary carpenters' tools. Easily cut and formed to accommodate irregularities. The accepted quality standard for low, medium and high-pressure steam service where maximum permanent efficiency is desired.



ASBESTOS - SPONGE

For temperatures up to 700° F. Furnished in split cylindrical pipe covering sections for pipe sizes up to 36 in., also in flat blocks and sheets. A resilient structure comprising approximately 30 to 40 layers of Asbestos Paper per inch of thickness. The asbestos paper is processed with very small indentations, giving the finished product a spongy consistency, having very high insulating value. Asbestos-Sponge is specifically recommended for use on vibrating lines and for underground steam distribution lines because of its tough structure and because cylindrical pipe covering sections can be furnished for large pipe sizes.



CAREY DEFENDEX

For temperatures up to 550° F. Furnished in semi-cylindrical pipe covering sections for pipe sizes up to 36 in., also in flat blocks and sheets. A semi-rigid structure comprising approximately 20 to 22 alternating layers of flat and processed asbestos paper per inch of thickness. The processed asbestos paper contains innumerable very fine indentations which give proper spacing between succeeding layers. Defendex combines high efficiency, medium price and tough laminated asbestos structure. Recommended for low, medium and high-pressure steam service.



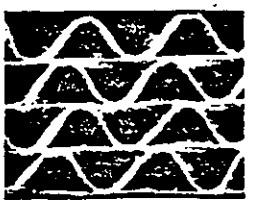
MINERAL WOOL BLANKETS

For temperatures up to 1200° F. Furnished in flexible blankets 1 in. to 6 in. thick, 2 ft. wide by 4 ft. or 8 ft. long consisting of mineral wool fibers felted to desired thickness and reinforced with wire mesh or metal lathe on both sides. These blankets combine the properties of high temperature resistance, high efficiency, low cost, flexibility and large-unit construction minimizing cracks and joints. Recommended primarily for use in enclosed walls of ovens and similar equipment.



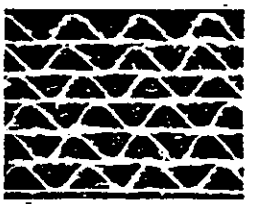
CAREY ALLTEMP

Produced from a formulation of expanded silicas and asbestos fiber. Available in sectional, tri-sectional, segmental and block forms. Alltemp is recommended for insulating high temperature piping and surfaces such as breaching, boiler walls, ovens, stills, and similar surfaces. It is an ideal insulator for irregular surfaces, due to its workability and ease of application. Its exceptionally low shrinkage factor, plus low co-efficient of conductivity, assures outstanding, economical performance when used as a single material or in combination with Carey Super-Light 85% magnesia. Alltemp is water resistant, and offers an excellent surface for cements. Now accepted and being used by principal boiler manufacturers, engineering contractors, and industry.



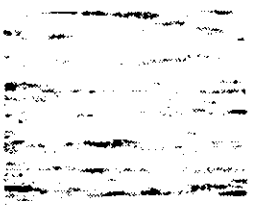
CAREY AIRCELL

For temperatures up to 300° F. Furnished in semi-cylindrical pipe covering sections for pipe sizes up to 36 in., also in flat blocks and sheets. A firm structure comprising alternate layers of corrugated and flat asbestos paper firmly cemented together. Corrugations are ¼ in. deep—4 plies per inch of thickness. The lowest cost, incombustible asbestos insulation. Recommended only for moderate temperature pipes and equipment where high efficiency and durability are not important.



CAREY EXCEL

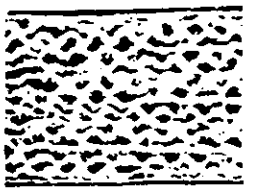
For temperatures up to 300° F. Furnished in semi-cylindrical pipe covering sections for pipe sizes up to 36 in., also in flat blocks and sheets. A firm structure comprising alternate layers of corrugated and flat asbestos paper firmly cemented together. Corrugations are 1/6 in. deep—6 plies per inch of thickness. Gives good efficiency and has more resistance to abuse and better appearance than Air Cell. Recommended for heating system piping and equipment.



CAREY THERMOGLAS

Thermoglas pipe covering is used on pipes having temperatures up to 350° F. It simply "snaps in place." Thermoglas is exceptionally lightweight insulation and is composed of long, fine, blown glass fibers bonded with thermal-setting phenolic resin. It is a strong, semi-rigid and resilient insulation, with no coarse fibers to irritate hands or skin. Thermoglas is an excellent cold, dual-temperature insulation when used with a vapor barrier jacket. Vapor barrier for dual temperatures is furnished in black and white. Other types of jacketing are Foil Faced Flame Proof Kraft jacket or weatherproof jacketing at 35, 45, or 55 lb. weights. Also available with standard weight 4-oz., 6-oz. and 8-oz. canvas jackets.

DESCRIPTIONS OF CAREY HEAT INSULATIONS



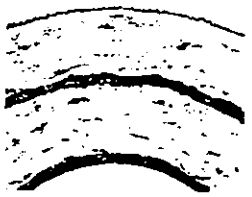
CAREY CAREYCEL

For temperatures up to 300° F. Furnished in semi-cylindrical pipe covering sections for pipe sizes up to 16 in., also in flat blocks and sheets. A firm structure comprising 12 to 14 layers of asbestos paper per inch thickness. The asbestos paper is processed with innumerable small indentations which space the layers, prevent internal convection, reduce conduction by contact and create high efficiency. Incombustible, non-corrosive, rugged, low heat shrinkage and inexpensive. Its unusually low heat shrinkage makes it particularly desirable—minimizing unsightly cracks and conserving high efficiency. Recommended for heating systems and low pressure process piping and equipment.



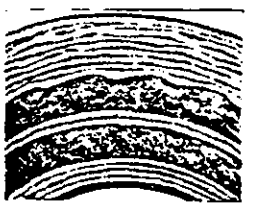
CAREY PERFECTO

For cold-water pipes to 55° F. Furnished only in semi-cylindrical pipe covering sections for pipe sizes up to 36 in. Not furnished in blocks or sheets. A semi-rigid structure comprising layers of indented organic insulating felt (sometimes termed "wool felt") firmly cemented together. Inner surface is lined with asphalt-saturated felt. Gives very high insulating value. Gives good results in preventing sweating and protecting from freezing. Recommended for service water piping carrying water down to 55° F.



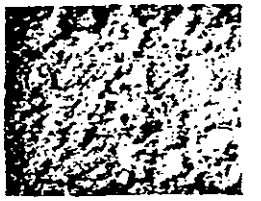
CAREY IMPERVO

For cold and ice water piping to 35° F. Furnished only in 3-foot long cylindrical pipe covering sections, for pipe sizes up to 36". Not furnished in blocks or sheets. A semi-rigid structure comprising layers of insulating felt cemented together with asphalt saturated organic felts applied to both inner and outer surfaces. Telescopic double layer construction recommended to provide staggered joint insulation and prevent air infiltration. Gives very high insulating value. Use for insulating chilled and ice water lines to keep water cold and prevent sweating. Proper sealing by use of a suitable vapor barrier is recommended to prevent infiltration of water vapor through the barrier into the insulation, causing condensation.



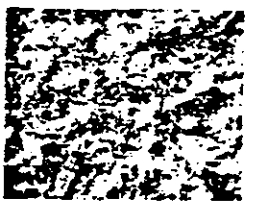
CAREY PROTECTO

Reduces the danger of freezing of exposed piping. Furnished only in 3-ft. long semi-cylindrical pipe covering sections, for pipe sizes up to 36". Not furnished in blocks or sheets. A semi-rigid structure, consisting of an inner portion of cattle hair felt and an outer, reinforced structure of insulating felt (sometimes termed "wool felt"). Furnished in 1¼" and 2" thicknesses. Inner surfaces are lined with asphalt-saturated felt. Gives very high insulating value and is especially designed for reducing danger of and delaying freezing time for unprotected water pipes. No insulation alone can prevent freezing, if the water stands still long enough. During extreme low temperature conditions, some water must be allowed to run during weekend or idle periods.



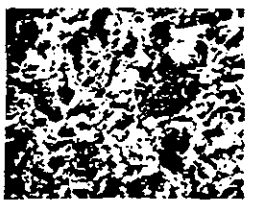
No. 303 ASBESTOS CEMENT

A general utility insulating cement. Furnished in 100-lb. bags. Composed of a dry mixture of asbestos fibers and bonding clays. To use, it is mixed with water to a mortar consistency for application with a trowel. It adheres well to iron surfaces or to insulating materials, and trowels to a smooth finish. Covering capacity is approximately 18 sq. ft. 1 in. thick per 100 lbs. of dry cement. Recommended for pointing up joints in block insulation, for insulating small fittings in low-pressure systems and primarily for a smooth-finish coat over block insulation.



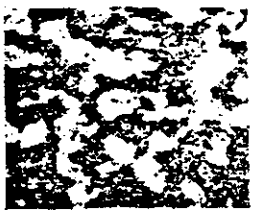
No. 707 ASBESTOS CEMENT

For temperatures up to 500° F. Furnished in 100-lb. bags. Composed of a dry mixture of asbestos fibers and bonding clays. To use, it is mixed with water to a mortar consistency for application with a trowel. It adheres well to iron or insulation surfaces, and trowels to a semi-smooth finish. Covering capacity is approximately 25 sq. ft. 1 in. thick per 100 lbs. of dry cement. Recommended for pointing up joints in block insulation, for insulating small fittings and for a finish coat over block insulation where high efficiency rather than smooth finish is desired.



CAREY MW-50 CEMENT

For temperatures up to 1600° F. Furnished in 50-lb. bags. Composed of a dry mixture of springy pellets of mineral wool, asbestos fiber and bonding clay. To use, it is mixed with water and applied with a trowel. Covering capacity is approximately 50 sq. ft. 1 in. thick per 100 lbs. of dry cement. Combines high insulating efficiency, toughness, reasonable hardness, excellent sticking properties and relative freedom from shrinkage cracks. Recommended as monolithic insulation for stills, tanks, furnace walls, etc. particularly where temperatures of 600° F. or higher are encountered.



CAREY MW-ONE CEMENT

A one-coat, white finishing. Furnished in 50-lb. bags. Composed of mineral wool pellets and other ingredients, giving an all-purpose, fast setting, finishing cement that insulates as well as protects. One-coat application, in the required thickness, saves time, labor and money. Hydraulic setting takes place in two hours. MW-One may be used directly over insulation and as a finishing cement for MW-50. Covering capacity for MW-One cement is approximately 35 sq. ft., 1" thick, for 100 lbs. Can be furnished for temperatures up to 1800° F. (grey finish) and for use over non-ferrous materials in lots of 100 bags minimum.

HEAT INSULATION FACTORS

A complete set of performance tables for Super-Light 85% Magnesia will be found on pages 905 to 909 inclusive.

Performance values for other Carey heat insulation materials can be obtained by using the following table of factors which give heat transmission relationships. These factors provide a quick and simple method of obtaining insulating values without the use of voluminous tables for each insulating material, and the per cent of error involved by their use is very small—generally less than the variation in heat transmission between different samples of the same material. The heat losses and efficiencies of the various Carey insulations can be determined by the use of these factors applied to the BASE THERMAL TABLES given on Pages 910 to 914 inclusive of this bulletin.

	TEMPERATURE DIFFERENCE, DEGREES FAHRENHEIT BETWEEN HEATED SURFACE AND AIR					
TYPE OF INSULATION	100	200	300	400	500	600
Aircell	1.400	1.444	1.488	....	....	....
Asbestos Sponge	1.050	1.048	1.045	1.043	1.040	
Careycel	1.090	1.110	1.130	....	....	
Carocel	1.400	1.410	1.420	....	....	
Defendex	1.143	1.171	1.199	1.227	1.255	
Excel	1.360	1.376	1.392	....	....	....
Alltemp	1.228	1.205	1.182	1.159	1.136	1.113
Thermoglas	.722	.712	.702	.692	....	....
Hi-Temp No. 19	1.475	1.408	1.340	1.273	1.205	1.138
Impervo	0.936	0.949	....	....	....	....
Mineral Wool Blanket	0.718	0.746	0.773	0.801	0.828	0.856
Perfecto	0.919	0.907	....	....	....	....
Protecto	0.840	0.812	....	....	....	....
303 Asbestos Cement	3.72	3.49	3.26	....	....	....
707 Asbestos Cement	2.362	2.295	2.228	2.161	2.094	2.027
MW-50 Cement	1.547	1.499	1.451	1.403	1.355	1.307
MW-One Cement	1.622	1.552	1.482	1.412	1.342	1.272

To find UNIT HEAT LOSS (B. T. U. per square foot per °F. temperature difference between iron and air per hour) multiply the unit loss for corresponding conditions in the BASE THERMAL TABLES by the heat insulation factor of the insulation for which this information is wanted.

Example: What is the unit heat loss (B. T. U. per square foot per ° F. temperature difference between iron and surrounding air per hour) for Carocel Covering 1" thick, for 3" pipe at 200° F. temperature difference between pipe and the surrounding air (steam in pipe at 270° F. and air temperature of room 70° F.)?

Heat insulation factor for Carocel at 200° F. temperature difference from table is 1.410.

Unit heat loss from BASE THERMAL TABLES for 1" thickness for 3" pipe at 200° F. temperature difference between pipe and surrounding air is 0.419 from table on page 910.

0.419 x 1.410 = 0.590 B. T. U. per square foot per degree F. temperature difference between pipe and air per hour.

To find the EFFICIENCY of a Carey insulation listed in the table of factors, first find from BASE THERMAL TABLES the efficiency of the corresponding Covering for the conditions involved—subtract this from 100—multiply the difference by the heat insulation factor—subtract this product from 100.

Example: What is the efficiency of Carey Carocel Covering 1" thick for 3" pipe at 200° F. temperature difference between pipe and the surrounding air?

Heat insulation factor for Carocel at 200° F. temperature difference from table is 1.410. Efficiency of 1" thick BASE THERMAL TABLE Covering for same conditions is 84.9% from page 910.

100 — 84.9 = 15.1.

15.1 x 1.410 = 21.29.

100 — 21.29 = 78.71% efficiency desired.

To find the SAVINGS in B. T. U. per lineal foot per hour for a Carey insulation shown in the table, first determine its efficiency as indicated above, multiply this efficiency by the corresponding saving for BASE THERMAL TABLE Covering under the same conditions of pipe size, temperature and thickness, and divide by the efficiency of BASE THERMAL TABLE Covering for these same conditions.

Example: What are the savings in B. T. U. per lineal foot of pipe per hour for Carey Carocel Covering 1" thick for 3" pipe at 200° F. temperature difference between pipe and surrounding air?

Heat insulation factor for Carocel at 200° F. from table is 1.410.

The efficiency of Carocel under these conditions is 78.71% (see previous example).

Efficiency of BASE THERMAL TABLE Covering under these conditions is 84.9% from the table on page 910.

Savings by BASE THERMAL TABLE Covering under same conditions are 431 B. T. U. per lineal foot per hour from table on page 910.

$$431 \times \frac{78.71}{84.9} = 398$$ B. T. U. per lineal foot per hour, savings required.

CAREY SUPER-LIGHT 85% MAGNESIA PIPE COVERING

Nominal 1½" Thick

EFFICIENCIES, HEAT SAVINGS AND UNIT HEAT LOSSES

Savings are in B. T. U. per linear foot of pipe per hour. *Unit losses* are in B. T. U. per square foot of pipe surface per hour per °F. temperature difference between pipe and surrounding air.

Pipe Size		TEMPERATURE DIFFERENCE °F. BETWEEN PIPE AND SURROUNDING AIR									
		100	150	200	250	300	350	400	450	500	550
½"	% Efficiency	79.6%	81.4%	82.7%	83.8%	84.8%	85.6%	86.6%	87.3%	88.0%	88.8%
	Savings	43	75	113	157	209	268	340	420	511	615
	Unit Loss	.505	.521	.537	.553	.569	.585	.600	.616	.632	.648
¾"	% Efficiency	80.8%	82.4%	83.7%	84.8%	85.7%	86.5%	87.4%	88.1%	88.8%	89.4%
	Savings	54	93	140	196	260	333	423	522	636	764
	Unit Loss	.466	.481	.495	.510	.525	.540	.554	.569	.584	.598
1"	% Efficiency	83.1%	84.5%	85.6%	86.6%	87.4%	88.1%	88.9%	89.6%	90.2%	90.7%
	Savings	68	117	176	245	326	418	530	654	797	957
	Unit Loss	.403	.416	.429	.442	.455	.468	.480	.493	.506	.519
1¼"	% Efficiency	84.6%	85.8%	87.0%	87.8%	88.6%	89.3%	90.0%	90.6%	91.1%	91.6%
	Savings	86	147	222	309	411	527	668	825	1005	1208
	Unit Loss	.360	.371	.382	.394	.405	.416	427	438	450	461
1½"	% Efficiency	84.6%	86.0%	87.0%	87.9%	88.6%	89.3%	90.0%	90.6%	91.2%	91.7%
	Savings	97	167	251	350	465	596	757	936	1140	1371
	Unit Loss	.355	.366	.377	.389	.400	411	422	433	445	456
2"	% Efficiency	85.9%	87.1%	88.1%	88.9%	89.6%	90.2%	90.9%	91.4%	91.9%	92.4%
	Savings	121	208	312	426	579	743	943	1166	1421	1709
	Unit Loss	.320	330	340	.350	360	.371	.381	.391	.401	411
2½"	% Efficiency	85.1%	86.4%	87.4%	88.3%	89.0%	89.6%	90.4%	90.9%	91.5%	92.0%
	Savings	143	246	370	516	687	883	1123	1389	1695	2041
	Unit Loss	333	.344	354	.365	.376	.387	.397	.408	.419	429
3"	% Efficiency	87.0%	88.1%	89.0%	89.8%	90.4%	91.0%	91.6%	92.2%	92.6%	93.0%
	Savings	175	301	452	630	838	1077	1369	1694	2066	2487
	Unit Loss	286	295	304	314	.323	.332	.341	.350	.360	369
3½"	% Efficiency	85.6%	86.8%	87.8%	88.6%	89.4%	90.0%	90.7%	91.3%	91.8%	92.3%
	Savings	195	336	504	705	939	1207	1537	1904	2325	2802
	Unit Loss	.314	324	335	.345	.356	.366	.376	.387	.397	408
4"	% Efficiency	87.6%	88.6%	89.5%	90.2%	90.8%	91.4%	92.1%	92.5%	93.0%	93.4%
	Savings	223	382	574	801	1065	1370	1744	2159	2636	3175
	Unit Loss	268	277	285	294	.302	.311	.319	.328	336	345
4½"	% Efficiency	86.0%	87.2%	88.2%	89.0%	89.7%	90.3%	91.0%	91.6%	92.1%	92.6%
	Savings	241	415	624	872	1162	1495	1905	2362	2885	3479
	Unit Loss	299	309	319	329	.339	.349	.358	368	.378	388
5"	% Efficiency	87.9%	88.9%	89.7%	90.5%	91.1%	91.6%	92.2%	92.7%	93.2%	93.6%
	Savings	272	467	701	979	1303	1677	2135	2644	3230	3893
	Unit Loss	258	266	275	283	.292	300	.308	.317	.325	334
6"	% Efficiency	87.9%	89.0%	89.8%	90.5%	91.2%	91.7%	92.3%	92.8%	93.2%	93.6%
	Savings	320	549	825	1154	1537	1978	2520	3125	3818	4604
	Unit Loss	.253	261	270	278	.286	.295	.303	311	.319	.328
7"	% Efficiency	88.3%	89.3%	90.1%	90.8%	91.4%	92.0%	92.6%	93.0%	93.5%	93.9%
	Savings	366	628	945	1320	1760	2266	2887	3581	4377	5289
	Unit Loss	.243	251	259	267	.275	.283	.291	.299	307	.315
8"	% Efficiency	88.4%	89.4%	90.2%	90.9%	91.5%	92.1%	92.7%	93.1%	93.6%	93.9%
	Savings	411	706	1061	1484	1979	2548	3250	4032	4930	5947
	Unit Loss	.238	246	254	262	.270	.278	.285	.293	.301	309
9"	% Efficiency	88.5%	89.5%	90.3%	91.0%	91.6%	92.1%	92.5%	93.2%	93.6%	94.0%
	Savings	456	782	1177	1647	2196	2829	3599	4476	5478	6614
	Unit Loss	.235	243	.250	258	.266	.274	.281	.289	.297	.304
10"	% Efficiency	89.0%	89.9%	90.7%	91.4%	92.0%	92.5%	93.0%	93.5%	93.9%	94.3%
	Savings	508	872	1311	1834	2446	3152	4021	4993	6108	7372
	Unit Loss	.224	.231	.239	246	.253	.261	.268	.275	.282	.290
12"	% Efficiency	88.9%	89.9%	90.7%	91.4%	91.9%	92.5%	93.0%	93.5%	93.9%	94.2%
	Savings	596	1022	1538	2154	2874	3706	4731	5875	7192	8684
	Unit Loss	.222	.229	.237	.244	.252	.259	.266	.274	.281	.289
14"	% Efficiency	88.6%	89.6%	90.4%	91.1%	91.7%	92.2%	92.8%	93.3%	93.7%	94.1%
	Savings	648	1112	1674	2346	3132	4039	5159	6412	7850	9486
	Unit Loss	.227	.235	.242	.250	.257	.265	.273	.280	.288	.295
16"	% Efficiency	88.7%	89.6%	90.5%	91.1%	91.8%	92.3%	92.9%	93.3%	93.8%	94.1%
	Savings	735	1261	1899	2661	3556	4588	5863	7289	8931	10792
	Unit Loss	.224	232	.239	.247	.254	.262	.269	.277	.284	.292
18"	% Efficiency	88.8%	89.7%	90.5%	91.2%	91.8%	92.3%	92.9%	93.4%	93.8%	94.2%
	Savings	821	1410	2124	2979	3981	5136	6570	8170	10014	12105
	Unit Loss	.222	229	.237	.244	.252	.259	.266	.274	.281	289
Flat Vertical 1½" Th'k.	% Efficiency	90.4%	91.2%	91.9%	92.5%	92.9%	93.4%	93.8%	94.2%	94.6%	94.9%
	Savings	194	332	497	692	920	1181	1501	1857	2265	2726
	Unit Loss	.205	.212	.219	.226	.233	.240	.246	253	.260	267

All data from Mellon Institute, University of Pittsburgh tests.

HEAT INSULATION FACTORS

To find **CANVAS TEMPERATURES** for any insulation, multiply the unit loss for corresponding conditions in the Base Thermal Tables by the heat insulation factor of the insulation for which the canvas temperature is wanted. Then find the outer diameter of the insulation by adding twice the thickness of the insulation to the pipe diameter. Multiply the new unit loss by the temperature difference between the pipe and the air, and by the ratio of the inner to the outer diameter of the covering to obtain the BTU loss per sq. ft. of canvas. From Figure "Surface Losses for Various Outside Diameters" find the temperature difference between the canvas surface and the air corresponding to the BTU loss per sq. ft. of canvas and the Outside diameter of the covering. Add 80° F to this value to obtain the canvas temperatures for 80° F surrounding air.

Example: What is the canvas temperature for Asbestos Sponge Covering 2″ thick, for 3-in. pipe at 400° F temperature difference between the pipe and the surrounding air? Heat Insulation factor for Asbestos Sponge at 400° F temperature difference from table is 1.043. Unit heat loss from "Base Thermal Tables" for 2″ thickness for 3-in. pipe at 400° F temperature difference between pipe and surrounding air is 0.313 from table on page 912. 0.313 x 1.043 = 0.326 BTU per square foot per F temperature difference between pipe and air per hour. The outer diameter of a 3-in. pipe is 3.5″. Twice the thickness of the insulation is 4″. The outer diameter of the insulation is therefore 3.5 x 4 or 7.5″. 0.326 x 400 x $\frac{3.5}{7.5}$ = 60.9 BTU per square foot of canvas surface per hour.

From the bottom of page 8, Bulletin 102-A, for a heat loss of 60.9 BTU follow the vertical line until it intersects the 7.5″ line (interpolated between the 6″ and the 8″ lines), then follow horizontally to the left to where this line intersects the 37° F temperature difference line. Add 80° F to 37° F temperature difference to obtain 117° F, the canvas temperature for 80° F air.

HEAT INSULATION DATA

CAREY SUPER-LIGHT 85% MAGNESIA PIPE COVERING

Nominal 1″ Thick

EFFICIENCIES, HEAT SAVINGS AND UNIT HEAT LOSSES

Savings are in B. T. U. per linear foot of pipe per hour. *Unit losses* are in B. T. U. per square foot of pipe surface per hour per °F. temperature difference between pipe and surrounding air.

Pipe Size		TEMPERATURE DIFFERENCE °F. BETWEEN PIPE AND SURROUNDING AIR									
		100	150	200	250	300	350	400	450	500	550
½″	% Efficiency	75.2%	77.3%	78.9%	80.3%	81.4%	82.4%	83.5%	84.5%	85.3%	86.1%
	Savings	41	71	108	151	201	258	328	406	495	596
	Unit Loss	.614	.634	.654	.674	.694	.715	.735	.755	.775	.795
¾″	% Efficiency	76.0%	78.0%	79.5%	80.8%	82.0%	83.0%	84.0%	84.9%	85.8%	86.5%
	Savings	51	88	133	186	248	320	407	503	614	740
	Unit Loss	.584	.604	.623	.643	.662	.682	.702	.721	.741	.760
1″	% Efficiency	79.6%	81.3%	82.6%	83.8%	84.7%	85.6%	86.5%	87.3%	88.0%	88.7%
	Savings	65	113	170	237	316	406	516	638	778	936
	Unit Loss	.487	.503	.519	.535	.551	.567	.583	.599	.615	.631
1¼″	% Efficiency	78.9%	80.6%	82.0%	83.2%	84.2%	85.1%	86.1%	86.9%	87.6%	88.3%
	Savings	80	139	209	293	390	502	639	792	966	1164
	Unit Loss	.494	.511	.528	.544	.561	.578	.595	.612	.628	.645
1½″	% Efficiency	81.0%	82.5%	83.8%	84.9%	85.7%	86.6%	87.5%	88.2%	88.9%	89.5%
	Savings	93	160	242	338	450	578	736	911	1112	1338
	Unit Loss	.440	.455	.470	.485	.500	.515	.529	.544	.559	.574
2″	% Efficiency	82.2%	83.7%	84.9%	85.9%	86.8%	87.5%	88.4%	89.1%	89.7%	90.3%
	Savings	116	200	301	421	561	721	918	1136	1387	1670
	Unit Loss	.404	.418	431	445	.458	472	.485	.499	.512	.526
2½″	% Efficiency	82.8%	84.3%	85.4%	86.4%	87.2%	88.0%	88.8%	89.5%	90.1%	90.7%
	Savings	139	240	361	505	673	866	1130	1367	1669	2011
	Unit Loss	.384	.397	410	423	436	.449	461	.474	487	.500
3″	% Efficiency	83.0%	84.5%	85.6%	86.6%	87.5%	88.2%	89.0%	89.7%	90.3%	98.8%
	Savings	167	288	435	608	811	1044	1329	1648	2014	2428
	Unit Loss	.373	.386	.398	.411	.423	.436	.449	.461	.474	.486
3½″	% Efficiency	85.6%	86.6%	87.2%	88.6%	89.4%	90.0%	90.7%	91.3%	91.8%	92.3%
	Savings	195	335	477	705	939	1207	1537	1904	2325	2019
	Unit Loss	.314	.324	335	.345	.356	.366	.376	.387	.397	.408
4″	% Efficiency	84.0%	85.3%	86.4%	87.3%	88.2%	88.9%	89.7%	90.3%	90.9%	91.4%
	Savings	214	368	554	775	1034	1332	1698	2016	2575	3106
	Unit Loss	.346	.358	.369	.381	.393	.405	.416	.428	.440	.451
4½″	% Efficiency	86.0%	87.2%	88.2%	89.0%	89.7%	90.3%	91.0%	91.6%	92.1%	92.6%
	Savings	241	415	624	872	1162	1495	1905	2362	2885	3479
	Unit Loss	.299	.309	.319	.329	.339	.349	.358	.368	.378	.388
5″	% Efficiency	84.0%	85.4%	86.5%	87.4%	88.2%	88.9%	89.7%	90.3%	90.9%	91.5%
	Savings	260	448	675	945	1262	1627	2075	2576	3152	3805
	Unit Loss	.340	.352	.363	.375	.386	.398	.410	.421	.433	.444
6″	% Efficiency	83.9%	85.3%	86.4%	87.3%	88.1%	88.8%	89.6%	90.3%	90.9%	91.4%
	Savings	305	526	793	1112	1486	1916	2447	3040	3720	4494
	Unit Loss	.338	.350	.361	.373	.385	.397	.408	.420	.432	.443
Flat Vertical 1″ Th'k.	% Efficiency	86.4%	87.6%	88.5%	89.3%	89.9%	90.5%	91.2%	91.7%	92.2%	92.6%
	Savings	185	318	478	668	890	1145	1458	1808	2208	2661
	Unit Loss	.291	.301	.312	.322	.332	.343	.353	.363	.373	.384

All data from Mellon Institute, University of Pittsburgh tests.

CAREY SUPER-LIGHT 85% MAGNESIA PIPE COVERING

Nominal 2" Thick

EFFICIENCIES, HEAT SAVINGS AND UNIT HEAT LOSSES

Savings are in B. T. U. per linear foot of pipe per hour. *Unit losses* are in B. T. U. per square foot of pipe surface per hour per °F. temperature difference between pipe and surrounding air.

Pipe Size		TEMPERATURE DIFFERENCE °F. BETWEEN PIPE AND SURROUNDING AIR									
		100	150	200	250	300	350	400	450	500	550
½"	% Efficiency	81.8%	83.4%	84.6%	85.6%	86.5%	87.2%	88.1%	88.7%	89.4%	90.0%
	Savings	45	77	115	161	213	273	346	427	519	623
	Unit Loss	.451	.465	.478	.492	.506	.520	.533	.547	.561	.574
¾"	% Efficiency	83.2%	84.6%	85.8%	86.7%	87.5%	88.2%	89.0%	89.6%	90.2%	90.8%
	Savings	56	96	144	200	265	340	431	531	646	775
	Unit Loss	.408	.421	.433	.446	.459	.472	.484	.497	.510	.522
1"	% Efficiency	85.2%	86.5%	87.5%	88.3%	89.0%	89.7%	90.4%	90.9%	91.4%	91.9%
	Savings	70	120	180	250	332	425	539	664	808	970
	Unit Loss	.352	.363	.374	.385	.396	.407	.418	.429	.440	.451
1¼"	% Efficiency	85.8%	87.1%	88.0%	88.8%	89.5%	90.1%	90.8%	91.3%	91.9%	92.3%
	Savings	87	150	224	313	415	532	674	832	10.3	1217
	Unit Loss	.331	.341	.352	.362	.372	.383	.393	.403	.413	424
1½"	% Efficiency	87.7%	88.7%	89.6%	90.3%	90.9%	91.4%	92.0%	92.5%	92.9%	93.3%
	Savings	101	172	258	359	477	611	774	955	1162	1396
	Unit Loss	.285	.294	.303	.311	.320	.329	.338	.347	.355	.364
2"	% Efficiency	88.0%	89.1%	89.9%	90.6%	91.2%	91.7%	92.3%	92.7%	93.2%	93.6%
	Savings	124	213	319	444	589	755	958	1183	1441	1731
	Unit Loss	.272	.280	.289	297	.306	.314	.322	.331	.339	.348
2½"	% Efficiency	89.3%	90.2%	91.0%	91.6%	92.1%	92.6%	93.1%	93.5%	93.9%	94.3%
	Savings	150	257	385	536	711	912	1157	1429	1740	2091
	Unit Loss	.239	.247	254	.262	269	.277	.284	.292	.299	.307
3"	% Efficiency	89.0%	90.0%	90.8%	91.4%	92.0%	92.4%	93.0%	93.4%	93.8%	94.2%
	Savings	179	307	461	642	853	1094	1389	1717	2093	2517
	Unit Loss	.241	.249	.256	.264	.271	.279	.287	.294	.302	.309
3½"	% Efficiency	90.0%	90.9%	91.6%	92.2%	92.7%	93.1%	93.6%	94.0%	94.4%	94.7%
	Savings	205	351	526	733	974	1249	1587	1962	2391	2877
	Unit Loss	.217	.224	230	.237	244	.251	.257	.264	271	.277
4"	% Efficiency	89.7%	90.6%	91.3%	91.9%	92.4%	92.9%	93.4%	93.8%	94.2%	94.5%
	Savings	228	390	585	816	1084	1392	1769	2189	2669	3213
	Unit Loss	.223	.230	.237	.244	251	.258	.265	.272	.279	.286
4½"	% Efficiency	89.0%	89.9%	90.7%	91.3%	91.9%	92.4%	93.0%	93.4%	93.8%	94.2%
	Savings	250	427	641	895	1190	1529	1945	2408	2939	3539
	Unit Loss	.236	.244	.251	.259	266	.274	.281	.289	.296	.304
5"	% Efficiency	90.0%	90.8%	91.6%	92.2%	92.7%	93.1%	93.6%	94.0%	94.4%	94.7%
	Savings	278	477	715	997	1326	1704	2167	2682	3272	3942
	Unit Loss	.213	.220	.226	.233	.240	.247	.253	.260	.267	.273
6"	% Efficiency	90.2%	91.1%	91.8%	92.4%	92.9%	93.3%	93.8%	94.2%	94.6%	94.9%
	Savings	328	562	843	1177	1566	2013	2561	3173	3873	4666
	Unit Loss	.205	.211	.218	.224	231	.237	.243	.250	.256	.263
7"	% Efficiency	90.4%	91.3%	91.9%	92.5%	93.0%	93.4%	93.9%	94.3%	94.7%	95.0%
	Savings	375	642	963	1345	1791	2302	29.0	3631	4435	5345
	Unit Loss	.199	.205	212	.218	.224	231	.237	.243	.249	.256
8"	% Efficiency	90.6%	91.4%	92.1%	92.6%	93.1%	93.6%	94.1%	94.4%	94.8%	95.1%
	Savings	421	721	1083	1512	2013	2590	3298	4089	4995	6021
	Unit Loss	.194	.200	.206	.213	.219	.225	.2.1	.237	.244	.250
9"	% Efficiency	91.1%	91.9%	92.5%	93.1%	93.5%	93.9%	94.4%	94.8%	95.1%	95.4%
	Savings	469	803	1206	1684	2242	2885	3674	4555	5565	6712
	Unit Loss	.182	.188	.193	.199	.205	.211	.216	.222	.228	.233
10"	% Efficiency	91.0%	91.8%	92.4%	93.0%	93.5%	93.9%	94.3%	94.7%	95.0%	95.4%
	Savings	520	889	1336	1866	2486	3200	4078	5059	6192	7458
	Unit Loss	.183	.189	.194	200	.206	.212	.217	.223	.229	.234
12"	% Efficiency	91.2%	92.0%	92.6%	93.2%	93.7%	94.1%	94.5%	94.9%	95.2%	95.5%
	Savings	611	1046	1572	2196	2928	3770	4807	5963	7294	8789
	Unit Loss	.176	.182	.187	.193	.198	.204	.209	.215	.220	.226
14"	% Efficiency	90.9%	91.7%	92.3%	92.9%	93.4%	93.8%	94.3%	94.6%	95.0%	95.3%
	Savings	664	1138	1709	2392	3190	4109	5241	6506	7960	9609
	Unit Loss	.182	.188	.194	.199	.205	.211	.217	.223	.228	.234
16"	% Efficiency	91.0%	91.7%	92.4%	93.0%	93.5%	93.9%	94.3%	94.7%	95.1%	95.4%
	Savings	754	1291	1940	2714	3622	4667	5957	7399	9054	10935
	Unit Loss	.179	.185	.190	.196	.202	.208	.213	.219	.225	.230
18"	% Efficiency	91.0%	91.8%	92.4%	93.0%	93.5%	93.9%	94.4%	94.8%	95.1%	95.4%
	Savings	842	1443	2171	3038	4056	5227	6674	8193	10153	12266
	Unit Loss	.177	.183	.188	.194	.199	.205	.211	.216	.222	.227
Flat Vertical 2" Th'k.	% Efficiency	92.6%	93.2%	93.7%	94.2%	94.6%	94.9%	95.2%	95.5%	95.8%	96.1%
	Savings	199	339	507	705	936	1201	1524	1883	2295	2760
	Unit Loss	.159	.164	.169	.174	.179	.185	.190	.195	.200	.205

All data from Mellon Institute, University of Pittsburgh tests.

CAREY SUPER-LIGHT 85% MAGNESIA PIPE COVERING

Nominal 2½" Thick

EFFICIENCIES, HEAT SAVINGS AND UNIT HEAT LOSSES

Savings are in B. T. U. per linear foot of pipe per hour. *Unit losses* are in B. T. U. per square foot of pipe surface per hour per °F. temperature difference between pipe and surrounding air.

Pipe Size		TEMPERATURE DIFFERENCE °F. BETWEEN PIPE AND SURROUNDING AIR									
		100	150	200	250	300	350	400	450	500	550
½"	% Efficiency	82.7%	84.2%	85.4%	86.4%	87.2%	87.9%	88.7%	89.3%	90.0%	90.5%
	Savings	45	78	117	162	215	275	349	430	522	627
	Unit Loss	.428	.441	.454	.466	.479	.492	.505	.518	.530	.543
¾"	% Efficiency	85.4%	86.6%	87.6%	88.4%	89.2%	89.8%	90.5%	91.0%	91.5%	92.0%
	Savings	57	98	147	204	270	346	438	539	655	786
	Unit Loss	.356	.367	.377	.388	.398	.409	.420	.430	.441	.451
1"	% Efficiency	86.6%	87.8%	88.7%	89.4%	90.1%	90.7%	91.3%	91.8%	92.3%	92.7%
	Savings	71	122	182	253	336	430	544	671	816	979
	Unit Loss	.319	.329	.339	.348	.357	.367	.377	.386	.396	.405
1¼"	% Efficiency	87.4%	88.5%	89.4%	90.1%	90.7%	91.3%	91.8%	92.3%	92.8%	93.2%
	Savings	89	152	228	317	420	538	682	841	1023	1228
	Unit Loss	.294	.303	.312	.321	.330	.339	.348	.357	.366	.375
1½"	% Efficiency	88.8%	89.8%	90.5%	91.2%	91.8%	92.2%	92.8%	93.2%	93.6%	94.0%
	Savings	102	174	261	363	481	616	780	962	1171	1405
	Unit Loss	.259	.267	.275	.282	.290	.298	.306	.314	.321	.329
2"	% Efficiency	89.3%	90.2%	90.9%	91.6%	92.1%	92.6%	93.1%	93.5%	93.9%	94.3%
	Savings	126	216	323	449	595	763	967	1193	1452	1744
	Unit Loss	.243	.250	.258	.265	.273	.280	.287	.295	.302	.310
2½"	% Efficiency	89.3%	90.2%	91.0%	91.6%	92.1%	92.6%	93.1%	93.5%	93.9%	94.3%
	Savings	150	257	385	536	711	912	1157	1429	1740	2091
	Unit Loss	.239	.246	.254	.261	.269	.276	.283	.291	.298	.306
3"	% Efficiency	90.4%	91.4%	91.9%	92.5%	93.0%	93.4%	93.8%	94.2%	94.6%	94.9%
	Savings	182	312	466	649	862	1105	1402	1732	2110	2537
	Unit Loss	.211	.218	.224	.231	.237	.244	.251	.257	.264	.270
3½"	% Efficiency	91.2%	92.0%	92.6%	93.1%	93.5%	93.9%	94.4%	94.7%	95.1%	95.4%
	Savings	208	355	532	740	983	1260	1599	1976	2408	2895
	Unit Loss	.192	.198	.204	.210	.216	.222	.227	.233	.239	.245
4"	% Efficiency	91.0%	91.8%	92.4%	93.0%	93.4%	93.8%	94.3%	94.6%	95.0%	95.3%
	Savings	232	396	593	825	1096	1406	1786	2208	2691	3238
	Unit Loss	.194	.200	.206	.212	.218	.224	.230	.236	.242	.248
4½"	% Efficiency	91.7%	92.4%	93.0%	93.5%	94.0%	94.3%	94.7%	95.1%	95.4%	95.7%
	Savings	257	439	658	916	1217	1561	1982	2451	2988	3595
	Unit Loss	.177	.183	.188	.194	.199	.205	.210	.216	.221	.227
5"	% Efficiency	91.4%	92.1%	92.8%	93.3%	93.7%	94.1%	94.5%	94.9%	95.2%	95.5%
	Savings	283	483	724	1009	1341	1722	2188	2707	3301	3974
	Unit Loss	.183	.189	.194	.200	.205	.211	.217	.222	.228	.233
6"	% Efficiency	91.6%	92.4%	92.9%	93.5%	93.9%	94.3%	94.7%	95.0%	95.4%	95.6%
	Savings	333	570	854	1191	1583	2034	2586	3201	3905	4702
	Unit Loss	.176	.181	.187	.192	.198	.203	.208	.214	.219	.225
7"	% Efficiency										
	Savings										
	Unit Loss										
8"	% Efficiency	92.3%	92.9%	93.5%	94.0%	94.4%	94.8%	95.2%	95.5%	95.8%	96.0%
	Savings	430	726	1100	1534	2041	2623	3338	4135	5048	6080
	Unit Loss	.158	.163	.168	.173	.178	.183	.187	.192	.197	.202
9"	% Efficiency	92.4%	93.1%	93.7%	94.1%	94.5%	94.9%	95.3%	95.6%	95.8%	96.1%
	Savings	476	814	1221	1703	2266	2913	3707	4594	5610	6762
	Unit Loss	.155	.160	.164	.169	.174	.179	.183	.188	.193	.197
10"	% Efficiency	92.3%	93.0%	93.5%	94.0%	94.4%	94.8%	95.2%	95.5%	95.8%	96.1%
	Savings	527	901	1352	1887	2512	3231	4114	5101	6232	7513
	Unit Loss	.156	.161	.166	.170	.175	.180	.185	.190	.194	.199
12"	% Efficiency	92.6%	93.2%	93.8%	94.2%	94.6%	95.0%	95.4%	95.7%	95.9%	96.2%
	Savings	620	1060	1591	2221	2958	3806	4849	6013	7344	8864
	Unit Loss	.149	.154	.158	.163	.168	.173	.177	.182	.187	.191
14"	% Efficiency	92.3%	93.0%	93.5%	94.1%	94.5%	94.8%	95.2%	95.5%	95.8%	96.1%
	Savings	675	1154	1732	2422	3226	4152	5292	6566	8028	9686
	Unit Loss	.153	.158	.163	.167	.172	.177	.182	.187	.191	.196
16"	% Efficiency	92.4%	93.1%	93.7%	94.1%	94.5%	94.9%	95.3%	95.6%	95.9%	96.1%
	Savings	766	1309	1966	2748	3663	4717	6015	7467	9132	11220
	Unit Loss	.150	.155	.159	.164	.169	.174	.178	.183	.188	.192
18"	% Efficiency	92.5%	93.1%	93.7%	94.2%	94.6%	94.9%	95.3%	95.6%	95.9%	96.2%
	Savings	856	1464	2200	3075	4102	5283	6740	8370	10240	12365
	Unit Loss	.148	.153	.157	.162	.166	.171	.176	.180	.185	.189
Flat Vertical 2½" Th'k.	% Efficiency	93.9%	94.5%	94.9%	95.3%	95.6%	95.8%	96.1%	96.4%	96.6%	96.8%
	Savings	201	343	513	713	946	1212	1538	1899	2313	2781
	Unit Loss	.130	.134	.138	.142	.146	.151	.155	.159	.163	.167

All data from Mellon Institute, University of Pittsburgh tests.

CAREY SUPER-LIGHT 85% MAGNESIA PIPE COVERING

Nominal 3" Thick

EFFICIENCIES, HEAT SAVINGS AND UNIT HEAT LOSSES

Savings are in B. T. U. per linear foot of pipe per hour. *Unit losses* are in B. T. U. per square foot of pipe surface per hour per °F. temperature difference between pipe and surrounding air.

Pipe Size		TEMPERATURE DIFFERENCE °F. BETWEEN PIPE AND SURROUNDING AIR									
		100	150	200	250	300	350	400	450	500	550
½"	% Efficiency	84.0%	85.4%	86.4%	87.3%	88.1%	88.7%	89.5%	90.1%	90.6%	91.2%
	Savings	46	79	118	164	217	278	351	433	526	631
	Unit Loss	.397	.409	.421	.433	.445	.458	.470	.482	.494	.506
¾"	% Efficiency	86.3%	87.5%	88.4%	89.2%	89.9%	90.5%	91.1%	91.6%	92.1%	92.5%
	Savings	58	99	148	206	272	348	441	543	659	791
	Unit Loss	.332	.342	.352	.362	.372	.382	.392	.402	.412	.422
1"	% Efficiency	87.6%	88.7%	89.5%	90.2%	90.8%	91.3%	91.9%	92.4%	92.9%	93.3%
	Savings	72	123	184	256	339	433	548	675	821	984
	Unit Loss	.296	.305	.314	.323	.332	.341	.349	.358	.367	.376
1¼"	% Efficiency	88.4%	89.5%	90.2%	90.9%	91.5%	92.0%	92.5%	93.0%	93.5%	93.8%
	Savings	90	154	230	320	424	543	687	847	1054	1236
	Unit Loss	.270	.278	.286	.294	.302	.311	.319	.327	.335	.343
1½"	% Efficiency	89.6%	90.5%	91.2%	91.8%	92.4%	92.8%	93.3%	93.7%	94.1%	94.4%
	Savings	103	176	263	366	484	620	785	968	1176	1412
	Unit Loss	240	247	254	262	269	276	283	290	298	305
2"	% Efficiency	90.2%	91.1%	91.8%	92.3%	92.8%	93.3%	93.7%	94.1%	94.5%	94.8%
	Savings	127	218	325	452	600	768	969	1201	1460	1754
	Unit Loss	222	229	235	242	248	255	262	268	275	281
2½"	% Efficiency	90.5%	91.3%	92.0%	92.5%	93.0%	93.4%	93.9%	94.3%	94.6%	94.9%
	Savings	152	260	389	541	718	920	1166	1440	1753	2106
	Unit Loss	213	220	226	233	239	246	252	259	265	272
3"	% Efficiency	91.3%	92.1%	92.7%	93.2%	93.7%	94.0%	94.5%	94.8%	95.1%	95.4%
	Savings	184	314	470	654	868	1113	1411	1743	2122	2551
	Unit Loss	191	197	203	208	214	220	226	232	237	243
3½"	% Efficiency	92.1%	92.8%	93.3%	93.8%	94.2%	94.5%	94.9%	95.3%	95.6%	95.8%
	Savings	210	358	536	746	989	1268	1609	1987	2421	2909
	Unit Loss	173	178	184	189	194	200	205	210	215	221
4"	% Efficiency	92.0%	92.7%	93.3%	93.7%	94.2%	94.5%	94.9%	95.3%	95.5%	95.8%
	Savings	234	400	598	832	1104	1417	1798	2222	2707	3256
	Unit Loss	173	178	183	189	194	199	204	209	215	220
4½"	% Efficiency	92.5%	93.2%	93.7%	94.2%	94.6%	94.9%	95.3%	95.6%	95.9%	96.1%
	Savings	259	443	663	923	1244	1571	1993	2464	3003	3612
	Unit Loss	160	165	170	174	179	184	189	194	198	203
5"	% Efficiency	92.4%	93.0%	93.6%	94.0%	94.4%	94.8%	95.2%	95.5%	95.8%	96.0%
	Savings	286	488	731	1017	1351	1734	2202	2723	3320	3994
	Unit Loss	162	167	172	177	182	187	192	197	202	207
6"	% Efficiency	92.6%	93.3%	93.8%	94.3%	94.6%	95.0%	95.3%	95.6%	95.9%	96.2%
	Savings	337	576	861	1201	1595	2048	2602	3220	3928	4727
	Unit Loss	155	160	165	169	174	179	184	189	193	198
7"	% Efficiency	93.0%	93.6%	94.1%	94.5%	94.9%	95.2%	95.5%	95.8%	96.1%	96.4%
	Savings	386	658	986	1374	1826	2345	2980	3690	4501	5421
	Unit Loss	146	151	155	160	164	169	174	178	183	187
8"	% Efficiency	93.1%	93.7%	94.2%	94.6%	95.0%	95.3%	95.7%	95.9%	96.2%	96.4%
	Savings	433	740	1108	1544	2053	2638	3355	4154	5070	6105
	Unit Loss	142	146	151	155	160	164	168	173	177	182
9"	% Efficiency	93.3%	93.9%	94.3%	94.7%	95.1%	95.4%	95.8%	96.0%	96.3%	96.5%
	Savings	481	821	1229	1714	2280	2930	3727	4617	5636	6790
	Unit Loss	138	142	147	151	155	160	164	168	172	177
10"	% Efficiency	93.3%	93.9%	94.4%	94.8%	95.1%	95.5%	95.8%	96.1%	96.3%	96.6%
	Savings	533	910	1364	1902	2531	3254	4141	5132	6265	7551
	Unit Loss	136	140	144	149	153	157	161	165	170	174
12"	% Efficiency	93.4%	94.0%	94.5%	94.9%	95.3%	95.5%	95.9%	96.2%	96.4%	96.6%
	Savings	626	1069	1603	2237	2978	3830	4876	6044	7385	8904
	Unit Loss	132	136	140	144	148	153	157	161	165	169
14"	% Efficiency	93.3%	93.9%	94.4%	94.8%	95.2%	95.5%	95.8%	96.1%	96.4%	96.6%
	Savings	682	1166	1748	2442	3251	4182	5327	6607	8074	9738
	Unit Loss	133	137	141	145	149	154	158	162	166	170
16"	% Efficiency	93.4%	94.0%	94.5%	94.9%	95.3%	95.6%	95.9%	96.2%	96.4%	96.7%
	Savings	774	1323	1984	2771	3692	4752	6056	7514	9186	11008
	Unit Loss	130	134	138	142	146	150	154	158	162	166
18"	% Efficiency	93.5%	94.1%	94.5%	94.9%	95.3%	95.6%	96.0%	96.2%	96.5%	96.7%
	Savings	866	1480	2220	3101	4134	5321	6787	8423	10302	12432
	Unit Loss	128	132	136	140	144	148	151	155	159	163
Flat Vertical 3" Th'k.	% Efficiency	94.9%	95.3%	95.7%	96.0%	96.2%	96.5%	96.7%	96.9%	97.1%	97.3%
	Savings	203	346	517	719	953	1221	1548	1910	2326	2795
	Unit Loss	.110	.113	.117	.120	.124	.127	.130	.134	.137	.141

All data from Mellon Institute, University of Pittsburgh tests

BASE THERMAL TABLE

1" Thickness

EFFICIENCIES, HEAT SAVINGS AND UNIT HEAT LOSSES

Savings are in B. T. U. per linear foot of pipe per hour. Unit losses are in B. T. U. per square foot of pipe surface per hour per °F. temperature difference between pipe and surrounding air.

Pipe Size		TEMPERATURE DIFFERENCE °F. BETWEEN PIPE AND SURROUNDING AIR									
		100	150	200	250	300	350	400	450	500	550
½"	% Efficiency	75.2%	76.7%	78.3%	79.4%	80.5%	81.5%	82.4%	83.2%	84.0%	84.8%
	Savings	41	70	106	148	199	257	324	400	490	590
	Unit Loss	0.614	0.643	0.672	0.701	0.730	0.759	0.788	0.817	0.846	0.875
¾"	% Efficiency	77.0%	78.4%	80.2%	81.0%	81.9%	82.9%	83.7%	84.5%	85.3%	86.0%
	Savings	51	87	136	187	249	322	405	501	614	737
	Unit Loss	0.558	0.584	0.610	0.637	0.663	0.689	0.716	0.742	0.768	0.795
1"	% Efficiency	78.5%	79.8%	81.2%	82.3%	83.2%	84.0%	84.8%	85.6%	86.3%	87.0%
	Savings	64	109	167	233	311	401	505	625	766	921
	Unit Loss	0.511	0.535	0.559	0.584	0.608	0.632	0.657	0.681	0.705	0.730
1¼"	% Efficiency	79.9%	81.2%	82.5%	83.4%	84.3%	85.1%	85.9%	86.6%	87.3%	87.9%
	Savings	81	138	211	294	393	507	640	792	968	1165
	Unit Loss	0.470	0.492	0.514	0.537	0.559	0.581	0.604	0.626	0.648	0.671
1½"	% Efficiency	80.5%	81.7%	83.0%	83.9%	84.8%	85.6%	86.3%	87.3%	87.7%	88.3%
	Savings	93	157	240	334	446	577	727	924	1102	1327
	Unit Loss	0.450	0.471	0.493	0.515	0.536	0.558	0.580	0.601	0.623	0.645
2"	% Efficiency	81.5%	82.5%	83.8%	84.6%	85.5%	86.3%	87.0%	87.7%	88.3%	88.9%
	Savings	115	194	297	413	554	716	905	1119	1371	1651
	Unit Lose	0.421	0.441	0.462	0.482	0.502	0.523	0.543	0.563	0.583	0.604
2½"	% Efficiency	82.1%	83.1%	84.4%	85.3%	86.1%	86.8%	87.5%	88.1%	88.8%	89.3%
	Savings	138	233	357	498	665	860	1089	1347	1651	1991
	Unit Loss	0.399	0.419	0.438	0.457	0.477	0.496	0.515	0.535	0.554	0.573
3"	% Efficiency	82.6%	83.6%	84.9%	85.7%	86.5%	87.2%	87.9%	88.5%	89.2%	89.7%
	Savings	167	282	431	601	804	1041	1316	1629	1999	2411
	Unit Loss	0.382	0.401	0.419	0.438	0.456	0.475	0.493	0.512	0.530	0.549
3½"	% Efficiency	83.0%	84.0%	85.1%	86.0%	86.8%	87.5%	88.2%	88.8%	89.4%	89.9%
	Savings	189	321	489	682	913	1183	1496	1853	2275	2739
	Unit Loss	0.371	0.389	0.407	0.425	0.443	0.461	0.479	0.497	0.515	0.533
4"	% Efficiency	83.2%	84.2%	85.3%	86.2%	87.0%	87.7%	88.3%	88.9%	89.5%	90.1%
	Savings	212	359	547	765	1024	1324	1674	2076	2550	3072
	Unit Loss	0.363	0.381	0.399	0.416	0.434	0.452	0.470	0.488	0.505	0.523
4½"	% Efficiency	83.4%	84.4%	85.6%	86.3%	87.2%	87.9%	88.5%	89.1%	89.7%	90.2%
	Savings	234	395	605	843	1134	1466	1855	2295	2820	3399
	Unit Loss	0.355	0.372	0.390	0.407	0.425	0.442	0.460	0.477	0.494	0.512
5"	% Efficiency	83.5%	84.5%	85.7%	86.5%	87.3%	88.0%	88.7%	89.2%	89.9%	90.3%
	Savings	258	436	670	933	1257	1626	2058	2547	3131	3775
	Unit Loss	0.349	0.366	0.383	0.400	0.417	0.434	0.451	0.468	0.485	0.502
6"	% Efficiency	83.9%	84.7%	86.0%	86.7%	87.5%	88.2%	88.9%	89.4%	90.0%	90.5%
	Savings	306	514	791	1103	1481	1918	2431	3011	3704	4478
	Unit Loss	0.339	0.356	0.372	0.389	0.406	0.423	0.439	0.456	0.473	0.490
7"	% Efficiency	84.0%	84.9%	86.1%	86.9%	87.6%	88.3%	89.0%	89.5%	90.1%	90.7%
	Savings	350	588	902	1264	1693	2195	2783	3449	4245	5136
	Unit Loss	0.332	0.349	0.365	0.382	0.398	0.415	0.431	0.448	0.465	0.481
8"	% Efficiency	84.1%	85.0%	86.2%	87.0%	87.7%	88.4%	89.0%	89.6%	90.2%	90.7%
	Savings	392	661	1013	1422	1905	2471	3126	3886	4775	5779
	Unit Loss	0.327	0.343	0.360	0.376	0.393	0.409	0.425	0.442	0.458	0.475
9"	% Efficiency	84.2%	85.1%	86.2%	87.0%	87.8%	88.5%	89.1%	89.7%	90.3%	90.8%
	Savings	434	731	1123	1577	2115	2745	3474	4321	5311	6417
	Unit Loss	0.323	0.339	0.356	0.372	0.388	0.404	0.420	0.437	0.453	0.469
10"	% Efficiney	84.3%	85.2%	86.3%	87.1%	87.9%	88.6%	89.2%	89.8%	90.4%	90.9%
	Savings	482	813	1245	1749	2347	3048	3859	4803	5906	7138
	Unit Loss	0.319	0.335	0.351	0.367	0.383	0.399	0.415	0.431	0.447	0.463
12"	% Efficiency	84.3%	85.3%	86.4%	87.2%	88.0%	88.6%	89.3%	89.9%	90.5%	91.0%
	Savings	567	958	1467	2056	2762	3590	4576	5667	6972	8431
	Unit Loss	0.314	0.330	0.346	0.361	0.377	0.393	0.409	0.424	0.440	0.456
14"	% Efficiency	84.3%	85.3%	86.4%	87.2%	88.0%	88.7%	89.3%	89.9%	90.5%	91.0%
	Savings	615	1040	1595	2236	3007	3910	4960	6180	7590	9203
	Unit Loss	0.312	0.327	0.343	0.358	0.374	0.390	0.405	0.421	0.436	0.452
16"	% Efficiency	84.3%	85.3%	86.4%	87.2%	88.0%	88.7%	89.4%	89.9%	90.5%	91.0%
	Savings	695	1177	1807	2537	3413	4443	5638	6991	8636	10475
	Unit Loss	0.309	0.324	0.340	0.355	0.371	0.386	0.401	0.417	0.432	0.448
18"	% Efficiency	84.4%	85.3%	86.5%	87.2%	88.0%	88.7%	89.4%	89.9%	90.6%	91.1%
	Savings	780	1322	2031	2840	3825	4981	6325	7845	9696	11768
	Unit Loss	0.306	0.321	0.337	0.352	0.367	0.383	0.398	0.414	0.429	0.444
Flat Vertical 1" Th'k	% Efficiency	86.3%	87.3%	88.1%	88.8%	89.4%	90.0%	90.5%	91.0%	91.5%	91.9%
	Savings	184	314	476	664	885	1146	1448	1798	2191	2654
	Unit Loss	0.292	0.306	0.320	0.336	0.350	0.365	0.380	0.394	0.409	0.424

All data from Mellon Institute, University of Pittsburgh tests.

BASE THERMAL TABLE

1 ½" Thickness

EFFICIENCIES, HEAT SAVINGS AND UNIT HEAT LOSSES

Savings are in B. T. U. per linear foot of pipe per hour. Unit losses are in B. T. U. per square foot of pipe surface per hour per °F. temperature difference between pipe and surrounding air.

Pipe Size		TEMPERATURE DIFFERENCE °F. BETWEEN PIPE AND SURROUNDING AIR									
		100	150	200	250	300	350	400	450	500	550
½"	% Efficiency	79.2%	80.5%	81.9%	82.8%	83.8%	84.6%	85.3%	86.0%	86.7%	87.4%
	Savings	43	73	112	155	207	267	336	414	506	608
	Unit Loss	0.515	0.538	0.562	0.585	0.609	0.632	0.656	0.680	0.703	0.727
¾"	% Efficiency	81.0%	82.1%	83.6%	84.3%	85.1%	85.9%	86.6%	87.2%	87.9%	88.5%
	Savings	54	91	142	194	258	333	419	517	632	759
	Unit Loss	0.462	0.483	0.504	0.526	0.546	0.568	0.589	0.611	0.632	0.653
1"	% Efficiency	82.4%	83.5%	84.7%	85.6%	86.4%	87.0%	87.7%	88.3%	89.0%	89.5%
	Savings	67	114	174	242	323	415	523	645	789	948
	Unit Loss	0.418	0.437	0.456	0.475	0.494	0.513	0.532	0.551	0.570	0.589
1¼"	% Efficiency	83.8%	84.8%	86.0%	86.7%	87.5%	88.1%	88.7%	89.3%	89.8%	90.3%
	Savings	85	144	220	305	407	524	661	816	997	1197
	Unit Loss	0.378	0.396	0.413	0.431	0.448	0.466	0.483	0.501	0.518	0.536
1½"	% Efficiency	84.5%	85.4%	86.5%	87.2%	87.9%	88.6%	89.2%	89.9%	90.3%	90.7%
	Savings	97	164	250	347	462	598	751	952	1135	1365
	Unit Loss	0.359	0.375	0.392	0.409	0.425	0.442	0.458	0.475	0.492	0.508
2"	% Efficiency	85.4%	86.2%	87.3%	88.0%	88.7%	89.3%	89.9%	90.4%	90.9%	91.3%
	Savings	121	203	310	429	574	740	934	1153	1410	1697
	Unit Loss	0.332	0.347	0.362	0.378	0.393	0.409	0.424	0.439	0.455	0.470
2½"	% Efficiency	86.1%	86.9%	87.9%	88.5%	89.2%	89.8%	90.3%	90.8%	91.3%	91.8%
	Savings	145	243	372	517	689	890	1124	1388	1699	2045
	Unit Loss	0.311	0.326	0.340	0.355	0.369	0.384	0.399	0.413	0.428	0.442
3"	% Efficiency	86.6%	87.4%	88.4%	89.1%	89.7%	90.2%	90.8%	91.3%	91.7%	92.2%
	Savings	175	295	449	625	834	1077	1359	1679	2057	2477
	Unit Loss	0.294	0.308	0.321	0.335	0.349	0.363	0.376	0.390	0.404	0.418
3½"	% Efficiency	87.0%	87.8%	88.7%	89.3%	90.0%	90.5%	91.0%	91.5%	92.0%	92.4%
	Savings	199	335	509	709	947	1224	1544	1910	2341	2815
	Unit Loss	0.283	0.297	0.310	0.323	0.336	0.349	0.363	0.376	0.389	0.402
4"	% Efficiency	87.3%	88.1%	88.9%	89.6%	90.2%	90.7%	91.2%	91.7%	92.2%	92.5%
	Savings	222	375	570	795	1062	1370	1729	2140	2624	3157
	Unit Loss	0.275	0.288	0.301	0.314	0.327	0.340	0.353	0.366	0.379	0.392
4½"	% Efficiency	87.5%	88.2%	89.1%	89.7%	90.4%	90.9%	91.4%	91.8%	92.3%	92.7%
	Savings	245	412	630	876	1175	1517	1916	2366	2902	3493
	Unit Loss	0.268	0.281	0.294	0.306	0.319	0.331	0.344	0.357	0.369	0.382
5"	% Efficiency	87.6%	88.3%	89.3%	89.9%	90.5%	91.0%	91.6%	92.0%	92.4%	92.8%
	Savings	271	456	698	970	1303	1682	2125	2625	3221	3879
	Unit Loss	0.262	0.275	0.287	0.299	0.312	0.324	0.336	0.349	0.361	0.373
6"	% Efficiency	88.0%	88.6%	89.5%	90.1%	90.7%	91.3%	91.8%	92.2%	92.6%	93.0%
	Savings	321	538	824	1146	1536	1985	2510	3104	3811	4601
	Unit Loss	0.253	0.265	0.277	0.289	0.301	0.313	0.325	0.337	0.349	0.361
7"	% Efficiency	88.1%	88.8%	89.7%	90.3%	90.9%	91.4%	91.9%	92.3%	92.8%	93.2%
	Savings	366	615	940	1314	1756	2271	2874	3556	4369	5278
	Unit Loss	0.248	0.259	0.271	0.282	0.294	0.306	0.317	0.329	0.341	0.352
8"	% Efficiency	88.2%	88.9%	89.8%	90.4%	91.0%	91.5%	92.0%	92.4%	92.8%	93.2%
	Savings	411	691	1056	1478	1975	2557	3228	4007	4914	5939
	Unit Loss	0.243	0.254	0.266	0.277	0.289	0.300	0.312	0.323	0.335	0.346
9"	% Efficiency	88.3%	89.0%	89.8%	90.5%	91.1%	91.6%	92.0%	92.5%	92.9%	93.3%
	Savings	455	765	1171	1639	2194	2840	3589	4456	5467	6595
	Unit Loss	0.239	0.250	0.262	0.273	0.284	0.296	0.307	0.318	0.330	0.341
10"	% Efficiency	88.4%	89.1%	90.0%	90.6%	91.2%	91.7%	92.1%	92.6%	93.0%	93.4%
	Savings	506	851	1298	1818	2435	3154	3987	4953	6079	7336
	Unit Loss	0.235	0.246	0.257	0.268	0.279	0.291	0.302	0.313	0.324	0.335
12"	% Efficiency	88.5%	89.2%	90.1%	90.7%	91.2%	91.8%	92.2%	92.6%	93.1%	93.5%
	Savings	595	1003	1530	2138	2865	3716	4726	5842	7175	8663
	Unit Loss	0.230	0.241	0.252	0.263	0.274	0.285	0.297	0.308	0.319	0.330
14"	% Efficiency	88.5%	89.2%	90.1%	90.7%	91.3%	91.8%	92.3%	92.7%	93.1%	93.5%
	Savings	645	1088	1663	2325	3119	4047	5124	6373	7811	9457
	Unit Loss	0.228	0.239	0.250	0.261	0.272	0.283	0.293	0.304	0.315	0.326
16"	% Efficiency	88.6%	89.3%	90.2%	90.8%	91.3%	91.9%	92.3%	92.7%	93.2%	93.6%
	Savings	730	1233	1886	2639	3542	4601	5826	7211	8889	10767
	Unit Loss	0.225	0.236	0.246	0.257	0.268	0.278	0.289	0.300	0.311	0.321
18"	% Efficiency	88.7%	89.4%	90.2%	90.8%	91.4%	91.9%	92.4%	92.8%	93.2%	93.6%
	Savings	820	1385	2119	2955	3969	5159	6536	8094	9984	12095
	Unit Loss	0.222	0.233	0.244	0.254	0.265	0.275	0.286	0.297	0.307	0.318
Flat Vertical 1½" Th'k	% Efficiency	90.4%	91.1%	91.7%	92.2%	92.6%	93.0%	93.4%	93.8%	94.1%	94.4%
	Savings	193	328	495	689	917	1185	1494	1852	2253	2725
	Unit Loss	0.204	0.214	0.224	0.234	0.244	0.254	0.264	0.274	0.284	0.295

All data from Mellon Institute, University of Pittsburgh tests.

BASE THERMAL TABLE

2" Thickness

EFFICIENCIES, HEAT SAVINGS AND UNIT HEAT LOSSES

Savings are in B. T. U. per linear foot of pipe per hour. Unit losses are in B. T. U. per square foot of pipe surface per hour per °F. temperature difference between pipe and surrounding air.

Pipe Size		TEMPERATURE DIFFERENCE °F. BETWEEN PIPE AND SURROUNDING AIR									
		100	150	200	250	300	350	400	450	500	550
½"	% Efficiency	81.6%	82.7%	83.9%	84.8%	85.6%	86.3%	87.0%	87.6%	88.2%	88.8%
	Savings	45	75	114	159	212	273	342	422	514	618
	Unit Loss	0.457	0.478	0.498	0.519	0.540	0.561	0.581	0.602	0.623	0.643
¾"	% Efficiency	83.3%	84.3%	85.6%	86.2%	86.9%	87.6%	88.3%	88.9%	89.4%	89.9%
	Savings	56	94	145	199	264	340	427	527	643	771
	Unit Loss	0.407	0.425	0.443	0.462	0.480	0.498	0.516	0.534	0.553	0.571
1"	% Efficiency	84.7%	85.7%	86.7%	87.4%	88.1%	88.7%	89.3%	89.8%	90.4%	90.9%
	Savings	69	117	178	247	329	423	532	656	802	963
	Unit Loss	0.363	0.380	0.396	0.413	0.429	0.446	0.462	0.480	0.495	0.512
1¼"	% Efficiency	86.1%	86.9%	87.9%	88.5%	89.2%	89.7%	90.3%	90.8%	91.3%	91.7%
	Savings	88	148	225	312	416	534	673	830	1012	1215
	Unit Loss	0.326	0.341	0.356	0.371	0.386	0.401	0.415	0.430	0.445	0.460
1½"	% Efficiency	86.7%	87.5%	88.4%	89.1%	89.7%	90.2%	90.7%	91.4%	91.7%	92.1%
	Savings	100	168	255	355	472	609	765	967	1153	1385
	Unit Loss	0.307	0.321	0.335	0.349	0.363	0.378	0.392	0.406	0.420	0.434
2"	% Efficiency	87.6%	88.3%	89.2%	89.8%	90.4%	90.9%	91.4%	91.8%	92.3%	92.7%
	Savings	124	208	316	438	520	754	951	1172	1432	1721
	Unit Loss	0.282	0.295	0.308	0.321	0.334	0.347	0.359	0.372	0.385	0.398
2½"	% Efficiency	88.3%	89.0%	89.8%	90.4%	90.9%	91.4%	91.9%	92.3%	92.7%	93.1%
	Savings	148	249	380	527	703	906	1143	1411	1725	2074
	Unit Loss	0.262	0.274	0.286	0.298	0.310	0.323	0.335	0.347	0.359	0.371
3"	% Efficiency	88.9%	89.6%	90.3%	90.9%	91.4%	91.9%	92.3%	92.7%	93.1%	93.5%
	Savings	179	302	459	638	850	1097	1382	1707	2088	2513
	Unit Loss	0.245	0.256	0.268	0.279	0.290	0.302	0.313	0.324	0.335	0.347
3½"	% Efficiency	89.2%	89.8%	90.6%	91.2%	91.7%	92.1%	92.6%	93.0%	93.4%	93.7%
	Savings	204	343	520	723	965	1246	1570	1940	2376	2854
	Unit Loss	0.236	0.247	0.258	0.268	0.279	0.290	0.301	0.312	0.322	0.333
4"	% Efficiency	89.4%	90.1%	90.8%	91.4%	91.9%	92.3%	92.8%	93.1%	93.5%	93.9%
	Savings	228	384	583	811	1082	1394	1759	2174	2663	3201
	Unit Loss	0.228	0.239	0.249	0.260	0.270	0.281	0.291	0.302	0.312	0.323
4½"	% Efficiency	89.6%	90.3%	91.0%	91.5%	92.0%	92.5%	92.9%	93.3%	93.7%	94.0%
	Savings	251	422	644	893	1197	1544	1948	2403	2945	3542
	Unit Loss	0.222	0.232	0.242	0.253	0.263	0.273	0.283	0.293	0.304	0.314
5"	% Efficiency	89.8%	90.4%	91.2%	91.7%	92.2%	92.7%	93.1%	93.4%	93.8%	94.1%
	Savings	278	467	713	989	1327	1712	2161	2667	3270	3933
	Unit Loss	0.216	0.226	0.236	0.246	0.256	0.266	0.275	0.285	0.295	0.305
6"	% Efficiency	90.1%	90.7%	91.5%	91.9%	92.5%	92.9%	93.3%	93.6%	94.0%	94.3%
	Savings	329	550	842	1169	1565	2020	2552	3153	3868	4646
	Unit Loss	0.207	0.217	0.226	0.236	0.245	0.255	0.265	0.274	0.284	0.293
7"	% Efficiency	90.3%	90.9%	91.6%	92.1%	92.6%	93.0%	93.4%	93.8%	94.1%	94.4%
	Savings	376	630	960	1341	1789	2311	2922	3612	4434	5350
	Unit Loss	0.201	0.210	0.220	0.229	0.239	0.248	0.257	0.267	0.276	0.286
8"	% Efficiency	90.5%	91.0%	91.8%	92.3%	92.8%	93.1%	93.5%	93.9%	94.3%	94.6%
	Savings	422	707	1079	1508	2014	2603	3284	4072	4989	6024
	Unit Loss	0.196	0.205	0.214	0.223	0.232	0.242	0.251	0.260	0.269	0.278
9"	% Efficiency	90.6%	91.1%	91.9%	92.4%	92.8%	93.2%	93.6%	94.0%	94.3%	94.6%
	Savings	467	784	1197	1673	2236	2893	3650	4528	5550	6690
	Unit Loss	0.192	0.201	0.210	0.219	0.228	0.237	0.246	0.255	0.264	0.273
10"	% Efficiency	90.7%	91.2%	91.9%	92.5%	92.9%	93.3%	93.7%	94.1%	94.4%	94.7%
	Savings	519	871	1326	1856	2481	3211	4054	5031	6171	7440
	Unit Loss	0.189	0.198	0.207	0.215	0.224	0.233	0.242	0.251	0.259	0.268
12"	% Efficiency	90.8%	91.4%	92.1%	92.6%	93.0%	93.4%	93.8%	94.2%	94.5%	94.8%
	Savings	611	1027	1564	2185	2920	3783	4807	5936	7283	8788
	Unit Loss	0.184	0.193	0.201	0.210	0.219	0.228	0.236	0.245	0.254	0.262
14"	% Efficiency	90.9%	91.4%	92.1%	92.6%	93.0%	93.5%	93.9%	94.2%	94.5%	94.8%
	Savings	662	1115	1700	2374	3180	4122	5212	6475	7930	9592
	Unit Loss	0.182	0.191	0.199	0.208	0.216	0.225	0.233	0.242	0.250	0.259
16"	% Efficiency	90.9%	91.5%	92.2%	92.7%	93.1%	93.5%	93.9%	94.2%	94.6%	94.9%
	Savings	749	1263	1928	2695	3611	4685	5926	7328	9025	10919
	Unit Loss	0.179	0.187	0.196	0.204	0.213	0.221	0.229	0.238	0.246	0.255
18"	% Efficiency	91.0%	91.6%	92.2%	92.7%	93.2%	93.6%	94.0%	94.3%	94.6%	95.0%
	Savings	841	1419	2167	3017	4047	5253	6649	8227	10134	12269
	Unit Loss	0.177	0.185	0.193	0.202	0.210	0.218	0.226	0.234	0.243	0.251
Flat Vertical 2" Th'k	% Efficiency	92.5%	93.1%	93.6%	93.9%	94.3%	94.6%	94.9%	95.2%	95.4%	95.7%
	Savings	197	335	505	702	933	1205	1518	1881	2286	2763
	Unit Loss	0.159	0.166	0.174	0.181	0.189	0.196	0.204	0.211	0.219	0.226

All data from Mellon Institute, University of Pittsburgh tests.

BASE THERMAL TABLE

2½" Thickness

EFFICIENCIES, HEAT SAVINGS AND UNIT HEAT LOSSES

Savings are in B. T. U. per linear foot of pipe per hour. Unit losses are in B. T. U. per square foot of pipe surface per hour per °F. temperature difference between pipe and surrounding air.

Pipe Size		TEMPERATURE DIFFERENCE °F. BETWEEN PIPE AND SURROUNDING AIR									
		100	150	200	250	300	350	400	450	500	550
½"	% Efficiency	83.2%	84.2%	85.3%	86.1%	86.9%	87.5%	88.1%	88.7%	89.3%	89.8%
	Savings	45	77	116	162	215	276	347	427	521	625
	Unit Loss	0.417	0.436	0.455	0.473	0.492	0.511	0.530	0.549	0.567	0.586
¾"	% Efficiency	84.9%	85.7%	87.0%	87.5%	88.1%	88.8%	89.4%	89.9%	90.4%	90.9%
	Savings	57	96	147	202	268	344	433	533	650	779
	Unit Loss	0.368	0.385	0.401	0.418	0.435	0.452	0.468	0.485	0.502	0.518
1"	% Efficiency	86.2%	87.1%	88.0%	88.7%	89.3%	89.9%	90.7%	90.9%	91.4%	91.8%
	Savings	71	119	180	251	334	428	540	664	811	972
	Unit Loss	0.329	0.343	0.358	0.373	0.388	0.402	0.417	0.432	0.446	0.461
1¼"	% Efficiency	87.4%	88.2%	89.1%	89.7%	90.3%	90.8%	91.3%	91.7%	92.2%	92.6%
	Savings	89	150	228	316	421	541	680	839	1022	1227
	Unit Loss	0.294	0.307	0.320	0.333	0.346	0.359	0.373	0.386	0.399	0.412
1½"	% Efficiency	88.1%	88.8%	89.7%	90.3%	90.8%	91.3%	91.8%	92.3%	92.6%	93.0%
	Savings	101	171	259	360	477	616	773	977	1164	1398
	Unit Loss	0.274	0.287	0.299	0.312	0.324	0.337	0.349	0.362	0.374	0.387
2"	% Efficiency	89.0%	89.7%	90.5%	91.0%	91.5%	92.0%	92.4%	92.8%	93.2%	93.5%
	Savings	126	211	321	444	592	763	961	1184	1446	1737
	Unit Loss	0.249	0.261	0.272	0.283	0.295	0.306	0.318	0.329	0.340	0.352
2½"	% Efficiency	89.6%	90.2%	91.0%	91.5%	92.0%	92.4%	92.9%	93.2%	93.6%	93.9%
	Savings	150	253	385	534	711	916	1155	1425	1741	2093
	Unit Loss	0.232	0.243	0.253	0.264	0.274	0.285	0.295	0.306	0.316	0.327
3"	% Efficiency	90.3%	90.9%	91.6%	92.0%	92.5%	92.9%	93.3%	93.7%	94.0%	94.3%
	Savings	182	306	465	646	860	1109	1396	1724	2108	2535
	Unit Loss	0.214	0.224	0.234	0.244	0.254	0.264	0.274	0.283	0.293	0.303
3½"	% Efficiency	90.6%	91.2%	91.9%	92.3%	92.8%	93.2%	93.6%	93.9%	94.3%	94.5%
	Savings	207	348	527	732	976	1260	1587	1960	2398	2880
	Unit Loss	0.204	0.214	0.223	0.232	0.242	0.251	0.261	0.270	0.279	0.289
4"	% Efficiency	90.9%	91.5%	92.1%	92.9%	93.3%	93.4%	93.8%	94.1%	94.4%	94.7%
	Savings	231	390	591	824	1099	1410	1777	2196	2689	3231
	Unit Loss	0.197	0.206	0.215	0.224	0.233	0.242	0.251	0.260	0.269	0.278
4½"	% Efficiency	91.1%	91.6%	92.3%	92.7%	93.2%	93.6%	93.9%	94.2%	94.6%	94.9%
	Savings	255	429	653	905	1212	1562	1969	2428	2973	3574
	Unit Loss	0.191	0.199	0.208	0.217	0.226	0.234	0.243	0.252	0.261	0.269
5"	% Efficiency	91.3%	91.8%	92.5%	92.9%	93.3%	93.7%	94.1%	94.4%	94.7%	95.0%
	Savings	282	474	723	1002	1343	1731	2184	2693	3300	3968
	Unit Loss	0.185	0.194	0.202	0.211	0.219	0.228	0.236	0.245	0.253	0.262
6"	% Efficiency	91.6%	92.1%	92.7%	93.1%	93.6%	93.9%	94.3%	94.6%	94.9%	95.2%
	Savings	334	559	853	1184	1584	2043	2579	3184	3904	4707
	Unit Loss	0.177	0.185	0.193	0.201	0.209	0.217	0.226	0.234	0.242	0.250
7"	% Efficiency	91.8%	92.3%	92.9%	93.3%	93.7%	94.1%	94.4%	94.7%	95.1%	95.3%
	Savings	382	639	973	1358	1811	2338	2954	3649	4477	5400
	Unit Loss	0.171	0.179	0.187	0.194	0.202	0.210	0.218	0.226	0.233	0.241
8"	% Efficiency	91.9%	92.4%	93.0%	93.5%	93.8%	94.2%	94.5%	94.8%	95.1%	95.4%
	Savings	428	718	1094	1527	2038	2632	3319	4112	5033	6076
	Unit Loss	0.166	0.174	0.181	0.189	0.197	0.205	0.212	0.220	0.228	0.236
9"	% Efficiency	92.1%	92.5%	93.1%	93.6%	94.0%	94.3%	94.6%	94.9%	95.2%	95.5%
	Savings	474	795	1214	1695	2263	2925	3689	4573	5602	6749
	Unit Loss	0.162	0.170	0.177	0.185	0.192	0.200	0.208	0.215	0.223	0.230
10"	% Efficiency	92.2%	92.7%	93.2%	93.7%	94.0%	94.4%	94.7%	95.0%	95.3%	95.5%
	Savings	527	885	1344	1880	2511	3248	4098	5082	6228	7505
	Unit Loss	0.159	0.166	0.174	0.181	0.189	0.196	0.203	0.211	0.218	0.226
12"	% Efficiency	92.3%	92.8%	93.4%	93.8%	94.1%	94.5%	94.8%	95.1%	95.4%	95.6%
	Savings	620	1042	1586	2210	2955	3826	4858	5997	7352	8865
	Unit Loss	0.155	0.162	0.169	0.176	0.184	0.191	0.198	0.205	0.213	0.220
14"	% Efficiency	92.3%	92.8%	93.4%	93.8%	94.2%	94.5%	94.9%	95.2%	95.4%	95.7%
	Savings	673	1132	1724	2405	3219	4169	5267	6541	8005	9678
	Unit Loss	0.153	0.160	0.167	0.174	0.181	0.188	0.195	0.202	0.209	0.216
16"	% Efficiency	92.4%	92.9%	93.4%	93.9%	94.2%	94.6%	94.9%	95.2%	95.5%	95.8%
	Savings	761	1282	1955	2729	3655	4737	5988	7403	9111	11018
	Unit Loss	0.150	0.157	0.164	0.171	0.178	0.185	0.192	0.198	0.205	0.212
18"	% Efficiency	92.4%	92.9%	93.5%	93.9%	94.3%	94.7%	95.0%	95.2%	95.5%	95.8%
	Savings	854	1440	2196	3055	4095	5313	6719	8308	10229	12378
	Unit Loss	0.149	0.155	0.162	0.169	0.176	0.182	0.189	0.196	0.203	0.209
Flat Vertical 2½" Th'k	% Efficiency	94.0%	94.4%	94.8%	95.1%	95.4%	95.7%	95.9%	96.1%	96.3%	96.5%
	Savings	200	340	512	711	944	1219	1534	1899	2307	2787
	Unit Loss	0.128	0.134	0.140	0.146	0.152	0.158	0.165	0.171	0.177	0.183

All data from Mellon Institute, University of Pittsburgh tests.

BASE THERMAL TABLE

3" Thickness

EFFICIENCIES, HEAT SAVINGS AND UNIT HEAT LOSSES

Savings are in B. T. U. per linear foot of pipe per hour. Unit losses are in B. T. U. per square foot of pipe surface per hour per °F. temperature difference between pipe and surrounding air.

Pipe Size		TEMPERATURE DIFFERENCE °F. BETWEEN PIPE AND SURROUNDING AIR									
		100	150	200	250	300	350	400	450	500	550
½"	% Efficiency	84.3%	85.3%	86.4%	87.1%	87.8%	88.4%	89.0%	89.5%	90.0%	90.5%
	Savings	46	78	118	163	217	279	350	431	525	630
	Unit Loss	0.388	0.406	0.423	0.441	0.458	0.476	0.493	0.511	0.528	0.545
¾"	% Efficiency	86.0%	86.8%	87.9%	88.4%	89.0%	89.6%	90.1%	90.6%	91.1%	91.5%
	Savings	57	97	149	204	270	348	436	537	655	785
	Unit Loss	0.341	0.357	0.372	0.388	0.403	0.418	0.434	0.449	0.465	0.480
1"	% Efficiency	87.3%	88.1%	89.0%	89.6%	90.2%	90.7%	91.2%	91.6%	92.0%	92.4%
	Savings	71	120	182	253	337	432	543	669	817	979
	Unit Loss	0.302	0.315	0.329	0.343	0.356	0.370	0.383	0.397	0.411	0.424
1¼"	% Efficiency	88.6%	89.3%	90.1%	90.6%	91.2%	91.6%	92.1%	92.5%	92.9%	93.2%
	Savings	90	152	230	319	425	545	686	845	1030	1235
	Unit Loss	0.267	0.280	0.292	0.304	0.316	0.328	0.340	0.352	0.364	0.376
1½"	% Efficiency	89.2%	89.8%	90.6%	91.1%	91.6%	92.1%	92.5%	93.0%	93.2%	93.6%
	Savings	103	172	262	363	482	621	779	984	1173	1407
	Unit Loss	0.250	0.262	0.273	0.284	0.296	0.307	0.318	0.330	0.341	0.352
2"	% Efficiency	90.0%	90.6%	91.4%	91.8%	92.3%	92.7%	93.1%	93.5%	93.8%	94.1%
	Savings	127	213	324	448	598	769	969	1193	1456	1749
	Unit Loss	0.226	0.236	0.246	0.257	0.267	0.277	0.287	0.298	0.308	0.318
2½"	% Efficiency	90.7%	91.2%	91.9%	92.4%	92.8%	93.2%	93.6%	93.9%	94.3%	94.5%
	Savings	152	256	389	539	717	924	1164	1435	1753	2107
	Unit Loss	0.208	0.218	0.227	0.237	0.246	0.255	0.265	0.274	0.284	0.293
3"	% Efficiency	91.3%	91.8%	92.4%	92.8%	93.3%	93.7%	94.0%	94.3%	94.6%	94.9%
	Savings	184	309	470	651	867	1118	1407	1736	2122	2552
	Unit Loss	0.192	0.201	0.210	0.219	0.227	0.236	0.245	0.254	0.262	0.271
3½"	% Efficiency	91.6%	92.1%	92.7%	93.1%	93.5%	93.9%	94.2%	94.5%	94.9%	95.1%
	Savings	209	351	532	738	984	1270	1598	1973	2413	2897
	Unit Loss	0.184	0.192	0.200	0.209	0.217	0.225	0.234	0.242	0.250	0.259
4"	% Efficiency	91.9%	92.4%	92.9%	93.4%	93.8%	94.1%	94.4%	94.7%	95.0%	95.3%
	Savings	234	394	596	828	1104	1421	1790	2211	2706	3250
	Unit Loss	0.176	0.184	0.192	0.200	0.208	0.216	0.224	0.232	0.240	0.248
4½"	% Efficiency	92.1%	92.5%	93.1%	93.5%	93.9%	94.3%	94.6%	94.9%	95.2%	95.4%
	Savings	258	433	659	913	1222	1573	1983	2444	2992	3596
	Unit Loss	0.170	0.178	0.186	0.193	0.201	0.209	0.216	0.224	0.232	0.239
5"	% Efficiency	92.3%	92.7%	93.3%	93.7%	94.1%	94.4%	94.7%	95.0%	95.3%	95.5%
	Savings	285	479	729	1011	1354	1744	2199	2712	3321	3992
	Unit Loss	0.164	0.172	0.179	0.187	0.194	0.202	0.209	0.217	0.224	0.232
6"	% Efficiency	92.6%	93.0%	93.6%	93.9%	94.3%	94.6%	94.9%	95.2%	95.5%	95.8%
	Savings	337	564	861	1194	1596	2059	2598	3206	3929	4736
	Unit Loss	0.156	0.163	0.170	0.178	0.185	0.192	0.199	0.206	0.213	0.220
7"	% Efficiency	92.7%	93.2%	93.7%	94.1%	94.5%	94.8%	95.1%	95.4%	95.6%	95.9%
	Savings	386	646	982	1370	1825	2356	2975	3674	4505	5432
	Unit Loss	0.151	0.157	0.164	0.171	0.178	0.185	0.191	0.198	0.205	0.212
8"	% Efficiency	92.9%	93.3%	93.9%	94.3%	94.6%	94.9%	95.2%	95.5%	95.7%	96.0%
	Savings	433	725	1104	1540	2054	2653	3342	4140	5068	6114
	Unit Loss	0.146	0.153	0.159	0.166	0.173	0.179	0.186	0.193	0.199	0.206
9"	% Efficiency	93.0%	93.4%	94.0%	94.4%	94.7%	95.0%	95.3%	95.6%	95.8%	96.1%
	Savings	479	803	1225	1709	2282	2947	3716	4604	5638	6790
	Unit Loss	0.142	0.149	0.155	0.162	0.168	0.175	0.181	0.188	0.194	0.201
10"	% Efficiency	93.2%	93.5%	94.1%	94.5%	94.8%	95.1%	95.4%	95.6%	95.9%	96.1%
	Savings	533	893	1357	1896	2531	3272	4127	5116	6268	7552
	Unit Loss	0.139	0.146	0.152	0.158	0.165	0.171	0.177	0.184	0.190	0.196
12"	% Efficiency	93.3%	93.7%	94.2%	94.6%	94.9%	95.2%	95.5%	95.8%	96.0%	96.2%
	Savings	627	1053	1600	2230	2981	3856	4893	6037	7400	8920
	Unit Loss	0.135	0.141	0.147	0.153	0.159	0.165	0.172	0.178	0.184	0.190
14"	% Efficiency	93.4%	93.7%	94.2%	94.6%	95.0%	95.3%	95.5%	95.8%	96.0%	96.3%
	Savings	681	1143	1740	2426	3245	4201	5305	6585	8057	9737
	Unit Loss	0.132	0.139	0.145	0.151	0.157	0.163	0.169	0.175	0.181	0.187
16"	% Efficiency	93.4%	93.8%	94.3%	94.7%	95.0%	95.4%	95.6%	95.9%	96.1%	96.3%
	Savings	770	1295	1972	2754	3687	4775	6033	7454	9169	11085
	Unit Loss	0.130	0.136	0.142	0.147	0.153	0.159	0.165	0.171	0.177	0.183
18"	% Efficiency	93.5%	93.9%	94.4%	94.7%	95.1%	95.4%	95.7%	95.9%	96.2%	96.4%
	Savings	865	1455	2218	3084	4131	5354	6770	8367	10297	12453
	Unit Loss	0.127	0.133	0.139	0.145	0.151	0.157	0.162	0.168	0.174	0.180
Flat Vertical 3" Th'k	% Efficiency	94.9%	95.3%	95.6%	95.8%	96.1%	96.3%	96.5%	96.7%	96.9%	97.0%
	Savings	202	343	516	716	951	1227	1544	1910	2320	2802
	Unit Loss	0.109	0.114	0.120	0.125	0.130	0.135	0.140	0.145	0.150	0.155

All data from Mellon Institute, University of Pittsburgh tests.

HEAT TRANSMISSION FROM SURFACES

BULLETIN 102-A

Carey
EST. 1873

THE PHILIP CAREY MFG. COMPANY

General Offices — LOCKLAND, CINCINNATI, OHIO

Branches In All Principal Cities

HEAT TRANSMISSION FROM SURFACES

Bulletin No. 102 A

THE PHILIP CAREY MFG. COMPANY

CINCINNATI, OHIO

R. H. Heilman's paper "Surface Heat Transmission," Trans. Am. Soc. Mech. Engrs., Fuels Steam Power, 51, 257 (1929), gives a sound basis for determining losses, savings to be made by the use of heat insulation, and the per cent efficiency of such insulation. Many and conflicting claims of efficiency have been made for various commercial heat insulations. It is obvious that the efficiencies and savings cannot be compared unless the same heat losses from the bare surfaces are used as a basis. As mentioned in the paper above, several types of commercial shapes, such as pipes and flat plates, were tested. From the results of those tests a formula was developed for the transfer by free convection, and emissivity values were determined for various surfaces for use in the Stefan-Boltzmann radiation formula. The separation of heat transmission from a surface to the surrounding air into its two components—radiation and convection—greatly extends the range of usefulness of former tests on bare and insulated surfaces. By means of these two formulae and the emissivity of various surfaces, one is able to calculate the rate of heat transfer under still air conditions for practically any shape or type of surface and for any temperatures ordinarily met with in engineering practice:

The formulae are as follows:

$$q_c = C\left(\frac{1}{D}\right)^{0.2} \left(\frac{1}{T_{avg.}}\right)^{0.181} \Delta t^{1.266}$$

$$q_r = 17.4 \times 10^{-10} \times e\,(T_1^4 - T_2^4)$$

where q_c = heat transfer by free convection in Btu per sq. ft. per hr.

C = a constant depending upon the shape of the surface.

(C = 1.016 for horizontal cylinders, = 1.235 for long vertical cylinders, = 1.394 for vertical plates, = 1.79 for horizontal plates facing upward, and = 0.89 for horizontal plates facing downward. The constants for the horizontal plates facing upward and facing downward are reversed when the plates are cooler than the surrounding air.)

D = cylinder diameter in inches or height of vertical plane in inches. (The effect of diameter or height becomes constant at a value of approximately 24 inches.)

$T_{avg.}$ = 460 plus the average of cylinder or plate surface and surrounding air temperature in deg. Fahr.

Δt=temperature difference (deg. Fahr.) between surface and air.

q_r=heat transfer by radiation in Btu per sq. ft. per hr.

e=emissivity of surface. (A value of 0.9 can be assumed as the emissivity of most industrial surfaces, such as brick, stone, glass, canvas, asphalt roofing and various colored flat paints at temperatures below 400 deg. Fahr. For highly polished metals "e" may be as low as 0.02.)

T_1=temperature of the hotter surface, deg. Fahr.+460.

T_2=temperature of surrounding objects, deg. Fahr.+460.

The bare pipe loss curves, the bare pipe loss tables, the surface loss curves for various outside diameters and the surface heat transmission from flat bare steel surfaces, contained in this bulletin, were all calculated with the above formula for free convection and radiation. The calculations were all based on an air temperature of 80 deg. Fahr. and with the surfaces at higher temperatures than the surrounding atmosphere.

Effect of Wind

The formula given above for free convection cannot be used for conditions where extraneous air currents are blowing over the surfaces. In this case the heat transfer takes place by forced convection and radiation. The forced convection for large bare plane surfaces greater than two feet on a side, can be obtained from the formula

$$q_{fc}=1.+0.225V.$$

where q_{fc}=heat transfer by forced convection in Btu per hr. per sq. ft. per deg. Fahr. temp. diff.

V=air velocity in feet per sec.

This formula is an approximate average of formula proposed by various investigators. The heat transmission curves shown on page 10 for large bare surfaces with various wind velocities were calculated from the above formula and the radiation formula. In this case an air temperature of 70 deg. Fahr. was assumed.

The data available on forced convection at present are not sufficient to enable one to differentiate to any degree of accuracy between the losses from plane surfaces in the various positions.

Considerable experimental work has been done on forced convection from wires and cylinders. The forced convection for air flowing at right angles to various sized single horizontal cylinders can be obtained from Reiher's equation which is as follows:

$$q_{fc}=.35\,\frac{k}{D}\left(\frac{DV\rho}{\mu}\right)^{.56}$$

where q_{fc}=surface conductance, Btu/sq. ft./hr./°F.

k=thermal conductivity of air, Btu/ft./hr./°F.

D=outside diameter of pipe, ft.

V=air velocity, ft./hr.

ρ=density of air, lb./ft.^{3}

μ=viscosity of air, lb./ft.—hr.

The heat transmission curves shown on page 9 for various diameter bare steel pipes with various wind velocities were calculated from the above formula and the radiation formula. In this case also, an air temperature of 70° F. was assumed.

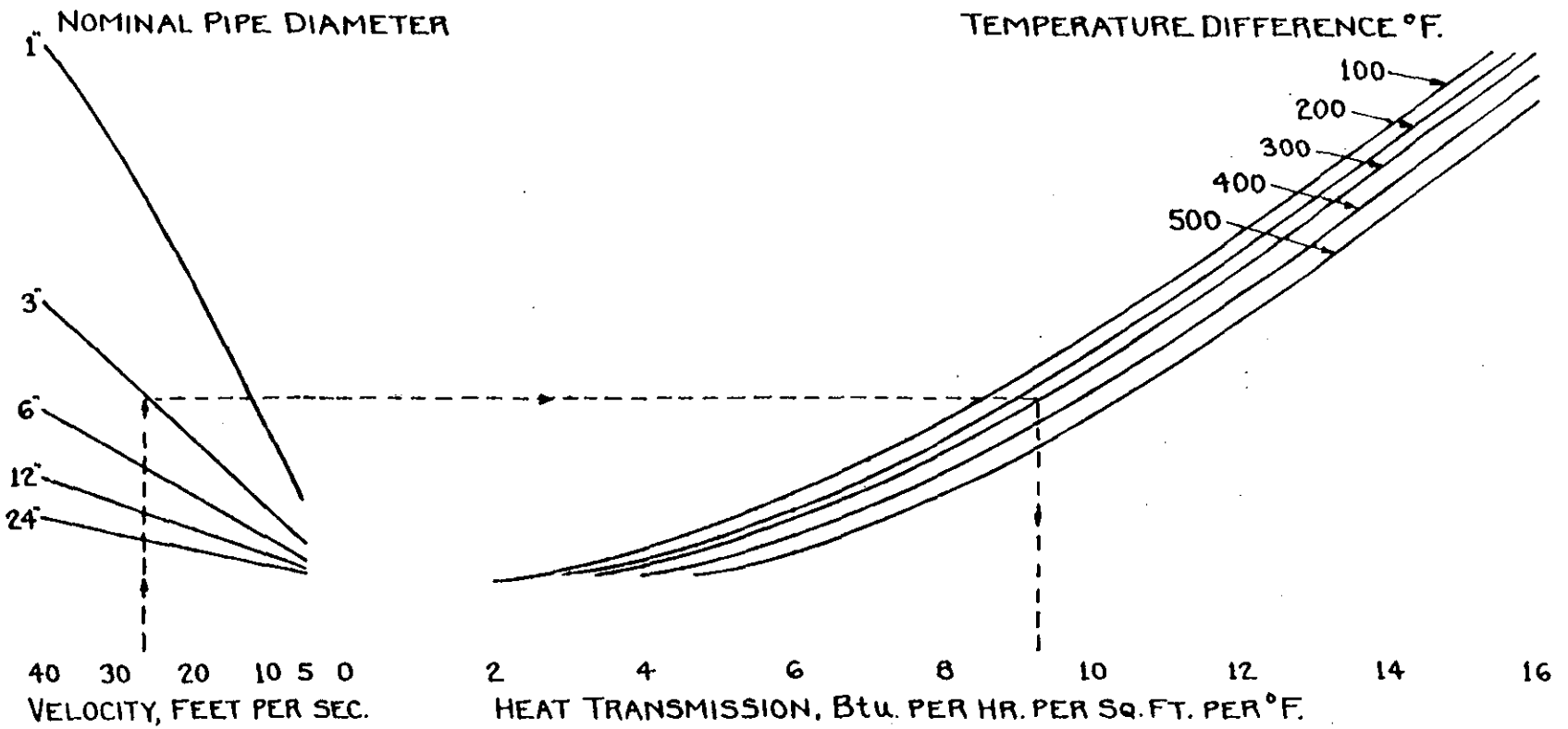
Losses From Horizontal Bare Steel Steam Pipes

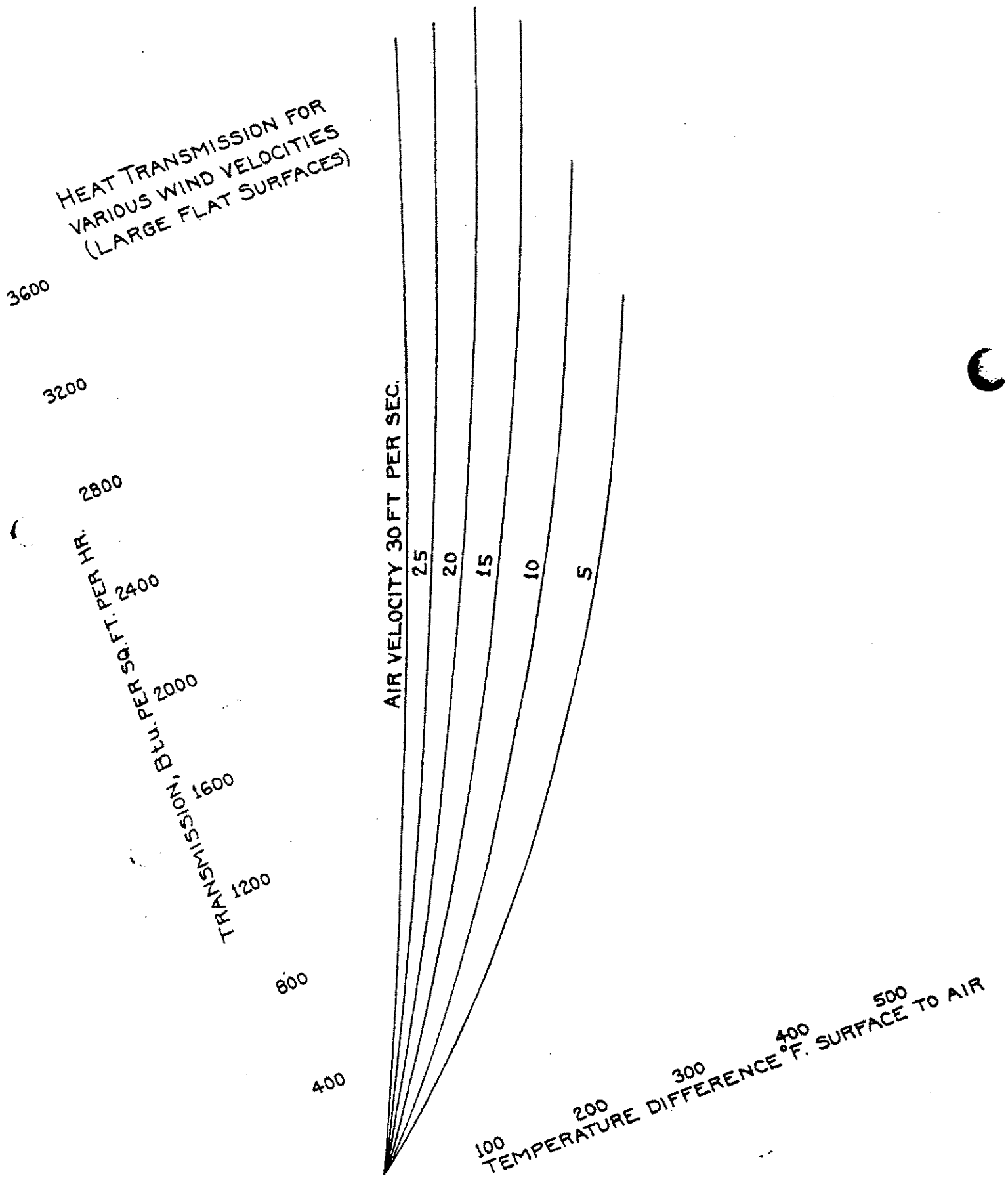
From 100 Linear Feet of Pipe per Month of 30 Days With Steam in Pipes 24 hours per Day.
Coal at $7.00 per Ton of 2000 Lbs.

Gage Press	Hot Water			10 Lbs.			80 Lbs.			120 Lbs.			160 Lbs.			200 Lbs.			200 Lbs. and 100°F. Superheat			275 Lbs. and 250° F. Superheat		
Temp	180°F.			239.4°F.			324.0°F.			350.0°F.			370.7°F.			387.9°F.			487.9°F.			664.3°F.		
Pipe Size	Dollars Loss	Pounds Coal	Btu/Lineal Foot/°F. Diff./hr.	Dollars Loss	Pounds Coal	Btu/Lineal Foot/°F. Diff./hr.	Dollars Loss	Pounds Coal	Btu/Lineal Foot/°F. Diff./hr.	Dollars Loss	Pounds Coal	Btu/Lineal Foot/°F. Diff./hr.	Dollars Loss	Pounds Coal	Btu/Lineal Foot/°F. Diff./hr.	Dollars Loss	Pounds Coal	Btu/Lineal Foot/°F. Diff./hr.	Dollars Loss	Pounds Coal	Btu. Lineal Foot/°F. Diff./hr.	Dollars Loss	Pounds Coal	Btu./Lineal Foot/°F. Diff. hr.
½"	1.73	432	.546	3.17	792	.628	5.74	1435	.743	6.66	1666	.780	7.44	1861	.809	8.13	2031	.834	12.86	3216	.996	24.59	6147	1.330
1"	2.60	649	.820	4.76	1191	.944	8.65	2164	1.121	10.06	2515	1.177	11.24	2811	1.222	12.28	3070	1.260	19.51	4878	1.511	37.52	9380	2.029
1½"	3.64	909	1.149	6.67	1669	1.323	12.16	3039	1.574	14.14	3535	1.655	15.81	3954	1.719	17.28	4320	1.773	27.54	6884	2.133	53.20	13299	2.877
2"	4.47	1117	1.411	8.21	2052	1.627	14.96	3740	1.938	17.41	4353	2.038	19.48	4871	2.118	21.30	5324	2.185	34.00	8499	2.633	65.86	16464	3.561
2½"	5.32	1331	1.682	9.79	2446	1.940	17.86	4466	2.313	20.79	5198	2.433	23.27	5818	2.530	25.44	6361	2.611	40.68	10170	3.151	78.99	19748	4.272
3"	6.38	1594	2.015	11.73	2933	2.325	21.44	5359	2.776	24.96	6241	2.921	27.95	6988	3.038	30.56	7641	3.136	48.93	12232	3.790	95.23	23809	5.150
3½"	7.22	1804	2.280	13.27	3319	2.631	24.28	6069	3.144	28.28	7069	3.309	31.66	7916	3.442	34.63	8657	3.553	55.50	13875	4.299	108.21	27054	5.852
4"	8.06	2014	2.546	14.81	3702	2.936	27.10	6774	3.509	31.57	7892	3.694	35.36	8839	3.843	38.67	9668	3.969	62.05	15512	4.806	121.12	30281	6.550
4½"	8.87	2218	2.804	16.33	4082	3.237	29.90	7475	3.872	34.84	8710	4.077	39.02	9756	4.242	42.69	10673	4.381	68.54	17136	5.310	133.97	33493	7.245
5"	9.79	2448	3.094	18.03	4507	3.574	33.02	8256	4.276	38.49	9622	4.504	43.13	10782	4.688	47.18	11796	4.842	75.81	18951	5.872	148.35	37088	8.022
6"	11.52	2880	3.640	21.21	5303	4.205	38.89	9722	5.036	45.34	11334	5.306	50.81	12702	5.522	55.60	13900	5.706	89.45	22363	6.929	175.39	43848	9.485
7"	13.13	3282	4.148	24.18	6046	4.794	44.37	11092	5.745	51.74	12934	6.055	57.99	14498	6.303	63.47	15868	6.514	102.21	25554	7.918	200.73	50181	10.855
8"	14.72	3680	4.651	27.13	6782	5.377	49.81	12452	6.450	58.10	14524	6.799	65.13	16283	7.079	71.29	17823	7.316	114.93	28732	8.903	225.99	56497	12.221
9"	16.31	4077	5.153	30.06	7514	5.958	55.22	13805	7.151	64.42	16105	7.539	72.23	18057	7.851	79.07	19769	8.115	127.55	31887	9.880	251.15	62788	13.582
10"	18.08	4520	5.712	33.32	8330	6.605	61.25	15313	7.932	71.47	17867	8.364	80.14	20036	8.711	87.75	21937	9.004	141.67	35416	10.974	279.26	69814	15.101
12"	21.16	5291	6.699	39.10	9774	7.750	71.94	17985	9.316	83.97	20992	9.826	94.18	23545	10.236	103.14	25785	10.584	166.70	41674	12.913	329.12	82279	17.798
14"	23.14	5785	7.312	42.68	10670	8.460	78.56	19641	10.174	91.71	22928	10.733	102.87	25718	11.182	112.67	28167	11.562	182.22	45554	14.115	360.14	90034	19.475
16"	26.22	6556	8.286	48.38	12094	9.589	89.09	22273	11.537	104.04	26009	12.175	116.73	29184	12.688	127.87	31967	13.122	206.98	51744	16.033	409.64	102409	22.152
18"	29.27	7318	9.250	54.01	13503	10.707	99.57	24891	12.893	116.28	29071	13.608	130.49	32623	14.184	142.95	35738	14.670	231.59	57898	17.940	458.89	114723	24.815

In these Tables Coal has been figured at $7.00 per Ton of 2,000 Lbs.—13,000 Btu. per lb. of Coal—Labor, Boiler Room Expense, etc. Taken at $1.00 per Ton. Making Total Value of Coal Fired at $8.00 per Ton. Boiler Efficiency taken at 70 Per Cent. Air Temp. 80°F. Experimental Data Obtained at Mellon Institute.

HEAT TRANSMISSION FOR VARIOUS WIND VELOCITIES (CROSS FLOW, HORIZONTAL BARE STEEL PIPES.)




HEAT TRANSMISSION FOR
VARIOUS WIND VELOCITIES
(LARGE FLAT SURFACES)
TRANSMISSION, Btu. PER sq. FT. PER HR.
3600
3200
2800
2400
2000
1600
1200
800
400
AIR VELOCITY 30 FT PER SEC.
25
20
15
10
5
100
200
300
400
500
TEMPERATURE DIFFERENCE °F. SURFACE TO AIR

Carey Heat Insulating Materials

High Temperature Surfaces (1000°F. to 2500°F.)

Carey Hi-Temp No. 19—An efficient insulator consisting essentially of a mixture of diatomaceous earth and asbestos fibre bonded and molded into commercial size blocks. This material is designed to give maximum efficiency with structural integrity in the temperature range from 1500° F to 1900° F—for use on ovens, regenerators, and kilns in this temperature range.

Super Heated Surfaces (500°F. to 1600°F.)

Carey Alltemp—Produced from a formulation of expanded silicas and asbestos fibre. Available in sectional, tri-sectional, segmental and block forms. ALLTEMP is recommended for insulating high temperature piping and surfaces such as breeching, boiler walls, ovens, stills and similar surfaces. It is an ideal insulator for irregular surfaces due to its workability and ease of application. Its exceptionally low shrinkage factor, plus low coefficient of conductivity assures outstanding economical performance when used as a single material or in combination with Carey Super Light 85% Magnesia.

Alltemp is water resistant and offers an excellent surface for cements. Now accepted and being used by principal boiler manufacturers, Engineering contractors, and industry.

Carey Mineral Wool Blankets—(for use up to 1200° F.) A high-quality mineral wool felted to a density of approximately 12 lbs. per cubic foot, and encased between various types of metal fabrics. Furnished in large blankets or sheets 2 ft. wide x standard lengths of 4 ft. or 8 ft., or can be supplied to special lengths, and in thicknesses 1 in. to 6 in. inclusive. These blankets have high thermal efficiency and relatively low cost. They are particularly designed for use in oven walls or on other areas where large-size insulating units are wanted and where mechanical strength or smooth finish is not required.

Medium and High Temperature Surfaces (200°F. to 600°F.)

Carey Super Light 85% Magnesia—is precision molded from a mixture of 85% basic Carbonate of Magnesia and approximately 15% asbestos fibre. Super Light has uniform, accurate dimensions—light density and low conductivity "K Factor." It has good strength, low shrinkage and excellent water resistance. Few materials have been so thoroughly tested and found to offer the long efficiency of performance with the economy of application found in Super Light.

Carey Asbestos Sponge—For temperatures up to 700° F. constructed of a series of laminated asbestos felts, averaging 30 to 35 layers per inch of thickness. Is recommended for use on vibrating lines and on installations requiring a structurally tough insulation. Is available in large semi-cylindrical sections, blocks and sheets.

Low and Medium Pressure Steam Surfaces (100°F. to 300°F.)

Careycel—Constructed of many layers of "cellized" asbestos sheets. Unusually low thermal conductivity. Furnished in pipe covering sections, sheets and blocks.

Carey Air Cell—Course corrugated asbestos structure having four plies of corrugations per inch of thickness.

Carey Excel—A medium corrugated asbestos structure having six plies of corrugations per inch of thickness.

Cold Water Pipes

Carey Impervo—Comprised from layers of insulating felt cemented together with asphalt saturated organic felts applied to both inner and outer surfaces. Used for insulating chilled and ice water lines to keep water cold and prevent sweating. Proper sealing by use of a suitable vapor barrier is recommended to prevent infiltration of water vapor through the barrier into the insulation causing condensation.

Carey Perfecto—Made up of laminations of insulating felt with waterproof felt liner and used to protect against freezing and sweating of cold water pipes.

Carey Protecto—Consists of an inner layer of hair felt reinforced by an outer layer of insulating felt and designed to reduce danger of freezing of exposed water pipes.

COMBINATION COVERING FOR 700° F.

* Indicates Recommended Combinations

INNER LAYER CAREY ALLTEMP, OUTER LAYER SUPER-LIGHT 85% MAGNESIA

80° F. Ambient Air Temperature

Pipe Size In.	Inner Layer Thickness Inches	Outer Layer Thickness Inches	Temp. °F. at Inner Magnesia Surface	Canvas Temp. °F. with Air at 80° F.	B. T. U. Loss Per Lin. Ft. Per Hr.		Percent Eff. %
					Covered Pipe	Bare Pipe	
8	* 1 17/32	1 19/32	441	125	286	8,100	96.4
	1 17/32	2 3/32	479	118	245	8,100	96.9
	1 17/32	2 5/8	504	113	223	8,100	97.2
	1 17/32	3 3/32	515	109	205	8,100	97.4
10	* 1 19/32	1½	442	128	341	10,000	96.6
	1 19/32	2	474	121	301	10,000	97.0
	1 19/32	2½	500	114	268	10,000	97.3
	1 19/32	3	519	111	241	10,000	97.5
12	1 19/32	1½	448	128	384	11,800	96.7
	* 1 19/32	2	479	122	339	11,800	97.1
	1 19/32	2½	501	116	305	11,800	97.4
	1 19/32	3	520	113	277	11,800	97.6
14	1½	1½	468	131	426	12,850	96.7
	* 1½	2	494	124	384	12,850	97.0
	1½	2½	518	119	341	12,850	97.3
	1½	3	540	114	300	12,850	97.6
16	1½	1½	470	132	477	14,650	96.7
	* 1½	2	496	125	419	14,650	97.1
	1½	2½	520	120	377	14,650	97.4
	1½	3	543	116	348	14,650	97.6
18	1½	1½	472	133	518	16,420	96.8
	* 1½	2	499	126	457	16,420	97.2
	1½	2½	522	121	415	16,420	97.5
	1½	3	545	117	377	16,420	97.7
Flat	1½	1½	482	131	91.0	3,870	97.6
	* 1½	2	517	125	78.1	3,870	98.0
	1½	2½	541	119	67.5	3,870	98.3
	1½	3	560	115	59.0	3,870	98.5

COMBINATION COVERING FOR 800° F.

* Indicates Recommended Combinations

INNER LAYER CAREY ALLTEMP, OUTER LAYER SUPER-LIGHT 85% MAGNESIA

80° F. Ambient Air Temperature

Pipe Size In.	Inner Layer Thickness Inches	Outer Layer Thickness Inches	Temp. °F. at Inner Magnesia Surface	Canvas Temp. °F. with Air at 80° F.	B. T. U. Loss Per Lin. Ft. Per Hr.		Percent Eff. %
					Covered Pipe	Bare Pipe	
8	1 17/32	1 19/32	507	133	341	11,080	96.9
	* 1 17/32	2 3/32	546	125	295	11,080	97.3
	1 17/32	2 5/8	577	120	270	11,080	97.5
	2 1/32	1 19/32	461	127	309	11,080	97.2
	2 1/32	2 3/32	496	121	282	11,080	97.4
10	1 19/32	1 1/2	504	136	412	13,700	96.9
	* 1 19/32	2	540	129	363	13,700	97.3
	1 19/32	2 1/2	570	120	323	13,700	97.6
	2 3/32	1 1/2	452	129	368	13,700	97.3
	2 3/32	2	494	122	326	13,700	97.6
	2 3/32	2 1/2	520	118	304	13,700	97.8
12	1 19/32	1 1/2	511	137	464	16,200	97.1
	1 19/32	2	548	129	404	16,200	97.5
	* 1 19/32	2 1/2	574	123	364	16,200	97.7
	2 3/32	1 1/2	467	130	417	16,200	97.4
	2 3/32	2	499	125	384	16,200	97.6
	2 3/32	2 1/2	532	119	344	16,200	97.9
	2 3/32	3	555	115	317	16,200	98.0
14	1 1/2	1 1/2	535	140	513	17,700	97.1
	1 1/2	2	564	132	462	17,700	97.4
	2	1 1/2	482	133	465	17,700	97.4
	* 2	2	517	126	421	17,700	97.6
	2	2 1/2	551	121	374	17,700	97.9
	2	3	571	116	344	17,700	98.0
16	1 1/2	1 1/2	537	141	578	20,100	97.1
	1 1/2	2	568	133	511	20,100	97.5
	2	1 1/2	485	134	519	20,100	97.4
	* 2	2	520	127	452	20,100	97.7
	2	2 1/2	554	122	410	20,100	97.9
	2	3	575	117	364	20,100	98.2

COMBINATION COVERING FOR 800° F.

* Indicates Recommended Combinations

INNER LAYER CAREY ALLTEMP, OUTER LAYER SUPER-LIGHT 85% MAGNESIA

80° F. Ambient Air Temperature

Pipe Size In.	Inner Layer Thickness Inches	Outer Layer Thickness Inches	Temp. °F. at Inner Magnesia Surface	Canvas Temp. °F. with Air at 80° F.	B. T. U. Loss Per Lin. Ft. Per Hr.		Percent Eff. %
					Covered Pipe	Bare Pipe	
18	1½	1½	539	142	632	22,600	97.2
	1½	2	572	134	551	22,600	97.6
	2	1½	490	135	570	22,600	97.5
	* 2	2	524	128	495	22,600	97.8
	2	2½	559	123	453	22,600	98.0
	2	3	580	118	400	22,600	98.2
Flat	1½	1½	550	140	110	5,000	97.8
	2	1½	504	135	96.9	5,000	98.0
	* 2	2	549	129	84.1	5,000	98.3
	2	2½	581	123	74.3	5,000	98.5
	2½	1½	466	130	86.7	5,000	98.3
	2½	2	510	124	76.0	5,000	98.5
	2½	2½	547	120	68.0	5,000	98.6
	2½	3	570	117	61.5	5,000	98.8

COMBINATION COVERING FOR 900° F.

* Indicates Recommended Combinations

INNER LAYER CAREY ALLTEMP, OUTER LAYER SUPER-LIGHT 85% MAGNESIA

80° F. Ambient Air Temperature

Pipe Size In.	Inner Layer Thickness Inches	Outer Layer Thickness Inches	Temp. °F. at Inner Magnesia Surface	Canvas Temp. °F. with Air at 80° F.	B. T. U. Loss Per Lin. Ft. Per Hr.		Percent Eff. %
					Covered Pipe	Bare Pipe	
½	2 1/16	None	...	136	147	1,560	90.5
¾	1 31/32	None	...	142	169	1,930	91.2
1	2 1/8	None	...	141	182	2,400	92.4
1¼	1 15/16	None	...	149	216	3,010	92.8
1½	2 5/16	None	...	141	208	3,430	93.9
2	1 19/32	1 1/32	438	138	201	4,240	95.2
	* 1 19/32	1 17/32	492	127	179	4,240	95.7
	1 19/32	2 1/32	531	120	164	4,240	96.1
	1 19/32	2 9/16	567	115	162	4,240	96.2
3	* 1 9/16	1½	516	132	222	6,170	96.4
	1 9/16	2 1/32	558	123	200	6,170	96.7
	1 9/16	2 17/32	589	118	184	6,170	97.0
	2 1/16	1 17/32	458	125	208	6,170	96.6
	2 1/16	2 1/32	500	118	190	6,170	96.9
	2 1/16	2 17/32	532	114	178	6,170	97.1
	2 1/16	3 1/8	560	110	150	6,170	97.5
4	* 1 9/16	1 17/32	534	134	260	7,860	96.7
	1 9/16	2 1/32	576	125	231	7,860	97.0
	2 1/16	1 17/32	474	127	239	7,860	96.9
	2 1/16	2 1/32	515	121	220	7,860	97.2
	2 1/16	2 11/16	554	115	198	7,860	97.5
	2 1/16	3 1/8	577	111	187	7,860	97.6
5	1 17/32	1 17/32	550	136	297	9,660	96.9
	1 17/32	2 1/32	591	128	268	9,660	97.2
	2 1/32	1 17/32	492	129	273	9,660	97.1
	* 2 1/32	2 5/32	545	122	243	9,060	97.4
	2 1/32	2 11/16	575	116	224	9,660	97.6
	2 9/16	2 5/32	480	118	235	9,660	97.5
	2 9/16	2 19/32	515	114	217	9,660	97.7
	2 9/16	3 5/32	542	110	203	9,660	97.9

COMBINATION COVERING FOR 900° F.

* Indicates Recommended Combinations

INNER LAYER CAREY ALLTEMP, OUTER LAYER SUPER-LIGHT 85% MAGNESIA

80° F. Ambient Air Temperature

Pipe Size In.	Inner Layer Thickness Inches	Outer Layer Thickness Inches	Temp. °F. at Inner Magnesia Surface	Canvas Temp. °F. with Air at 80° F.	B. T. U. Loss Per Lin. Ft. Per Hr.		Percent Eff. %
					Covered Pipe	Bare Pipe	
6	1½	1 17/32	564	139	338	11,460	97.0
	2 1/32	1 19/32	503	131	305	11,460	97.3
	* 2 1/32	2 3/32	546	123	274	11,460	97.6
	2 17/32	1 19/32	453	126	286	11,460	97.5
	2 17/32	2 3/32	498	120	258	11,460	97.7
	2 17/32	3 3/32	557	111	225	11,460	98.0
8	1 17/32	1 19/32	572	140	397	14,800	97.3
	2 1/32	1 19/32	517	134	366	14,800	97.5
	* 2 1/32	2 3/32	560	127	330	14,800	97.7
	2 11/16	2	491	122	311	14,800	97.9
	2 11/16	2½	525	118	289	14,800	98.0
10	1 19/32	1½	566	144	484	18,300	97.3
	2 3/32	1½	508	136	437	18,300	97.6
	* 2 3/32	2	556	129	388	18,300	97.8
	2 3/32	2½	587	124	354	18,300	98.0
	2 19/32	2	509	125	365	18,300	98.0
	2 19/32	2½	540	120	340	18,300	98.1
12	1 19/32	1½	574	146	544	21,600	97.5
	2 3/32	1½	523	138	498	21,600	97.7
	* 2 3/32	2	560	132	457	21,600	97.9
	2 5/8	1½	475	133	460	21,600	97.9
	2 5/8	2	515	126	420	21,600	98.0
	3 3/32	1½	435	126	420	21,600	98.0
	3 3/32	2	469	122	394	21,600	98.2
	3 3/32	2½	513	118	360	21,600	98.3
	3 3/32	3	540	115	333	21,600	98.4

COMBINATION COVERING FOR 900° F.

* Indicates Recommended Combinations

INNER LAYER CAREY ALLTEMP, OUTER LAYER SUPER-LIGHT 85% MAGNESIA

80° F. Ambient Air Temperature

Pipe Size In.	Inner Layer Thickness Inches	Outer Layer Thickness Inches	Temp. °F. at Inner Magnesia Surface	Canvas Temp. °F. with Air at 80° F.	B. T. U. Loss Per Lin. Ft. Per Hr.		Percent Eff. %
					Covered Pipe	Bare Pipe	
14	2	1½	543	141	550	23,600	97.7
	2	2	583	134	495	23,600	97.9
	* 2½	1½	489	135	498	23,600	97.9
	2½	2	530	128	458	23,600	98.1
	3	1½	446	130	469	23,600	98.0
	3	2	492	124	425	23,600	98.2
	3	2½	529	121	392	23,600	98.4
	3	3	555	117	352	23,600	98.5
16	2	1½	547	143	607	26,800	97.7
	* 2½	1½	492	136	557	26,800	97.9
	2½	2	535	129	490	26,800	98.2
	3	1½	450	131	582	26,800	97.8
	3	2	496	125	452	26,800	98.3
	3	2½	534	122	535	26,800	98.0
	3	3	560	118	402	26,800	98.5
18	2	1½	552	144	684	30,300	97.7
	* 2½	1½	496	137	603	30,300	98.0
	2½	2	541	131	552	30,300	98.2
	3	1½	455	132	566	30,300	98.1
	3	2	500	126	495	30,300	98.4
	3	2½	539	123	486	30,300	98.4
	3	3	565	119	429	30,300	98.6
Flat	2	1½	564	142	115	6,650	98.3
	* 2½	1½	521	135	102.3	6,650	98.4
	2½	2	572	131	90.3	6,650	98.6
	3	1½	486	132	92.2	6,650	98.6
	3	2	529	127	82.6	6,650	98.7
	3	2½	568	121	74.4	6,650	98.9

COMBINATION COVERING FOR 1000° F.

* Indicates Recommended Combinations

INNER LAYER CAREY ALLTEMP, OUTER LAYER SUPER-LIGHT 85% MAGNESIA

80° F. Ambient Air Temperature

Pipe Size In.	Inner Layer Thickness Inches	Outer Layer Thickness Inches	Temp. °F. at Inner Magnesia Surface	Canvas Temp. °F. with Air at 80° F.	B. T. U. Loss Per Lin. Ft. Per Hr.		Percent Eff. %
					Covered Pipe	Bare Pipe	
½	2 1/16	None	...	143	170	2,030	91.6
¾	1 31/32	None	...	150	195	2,510	92.2
1	2 1/8	None	...	149	210	3,120	93.2
1¼	1 15/16	None	...	157	250	3,910	93.6
1½	2 5/16	None	...	149	240	4,450	94.6
2	1 19/32	1 1/32	485	145	231	5,520	95.8
	* 1 19/32	1 17/32	547	134	205	5,520	96.3
	2 1/8	1	442	132	204	5,520	96.3
	2 1/8	1½	473	126	195	5,520	96.5
3	1 9/16	1½	574	139	261	8,050	96.7
	* 2 1/16	1 17/32	509	131	242	8,050	97.0
	2 1/16	2 1/32	560	123	218	8,050	97.2
	2 9/16	1 17/32	447	125	230	8,050	97.1
	2 9/16	2 1/32	502	119	210	8,050	97.3
4	* 2 1/16	1 17/32	530	133	276	10,280	97.3
	2 1/16	2 1/32	574	126	253	10,280	97.5
	2 9/16	1 17/32	480	127	259	10,280	97.4
	2 9/16	2 5/32	535	120	235	10,280	97.7
5	2 1/32	1 17/32	544	136	320	12,650	97.4
	* 2 9/16	1 19/32	494	129	292	12,650	97.7
	2 9/16	2 1/32	536	124	272	12,650	97.8
	2 9/16	2 19/32	576	119	250	12,650	98.0
	3 1/16	1 19/32	449	124	276	12,650	97.8
6	2 1/32	1 19/32	559	137	352	15,000	97.6
	* 2 17/32	1 19/32	503	132	332	15,000	97.7
	2 17/32	2 3/32	555	126	300	15,000	98.0
	3 1/32	1 19/32	458	127	312	15,000	97.9
	3 1/32	2 3/32	505	122	291	15,000	98.0
	3 11/16	1½	400	123	298	15,000	98.0

COMBINATION COVERING FOR 1000° F.

* Indicates Recommended Combinations

INNER LAYER CAREY ALLTEMP, OUTER LAYER SUPER-LIGHT 85% MAGNESIA

80° F. Ambient Air Temperature

Pipe Size In.	Inner Layer Thickness Inches	Outer Layer Thickness Inches	Temp. °F. at Inner Magnesia Surface	Canvas Temp. °F. with Air at 80° F.	B. T. U. Loss Per Lin. Ft. Per Hr.		Percent Eff. %
					Covered Pipe	Bare Pipe	
8	2 1/32	1 19/32	574	141	424	19,400	97.8
	2 11/16	1½	495	135	397	19,400	97.9
	* 2 11/16	2	543	129	363	19,400	98.1
	3⅛	1½	450	130	372	19,400	98.0
	3⅛	2	507	124	338	19,400	98.2
10	2 3/32	1½	565	144	506	24,000	97.8
	* 2 19/32	2	567	131	422	24,000	98.2
	3 3/32	1½	463	132	442	24,000	98.1
	3 3/32	2	517	126	402	24,000	98.3
	3 19/32	1½	431	127	413	24,000	98.2
12	2 3/32	1½	580	146	580	28,400	97.9
	2⅝	1½	527	140	535	28,400	98.1
	* 3 3/32	1½	481	132	491	28,400	98.3
	3 3/32	2	520	128	457	28,400	98.4
	3 3/32	2½	570	124	420	28,400	98.5
	3 19/32	1½	442	130	467	28,400	98.4
	3 19/32	2	495	125	434	28,400	98.5
14	2½	1½	540	142	582	31,000	98.1
	* 3	1½	495	136	544	31,000	98.2
	3	2	545	130	495	31,000	98.4
	3½	1½	459	132	505	31,000	98.4
	3½	2	510	127	470	31,000	98.5
	4	1½	432	129	480	31,000	98.4
16	2½	1½	543	144	657	35,400	98.1
	* 3	1½	500	137	586	35,400	98.3
	3	2	550	131	528	35,400	98.5
	3½	1½	463	133	557	35,400	98.4
	3½	2	514	128	515	35,400	98.5
	4	1½	436	129	528	35,400	98.5

COMBINATION COVERING FOR 1000° F.

* Indicates Recommended Combinations

INNER LAYER CAREY ALLTEMP, OUTER LAYER SUPER-LIGHT 85% MAGNESIA

80° F. Ambient Air Temperature

Pipe Size In.	Inner Layer Thickness Inches	Outer Layer Thickness Inches	Temp. °F. at Inner Magnesia Surface	Canvas Temp. °F. with Air at 80° F.	B. T. U. Loss Per Lin. Ft. Per Hr.		Percent Eff. %
					Covered Pipe	Bare Pipe	
18	2½	1½	546	146	726	39,800	98.2
	* 3	1½	500	138	641	39,800	98.4
	3	2	555	132	585	39,800	98.5
	3½	1½	467	134	608	39,800	98.5
	3½	2	518	129	552	39,800	98.6
	4	1½	440	130	575	39,800	98.5
Flat	2½	1½	578	142	119	8,700	98.6
	* 3	1½	537	139	108	8,700	98.7
	3½	1½	508	134	97.5	8,700	98.9
	3½	2	560	130	87.5	8,700	99.0
	4	1½	475	130	90.1	8,700	99.0

COMBINATION COVERING FOR 1100° F.

* Indicates Recommended Combinations

INNER LAYER CAREY ALLTEMP, OUTER LAYER SUPER-LIGHT 85% MAGNESIA

80° F. Ambient Air Temperature

Pipe Size In.	Inner Layer Thickness Inches	Outer Layer Thickness Inches	Temp. °F. at Inner Magnesia Surface	Canvas Temp. °F. with Air at 80° F.	B. T. U. Loss Per Lin. Ft. Per Hr.		Percent Eff. %
					Covered Pipe	Bare Pipe	
½	2 1/16	None	...	150	193	2,580	92.5
¾	1 31/32	None	...	158	222	3,200	93.0
1	2 1/8	None	...	156	238	3,980	94.0
1¼	1 15/16	None	...	165	283	5,000	94.3
1½	2 5/16	None	...	156	273	5,700	95.2
2	* 2 1/8	1½	517	133	223	7,090	96.8
	2 1/8	2 1/32	571	123	206	7,090	97.1
	2 5/8	1 17/32	475	125	210	7,090	97.0
	2 5/8	2 1/32	518	120	199	7,090	97.2
	2 5/8	2 17/32	557	115	187	7,090	97.4
3	* 2 1/16	1 17/32	560	137	276	10,330	97.3
	2 9/16	1 17/32	498	131	262	10,330	97.5
	2 9/16	2 1/32	553	124	241	10,330	97.6
	3 1/16	1 17/32	453	126	247	10,330	97.6
	3 1/16	2 5/32	516	120	224	10,330	97.8
	3 1/16	2 11/16	547	115	216	10,330	97.9
4	2 1/16	1 17/32	586	140	313	13,210	97.6
	* 2 9/16	1 17/32	529	132	295	13,210	97.7
	2 9/16	2 5/32	585	126	272	13,210	97.9
	3 3/32	1 19/32	479	126	279	13,210	97.8
	3 3/32	2 3/32	528	121	259	13,210	98.0
	3 3/32	2 19/32	562	118	246	13,210	98.1
5	2 9/16	1 19/32	540	135	336	16,250	97.9
	2 9/16	2 3/32	592	128	310	16,250	98.0
	* 3 1/16	1 19/32	490	130	317	16,250	98.0
	3 1/16	2 3/32	540	124	295	16,250	98.2
	3 1/16	2 5/8	577	121	276	16,250	98.3
6	2 17/32	1 19/32	554	138	378	19,300	98.0
	3 1/32	1 19/32	506	132	356	19,300	98.1
	* 3 1/32	2 3/32	556	127	329	19,300	98.3
	3 11/16	1½	443	128	340	19,300	98.2
	3 11/16	2	497	123	315	19,300	98.3

COMBINATION COVERING FOR 1100° F.

* Indicates Recommended Combinations

INNER LAYER CAREY ALLTEMP, OUTER LAYER SUPER-LIGHT 85% MAGNESIA

80° F. Ambient Air Temperature

Pipe Size In.	Inner Layer Thickness Inches	Outer Layer Thickness Inches	Temp. °F. at Inner Magnesia Surface	Canvas Temp. °F. with Air at 80° F.	B. T. U. Loss Per Lin. Ft. Per Hr.		Percent Eff. %
					Covered Pipe	Bare Pipe	
8	2 11/16	1½	544	141	453	25,000	98.1
	3⅛	1½	498	135	424	25,000	98.3
	* 3⅛	2	557	129	388	25,000	98.4
	3⅝	1½	466	130	397	25,000	98.4
	3⅝	2	517	125	372	25,000	98.5
10	2 19/32	1½	569	144	532	30,900	98.2
	3 3/32	1½	508	138	506	30,900	98.3
	* 3 3/32	2	565	132	461	30,900	98.5
	3 19/32	1½	470	133	476	30,900	98.4
	3 19/32	2	535	128	430	30,900	98.6
	3 19/32	2½	580	123	402	30,900	98.7
12	2⅝	1½	580	147	610	36,600	98.3
	3 3/32	1½	527	139	569	36,600	98.4
	3 3/32	2	571	134	521	36,600	98.6
	* 3 19/32	1½	488	135	533	36,600	98.5
	3 19/32	2	545	130	492	36,600	98.6
14	2½	1½	592	150	667	40,000	98.3
	3	1½	544	143	619	40,000	98.4
	* 3½	1½	503	138	580	40,000	98.5
	3½	2	550	136	555	40,000	98.6
	4	1½	476	134	540	40,000	98.6
	4	2	522	129	513	40,000	98.7
16	3	1½	550	144	678	45,500	98.5
	* 3½	1½	509	139	628	45,500	98.6
	3½	2	555	137	624	45,500	98.6
	4	1½	482	135	586	45,500	98.7
	4	2	528	130	549	45,500	98.8
18	3	1½	555	145	740	51,300	98.5
	* 3½	1½	514	140	693	51,300	98.6
	3½	2	562	138	684	51,300	98.6
	4	1½	488	136	660	51,300	98.7
	4	2	535	131	604	51,300	98.8

COMBINATION COVERING FOR 1100° F.

* Indicates Recommended Combinations

INNER LAYER CAREY ALLTEMP, OUTER LAYER SUPER-LIGHT 85% MAGNESIA

80° F. Ambient Air Temperature

Pipe Size In.	Inner Layer Thickness Inches	Outer Layer Thickness Inches	Temp. °F. at Inner Magnesia Surface	Canvas Temp. °F. with Air at 80° F.	B. T. U. Loss Per Lin. Ft. Per Hr.		Percent Eff. %
					Covered Pipe	Bare Pipe	
Flat	3	1½	590	145	123	11,180	98.9
	* 3½	1½	547	139	111	11,180	99.0
	4	1½	516	135	101	11,180	99.1
	4	2	578	130	92.6	11,180	99.2
	4½	1½	487	131	94.4	11,180	99.1
	4½	2	541	128	87.1	11,180	99.2

COMBINATION COVERING FOR 1200° F.

* Indicates Recommended Combinations

INNER LAYER CAREY ALLTEMP, OUTER LAYER SUPER-LIGHT 85% MAGNESIA

80° F. Ambient Air Temperature

Pipe Size In.	Inner Layer Thickness Inches	Outer Layer Thickness Inches	Temp. °F. at Inner Magnesia Surface	Canvas Temp. °F. with Air at 80° F.	B. T. U. Loss Per Lin. Ft. Per Hr.		Percent Eff. %
					Covered Pipe	Bare Pipe	
½	2 1/16	None	...	157	216	3,240	93.3
¾	1 31/32	None	...	166	248	4,040	93.8
1	2 1/8	None	...	164	266	5,000	94.7
1¼	1 15/16	None	...	174	317	6,300	94.9
1½	2 5/16	None	...	164	305	7,200	95.7
2	* 2 1/8	1½	563	138	254	8,920	97.1
	2 5/8	1 17/32	516	131	238	8,920	97.3
	2 5/8	2 1/32	569	125	224	8,920	97.5
	3 1/8	1 17/32	463	126	228	8,920	97.4
3	* 2 9/16	1 17/32	544	136	296	13,050	97.7
	3 1/16	1 17/32	493	130	281	13,050	97.8
	3 1/16	2 3/32	562	124	257	13,050	98.0
	3 19/32	1 19/32	458	125	263	13,050	97.9
	3 19/32	2 3/32	503	121	250	13,050	98.0
4	2 9/16	1 17/32	580	137	333	16,730	98.0
	* 3 3/32	1 19/32	523	131	315	16,730	98.1
	3 3/32	2 3/32	573	126	293	16,730	98.2
	3 19/32	1 19/32	479	128	300	16,730	98.2
	3 19/32	2 3/32	526	122	283	16,730	98.3
5	* 3 1/16	1 19/32	530	135	360	20,600	98.2
	3 9/16	2 3/32	547	125	317	20,600	98.4
	4 7/32	1½	426	126	330	20,600	98.4
	4 7/32	2	481	122	311	20,600	98.5
6	3 1/32	1 19/32	555	138	400	24,400	98.3
	* 3 11/16	1½	486	133	383	24,400	98.4
	3 11/16	2	540	128	359	24,400	99.1
	4 1/8	1½	455	130	362	24,400	98.5
	4 1/8	2	505	124	343	24,400	98.6

COMBINATION COVERING FOR 1200° F.

* Indicates Recommended Combinations

INNER LAYER CAREY ALLTEMP, OUTER LAYER SUPER-LIGHT 85% MAGNESIA

80° F. Ambient Air Temperature

Pipe Size In.	Inner Layer Thickness Inches	Outer Layer Thickness Inches	Temp. °F. at Inner Magnesia Surface	Canvas Temp. °F. with Air at 80° F.	B. T. U. Loss Per Lin. Ft. Per Hr.		Percent Eff. %
					Covered Pipe	Bare Pipe	
8	3 1/8	1 1/2	547	141	476	31,600	98.4
	* 3 5/8	1 1/2	506	136	451	31,600	98.5
	3 5/8	2	566	130	417	31,600	98.6
	4 3/16	1 1/2	457	132	433	31,600	98.6
	4 3/16	2	514	127	406	31,600	98.7
10	3 5/32	1 1/2	554	145	571	39,100	98.5
	* 3 19/32	1 1/2	509	140	540	39,100	98.6
	3 19/32	2	581	133	490	39,100	98.7
	4 5/32	1 1/2	488	134	500	39,100	98.7
	4 5/32	2	531	130	475	39,100	98.8
12	3 5/32	1 1/2	574	146	634	46,400	98.6
	* 3 19/32	1 1/2	534	141	600	46,400	98.7
	3 19/32	2	594	135	550	46,400	98.8
	4 1/8	1 1/2	487	137	577	46,400	98.7
	4 1/8	2	552	132	527	46,400	98.8
14	3	1 1/2	594	149	696	50,700	98.6
	* 3 1/2	1 1/2	545	144	656	50,700	98.7
	4	1 1/2	520	139	619	50,700	98.7
	4	2	565	134	579	50,700	98.8
	4 1/2	1 1/2	475	136	586	50,700	98.8
16	* 3 1/2	1 1/2	551	146	724	57,700	98.7
	4	1 1/2	525	140	670	57,700	98.8
	4	2	571	135	615	57,700	98.9
	4 1/2	1 1/2	481	137	645	57,700	98.8
	4 1/2	2	547	132	600	57,700	99.0
18	* 3 1/2	1 1/2	555	147	787	64,900	98.8
	4	1 1/2	529	141	722	64,900	98.9
	4	2	576	136	679	64,900	99.0
	4 1/2	1 1/2	486	138	712	64,900	98.9
	4 1/2	2	552	133	650	64,900	99.0

COMBINATION COVERING FOR 1200° F.

* Indicates Recommended Combinations

INNER LAYER CAREY ALLTEMP, OUTER LAYER SUPER-LIGHT 85% MAGNESIA

80° F. Ambient Air Temperature

Pipe Size In.	Inner Layer Thickness Inches	Outer Layer Thickness Inches	Temp. °F. at Inner Magnesia Surface	Canvas Temp. °F. with Air at 80° F.	B. T. U. Loss Per Lin. Ft. Per Hr.		Percent Eff. %
					Covered Pipe	Bare Pipe	
Flat	3½	1½	599	146	127	14,110	99.1
	* 4	1½	565	142	116	14,110	99.2
	4½	1½	535	138	107	14,110	99.2
	5	1½	515	134	99	14,110	99.3
	5	2	580	131	92	14,110	99.3

DOUBLE LAYER ALLTEMP COVERING

For 1300° F.

* Indicates Recommended Thickness

80° F. Ambient Air Temperature

Pipe Size In.	Thickness Inches		Canvas Temp. ° F.	B. T. U. Loss Per Lineal Ft. Per Hour		Percent Eff. %
	Inner Layer	Outer Layer		Covered Pipe	Bare Pipe	
½	3-11/32	None	136	199	4,020	95.0
¾	3-1/4	None	142	220	5,020	95.6
1	3-5/32	None	148	249	6,240	96.0
1¼	2-31/32	None	156	283	7,850	96.4
1½	3-11/32	None	150	288	8,940	96.8
2	* 2-1/8	1-1/2	149	311	11,140	97.2
	2-1/8	2-1/32	139	290	11,140	97.4
3	* 2-1/16	2-1/32	147	359	16,260	97.8
	2-9/16	2-1/32	139	337	16,260	97.9
4	* 2-9/16	2-5/32	142	384	20,810	98.2
	2-9/16	2-21/32	135	364	20,810	98.3
5	* 2-9/16	2-3/32	145	437	25,620	98.3
	2-9/16	2-19/32	139	412	25,620	98.4
6	2-17/32	2-3/32	148	490	30,410	98.4
	* 2-17/32	2-5/8	142	463	30,410	98.5
8	* 2-11/16	2-1/2	146	549	39,420	98.6
	3-1/8	2-1/2	140	523	39,420	98.7
10	* 2-19/32	2-1/2	150	650	48,950	98.7
	3-1/8	2-1/2	143	608	48,950	98.7
12	* 2-5/8	2-1/2	152	738	57,900	98.7
	3-3/32	2-1/2	147	690	57,900	98.8
	3-3/32	3	142	650	57,900	98.9

DOUBLE LAYER ALLTEMP COVERING

For 1300° F.

* Indicates Recommended Thickness

80° F. Ambient Air Temperature

Pipe Size In.	Thickness Inches		Canvas Temp. ° F.	B. T. U. Loss Per Lineal Ft. Per Hour		Percent Eff. %
	Inner Layer	Outer Layer		Covered Pipe	Bare Pipe	
14	* 2-1/2	2-1/2	156	806	63,480	98.7
	3	2-1/2	151	755	63,480	98.8
	3	3	145	703	63,480	98.9
	2-1/2	2-1/2	159	900	72,400	98.8
16	* 3	2-1/2	152	838	72,400	98.8
	3	3	147	783	72,400	98.9
	3-1/2	3	143	741	72,400	99.0
	2-1/2	2-1/2	161	985	81,380	98.8
18	* 3	2-1/2	155	920	81,380	98.9
	3	3	148	849	81,380	98.9
	3-1/2	3	143	811	81,380	99.0
	2-1/2	2-1/2	159	155	17,630	99.1
Flat	* 3	2-1/2	152	142	17,630	99.2
	3	3	148	131	17,630	99.3
	3-1/2	3	144	121	17,630	99.3

DOUBLE LAYER ALLTEMP COVERING

For 1400° F.

* Indicates Recommended Thickness

80° F. Ambient Air Temperature

Pipe Size in.	Thickness Inches		Canvas Temp. ° F.	B. T. U. Loss Per Lineal Ft. Per Hour		Percent Eff. %
	Inner Layer	Outer Layer		Covered Pipe	Bare Pipe	
½	3-11/32	None	141	220	4,960	95.6
¾	3-1/4	None	148	245	6,170	96.0
1	3-5/32	None	154	277	7,680	96.4
1 ¼	2-31/32	None	162	316	9,660	96.7
1 ½	3-11/32	None	156	320	11,010	97.1
2	* 2-1/8	1-1/2	155	346	13,720	97.5
	2-1/8	2-1/32	144	323	13,720	97.6
3	* 2-1/16	2-1/32	153	400	18,860	97.9
	2-9/16	2-1/32	144	376	18,860	98.0
4	* 2-9/16	2-5/32	147	428	25,690	98.3
	2-9/16	2-21/32	140	406	25,690	98.4
5	* 2-9/16	2-3/32	150	488	31,640	98.5
	2-9/16	2-19/32	144	459	31,640	98.5
6	* 2-17/32	2-3/32	153	545	37,580	98.5
	2-17/32	2-5/8	148	516	37,580	98.6
8	* 2-11/16	2-1/2	152	614	48,740	98.7
	3-1/8	2-1/2	145	582	48,740	98.8
10	* 2-19/32	2-1/2	156	725	60,540	98.8
	3-1/8	2-1/2	148	675	60,540	98.9
12	* 2-5/8	2-1/2	158	825	71,640	98.8
	3-3/32	2-1/2	153	769	71,640	98.9
	3-3/32	3	147	724	71,640	99.0

DOUBLE LAYER ALLTEMP COVERING

For 1400° F.

* Indicates Recommended Thickness

80° F. Ambient Air Temperature

Pipe Size In.	Thickness Inches		Canvas Temp. ° F.	B. T. U. Loss Per Lineal Ft. Per Hour		Percent Eff. %
	Inner Layer	Outer Layer		Covered Pipe	Bare Pipe	
14	2-1/2	2-1/2	162	904	78,560	98.8
	* 3	2-1/2	157	839	78,560	98.9
	3	3	150	786	78,560	99.0
16	2-1/2	2-1/2	166	1,002	89,600	98.9
	* 3	2-1/2	158	932	89,600	99.0
	3	3	153	873	89,600	99.0
	3-1/2	3	148	825	89,600	99.1
18	2-1/2	2-1/2	168	1,100	100,770	99.0
	* 3	2-1/2	161	1,022	100,770	99.0
	3	3	154	949	100,770	99.1
	3-1/2	3	149	902	100,770	99.1
Flat	2-1/2	2-1/2	166	173	21,780	99.2
	* 3	2-1/2	158	158	21,780	99.3
	3	3	153	146	21,780	99.4
	3-1/2	3	149	135	21,780	99.4

DOUBLE LAYER ALLTEMP COVERING

For 1500° F.

* Indicates Recommended Thickness

80° F. Ambient Air Temperature

Pipe Size In.	Thickness Inches		Canvas Temp. ° F.	B. T. U. Loss Per Lineal Ft. Per Hour		Percent Eff. %
	Inner Layer	Outer Layer		Covered Pipe	Bare Pipe	
½	3-11/32	None	147	241	6,040	96.0
¾	3-1/4	None	154	271	7,520	96.4
1	3-5/32	None	160	305	9,360	96.7
1 ¼	2-31/32	None	169	349	11,790	97.0
1 ½	3-11/32	None	162	353	13,440	97.4
2	2-1/8	1-1/2	161	382	16,750	97.7
	* 2-1/8	2-1/32	150	356	16,750	97.9
3	* 2-1/16	2-1/32	159	441	24,510	98.2
	2-9/16	2-1/32	150	415	24,510	98.3
4	* 2-9/16	2-5/32	153	473	31,400	98.5
	2-9/16	2-21/32	145	448	31,400	98.6
5	* 2-9/16	2-3/32	156	539	38,690	98.6
	2-9/16	2-19/32	149	506	38,690	98.7
6	* 2-17/32	2-3/32	159	600	45,970	98.7
	2-17/32	2-5/8	154	570	45,970	98.8
8	* 2-11/16	2-1/2	158	678	59,650	98.8
	3-1/8	2-1/2	151	641	59,650	98.9
10	2-19/32	2-1/2	163	800	74,110	98.9
	* 3-1/8	2-1/2	154	742	74,110	99.0
12	2-5/8	2-1/2	164	912	87,720	99.0
	* 3-3/32	2-1/2	159	848	87,720	99.0
	3-3/32	3	153	799	87,720	99.1

DOUBLE LAYER ALLTEMP COVERING

For 1500° F.

* Indicates Recommended Thickness

80° F. Ambient Air Temperature

Pipe Size In.	Thickness Inches		Canvas Temp. ° F.	B. T. U. Loss Per Lineal Ft. Per Hour		Percent Eff. %
	Inner Layer	Outer Layer		Covered Pipe	Bare Pipe	
14	2-1/2	2-1/2	169	1,002	96,200	99.0
	* 3	2-1/2	162	923	96,200	99.0
	3	3	156	869	96,200	99.1
16	2-1/2	2-1/2	172	1,104	109,780	99.0
	3	2-1/2	164	1,026	109,780	99.1
	* 3	3	159	963	109,780	99.1
	3-1/2	3	154	909	109,780	99.2
18	2-1/2	2-1/2	175	1,215	123,440	99.0
	3	2-1/2	167	1,124	123,440	99.1
	* 3	3	160	1,050	123,440	99.1
	3-1/2	3	155	993	123,440	99.2
Flat	2-1/2	2-1/2	173	191	26,620	99.3
	3	2-1/2	164	175	26,620	99.3
	* 3	3	159	161	26,620	99.4
	3-1/2	3	154	149	26,620	99.4

DOUBLE LAYER ALLTEMP COVERING

For 1600° F.

* Indicates Recommended Thickness

80° F. Ambient Air Temperature

Pipe Size In.	Thickness Inches		Canvas Temp. ° F.	B. T. U. Loss Per Lineal Ft. Per Hour		Percent Eff. %
	Inner Layer	Outer Layer		Covered Pipe	Bare Pipe	
½	3-11/32	None	152	261	7,290	96.4
¾	3-1/4	None	160	297	9,080	96.7
1	3-5/32	None	167	333	11,310	97.0
1¼	2-31/32	None	176	382	14,250	97.3
1½	3-11/32	None	169	386	16,250	97.6
2	2-1/8	1-1/2	167	418	20,260	97.9
	* 2-1/8	2-1/32	156	390	20,260	98.1
3	* 2-1/16	2-1/32	165	483	29,670	98.4
	2-9/16	2-1/32	156	455	29,670	98.5
4	* 2-9/16	2-5/32	158	518	38,020	98.6
	2-9/16	2-21/32	150	490	38,020	98.7
5	* 2-9/16	2-3/32	162	591	46,870	98.7
	2-9/16	2-19/32	155	554	46,870	98.8
6	* 2-17/32	2-3/32	165	655	55,700	98.8
	2-17/32	2-5/8	160	624	55,700	98.9
8	* 2-11/16	2-1/2	164	743	72,290	98.9
	3-1/8	2-1/2	157	700	72,290	99.0
10	2-19/32	2-1/2	169	875	89,860	99.0
	* 3-1/8	2-1/2	160	810	89,860	99.1
12	2-5/8	2-1/2	171	1,000	106,390	99.1
	* 3-3/32	2-1/2	165	927	106,390	99.1
	3-3/32	3	159	874	106,390	99.2

DOUBLE LAYER ALLTEMP COVERING

For 1600° F.

* Indicates Recommended Thickness

80° F. Ambient Air Temperature

Pipe Size In.	Thickness Inches		Canvas Temp. ° F.	B. T. U. Loss Per Lineal Ft. Per Hour		Percent Eff. %
	Inner Layer	Outer Layer		Covered Pipe	Bare Pipe	
14	2-1/2	2-1/2	176	1,100	116,690	99.1
	3	2-1/2	168	1,007	116,690	99.2
	* 3	3	162	953	116,690	99.2
16	2-1/2	2-1/2	179	1,206	133,180	99.1
	3	2-1/2	171	1,122	133,180	99.2
	* 3	3	165	1,055	133,180	99.2
	3-1/2	3	159	993	133,180	99.2
18	2-1/2	2-1/2	182	1,330	149,780	99.1
	3	2-1/2	173	1,226	149,780	99.2
	* 3	3	166	1,150	149,780	99.2
	3-1/2	3	161	1,085	149,780	99.3
Flat	2-1/2	2-1/2	180	210	32,240	99.3
	3	2-1/2	171	192	32,240	99.4
	* 3	3	165	176	32,240	99.5
	3-1/2	3	160	163	32,240	99.5

Where to buy

Carey Industrial Sales Engineers can be easily reached at the District Offices listed below. Call on them for any information you need, or for the name of a Carey-approved contract unit in a major trading area near you.

District Offices

Atlanta 6, Ga.
251 Armour Drive, N.E.
TRinity 4-5793

Boston, Mass. (Cambridge 38)
22 Moulton St.
TRowbridge 6-7700

Charlotte 2, N. C.
402 Addison Bldg.
222 S. Church St.
FRanklin 7-6502, 7-6503

Chicago District
25th and Warren, Bellwood, Ill.
AUstin 7-4063

Cincinnati 15, Ohio
316 S. Wayne Ave.
VAlley 1-3000

Cleveland 29, Ohio
8551 Brookpark Road
FLorida 1-8505

Des Moines, Iowa
927-28 Insurance Exchange Bldg.
CHerry 4-7113

Detroit 38, Mich.
14420 Livernois Ave.
TOwnsend 8-2600

Houston 8, Texas
1400 N. Post Oak Road
UNderwood 9-3363

Indianapolis 21, Ind.
1432 Kentucky Ave.
MElrose 5-1314

Los Angeles 21, Calif.
1760 E. 15th St.
RIchmond 8-5207

Memphis, Tenn.
1510 Orendo Road
JAckson 7-3081

Montreal 9, P.Q.
95 Stinson Blvd.
Ville St. Laurent
Regent 1-6451

New York 17, N.Y.
Lincoln Bldg., 60 E. 42nd St.
MUrray Hill 7-1530

Philadelphia 32, Pa.
24th & Sedgley Ave.
BAldwin 9-6430

Pittsburgh 20, Pa.
1018 Saw Mill Run Blvd.
HEmlock 1-6334

St. Louis 3, Mo.
307 N. Theresa Ave.
JEfferson 1-1930

San Francisco 24, Calif.
101 Williams Ave.
MIssion 8-4400

Seattle 4, Wash.
505 Dexter Horton Bldg.
SEneca 2351

ngineering service

ALLTEMP is the newest and latest formulation in the Carey line of Industrial Insulations. Other famous products developed by Carey include Super-Light 85% Magnesia, Hi-Temp No. 19, MW-50 Insulating Cement, MW-1 Insulating and Finishing Cement, Asbestos Cement and a complete line of Bonding, Finishing and Refractory Cements. Carey Engineering Service will help you determine which type of insulation is the best suited and most economical for your particular requirements, and will show you how it can be used to best advantage. Call on Carey any time.

etter products for industry since 1873

Carey®

The Philip Carey Mfg. Company
Lockland, Cincinnati 15, Ohio
In Canada:
The Philip Carey Co., Ltd., Montreal 9, P.Q.

Carey

LIST PRICES
PIPE COVERINGS & BLOCKS

industrial insulation

The following list prices are to be used for pricing all Carey pipe coverings of corresponding thickness, except that 1" thick list prices are to be used for pricing all pipe coverings of 1" or less thickness.

NOTE: All pipe coverings, blocks and sheets while quoted in terms of following List Prices less discount are actually priced at net unit prices appearing in "Manual of Unit Prices" which are essentially the same as list prices less quoted discount.

Nominal Pipe Size	1 Inch Thick	1½ Inch Thickness	2 Inch Thickness	2½ Inch Thickness	3 Inch Thickness	3½ Inch Thickness (Double Layer)	4 Inch Thickness	4½ Inch Thickness	5 Inch Thickness	5½ Inch Thickness	6 Inch Thickness
	Price per Lineal Foot	Price per Lineal Foot	Price per Lineal Foot	Price per Lineal Foot	Price per Lineal Foot	Price Per Lineal Foot	Price Per Lineal Foot	Price Per Lineal Foot	Price Per Lineal Foot	Price Per Lineal Foot	Price Per Lineal Foot
Inches											
⅛	$0.22 °C	$0.46 °C	$0.75 °C	$1.00 °C	$1.20 °C	$1.55 #	$1.95 #	$2.40	$2.90	$3.45	$4.05
¼	.24 °C	.49 °C	.80 °C	1.05 °C	1.35 °C	1.75 #	2.15 #	2.55	3.10	3.65	4.20
¾	.27 °C	.52 °C	.85 °C	1.10 °C	1.40 °C	1.80 #	2.20 #	2.60	3.15	3.70	4.25
1	.30 °C	.56 °C	.90 °C	1.15 °C	1.45 °C	1.95 #	2.35 #	2.80	3.45	4.00	4.45
1¼	.33 °C	.60 °C	.95 °C	1.20 °C	1.55 °C	2.00 #	2.40 #	2.90	3.50	4.05	4.65
1½	.36 °C	.64 °C	1.00 °C	1.25 °C	1.65 °C	2.10 #	2.45 #	3.00	3.60	4.10	4.75
2	.40 °C	.70 °C	1.05 °C	1.35 °C	1.75 °C	2.25 #	2.70 #	3.25	3.90	4.45	5.10
2½	.45 °C	.76 °C	1.15 °C	1.50 °C	1.90 °C	2.35 #	2.85 #	3.40	4.00	4.60	5.25
3	.50 °C	.82 °C	1.25 °C	1.65 °C	2.05 °C	2.60 #	3.15 #	3.70	4.35	5.00	5.65
3½	.60 °C	.88 °C	1.35 °C	1.80 °C	2.20 °C	2.70 #	3.30 #	3.80	4.45	5.10	5.75
4	.65 °C	.94 °C	1.45 °C	1.95 °C	2.35 °C	2.95 #	3.50 #	4.10	4.80	5.50	6.20
4½	.70 °C	1.00 °C	1.55 °C	2.10 °C	2.50 °C	3.00 #	3.55 #	4.15	4.85	5.55	6.25
5	.80 °C	1.10 °C	1.70 °C	2.25 °C	2.70 °C	3.30 #	3.90 #	4.50	5.30	6.00	6.70
6	1.00 °C	1.20 °C	1.85 °C	2.40 °C	2.90 °C	3.60 #	4.25 #	4.85	5.75	6.50	7.35
7	1.10 °C	1.35 °C	2.00 °C	2.55 °C	3.15 °C	3.85 •	4.55 #	5.25	6.10	7.05	7.85
8	1.20 °C	1.50 °C	2.20 °C	2.80 °C	3.40 °C	4.20 •	4.90 •	5.60	6.65	7.50	8.35
9	1.30 °C	1.65 ‡C	2.40 ‡C	3.05 ‡C	3.65 ◆E	4.65 •	5.40 •	6.15	7.10	8.05	9.00
10	1.75 ‡C	1.75 ‡C	2.55 ‡C	3.20 †C	3.90 ◆E	4.90 •	5.70 •	6.50	7.50	8.50	9.50
11	1.85 ‡E	1.85 ‡E	2.70 †E	3.40 †E	4.10 ◆E	5.15 •	6.00 †	6.85	7.90	8.90	9.90
12	2.10 †E	2.10 †E	3.00 †E	3.80 †E	4.60 †E	5.55 †	6.50 †	7.45	8.55	9.60	10.60
14	2.25 †E	2.25 †E	3.15 †E	4.00 †E	4.85 †E	5.85 †	6.85 †	7.85	8.95	10.00	11.10
15	2.35 †E	2.35 †E	3.30 †E	4.20 †E	5.10 †E	6.15 †	7.15 †	8.15	9.30	10.45	11.60
16	2.50 †E	2.50 †E	3.45 †E	4.40 †E	5.35 †E	6.45 †	7.50 †	8.50	9.70	10.90	12.05
17	2.60 †E	2.60 †E	3.60 †E	4.60 †E	5.60 †E	6.70 †	7.80 †	8.85	10.10	11.35	12.50
18	2.75 †E	2.75 †E	3.80 †E	4.80 †E	5.80 †E	7.00 †	8.10 †	9.25	10.55	11.75	13.00
19	2.85 †E	2.85 †E	4.00 †E	5.00 †E	6.00 †E	7.25 †	8.45 †	9.55	10.85	12.20	13.50
20	3.00 †E	3.00 †E	4.15 †E	5.20 †E	6.25 †E	7.50 †	8.75 †	9.90	11.25	12.65	13.90
21	3.10 †E	3.10 †E	4.30 †E	5.40 †E	6.50 †E	7.85 †	9.05 †	10.25	11.65	13.05	14.45
22	3.20 †E	3.20 †E	4.40 †E	5.60 †E	6.75 †E	8.05 †	9.35 †	10.70	12.05	13.55	15.00
23	3.30 †E	3.30 †E	4.50 †E	5.75 †E	7.00 †E	8.25 †	9.65 †	11.00	12.45	13.90	15.35
24	3.55 †E	3.55 †E	4.85 †E	6.20 †E	7.50 †E	8.85 †	10.35 †	11.80	13.25	14.85	16.40
26	3.65 †E	3.65 †E	5.05 †E	6.40 †E	7.70 †E	9.15 †	10.60 †	12.05	13.65	15.20	16.65
27	3.75 †E	3.75 †E	5.15 †E	6.65 †E	7.95 †E	9.45 †	11.05 †	12.45	14.05	15.65	17.15
28	4.00 †E	4.00 †E	5.50 †E	6.95 †E	8.40 †E	10.00 †	11.55 †	13.00	14.70	16.40	17.95
30	4.30 †E	4.30 †E	5.90 †E	7.40 †E	9.10 †E	10.50 †	12.10 †	13.85	15.45	17.15	19.00
32	4.40 †E	4.40 †E	6.05 †E	7.60 †E	9.20 †E	10.70 †	12.45 †	13.95	15.75	17.60	19.25
33											

APPLYING ONLY TO FILTER MOLDED 85% MAGNESIA

* Sections (semi-cylindrical) 36" long.
† Segments (curved blocks) 36" long x approx. 6" wide.
‡ Sections or segments.
◆ 1st layer sections or segments, 2nd layer segments.
1st layer sections, 2nd layer sections.
• 1st layer sections, 2nd layer segments.

C Furnished with canvas.
D No canvas, but will be furnished without extra charge if ordered.
E No canvas. Additional charge if ordered.

For pipe sizes over 33" locomotive lagging blocks must be used and prices figured on a square foot basis. See table of quantities and areas at bottom of page 3.

APPLYING TO ALL LAMINATED ASBESTOS & FELT PIPE COVERINGS

All laminated asbestos and felt pipe coverings are furnished in split cylindrical or semi-cylindrical sections complete with canvas and bands.

SHEETS AND BLOCKS

The following list prices are to be used for pricing all Carey sheets and blocks of corresponding thickness.

Thickness	Price Square Foot	Thickness	Price Square Foot	Thickness	Price Square Foot	Thickness	Price Square Foot
⅛ inch	$0.27	1½ inch	$0.45	2½ inch	$0.64	2¾ inch	$0.83
1 inch	.30	1⅝ inch	.49	2¾ inch	.68	2⅞ inch	.87
1⅛ inch	.34	1¾ inch	.53	2⅞ inch	.72	3 inch	.90
1¼ inch	.38	1⅞ inch	.57	2½ inch	.75	3½ inch	1.05
1⅜ inch	.42	2 inch	.60	2⅝ inch	.79	4 inch	1.20
						4½ inch	1.35

Carey

85% MAGNESIA

List Prices (per linear foot) and Thickness Schedules

industrial insulation

COPPER TUBING				STANDARD STEEL OR W. I. PIPE															
Pipe Size	Pipe O. D.	Nominal 1" Thick		Pipe Size	Pipe O. D.	Nominal 1" Thick		Minimum Double Layer		Nominal 1½" Thick		Nominal 2" Thick		Nominal 2½" Thick		Nominal 3" Thick	
		Th'k	List			Th'k	List	Th'k	List	Th'k	List	Th'k	List	Th'k	List	Th'k	List
¼"	.375	1¼	$.22	¼"	.540	1⅝	2-1/2 $.22	2⅞	$.75								
⅜"	.500	1⅜	.22	⅜"	.675	1¾	2-1/2 .22	2⅝	.75								
½"	.625	1⅜	.22	½"	.840	1	2-1/2 .22	2⅛	.75	1⅛	3-1/2 $.46	2⅛	4-1/2 $.75	2⅜	6 $1.00	3⅜	†$1.20
¾"	.875	1	.24	¾"	1.050	1⅛	2-1/2 .24	1⅜	.80	1⅜	2-1/2 .49	1⅜	4-1/2 .80	2⅜	6 1.05	3⅜	† 1.35
1"	1.125	⅞	.27	1"	1.315	1⅛	3 .27	2⅛	.85	1⅛	4 .52	2⅛	6 .85	2⅜	6 1.10	3⅜	† 1.40
1¼"	1.375	1⅛	.30	1¼"	1.660	1⅛	3 .30	1⅝	.90	1⅝	4-1/2 .56	1⅝	5 .90	2⅜	6 1.15	3⅜	† 1.45
1½"	1.625	⅝	.30	1½"	1.900	1⅛	3-1/2 .33	2⅛	.95	1⅝	4-1/2 .60	2⅜	6 .95	2⅞	7 1.20	3⅜	‡ 1.55
2"	2.125	⅝	.36	2"	2.375	1⅛	4 .36	2⅛	1.00	1⅛	5 .64	2⅛	6 1.00	2⅝	7 1.25	3⅛	‡ 1.65
2½"	2.625	⅞	.40	2½"	2.875	1⅛	4-1/2 .40	2⅜	1.05	1⅞	6 .70	2⅜	7 1.05	2⅞	8 1.35	3⅜	‡ 1.75
3"	3.125	⅞	.45	3"	3.500	1⅛	5 .45	2⅛	1.15	1⅜	6 .76	2⅛	7 1.15	2⅜	8 1.50	3⅛	‡ 1.90
½"	3.625	1⅛	.50	3½"	4.000	1⅜	6 .50	2⅜	1.25	1⅜	7 .82	2⅜	8 1.25	2⅜	9 1.65	3⅜	† 2.05
4"	4.125	1⅜	.60	4"	4.500	1⅛	6 .60	2⅛	1.35	1⅜	7 .88	2⅛	8 1.35	2⅜	9 1.80	3⅜	† 2.20
4½"	4.625	1⅜	.65	4½"	5.000	1⅜	7 .65	2⅞	1.95	1⅜	8 .94	2⅜	9 1.45	2⅞	10 1.95	3⅛	† 2.35
5"	5.125	1⅜	.70	5"	5.563	1⅛	7 .70	2⅜	2.10	1⅛	8 1.00	2⅛	9 1.55	2⅜	10 2.10	3⅛	† 2.50
6"	6.125	1⅜	.80	6"	6.625	1	8 .80	2⅛	2.25	1½	9 1.10	2⅜	10 1.70	2⅛	11 2.25	3⅛	† 2.70
				7"	7.625					1⅜	10 1.20	2⅛	11 1.85	2⅜	12 2.40	3⅜	† 2.90
				8"	8.625					1⅛	11 1.35	2⅛	12 2.00	2⅛	14 2.55	3⅛	† 3.15
				9"	9.625					1⅜	12 1.50	2⅜	14 2.20	2⅛	16 2.80	3⅜	† 3.40
				10"	10.75					1⅜	14 1.65	2⅜	15 2.40	2⅛	16 3.05	3⅛	† 3.65
				11"	11.75					1⅛	15 1.75	2⅜	16 2.55	2⅜	17 3.20	3⅛	† 3.90
				12"	12.75					1⅛	16 1.85	2⅛	17 2.70	2⅜	18 3.40	3⅛	† 4.10
				14"	14.00					1½	17 2.10	2	18 3.00	2½	19 3.80	3	‡ 4.60
				15"	15.00					1½	18 2.25	2	19 3.15	2½	20 4.00	3	‡ 4.85
				16"	16.00					1½	19 2.35	2	20 3.30	2½	21 4.20	3	‡† 5.10
				17"	17.00					1½	20 2.50	2	21 3.45	2½	22 4.40	3	‡† 5.35
				18"	18.00					1½	21 2.60	2	22 3.60	2½	‡ 4.60	3	‡† 5.60

1½" Nom. Thickness is minimum for 7" and larger.

2" Nom. Thickness for ¼" thru 4" P.S.
2½" Nom. Thickness for 4½" thru 6" P.S.
3" Nom. Thickness - 7" P.S. and over

Black figures in thickness columns indicate "prime" solid sections.
Red figures in "TH'K" columns, indicate 2 layer assembled sections. Nominal 2" and 2½" thick assemblies can be cemented on request to form one piece. Red figures in "List" columns indicate outer layer pipe sizes that will make exact fit.
Indicator (___) means nominal 1" thick. (___) means nominal 1½" thick. (___) means nominal 2" thick.
Example:—6" pipe size, nominal 3" thick shows 3 1½ which means first layer nominal 1½" thick, second layer nominal 1½" thick to make total 3-½" thick.
†Inner layer sections—outer layer segmental blocks. ‡Segmental blocks.
NOTE: Assembled double layer sections will be priced on the basis of the list prices in above tables for such assemblies.
Special thicknesses to and including 4" can be supplied by combining layers of above prime sections in multiple.

SIZES OVER 18"

For diameters over 18", to and including 33", segmental blocks approx. 6" wide by 36" long are furnished. Actual thickness is the same as nominal thickness. List prices per linear foot are as follows:

Red Numerals indicate blocks per section

	19"	20"	21"	22"	23"	24"	26"	27"	28"	30"	32"	33"
1½" Thick	$2.75x 11	$2.85 12	$3.00x 12	$3.10 13	$3.20x 14	$3.30 15	$3.55 16	$3.65 16	$3.75 17	$4.00 18	$4.30x 16	$4.40x 17
2" Thick	3.80x	4.00	4.15x	4.30	4.40x	4.50	4.85	5.05	5.15	5.50	5.90 19	6.05x 19
2½" Thick	4.80x	5.00	5.20x	5.40	5.60x	5.75	6.20	6.40	6.65	6.95	7.40 19	7.60x 19
3" (2-layer)	5.80x	6.00x	6.25 13	6.50x	6.75x	7.00	7.50	7.70	7.95	8.40	9.10x 18	9.20x 19

For pipe sizes over 33", prices are figured on a square foot basis—see table, page 3. x Plus filler block.

FLAT BLOCKS

Size	List Price Per Sq. Ft.	Size	List Price Per Sq. Ft.	Size	List Price Per Sq. Ft.
*1 " x 6" x 36"	$0.30	2¼" x 6" x 36"	$0.68	1½" x 12" x 36"	$0.45
*1¼" x 6" x 36"	.38	*2½" x 6" x 36"	.75	2 " x 12" x 36"	.60
*1½" x 6" x 36"	.45	*3 " x 6" x 36"	.90	2½" x 12" x 36"	.75
1¾" x 6" x 36"	.53	3½" x 6" x 36"	1.05	3 " x 12" x 36"	.90
*2 " x 6" x 36"	.60	4 " x 6" x 36"	1.20	3½" x 12" x 36"	1.05
				4 " x 12" x 36"	1.20

*Sizes available in Super-Light 85% Magnesia Flat Blocks

Carey Alltemp Pipe Coverings are regularly furnished in thicknesses shown in following table. Special thicknesses are made to order. Sizes ½ in. to 1½ in. inclusive should be used without any outer layer, and are then supplied with canvas jacket for applying. All larger pipe sizes are intended to be used as inner layers only in combination with other outer layer coverings, and no canvas is supplied except on special order.

Pipe Size	1" Nominal Thickness			1½" Nominal Thickness			2" Nominal Thickness			2½" Nominal Thickness (Single Layer)			3" Nominal Thickness ★ (Single Layer)			3½" Nominal Thickness (Double Layer)			4" Nominal Thickness (Double Layer)		
Inches	Actual thickness	List price	Outer layer pipe size	Actual thickness	List price	Outer layer pipe size	Actual thickness	List price	Outer layer pipe size	Actual thickness	List price	Outer layer pipe size	Actual thickness	List price	Outer layer pipe size	Actual thickness	List price	Outer layer pipe size	Actual thickness	List price	Outer layer pipe size
¼	1 9/32	$0.22	2½	1½	$0.46	3	2 7/32	$0.75	4½	2 17/32	$1.00	5	3 9/16	$1.20	6						
⅜	1 13/32	.22	2½	1 9/16	.46	3	2⅛	.75	4½	2 7/16	1.00	5	3	1.20	6						
½	1	.22	2½	1 19/32 °C	.46	3½	2 5/16 °C	.75	4½	2 29/32 °C	1.00	6	3 13/32 °D	1.20	7						
¾	1 9/32	.24	2½	1 15/32 °C	.49	3½	1 31/32 °C	.80	4½	2 25/32 °C	1.05	6	3 9/32 °D	1.35	7						
1	1 13/32	.27	3	1 9/32 °C	.52	4	2⅛ °C	.85	5	2 21/32 °C	1.10	6	3 5/32 °D	1.40	7						
1¼	1 9/32	.30	3	1 11/16 °C	.56	4½	1 15/16 °C	.90	5	2 15/32 °C	1.15	6	2 27/32 °D	1.45	7						
1½	1 1/16	.33	3½	1 9/16 °C	.60	4½	2⅜ °C	.95	6	2⅞ °C	1.20	7	3⅛ °D	1.55	8						
2	1 1/16	.36	4	1 13/32 °D	.64	5	2½ °D	1.00	6	2 5/16 °D	1.25	7	3½ °D	1.65	8	3⅜ °D	$2.10	9	4 5/32 °D	$2.45	10
2½	1 1/16	.40	4½	1⅞ °D	.70	6	2⅜ °D	1.05	7	2⅞ °D	1.35	8	3⅜ °D	1.75	9	3 1/16 °D	2.25	10	4 13/32 °D	2.70	11
3	1 9/32	.45	5	1 9/16 °D	.76	6	2 1/16 °D	1.15	7	2 9/16 °D	1.50	8	3 1/16 °D	1.90	9	3⅝ °D	2.35	10	4 3/32 °D	2.85	11
3½	1 5/16	.50	6	1 13/16 °D	.82	7	2 5/16 °D	1.25	8	2 13/16 °D	1.65	9	3⅜ °D	2.05	10	3 27/32 °D	2.60	11	4 5/16 °D	3.15	12
4	1 1/16	.60	6	1 9/16 °D	.88	7	2 1/16 °D	1.35	8	2 9/16 °D	1.80	9	3 3/32 °D	2.20	10	3 19/32 °D	2.70	11	4 3/32 °D	3.30	12
4½	1 5/16	.65	7	1 11/16 °D	.94	8	2 5/16 °D	1.45	9	2 27/32 °D	1.95	10	3 11/32 °D	2.35	11	3⅞ °D	2.95	12	4 7/16 °D	3.50	14
5	1 1/32	.70	7	1 13/32 °D	1.00	8	2 1/32 °D	1.55	9	2 9/16 °D	2.10	10	3 1/16 °D	2.50	11	3 19/32 °D	3.00	12	4 1/32 °D	3.55	14
6	1	.80	8	1½ °D	1.10	9	2 1/16 °D	1.70	10	2 17/32 °D	2.25	11	3 1/16 °D	2.70	12	3 11/16 °D	3.30	14	4 1/8 °D	3.90	15
7				1 9/16 °D	1.20	10	2 1/32 °D	1.85	11	2 9/16 °D	2.40	12	3 1/32 °D	2.90	14	3 21/32 °D	3.60	15	4 1/8 °D	4.25	16
8				1 17/32 °D	1.35	11	2 1/16 °D	2.00	12	2 11/16 °D	2.55	14	3 1/8 °D	3.15	15	3 7/32 °D	3.85	16	4 3/16 E	4.55	17
9				1 9/16 °D	1.50	12	2 5/16 °D	2.20	14	2 21/32 °D	2.80	15	3 5/32 °E	3.40	16	3 11/16 ° E	4.20	17	4 5/32 E	4.90	18
10				1 5/8 ‡D	1.65	14	2 3/32 ‡D	2.40	15	2 19/32 ‡D	3.05	16	3⅛ E	3.65	17	3⅝ E	4.65	18	4 3/32 E	5.40	19
12				1 19/32 ‡E	1.85	16	2⅛ ‡E	2.70	17	2⅝ E	3.40	18	3 3/32 E	4.10	19	3 19/32 E	5.15	20	4⅛ E	6.00	21
14				1½ E	2.10	17	2 E	3.00	18	2½ E	3.80	19	3 E	4.60	20	3½ E	5.55	21	4 E	6.50	22
16				1½ E	2.35	19	2 E	3.30	20	2½ E	4.20	21	3 E	5.10	22	3½ † E	6.15	23	4 † E	7.15	24
18				1½ E	2.60	21	2 E	3.60	22	2½ †E	4.60	23	3 †°E	5.60	24	3½ † E	6.70	25	4 † E	7.80	26
20				1½ †E	2.85	23	2 †E	4.00	24	2½ †E	5.00	25	3 †°E	6.00	26	3½ † E	7.25	27	4 † E	8.45	28
24				1½ †E	3.30	27	2 †E	4.50	28	2½ †E	5.75	29	3 †°E	7.00	30	3½ † E	8.25	31	4 † E	9.65	32
30				1½ †E	4.00	33	2 †E	5.50	**	2½ †E	6.95	**	3 †°E	8.40	**	3½ † E	10.00	**	4 † E	11.55	**
33				1½ †E	4.40	**	2 †E	6.05	**	2½ †E	7.60	**	3 †°E	9.20	**	3½ † E	10.70	**	4 † E	12.45	**

No outer layers included in price.
Alltemp furnished in nominal 1" thickness up to 6" dia., and can be supplied in special thicknesses up to and including 4" by combining layers of above prime sections in multiple.
Rod X — 12" Tri-sectional covering can also be made in one layer 4½" thickness.

APPLYING ONLY TO ALLTEMP

° Sections (semi-cylindrical) 36" long.
† Segments 36" long x approx. 6" wide.
‡ Sections or segments.
♦ 1st layer sections or segments, 2nd layer segments.
* Also available in solid segments.
C Furnished with canvas.
D No canvas, but will be furnished without extra charge if ordered.
E No canvas. Additional charge if ordered.
Rod — Tri-sectional covering in single thickness 36" long.
Rod E — No canvas. Additional charge if ordered.

FLAT AND CURVED BLOCKS—Flat blocks available in thicknesses from 1" to 4" in 6" widths and from 1½" to 4" in 12" widths. Segmental covering is furnished from 10" to 33" dia. in thicknesses from 1½" to 3". Curved blocks are furnished for diameters from 34" to 120" in thicknesses from 1½" to 3".

DIAMETERS OVER 33 IN.

Block insulation for diameters over 33-in. is not classified nor priced as pipe covering. For such large diameters up to 96-in. curved blocks 36-in. long, 1½-in. to 3-in. thick, are supplied having a standard inside cord measurement of 6-in. These blocks are priced based on BLOCK LIST PRICES, page 4, and on their external area as shown in the Standard Area Table, page 13. The following table shows the number of blocks and their corresponding areas for covering cylinders up to 60-in. diameter.

Diameter Cylinder	No. of 6" Wide Blocks to Cover	3" Wide Filler Block	Pricing Area Sq. Ft. Per 3 Ft. Length		Diameter Cylinder	No. of 6" Wide Blocks to Cover	3" Wide Filler Block	Pricing Area Sq. Ft. Per 3 Ft. Length		Cylinder Diameter	No. of 6" Wide Blocks to Cover	3" Wide Filler Block	Pricing Area Sq. Ft. Per 3 Ft. Length	
			1½' to 2" Thick	Over 2" Thick				1½' to 2" Thick	Over 2" Thick				1½' to 2" Thick	Over 2" Thick
34"	18	.....	28.692	28.980	43"	22	1	35.865	36.225	52"	27	1	43.835	44.275
35"	18	1	29.489	29.785	44"	23	.....	36.662	37.030	53"	28	.....	44.632	45.080
36"	19	.....	30.286	30.590	45"	23	1	37.459	37.835	54"	28	1	45.429	45.885
37"	19	1	31.083	31.395	46"	24	.....	38.256	38.640	55"	29	.....	46.226	46.690
38"	20	.....	31.880	32.200	47"	24	1	39.053	39.445	56"	29	1	47.023	47.495
39"	20	1	32.677	33.005	48"	25	.....	39.850	40.250	57"	30	.....	47.820	48.300
40"	21	.....	33.474	33.810	49"	25	1	40.647	41.055	58"	30	1	48.617	49.105
41"	21	1	34.241	34.615	50"	26	.....	41.444	41.860	59"	31	.....	49.414	49.910
42"	22	.....	35.068	35.420	51"	26	1	42.241	42.665	60"	31	1	50.211	50.715

Carey

LIST PRICES — ALLTEMP
Including thickness tables and working sizes for
COMBINATION COVERINGS

industrial insulation

Carey

MINERAL WOOL PIPE INSULATION

LIST PRICE PER LINEAL FOOT—CRATED

industrial insulation

The bold figures immediately below the list prices indicate the approximate shipping weight per lineal foot.

PIPE SIZE IN INCHES	THICKNESS 1" THICK	1½" THICK	2" THICK	2½" THICK	3" THICK	4" THICK
NOMINAL						
	$0.70	$0.90	$1.30	$1.65	$2.20	$3.10
2"	1.7	3.0	4.5	6.2	9.0	13.5
	.75	1.00	1.40	1.75	2.30	3.25
2½"	2.0	3.2	5.0	7.0	9.4	14.3
	.85	1.10	1.50	1.85	2.45	3.40
3"	2.2	3.5	5.6	7.3	10.0	15.0
	.95	1.20	1.60	1.95	2.60	3.55
3½"	2.8	3.8	5.8	7.5	10.3	16.0
	1.05	1.30	1.70	2.05	2.75	3.70
4"	2.9	4.0	6.0	8.2	10.7	16.6
	1.15	1.40	1.85	2.20	2.90	3.85
4½"	3.0	4.3	6.5	8.7	11.2	17.5
	1.25	1.50	2.00	2.35	3.05	4.00
5"	3.2	4.7	6.8	9.1	11.8	18.1
	1.35	1.65	2.15	2.50	3.30	4.20
6"	3.4	5.3	7.5	10.0	13.0	20.0
	1.50	1.85	2.30	2.70	3.55	4.50
7"	3.8	5.8	8.2	11.0	14.0	20.6
	1.65	1.95	2.50	2.95	3.80	4.80
8"	4.2	6.3	9.0	12.0	15.0	22.5
	1.85	2.15	2.75	3.20	4.10	5.10
9"	4.6	7.0	9.8	12.8	16.1	24.0
	2.00	2.35	3.00	3.50	4.40	5.50
10"	5.0	7.6	10.5	13.7	17.0	25.0
	2.20	2.70	3.30	3.80	4.80	6.00
12"	5.8	8.7	12.0	15.0	19.0	27.5
OUTSIDE DIAMETER						
	$2.50	$3.00	$3.60	$4.20	$5.30	$6.50
14"	6.4	9.5	12.7	16.5	20.5	30.0
	2.80	3.30	4.00	4.60	5.80	7.10
16"	7.0	10.5	14.0	18.0	22.5	32.0
	3.10	3.60	4.40	5.00	6.30	7.60
18"	8.0	11.5	15.5	20.0	24.5	34.5
	3.40	3.90	4.80	6.50	6.90	8.20
20"	8.5	12.5	17.0	21.5	26.5	37.5
	4.00	4.60	5.60	6.40	7.90	9.50
24"	10.0	15.0	20.0	26.0	30.5	43.0
	5.00	5.60	6.80	7.80	9.40	11.20
30"	13.0	18.0	24.5	30.5	37.5	52.0

Furnished in 2-foot lengths. Expanded metal lath on outside. Strips of expanded metal lath on the inside.

Various types of Carey Mineral Wool blankets

STYLE NO. 200—1-in. galvanized wire mesh both sides.
For flexibility—no plaster base.

STYLE NO. 201—1-in. galvanized wire mesh one side—expanded metal lath other side.
For flexibility and plaster base one side.

STYLE NO. 202—Metal lath both sides.
For flexibility and plaster base both sides.

STYLE NO. 203—⅜-in. rib lath (rib in) one side—1-in. galvanized wire mesh other side.
Rigid one side and plaster base one side.

STYLE NO. 203A—⅜-in. rib lath (rib out) one side—1-in. galvanized wire mesh other side.
Rigid one side and furnishes a ⅜-in. air space—no plaster base.

STYLE NO. 204—⅜-in. rib lath (rib in) one side—metal lath other side.
Rigid one side and plaster base both sides.

STYLE NO. 204A—⅜-in. rib lath (rib out) one side—metal lath other side.
Rigid one side with ⅜-in. air space and plaster base one side.

STYLE NO. 205—¾-in. rib lath (rib in) one side—1-in. galvanized wire mesh other side.
Rigid one side and plaster base one side.

STYLE NO. 205A—¾-in. rib lath (rib out) one side—1-in. galvanized wire mesh other side.
Rigid one side and furnishes a ¾-in. air space—no plaster base.

STYLE NO. 206—¾-in. rib lath (rib in) one side—metal lath other side.
Rigid one side and plaster base both sides.

STYLE NO. 206A—¾-in. rib lath (rib out) one side—metal lath other side.
Rigid one side with ¾-in. air space and plaster base one side.

STYLE NO. 208—⅜-in. rib lath (rib in) both sides.
Rigid both sides and plaster base both sides.

STYLE NO. 209—⅜-in. rib lath (rib out) one side—⅜-in. rib lath (rib in) other side.
Rigid both sides and furnishes ⅜-in. air space one side and plaster base other side.

LIST PRICES PER SQUARE FOOT

The bold figures immediately below the list prices indicate the approximate shipping weight per square foot.

STYLE	1" TH'K	1½" TH'K	2" TH'K	2½" TH'K	3" TH'K	3½" TH'K	4" TH'K	5" TH'K	6" TH'K
	$0.50	$0.55	$0.60	$0.70	$0.80	$0.88	$0.95	$1.10	$1.25
200	1.50	2.05	2.60	3.25	3.85	4.40	5.00	6.20	7.45
	0.55	0.65	0.70	0.80	0.90	0.96	1.05	1.20	1.35
201	1.65	2.20	2.75	3.40	4.00	4.55	5.15	6.35	7.60
	0.65	0.70	0.75	0.85	0.95	1.03	1.10	1.25	1.40
202	1.75	2.00	2.85	3.50	4.10	4.65	5.25	6.45	7.70
	0.55	0.65	0.80	0.90	1.00	1.08	1.15	1.30	1.45
203	1.85	2.40	2.95	3.60	4.20	4.75	5.35	6.55	7.80
	0.55	0.65	0.70	0.80	0.90	0.98	1.05	1.20	1.35
203A	1.85	2.40	2.95	3.60	4.20	4.75	5.35	6.55	7.80
	0.70	0.75	0.80	0.90	1.00	1.08	1.15	1.30	1.45
204	2.00	2.55	3.10	3.75	4.35	4.90	5.50	6.70	7.95
	0.70	0.75	0.80	0.90	1.00	1.08	1.15	1.30	1.45
204A	2.00	2.55	3.10	3.75	4.35	4.90	5.50	6.70	7.95
	0.70	0.80	0.90	1.00	1.10	1.18	1.25	1.45	1.65
205	2.10	2.65	3.20	3.85	4.45	5.00	5.60	6.80	8.05
	0.70	0.80	0.90	1.00	1.10	1.18	1.25	1.45	1.65
205A	2.10	2.65	3.20	3.85	4.45	5.00	5.60	6.80	8.05
	0.85	0.95	1.00	1.10	1.20	1.28	1.35	1.55	1.75
206	2.25	2.75	3.30	3.95	4.55	5.20	5.70	6.90	8.15
	0.85	0.95	1.00	1.10	1.20	1.28	1.35	1.55	1.75
206A	2.25	2.75	3.30	3.95	4.55	5.20	5.70	6.90	8.15
	0.85	0.95	1.00	1.10	1.20	1.28	1.35	1.55	1.75
208	2.25	2.80	3.35	4.00	4.60	5.25	5.75	6.95	9.00
	0.85	0.95	1.00	1.10	1.20	1.28	1.35	1.55	1.75
209	2.25	2.80	3.35	4.00	4.60	5.25	5.75	6.95	9.00

Above prices are for Carey Mineral Wool Blankets in standard size sheets, [illegible] packed in cartons [illegible]

Carey

PIPE COVERING WEIGHTS AND PACKAGING DATA

industrial insulation

IN POUNDS PER THREE-FOOT SECTION (Net Weight)

KIND OF COVERING	Thick. Inches	PIPE SIZES — INCHES																	
		½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6	7	8	9	10	12
Super Light 85% Magnesia	1	1.4	1.3	2.0	1.8	2.3	2.7	3.1	3.5	5.2	4.4	6.1	5.0	5.6	...	...	...	...	...
Super Light 85% Magnesia	1½ Min. Dbl. Layer	2.9	2.8	3.5	4.1	4.0	4.7	4.2	5.9	5.2	7.0	6.1	8.0	9.0	10.5	11.5	12.7	14.4	16.7
Super Light 85% Magnesia		4.5	4.4	5.5	5.3	7.5	7.1	9.2	8.5	10.8	10.0	16.6	15.5	17.1	25.0	27.0	29.4	31.3	35.6
Super Light 85% Magnesia	2	4.5	4.4	5.5	5.3	7.5	7.1	9.2	8.5	10.8	10.0	9.11	11.4	13.0	14.5	16.0	18.6	19.7	23.3
Super Light 85% Magnesia	2½	5.7	8.0	7.8	7.6	10.1	9.7	9.2	11.5	14.1	13.3	16.6	15.5	17.1	...	22.0	24.0	25.3	29.7
Super Light 85% Magnesia	3	8.0	10.6	10.5	10.3	13.1	12.7	12.2	14.8	18.2	17.4	20.6	19.5	21.7	24.9	27.0	29.4	31.3	35.8
Alltemp	1	1.5	1.7	2.3	2.3	2.4	3.5	4.0	4.6	5.1	6.3	6.8	7.5	8.6	11.0	12.2	13.4	14.8	21.1
Alltemp	1½	3.2	3.1	4.5	4.7	5.2	5.7	6.4	7.3	8.1	8.8	9.5	10.4	11.9	13.4	14.8	16.3	17.9	21.1
Alltemp	2	5.9	6.1	6.4	7.0	7.6	8.6	9.6	10.8	11.8	13.0	13.7	15.1	16.9	18.8	20.8	23.6	25.0	29.1
Alltemp	Dbl. 1½	11.9	11.8	13.5	13.2	14.9	18.7	16.0	19.8	18.8	22.8	21.6	25.6	28.4	32.1	34.6	38.3	40.7	46.6
Careycel	1	2.1	2.3	2.4	2.8	3.1	3.5	4.0	4.2	4.6	5.3	5.7	6.2	7.2	7.9	8.5	10.8	11.5	12.7
Asbestos Sponge	1	3.6	4.3	5.2	6.0	7.0	7.5	8.0	9.2	10.2	11.3	12.0	13.6	15.0	15.7	19.0	19.7	23.8	27.8
Air Cell	1	1.6	1.7	1.8	1.9	2.0	2.4	2.7	3.0	3.3	3.8	4.2	4.9	5.3	6.1	6.9	8.2	8.0	9.6
Air Cell	¾	1.2	1.2	1.3	1.4	1.6	1.9	2.2	2.5	2.7	3.3	3.4	3.8	4.3	4.8	5.4	6.1	6.6	8.0
Air Cell	½	0.9	1.0	1.1	1.2	1.3	1.5	1.6	1.9	2.2	2.3	2.5	2.7	3.0	3.3	3.8	4.2	4.7	5.6
Impervo	¾	2.1	2.2	2.5	3.0	3.2	3.7	4.1	4.7	5.2	5.7	6.2	6.8	7.8	8.9	10.0	11.0	12.0	14.1
Impervo	½	1.3	1.4	1.6	1.9	2.2	2.5	2.9	3.2	3.6	4.0	4.3	4.8	5.7	6.3	7.1	7.9	8.7	10.2
Impervo	Dbl. ¾	5.1	5.5	6.0	6.7	7.2	8.1	9.0	10.2	11.0	12.2	13.2	14.3	16.4	18.3	20.2	22.4	24.5	28.9
Impervo	Dbl. ½	3.2	3.4	3.8	4.3	4.6	5.2	5.8	6.7	7.4	8.1	8.9	9.1	11.2	12.7	14.0	15.8	17.5	19.7
Perfecto	1	2.1	2.3	2.8	3.0	3.2	3.4	3.9	4.6	5.0	5.3	5.8	9.8	7.2	8.4	10.7	12.2	13.5	15.6
Perfecto	¾	1.3	1.5	1.8	2.1	2.3	2.4	3.0	3.7	4.1	4.5	4.9	5.1	5.7	6.7	7.7	8.6	9.5	11.5
Perfecto	½	0.8	1.0	1.3	1.5	1.6	1.7	1.9	2.3	2.5	2.8	3.1	3.4	3.8	4.7	5.8	6.1	7.0	8.2
Perfecto	Dbl. ¾	3.4	4.0	4.6	5.0	5.5	6.3	7.2	8.3	9.0	10.1	11.2	12.2	14.2	15.9	17.6	19.7	21.6	25.0
Perfecto	Dbl. ½	2.2	2.5	3.0	3.2	3.5	3.6	4.1	4.9	5.3	5.6	6.2	6.6	7.7	8.9	11.2	12.8	14.3	16.2
Protecto	1	1.2	1.3	1.7	2.3	2.4	2.6	3.3	3.6	4.1	4.7	5.1	5.6	6.1	6.7	7.8	8.8	9.6	11.5
Defendex	1	3.0	3.2	3.4	3.7	4.4	5.1	5.8	6.5	6.9	7.2	7.6	8.0	9.4	10.8	12.2	13.6	15.0	18.0

F. M. 85% Magnesia weights same as Alltemp.

The weights given in the tables are subject to some variation, but represent averages from which fairly accurate estimates can be made. These weights are not guaranteed.

Carton Data—Asbestos Blocks and Sheets

Material	Sq. Ft. Per Crate	Gross Weight, Lb.	Sq. Ft. Per Carton	Gross Weight, Lb.
2 Ply Air Cell	....	....	108	57
3 Ply Air Cell	....	....	72	57
4 Ply Air Cell	....	....	54	57
1" Thick Careycel	....	....	54	72
1" Thick Defendex	....	....	54	91
1" Thick Asbestos Sponge	....	....	54	157

Carton Size: 6¼" x 36½" x 36½"

40' x 8 Car holds 475 cartons
40' x 10 Car holds 585 cartons

Slatted Crates
Size: 4" x 48¼" x 96" or
4" x 48¼" x 48¼"

Carey

PIPE COVERINGS (Low Pressure)

industrial insulation

Cartons (All Coverings except Asbestos Sponge)
Approximate Number of 3 Foot Sections Per Carton

Nominal Pipe Size	For Standard Steel Pipe Thicknesses					
	½"	¾"	1"	1¼"	1½"	2"
½"	60	42	30	20	18	11
¾"	55	35	28	18	15	9
1"	42	30	23	15	12	8
1¼"	30	24	18	12	11	7
1½"	24	20	15	12	11	6
2"	20	15	12	9	8	6
2½"	15	12	11	6	6	5
3"	11	9	8	6	6	4
3½"	9	8	6	5	5	4
4"	8	6	6	4	4	4
4½"	6	5	5	4	4	4
5"	5	5	4	3	3	3
6"	4	4	4	2	2	3
7"	4	4	4	2	2	3
8"	4	4	3★	2	2	2
9"	3	2	2	2	2	2
10"		2	2	2	2	1*
12"		2	2†	1	1*	1*

Nominal Copper Tube Size	For Copper Tubing—Thickness				
	O.D. of Copper Tube	½"	¾"	1"	1½"
⅜"	½"	77	60	42	20
½"	⅝"	73	54	35	18
¾"	⅞"	54	42	30	15
1"	1⅛"	50	35	28	15
1¼"	1⅜"	40	30	23	12
1½"	1⅝"	30	24	18	12
2"	2⅛"	24	18	15	9
2½"	2⅝"	18	15	12	7
3"	3⅛"	15	12	9	6
3½"	3⅝"	12	9	8	6
4"	4⅛"	8	6	6	4
5"	5⅛"	6	5	4	3
6"	6⅛"	7	4	4	
8"	8⅛"	8	4	3	

Carton Size: 13½" x 19⅞" x 36"
Carton Weighs: 5 lbs.

36' Car holds 360 cartons
40' Car holds 450 cartons
40' x 10 Car holds 550 Cartons
50' Car holds 670 cartons

*Carton Size: 18" x 18" x 37"
Carton Weighs: 6 lbs.

† - 1 sec. Impervo, Perfecto, Protecto

★ - 2 sec. Impervo, Perfecto, Protecto

Cartons (Asbestos Sponge Only)
Approximate Number of 3 Foot Sections Per Carton

Nominal Pipe Size	Thickness			
	1"	1½"	2"	3"
½"	15*	8*	5*	5
¾"	12*	6*	4*	4
1"	12*	6*	4*	4
1¼"	9*	6*	4*	4
1½"	8*	5*	3*	4
2"	6*	4*	5	4
2½"	5*	6	4	3
3"	8	6	3	2
3½"	6	5	3	2
4"	6	4	2	2
4½"	5	4	2	2
5"	4	4	2	2
6"	4	2	2	2
7"	4	2	2	1
8"	2	2	2	1
9"	2	2	1	1
10"	2	1	1	1
12"	2	1	1	1

Carton Size
13½" x 19⅞" x 36"
Carton Weighs: 5 lbs.

*Half Carton Size
10¼" x 13¼" x 36"
Carton Weighs: 2½ lbs.

36' Car holds 360 cartons
40' Car holds 450 cartons
40' x 10 Car holds 550 cartons
50' Car holds 670 cartons

PACKAGING

All sizes and thicknesses of 85% Magnesia and Alltemp pipe coverings and blocks are packed in cartons for domestic shipment as shown in the following tables:

INSULATION PACKAGING

Pipe Size	NOM. 1" THICK				NOM. 1-1/2" THICK				NOM. 2" THICK				NOM. 2-1/2" THICK				NOM. 3" THICK			
	Sec Per Ctn	Pkg. Type	Gross Wt. Super Light	Gross Wt. Alltemp F.P.	Sec Per Ctn	Pkg. Type	Gross Wt. Super Light	Gross Wt. Alltemp F.P.	Sec Per Ctn	Pkg. Type	Gross Wt. Super Light	Gross Wt. Alltemp F.P.	Sec Per Ctn	Pkg. Type	Gross Wt. Super Light	Gross Wt. Alltemp F.P.	Sec Per Ctn	Pkg. Type	Gross Wt. Super Light	Gross Wt. Alltemp F.P.
1/4	36	52	68	76	25	53	61	79	16	55	79	99	9	51	55	71	9	55	78	102
3/8	36	52	58	75	25	53	60	78	16	55	78	98	9	51	57	71	9	55	78	102
1/2	36	52	57	73	25	55	79	100	16	55	80	97	9	55	77	101	8	59	90	118
3/4	36	52	54	68	25	55	77	96	16	55	79	94	9	55	77	99	8	59	90	117
1	25	53	55	70	16	53	62	77	9	51	53	65	9	55	78	98	8	59	90	114
1-1/4	25	53	50	63	16	55	74	89	9	51	53	68	9	55	76	96	8	59	88	114
1-1/2	25	55	65	81	16	55	71	85	9	55	75	94	8	59	88	112	4	52	58	73
2	16	53	50	59	9	51	48	59	9	55	72	91	8	59	83	108	4	52	56	68
2-1/2	16	55	57	67	9	55	64	84	8	59	81	101	4	52	53	69	4	54	67	88
3	9	51	37	49	9	55	60	75	8	59	74	97	4	52	52	65	4	54	67	87
3-1/2	9	55	54	67	8	59	67	88	4	52	49	58	4	54	64	79	4	56	78	103
4	9	55	47	58	8	59	63	80	4	52	46	56	4	54	61	76	4	56	77	97
4-1/2	8	59	56	70	4	52	41	53	4	54	55	71	4	56	74	94	2	57	46	59
5	8	59	47	59	4	52	38	44	4	54	53	64	4	56	70	88	2	57	44	57
6	4	52	28	34	4	54	43	54	4	56	59	78	2	57	40	50	2	58	49	63
7	–	–	–	–	4	56	49	62	2	57	34	45	2	58	43	56	2	58	54	72
8	–	–	–	–	2	57	28	37	2	58	38	48	2	58	50	63	2	59	59	80
9	–	–	–	–	2	58	31	39	2	58	43	55	2	59	54	69	1	51	36	44
10	–	–	–	–	2	58	34	46	2	59	45	58	1	51	30	36	1	51	37	–
11	–	–	–	–	2	59	37	49	1	51	27	33	1	51	33	–	1	53	39	–
12	–	–	–	–	1	51	22	27	1	51	29	–	1	53	36	–	1	54	44	–
14	–	–	–	–	1	51	22	–	1	53	30	–	1	54	38	–	1	55	45	–
15	–	–	–	–	1	53	24	–	1	54	31	–	1	55	40	–	1	56	48	–
16	–	–	–	–	1	54	27	–	1	55	35	–	1	56	41	–	–	–	–	–
17	–	–	–	–	1	55	27	–	1	56	36	–	1	–	41	–	–	–	–	–
18	–	–	–	–	1	56	30	–	1	–	35	–	–	–	–	–	–	–	–	–

* Pipe Covering Cartons – Types and Sizes (Outside Dimensions)

	Cu. Ft.		
No. 51 – 17-1/2" x 17-1/2" x 36-7/8"	6.535	No. 56 – 22" x 22" x 36-7/8	10.328
No. 52 – 18" x 18" x 36-7/8"	6.914	No. 57 – 24-1/8" x 12-1/8" x 36-7/8"	6.242
No. 53 – 18-5/8" x 18-5/8" x 36-7/8"	7.403	No. 58 – 28-5/8" x 14-1/2" x 36-7/8"	8.857
No. 54 – 19-7/8" x 19-7/8" x 36-7/8"	8.430	No. 59 – 31-1/4" x 15-3/4" x 36-7/8"	10.503
No. 55 – 20-5/8" x 20-5/8" x 36-7/8"	9.078	No. 60 – 22-3/8" x 16-1/8" x 36-7/8"	7.699

BLOCK PACKAGING DATA — FLAT BLOCKS

Super-Light 85% Magnesia

Block Size	Blocks Per Carton	Gross Weight
1 " x 6" x 36"	36	53
1¼" x 6" x 36"	28	51½
1½" x 6" x 36"	24	53
2 " x 6" x 36"	18	53
2½" x 6" x 36"	14	51½
3 " x 6" x 36"	12	53

Super-Light Flat Blocks packed in Carton Type 40 with outside size of 12⅝" x 18⅝" x 36⅛".
Cu. Ft. - 5.117

Filter Press 85% Magnesia, Alltemp and Hi-Temp No. 19

Block Size	Blocks Per Carton	Carton	Gross Weight Filter Press	Gross Weight All-temp	Gross Weight Hi-Temp
1 " x 6" x 36"	24	CN-1	51	60	87
1¼" x 6" x 36"	20	CN-5	53	63	93
1½" x 6" x 36"	16	CN-1	51	60	87
2 " x 6" x 36"	12	CN-1	51	60	87
2½" x 6" x 36"	10	CN-5	53	63	93
3 " x 6" x 36"	8	CN-1	51	60	87
3½" x 6" x 36"	6	CN-1	51	60	87
4 " x 6" x 36"	6	CN-1	51	60	87

Carton Size (outside dimension) No. CN-1 - 12¾" x 12¾" x 37". - 3.481 cu. ft.
No. CN-5 - 12¾" x 13⅛" x 37". - 3.583 cu. ft.

BLOCK PACKAGING DATA — SEGMENTAL BLOCKS

Super-Light 85% Magnesia

Block Size	Blocks Per Carton	Gross Weight
1½" x 6" x 36"	24	62
2 " x 6" x 36"	18	64
2½" x 6" x 36"	14	64

Super-Light Segmental Blocks packed in Carton Type 47 with outside size of 14⅝" x 19⅝" x 36⅛".
Cu. Ft. - 6.315

Filter Press 85% Magnesia, Alltemp and Hi-Temp No. 19

Nominal Pipe Size	No. of Segments per Section All Thicknesses	No. of Blocks per Carton Thickness 1½"	2"	2½"	3"
12"	8	14	10	8	6
14"	9	16	12	8	6
16"	10	16	12	8	6
18"	11	16	12	8	6
20"	12	16	12	8	6
22"	13	16	12	8	6
24"	15	16	12	8	6
26"	16	16	12	8	6
28"	17	16	12	8	6
30"	18	16	12	8	6

Carton Size - 12" to 18" incl. packed in CN-5 (size shown above)
20" to 30" incl. packed in CN-1 (" " " ")

Carey

PACKAGING TRI-SECTIONAL ALLTEMP PIPE COVERING

industrial insulation

CKAGING

Tri-Sectional Pipe Covering is packed in cartons for domestic shipment as shown in the following table:

	Nom. 1½" Thk.				Nom. 2" Thk.				Nom. 2½" Thk.				Nom. 3" Thk.				Nom. 3½" Thk.				Nom. 4" Thk.				Nom. 4½" Thk.			
Pipe Size	Package Type	Segments and/or Lin. Ft./Ctn.	Sections per Carton	Gross Weight	Package Type	Segments and/or Lin. Ft./Ctn.	Sections per Carton	Gross Weight	Package Type	Segments and/or Lin. Ft./Ctn.	Sections per Carton	Gross Weight	Package Type	Segments and/or Lin. Ft./Ctn.	Sections per Carton	Gross Weight	Package Type	Segments and/or Lin. Ft./Ctn.	Sections per Carton	Gross Weight	Package Type	Segments and/or Lin. Ft./Ctn.	Sections per Carton	Gross Weight	Package Type	Segments and/or Lin. Ft./Ctn.	Sections per Carton	Gross Weight
12"					60	6	2	82	60	5	1⅔	84	51	3	1	63	51	3	1	75	54	3	1	87	55	3	1	99
14"	60	7	2⅓	69	60	6	2	79	51	4	1⅓	69	51	3	1	62	53	3	1	76	54	3	1	89				
15"	60	7	2⅓	74	51	4	1⅓	58	51	3	1	56	53	3	1	70	54	3	1	81								
16"	51	5	1⅔	55	51	4	1⅓	61	53	4	1⅓	77	54	3	1	72												
17"	51	5	1⅔	59	53	4	1⅓	64	54	4	1⅓	81																
8"	53	5	1⅔	62	54	5	1⅔	83																				

Carey

PIPE DIMENSIONS FITTINGS AND FLANGES

industrial insulation

Standard dimensions; wrought iron and steel—steam, gas and water pipe

DIAMETER			NOMINAL THICKNESS	CIRCUMFERENCE		TRANSVERSE AREA			LENGTH PIPE PER SQUARE FOOT		LENGTH OF PIPE Containing 1 cu. foot	NOMINAL WEIGHT PER FOOT
Nominal internal	Actual external	Actual internal		External	Internal	External	Internal	Metal	External surface	Internal surface		
INCHES	INCHES	INCHES	INCHES	INCHES	INCHES	SQ. INCHES	SQ. INCHES	SQ. INCHES	FEET	FEET	FEET	POUNDS
⅛	.405	.269	.068	1.272	.845	.129	.057	.0717	9.431	14.199	2533.	.244
¼	.54	.364	.088	1.695	1.144	.229	.104	.1249	7.075	10.49	1383.3	.42
⅜	.675	.493	.091	2.121	1.549	.358	.191	.167	5.657	7.747	754.3	.567
½	.84	.622	.109	2.639	1.954	.554	.304	.250	4.547	6.141	473.9	.850
¾	1.05	.824	.113	3.299	2.589	.966	.533	.3327	3.637	4.635	270.	1.115
1	1.315	1.049	.133	4.131	3.296	1.358	.864	.494	2.904	3.641	166.6	1.678
1¼	1.66	1.38	.14	5.215	4.333	2.164	1.496	.668	2.301	2.768	96.25	2.244
1½	1.9	1.610	.145	5.969	5.058	2.835	2.036	.799	2.01	2.372	70.73	2.717
2	2.375	2.067	.154	7.461	6.494	4.43	3.356	1.074	1.608	1.848	42.91	3.609
2½	2.875	2.469	.203	9.032	7.757	6.492	4.788	1.704	1.328	1.547	30.07	5.793
3	3.5	3.068	.216	10.996	9.638	9.621	7.393	2.228	1.091	1.245	19.47	7.575
3½	4.0	3.548	.226	12.566	11.146	12.566	9.887	2.679	.955	1.077	14.57	9.001
4	4.5	4.026	.237	14.137	12.648	15.904	12.73	3.174	.849	.949	11.31	10.665
4½	5.0	4.506	.247	15.708	14.156	19.635	15.947	3.688	.763	.847	9.03	12.538
5	5.563	5.047	.258	17.477	15.856	24.306	20.006	4.300	.686	.756	7.198	14.671
6	6.625	6.065	.28	20.813	19.054	34.472	28.888	5.584	.577	.63	4.98	18.762
7	7.625	7.023	.301	23.955	22.063	45.664	38.738	6.926	.501	.544	3.72	23.271
8	8.625	7.981	.322	27.096	25.073	58.426	50.027	8.399	.442	.478	2.878	28.544
9	9.625	8.941	.342	30.238	28.089	72.76	62.786	9.974	.396	.427	2.294	33.907
10	10.75	10.020	.365	33.772	31.479	90.763	78.855	11.908	.355	.381	1.826	40.483
11	11.75	11.	....	36.914	34.558	108.434	95.033	13.401	.325	.347	1.51	45.028
12	12.75	12.	....	40.055	37.7	127.677	113.098	14.579	.299	.319	1.27	48.985
	14.0	13.25	.375	43.982	41.626	153.938	137.887		.273	.288		
	16.0	15.25	.375	50.266	47.909	201.062	182.655		.239	.250		
	18.0	17.25	.375	56.549	54.193	254.470	239.706		.212	.221		
	20.0	19.25	.375	62.832	60.476	314.159	291.040		.191	.198		
	22.0	21.25	.375	69.115	66.759	380.143	354.657		.174	.180		
	24.0	23.25	.375	75.398	73.042	452.390	424.558		.159	.164		

Asbestos cement for standard fittings

THIS TABLE gives the approximate number of pounds of asbestos cement which will cover standard screwed fittings and flanges 1 in. thick. It is based upon asbestos cement having a covering capacity of 15 sq. ft. 1 in. thick per 100-lb. bag.

If 85% Magnesia cement is used, one-fourth the amount will be required.

Where fittings are covered flush with adjacent 1-in. thick pipe covering only approximately ½-in. thickness is required and consequently one-half the amount specified in this table.

For flanged fittings figure the amount required for screwed fittings and in addition the amount required for the number of sets of flanges on each flanged fitting.

Where sleeves of sectional covering or blocks are used around the outer surface of flanges only one-third the amount of cement specified in the table will be needed for filling cracks and filling in space between such sleeve and the outer surface of 1-in. thick pipe covering.

For 45-degree ells approximately one-half the amount specified for 90-degree ells will be required.

For long radius ells approximately two times the amount specified for 90-degree ells will be required.

NOMINAL PIPE SIZE, INCHES	POUNDS ASBESTOS CEMENT			
	90° ELLS	VALVES AND TEES	CROSSES	ONE PAIR FLANGES
½, ¾, and 1	2.0	2.5	2.7	4.5
1¼, 1½, and 2	3.5	4.3	4.7	6.1
2½ and 3	6.0	7.5	8.0	8.9
3½ and 4	9.0	12.3	12.0	13.1
4½ and 5	12.5	15.6	16.7	14.1
6	15.0	18.8	20.0	16.4
7	18.5	23.1	24.3	19.0
8	19.5	24.2	26.0	22.0
9	24.0	30.0	32.0	26.0
10	29.0	36.1	38.9	27.5
12	37.5	47.0	50.0	38.0

Fittings and Flanges—Insulation Areas

FLANGED FITTINGS			FLANGES		
PIPE SIZE INCHES	AVERAGE SQ. FT. AREA OF METAL SURFACE	SQ. FT. CEMENT USED SOLID	PIPE SIZE INCHES	SQUARE FOOT BLOCKS	SQ. FT. CEMENT ½" THICK OVER 1½" BLOCKS
2½	0.7	1.0	2½	1.0	2.4
3	0.9	1.3	3	1.2	2.6
3½	1.0	1.5	3½	1.4	2.7
4	1.2	1.7	4	1.6	2.9
4½	1.5	1.9	4½	1.7	3.0
5	1.7	2.1	5	1.8	3.3
6	2.2	2.6	6	2.1	3.5
7	2.7	3.3	7	2.4	4.0
8	3.3	3.5	8	2.7	4.5
9	4.0	4.5	9	3.1	4.8
10	4.5	5.0	10	3.7	5.0
12	6.3	6.8	12	4.4	6.7
14	8.3	9.0	14	4.8	7.0
16	9.7	10.5	16	8.0	9.0
18	12.0	13.0	18	6.8	10.0
20	14.5	15.5	20	7.7	11.0
22	17.3	18.5	22	8.7	12.2
24	21.0	22.3	24	10.0	13.4
26	24.0	25.0	26	11.0	14.7
28	27.0	28.5	28	13.0	16.0
30	30.0	31.0	30	14.5	18.0

USE METAL AREA to secure area of blocks.

For area of ½-in. cement over 1-in. block use 133⅓% of metal area.

For area of ½-in. cement over 1½-in. block use 140% of metal area.

For area of ½-in. cement over 2-in. block use 150% of metal area.

The second column under fittings indicates the square-foot area of blocks required to cover them while the third column shows the square-foot area of cement used solid.

THE SECOND COLUMN UNDER FLANGES indicates the square-foot area of block insulation required to cover them, while the third column shows the square-foot area of cement ½ in. thick used over 1½-in. thick blocks.

Carey

PROPERTIES OF SATURATED STEAM STANDARD AREA TABLES

industrial insulation

ABSOLUTE PRESSURE IN POUNDS PER SQ. INCH	TEMPERATURE IN DEGREES F.	HEAT UNITS IN LIQUID ABOVE 32° F.	HEAT OF VAPORIZATION (LATENT HEAT)	TOTAL HEAT UNITS IN STEAM ABOVE 32° F.	DENSITY POUNDS PER CU. FOOT	SP. VOL. CU. FOOT PER POUND STEAM
5	162.28	130.1	1000.3	1130.5	0.01364	73.3
10	193.22	161.1	982.0	1143.1	0.02606	38.4
14.7	212.0	180.0	970.4	1150.4	0.03732	26.8
20	228.0	196.1	960.0	1156.2	0.04980	20.1
30	250.3	218.8	945.1	1163.9	0.0728	13.7
40	267.3	236.1	933.3	1169.4	0.0953	10.5
50	281.0	250.1	923.5	1173.6	0.1175	8.5
60	292.7	262.1	914.9	1177.0	0.1394	7.2
70	302.9	272.6	907.2	1179.8	0.1612	6.2
80	312.0	282.0	900.3	1182.3	0.1829	5.5
90	320.3	290.5	893.9	1184.4	0.2044	4.9
100	327.8	298.3	888.0	1186.3	0.2258	4.4
110	334.8	305.5	882.5	1188.0	0.2472	4.0
120	341.3	312.3	877.2	1189.6	0.2683	3.7
130	347.4	318.6	872.3	1191.0	0.2897	3.5
140	353.1	324.6	867.6	1192.2	0.3107	3.2
150	358.5	330.2	863.2	1193.4	0.3320	3.0
160	363.6	335.6	858.8	1194.3	0.3529	2.8
170	368.5	340.7	854.7	1195.4	0.3738	2.7
180	373.1	345.6	850.8	1196.4	0.3948	2.5
190	377.6	350.4	846.9	1197.3	0.4157	2.4
200	381.9	354.9	843.2	1198.1	0.437	2.3
225	391.5	365.0	834.8	1199.8	0.489	2.1
250	401.1	375.2	826.3	1201.5	0.541	1.9
275	409.3	384.0	818.8	1202.8	0.593	1.7
300	417.5	392.7	811.3	1204.1	0.645	1.6
325	424.7	400.5	804.6	1205.1	0.698	1.5
350	431.9	408.2	797.8	1206.1	0.750	1.3
375	438.4	415.	792.	1207.	0.81	1.3
400	444.8	422.	786.	1208.	0.86	1.2
425	450.7	429.	780.	1208.	0.91	1.1
450	456.5	435.	774.	1209.	0.96	1.0
475	461.9	442.	768.	1209.	1.02	1.0
500	467.3	448.	762.	1210.	1.08	0.9
525	472.3	454.	757.	1210.	1.14	0.9
550	477.3	459.	751.	1210.	1.20	0.8
575	482.0	464.	746.	1210.	1.26	0.8
600	486.6	469.	741.	1210.	1.32	0.8
625	490.9	474.	732.	1205.	1.37	0.7
650	495.2	478.	722.	1200.	1.41	0.7
675	499.3	484.	717.	1199.	1.47	0.7
700	503.4	487.	711.	1198.	1.52	0.7

Absolute pressure = gauge pressure + 14.7.

THE STEAM TABLE ABOVE is reprinted in part from Marks and Davis, Tables and Diagrams of the "Thermal Properties of Saturated and Superheated Steam" by permission of the publishers Messrs. Longmans, Green & Co.

TABLE AT RIGHT →

Areas for Flat, Curved and Tapered Blocks 6 in. wide.
For 3-in. wide blocks multiply area shown by 0.5.
For 9-in. wide blocks multiply area shown by 1.5.
For 12-in. wide blocks multiply area shown by 2.0.
Retain all decimals in all cases.
*All blocks curved to a radius less than 16½-in. are figured on segmental Pipe Covering basis.

For Blocks and Lagging

FLAT BLOCKS		CURVED BLOCKS—OVER 16½-IN. RADIUS*		
THICKNESS		LESS THAN 1½ INCHES	1½ INCHES TO 2 INCHES INCLUSIVE	OVER 2 INCHES
LENGTH BLOCK INCHES	AREA BLOCK SQUARE FEET	AREA BLOCK SQUARE FEET	AREA BLOCK SQUARE FEET	AREA BLOCK SQUARE FEET
½	.002	.002	.002	.002
⅝	.002	.002	.002	.002
¾	.006	.006	.006	.006
⅞	.010	.010	.012	.012
1	.016	.016	.016	.016
1⅛	.020	.022	.022	.022
1¼	.026	.028	.028	.028
1⅜	.032	.032	.034	.034
1½	.036	.038	.038	.040
1	.042	.044	.044	.044
2	.084	.088	.088	.090
3	.126	.132	.132	.134
4	.166	.176	.178	.178
5	.208	.220	.222	.224
6	.250	.264	.266	.268
7	.292	.306	.310	.312
8	.334	.350	.354	.358
9	.376	.394	.398	.402
10	.416	.438	.442	.448
11	.458	.482	.486	.492
12	.500	.526	.532	.536
13	.542	.570	.576	.582
14	.584	.614	.620	.626
15	.626	.658	.664	.670
16	.666	.702	.708	.716
17	.708	.746	.752	.760
18	.750	.790	.796	.804
19	.792	.832	.842	.850
20	.834	.876	.886	.894
21	.876	.920	.930	.938
22	.916	.964	.974	.984
23	.958	1.008	1.018	1.028
24	1.000	1.052	1.062	1.072
25	1.042	1.096	1.106	1.118
26	1.084	1.140	1.152	1.162
27	1.128	1.184	1.196	1.208
28	1.166	1.228	1.240	1.252
29	1.208	1.272	1.284	1.296
30	1.250	1.316	1.328	1.342
31	1.292	1.358	1.372	1.386
32	1.334	1.402	1.416	1.430
33	1.376	1.446	1.460	1.476
34	1.416	1.490	1.506	1.520
35	1.458	1.534	1.550	1.564
36	1.500	1.578	1.594	1.610
37	1.542	1.622	1.638	1.654
38	1.584	1.666	1.682	1.698
39	1.626	1.710	1.726	1.744
40	1.666	1.754	1.770	1.788
41	1.708	1.798	1.815	1.832
42	1.750	1.842	1.860	1.877

freight tables

ximate freight in per cent of list price for any rate of freight multiply the percentage given e freight rate in dollars:

example, to determine the cost of Magnesia covering when the freight rate is 35c per cwt.:
.0 % × $0.35 = 1.75% of the list price.

OLLOWING TABLE shows the approximate freight cost for various coverings in per cent of list based on $1.00 per cwt. freight rate.

% Magnesia Blocks	6.0%	Hi-Temp No. 19 Blocks	8.5%
% Magnesia Covering	5.0%	Tempchek Pipe Covering	7.5%
Alltemp Covering	5.0%	Impervo Covering (½" th.)	3.3%
Alltemp Blocks	6.0%	Impervo Covering (¾" th.)	4.6%
Air Cell Covering (2-ply)	1.9%	Impervo Covering (1" th.)	6.3%
Air Cell Covering (3-ply)	2.8%	Multi-Ply Covering (1" th.)	8.5%
Air Cell Covering (4-ply)	3.5%	Perfecto Covering (½" th.)	3.0%
Carocel Covering (½" th.)	2.9%	Perfecto Covering (¾" th.)	4.3%
Carocel Covering (¾" th.)	5.0%	Perfecto Covering (1" th.)	5.9%
Carocel Covering (1" th.)	6.0%	Protecto Covering (1" th.)	5.0%

Asbestos Paper weights and measurements

WEIGHT PER 100 SQUARE FEET	ONE POUND WILL COVER	WEIGHT OF ONE SQUARE FOOT	THEORETICAL GAUGE 65 LBS. PER CU. FT.	AVERAGE ACTUAL GAUGE	FRACTIONAL THICKNESS	SQUARE FEET PER 100 POUNDS
POUNDS	SQUARE FEET	POUND	INCHES	INCHES		
6	16.66	.06	.0109	.015	...	1666
7	14.28	.07	.0127	.017	...	1428
8	12.50	.08	.0145	.019	1/64	1250
9	11.11	.09	.0163	.021	...	1111
10	10.00	.10	.0181	.022	...	1000
12	8.33	.12	.0218	.027	...	833
14	7.14	.14	.0254	.029	...	714
16	6.25	.16	.0290	.032	1/32	623
20	5.00	.20	.0363	.039	...	500
24	4.16	.24	.0435	.046	3/64	416
32	3.12	.32	.0581	.060	1/16	312
48	2.08	.48	.0872	.089	3/32	208
64	1.56	.64	.1162	.125	1/8	156