PLAINTIFF'S
EXHIBIT
DUP-1505

REV. SEP 1979

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PREFORMED BLOCK AND PIPE INSULATION

THERMAL INSULATION
STANDARD ENGINEERING SPECIFICATION

ISSUED	OCT 1964	SN 100 M
THIS PAGE REVISED	NOV 1978	Page 1 of 8
STANDARD REAPPROVED	NOV 1978	

Code	102	102.1	111
Material Designation	Calcium silicate	Calcium silicate – inhibited	Cellular glass
Purpose	Insulation for hot pipe and equipment	Insulation for hot pipe and equipment	Insulation for cold- or dual-temperature pipe and equipment
Material Description	Asbestos free, reacted hydrous calcium silicate reinforced with fibers	Asbestos free, reacted hydrous calcium silicate with inhibitor for enhanced cross-corrosion cracking and reinforced with fibers	Cellular glass, foamed and fused into unicellular form
Suitable for Use On Unprotected Aluminum	No	No	No
In direct contact with austenitic stainless steel at or above 140°F	No	Yes	No
Recommended Temperature Range	1,200°F max	1,200°F max	−200 to +100°F (200°F for dual temp)
K Factor Btu/(hr)(sq ft)(°F/in.)	0.41 at 200°F mean 0.46 at 400°F mean 0.50 at 600°F mean	0.41 at 200°F mean 0.46 at 400°F mean 0.50 at 600°F mean	0.25 at 50°F mean 0.25 at 75°F mean 0.25 at 100°F mean
Moisture Resistance or Water Vapor Permeability	Poor	Poor	Fair
Density	14 lb per cu ft max	14 lb per cu ft max	7 to 9 lb per cu ft
Compressive Strength Specimen 8 in. × 6 in. × 2 in. Load Rate 0.10 per min	50 lb per sq in. min at 5 percent deformation	50 lb per sq in. min at 5 percent deformation	50 lb per sq in.
Resistance to Handling Breakage	Fair to poor	Poor	Fair
Dimensions	See SN100	See SN100	See SN100
Flame-Spread Rating	Does not burn	Does not burn	Does not burn
Specifications, Qualifications, Limitations	All materials listed under Code 102.1 are approved where Code 102 is specified. Austenitic stainless steel at or above 140°F and aluminum must be protected per SN1A.	Recommended for use on austenitic stainless steel. Aluminum must be protected per SN1A. For an alternate to purchased inhibited material, see SN102.1B. Stressed Type 304 stainless steel U-bend specimens at 100°C, when in contact with this insulating material in the Du Pont test test with 1,000 ppm chloride as NaCl in the test water, shall show no cracking at the end of 144 hours exposure. Passing the test in MIL-I-24244 specification does not qualify a material under Code 102.1	Aluminum must be protected per SN1A. Austenitic stainless steel at or above 140°F must be protected per SN1A.

The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their products meet the above specifications. These manufacturers' materials also are acceptable under other vendor's labels upon certification as to their identity.

Approved Materials and Vendors			
	Thermo-12 Johns-Manville Sales Corp	Super Cabrera, Type NA Fiberboard Corp	Foamglas Pittsburg Corning Corp
	Kaylo-104F Owens-Corning Fiberglas Corp	Pomini (Notes 1, 2, and 3) Pomini, Inc	
	Super Cabrera, Type NA Fiberboard Corp	Wesselite (Notes 1, 2, and 3) Wesselite Co	
	Cabrera 1200 (Notes 1, 2, and 4) Cabrera Corp	Kaylo-104F Owens-Corning Fiberglas Corp	
	Pomini (Notes 1, 2, and 3) Pomini, Inc		
	Wesselite (Notes 1, 2, and 3) Wesselite Co		

Notes:
1. Molded two-piece fitting covers are available in sectored, welded, and sweet types. Advise the fabricator of the brand of aluminum elbow covers to be used to ensure a proper fit.
2. A [illegible].
3. Reused or molded two-piece fitting covers are available in sizes up to 12¾ inch OD; larger sizes are fabricated.
4. Do not use in thermal/acoustical systems.

Vendors and merchandise designations are given to describe materials and may not include all acceptable products. Substitutions by suppliers are to be made only on approval of the local authority initiating the use of this specification.

SUBCOMMITTEE NO. 23

R-183

DUP 0990303

DU 046104

MATERIAL SPECIFICATION - SERIES 100

OCTOBER 1954

Code	104	105	106
Material	Diatomaceous silicas	Asbestos molded	Asbestos and diatomaceous earth molded
Material Description	Diatomaceous silicas and asbestos fibers	Compressed fluffy asbestos sprayed with sodium silicate	Compressed fluffy asbestos sprayed with sodium silicate and diatomaceous earth sprinkled on the asbestos mat
Filler			
Binder			
Temperature Range	500°F. to 1500°F.	100°F. to 700°F.	700°F. to 1000°F.
K Factor	1000°F. - 0.77 max.	500°F. - 0.56 max.	500°F. - 0.58 max.
Density	20-24 lb. per cu. ft.	14 lbs. per cu. ft.	14 lbs. per cu. ft.
Compressive Strength			
Manufacturing Process	Machine extruded. Pipe mach. cut on diameter.	Formed and comp. on mandril. Pipe mach. cut on diam.	Formed and comp. on mandril. Pipe mach. cut on diam.
Resistance to breakage in handling	Good	Good	Good
Dimensions	To Specification		
Other Qualifications		Formed on a mandril to a predetermined wt. Pressed to obtain the desired density, and baked.	Formed on a mandril to a predetermined wt. Pressed to obtain the desired density, and baked.

The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.

	Tempeheck Philip Carey Mfg. Co.	*Unibestos 750* Union Asbestos & Rubber Co.	*Unibestos 1200* Union Asbestos & Rubber Co.

Vendors and merchandise designations are given to describe the materials and may not include all acceptable products; however, no substitutions are to be made without the written approval of the authority initiating the use of this Specification.

DUP 0990304

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DU 046105

MATERIALS

PREFORMED BLOCK AND PIPE INSULATION

THERMAL INSULATION
STANDARD ENGINEERING SPECIFICATION

ISSUED OCT 1964
TYPE PAGE REVISED SEPT 1977
STANDARD RECAPTURED JULY 1977

SN 100 M

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Code	100	100.1	111
Material Designation	Calcium silicate	Calcium silicate - reinforced	Cellular glass
Purpose	Insulation for hot pipe and equipment	Insulation for hot pipe and equipment	Insulation for cold or sub-temperature pipe and equipment
Material Description	Asbestos free material hydrous calcium silicate reinforced with fibers	Asbestos free material hydrous calcium silicate with admixture for chemical corrosion protection and reinforced with fibers	Cellular glass, sealed and fused into monolithic form
Suitable for Use On Unprotected Aluminum	No	No	No
In direct contact with austenitic stainless steel at or above 140°F	No	Yes	No
Recommended Temperature Range	1,200°F max	1,200°F max	200° to +100°F (300°F for short terms)
K Factor Btu·in/(hr·sq ft·°F)	0.41 at 200°F mean 0.46 at 400°F mean 0.59 at 600°F mean	0.41 at 200°F mean 0.46 at 400°F mean 0.59 at 600°F mean	0.30 at 50°F mean 0.35 at 75°F mean 0.39 at 100°F mean
Moisture Resistance or Water Vapor Permeability	Poor	Poor	Fair
Density	14 to 20 pcf	14 to 20 pcf	7 to 9 lb per cu ft
Compressive Strength Specimen 6 in. × 6 in. × 2 in. Load Rate 0.10 per min	50 lb per sq in. min at 5 percent deformation	50 lb per sq in. min at 5 percent deformation	90 lb per sq in.
Resistance to Handling Breakage	Poor to fair	Poor	Fair
Dimensions	See SN100	See SN100	See SN100
Flame-Spread Rating			
Specifications, Qualifications, Limitations	All materials listed under Code 100.1 are approved where Code 100 is specified. Aluminum must be protected per SN1A. Austenitic stainless steel at or above 140°F must be protected per SN1A.	Recommended for use on austenitic stainless steel. Aluminum must be protected per SN1A. For an alternate to non-chloride-inhibited materials, see SN100.10. Stressed Type 304 stainless steel U-bend specimens at 150°C, when in contact with this insulating material at the Dry Point were test with 1,000 ppm chlorides as NaCl in the test water, stress show no cracking at the end of 168 hours exposure. Passing this test in MIL-I-24244 specification does not qualify a material under Code 100.1.	Aluminum must be protected per SN1A. Austenitic stainless steel at or above 140°F must be protected per SN1A
Approved Materials and Vendors	Thermo-12 Johns-Manville Sales Corp	Super Calsimo, Type 1-4 Fibreboard Corp	Foamglas Pittsburg Corning Corp
	Kaylo 1665 Owens-Corning Fiberglas Corp	Pabco Grades 1 and 2 Pabco, Inc	
	Super Calsimo, Type 1-4 Fibreboard Corp	Kaylo Grades 1 and 2 Manville Co	
	Calsimo (Non Grade 1) Celotex Corp		
	Pabco Grades 1 and 2 Pabco, Inc		
	Kaylo Grades 1 and 2 Manville Co		

NOTES:
1. Asbestos fiber-based fitting blocks are available in standard, contour, and special types. Advise the fabricator of the grade of aluminum jacket covers to be used to ensure a proper fit.
2. A service-limiting recommended temperature rate 1,100°F

Vendors and merchandise designations are given to describe materials and may not include all acceptable products. Substitutions by suppliers are to be made only on approval of the local authority governing the use of this specification.

SUPERSEDES SPEC. SN

R-1941

REV. NOV 1978

DUP 0990305

DU 046106

Class	11E	11E-A	11H
Material Designation	Glass fiber	Glass fiber/cloth	Mineral wool + [illegible]°F
Purpose	Insulation for moderate temperature pipe and equipment	Blanket insulation for moderate temperature equipment	Insulation for high-temperature pipe fittings and equipment
Material Description	Glass fiber, thermosetting resin-bonded insulation for pipe and fittings. Pipe sections, one-piece, fittings, pipe, without jacket	Glass fiber bonded blank, pipe, without covering	Mineral wool with high-temperature binder
Suitable for Use On Unprotected Aluminum	No	No	No
In direct contact with austenitic stainless steel at or above 140°F	No	No	No
Recommended Temperature Range	-40 to 375°F	-40 to 350°F	1,000°F max
K Factor Btu/(hr)(sq ft)(°F/in.)	0.23 at 100°F mean 0.27 at 200°F mean 0.32 at 300°F mean	0.24 at 100°F mean 0.28 at 200°F mean 0.37 at 300°F mean	0.28 at 200°F mean 0.51 at 600°F mean 0.76 at 1,000°F mean
Moisture Resistance or Water Vapor Permeability	Poor	Poor	Poor
Density	4 lb per cu ft, nominal	3 lb per cu ft, nominal	15 to 19 lb per cu ft
Compressive Strength Specimen 6 in. x 6 in. x 2 in. Load Rate 0.10 per min	Nominal bearing, inserts required where pipe is supported outside insulation	Nominal bearing	Low
Resistance to Handling Breakage	Good	Good	Good
Dimensions	See 3N30	Standard blank: 24 in. x 48 in. Thickness: 1 in., 1½ in., 2 in.	Standard blank: Up to 24 in. x 36 in. Thickness: 1 in. to 4 in.
Flame-Spread Rating	25 or less	25 or less	Does not burn
Specific uses, Qualifications, Limitations	Easily damaged at handling. Poor resistance to shock. Not recommended for pressurization. Specify whether for pipe or tubing on order. Available with factory-applied finishes and lap adhesive. When specified, consult vendor's catalog and include on order. 7½ lb per cu ft density recommended for field fabricated fittings. Molded fittings are generally lower in cost and are preferred over field fabricated fittings. Austenitic stainless steel at or above 140°F and aluminum must be protected per 3N1A.	Available with factory-applied finishes. When specified, consult vendor's catalogs and include on order. Nominal 4½ lb per cu ft density material is available and is recommended for fabrication involving considerable shaping and fitting. Austenitic stainless steel at or above 140°F and aluminum must be protected per 3N1A.	Austenitic stainless steel at or above 140°F and aluminum must be protected per 3N1A.
The following materials have proven satisfactory in field tests and great has been furnished by the manufacturers that their products meet the above specifications. These manufacturers' materials also are acceptable under other vendor's listed upon certification as to their identity.			
Approved Materials and Vendors	*Snap-On 650 Pipe Covering* Certain-Teed Corp	*10 300* Certain-Teed Corp	*PF Superwrap* (Glass cloth) Knight-Pittsburgh Sales Corp
	Micro-Lok 650 Johns-Manville Sales Corp	*Spin-Glas No. 814* Johns-Manville Sales Corp	*Nomex Blank* (Glass cloth) Keene Corp Industrial Insulation Div
	Pipe Covering - One Piece Owens-Corning Fiberglas Corp	*Fiberglass, Type 705* Owens-Corning Fiberglas Corp	*E-Fiber PC* (Glass cloth) (Note 2) U. S. Gypsum
	Insul-Sure (Note 1) Ehret Products, Vose-Cousins Div		*H. T. Blank* (Glass cloth) Pump-Eight Insulations, Inc
			Fiberfrax Mineral Felt Blank (Glass cloth) Carborundum

Notes
1. Molded fitting covers only.
2. Also available as pipe fitting covers. Advise the fabricator of the grade of stainless steel cover to be used to ensure a proper fit.

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DU 046107

MATERIAL SPECIFICATION - SERIES 100
PREFORMED BLOCK AND PIPE

Code	120	130
Material	Polystyrene foam	Asbestos board
Material Description*	Preformed polystyrene foam block, pipe, and fitting insulation cut from extruded polystyrene foam (pipe insulation available with a variety of different joint designs), or pipe and fitting insulation molded to final shape from expanded polystyrene beads with tongue-and-groove side longitudinal joints and ship lap butt joints.	Asbestos fibers, diatom silica, and inorganic bi Flame-spread rating 0. Weather-resistant.
Recommended Temperature Range	- 100 F to + 140 F	1200 max
K Factor, Max Btu/(hr) (sq ft) (°F/in.)	0.24 at 50 F 0.26 at 75 F 0.28 at 100 F	0.77 at 200 F 0.79 at 400 F 0.81 at 600 F
Density	1.5 lb per cu ft minimum	36 lb per cu ft
Compressive Strength Specimen size 6" x 6" x 2", load rate 0.10" per min	Min 25 lb per sq in. at 5% deformation	Compressive, ultimate - 14,000 psi Tensile parallel to face - 420 psi Shear normal to face - 70(Shear parallel - 32
Dimensions	SN3D. All dimensions to be ± 1/16" including straightness and squareness	Thickness, in. - 1/2, 1/ 1, 1 1/4, 1 1/2, 2 and 4 Sheet size, ft - 3, 2 1/2 x 4 x 8 and 4 x 10
Qualifications and Limitations	Uniform cell structure with max 10% open cells. No distortion or volume change, or loss of compressive strength after exposure at 140 F and 50% relative humidity for 15 days. Water absorption max 0.02% by volume after being subjected to 90 F, 90% relative humidity for 15 days and max 4% by volume into a 2" x 2" x 1" skin-free piece immersed in water just under the surface for 5 days, then wiped with a wet cloth and weighed, with no delay between steps. Not resistant to solvents other than alcohol.	Sanded both sides, may be used unpainted for interior use. When painted, use we base or epoxy coating.

The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that the products meet the above specifications. These manufacturers' materials also are acceptable under other vendor's labels upon certification as to their identity.

♦ Available in the form of fitting covers (see Code 114.1) from fabricators	*Styrofoam FR* ♦ Dow Chemical Co	*Marinite 36 (Type A)* Johns-Manville Sales Corp

REV. MAY 1973

DUP 0990307

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DU 046108

97

Code	128	130
Material	Polystyrene foam	Asbestos board
Material Description	Preformed polystyrene foam slabs, pipe, and fitting insulation cut from extruded polystyrene foam (pipe insulation available with a variety of different joint designs), or pipe and fitting insulation molded to final shape from expanded polystyrene beads with tongue-and-groove side longitudinal joints and ship lap butt joints.	Asbestos fibers, diatomaceous silica, and inorganic b... Flame-spread rating 0. Weatherproof cement.
Recommended Temperature Range	- 100 F to + 140 F	1200 max
K Factor, Max Btu/(hr) (sq ft) (°F/in.)	0.24 at 50 F 0.26 at 75 F 0.28 at 100 F	0.77 at 200 F 0.79 at 400 F 0.81 at 600 F
Density	1.3 lb per cu ft minimum	36 lb per cu ft
Compressive Strength Specimen size 6" x 6" x 2"; load rate 0.10" per min	Min 25 lb per sq in. at 5% deformation	Compressive, ultimate - 14,000 psi Tensile parallel to face - 420 psi Shear normal to face - 70 Shear parallel - 32
Dimensions	SN30. All dimensions to be ± 1/16" including straightness and squareness	Thickness, in. - 1/2, 3/4, 1, 1 1/2, 1 1/2, 2 and 4 Sheet size, ft - 3, 3 1/2 x 4 x 8 and 4 x 10
Qualifications and Limitations	Uniform cell structure with max 10% open cells. No dimension or volume change, or loss of compressive strength after exposure at 140 F and 50% relative humidity for 15 days. Water absorption max 0.03% by volume after being subjected to 90 F, 90% relative humidity for 15 days and max 4% by volume into a 2" x 2" x 1" chloroform piece immersed in water just under the surface for 5 days, then wiped with a wet cloth and weighed, with no delay between steps. Not resistant to solvents other than alcohol.	Sanded both sides, may be used unpainted for interior use. When painted, use we base or epoxy coating.

The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that the products meet the above specifications. These manufacturers' materials also are acceptable under other vendor's labels upon certification as to their identity.

◊ Available in the form of fitting covers (see Code 114.1) from fabricators	*Styrofoam FR* ◊ Dow Chemical Co	*Marinite 36 (Type 4)* Johns-Manville Sales Corp
		Fyrepar Owens-Corning Corp

DUP 0990308

R-186

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87

Code	128	138
Material	Polystyrene foam	Asbestos board
Material Description	Preformed polystyrene foam block, pipe, and fitting insulation cut from extruded polystyrene foam (pipe insulation available with a variety of different joint designs), or pipe and fitting insulation molded to final shape from expanded polystyrene beads with tongue-and-groove side longitudinal joints and ship lap butt joints.	Asbestos fibers, diatom. silica, and inorganic bin Plasma-sprayed coating 2. Weather-resistant.
Recommended Temperature Range	- 100 F to + 140 F	1200 max
K Factor, max Btu-(hr) (sq ft) (°F/in.)	0.24 at 50 F 0.26 at 75 F 0.28 at 100 F	0.77 at 200 F 0.79 at 400 F 0.81 at 600 F
Density	1.5 lb per cu ft minimum	36 lb per cu ft
Compressive Strength Specimen size 6" x 6" x 2"; load rate 0.10" per min	Min 25 lb per sq in. at 5% deformation	Compressive, ultimate - 14,000 psi Tensile parallel to face - 420 psi Shear normal to face - 70C Shear parallel - 32C
Dimensions	SNIP. All dimensions to be ± 1/16" including straightness and squareness	Thickness, in. - 1/2, 3/4, 1, 1 1/2, 1 1/2, 2 and 4 Sheet size, ft - 3, 3 1/2 x 4 x 8 and 4 x 10
Qualifications and Limitations	Uniform cell structure with max 10% open cells. No disorientation or volume change, or loss of compressive strength after exposure at 140 F and 80% relative humidity for 15 days. Water absorption max 0.02% by volume after being submerged to 90 F, 90% relative humidity for 15 days and max 4% by volume into a 2" x 2" x 1" skinless piece immersed in water just under the surface for 5 days, then wiped with a wet cloth and weighed, with no delay between steps. — Not resistant to solvents other than alcohol.	Sanded both sides, may be used unpainted for interior use. When painted, use wa base or epoxy coating.

The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that the products meet the above specifications. These manufacturers' materials also are acceptable under other vendor's labels upon certification as to their identity.

◊ Available in the form of pipe and fitting insulation from fabricators.	Styrofoam FR ◊ Dow Chemical Co	Marinite 36 (Type 4) Johns-Manville Sales Corp
		Pyrex Owens-Corning Corp

DU 046110

DUP 0990309

R-187 LR 33F

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MATERIAL SPECIFICATION - SERIES 100
PREFORMED BLOCK AND PIPE

45

Code	130	138
Material	Polystyrene foam	Asbestos board
Material Description	Preformed polystyrene foam: Type A - block, pipe and fitting insulation cut from extruded polystyrene foam. Pipe insulation available with a variety of different joint designs. Type B - pipe and fitting insulation molded to final shape from expanded polystyrene beads with tongue and groove side wall joints and strip lap butt joints.	Asbestos fibers, diatomaceous silica, and inorganic binder. Filament-reinforced rating 0. Weather-resistant
Filler		Asbestos fiber
Binder		Inorganic
Temperature Range	-100 F to +140 F	1200 F max
K Factor Btu/(hr) (sq ft) (°F/in.)	0.26 max at 75 F mean	0.86 max at 500 F mean
Density	1.8 lb per cu ft minimum	36 lb per cu ft
Compressive Strength	Min 25 lb per sq in. at 5% deformation	Compressive, ultimate= 14,000 psi Tensile = 420 psi Shear normal to face = 700 psi Shear parallel = 220 psi
Resistance to Breakage in Handling	Excellent	Good
Dimensions	See SN30	
Dimensional Tolerances	$\pm 1/16"-0"$ on insulation ID, all other dimensions to be $\pm 1/16"$ including straightness and squareness	Thickness, in. = 1/2, 3/4, 7/8, 1, 1 1/4, 1 1/2, 2 and 4 Sheet size, ft = 3, 3 1/2 or 4 x 8 and 4 x 10
Other Qualifications	Uniform cell structure with max 10% open cells for Type A. No voids having any dimensions exceeding 1/4". No distortion or volume change, or loss of compressive strength after exposure at 140 F and 98% relative humidity for 15 days. Water absorption max 0.02% by volume after being subjected to 98 F, 98% relative humidity for 15 days and max 4% by volume into a 2" x 2" x 1" shiplap piece immersed in water just under the surface for 5 days, then wiped with a wet cloth and weighed, with no delay between steps. Has resistance to solvents other than alcohol	Sanded both sides, may be used unpainted for interior use. When painted, use water base or epoxy coating

The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.

* Available in the form of pipe and fitting insulation from fabricators.		
	Type A: Styrofoam FR* Dow Chemical Co	Marinite 36 (Type A) Johns-Manville Sales Corp
	Type B: Vapor-Lock MMM Div, Insolair Products Co	Unarco Board 36 Chamber Div Unarco Industries, Inc

REV. JUL 1970 SUP. BY _____

DUP 0990310

DU 046111

MATERIAL SPECIFICATION - SERIES 100
PREFORMED BLOCK AND PIPE

OCTOBER 1954
This Page Rev July 1970

Code	120	130
Material	Polystyrene foam:	Asbestos board
Material Description	Preformed polystyrene foam: Type A - block, pipe and fitting insulation cut from extruded polystyrene foam. Pipe insulation available with a variety of different joint designs. Type B - pipe and fitting insulation molded to final shape from expanded polystyrene beads with tongue and groove side wall joints and ship lap butt joints.	Asbestos fibers, diatomaceous silica, and inorganic binder. Flame-spread rating 0. Weather-resistant
Filler		Asbestos fiber
Binder		Inorganic
Temperature Range	-100 F to +140 F	1200 F max
K Factor Btu/(hr) (sq ft) (°F/in.)	0.26 max at 75 F mean	0.50 max at 500 F mean
Density	1.8 lb per cu ft minimum	36 lb per cu ft
Compressive Strength	Min 25 lb per sq in. at 5% deformation	Compressive, ultimate - 14,000 psi Tensile - 420 psi Shear normal to face - 700 psi Shear parallel - 320 psi
Resistance to Breakage in Handling	Excellent	Good
Dimensions	See SN30	
Dimensional Tolerances	±1/16" -0" on insulation ID, all other dimensions to be ±1/16" including straightness and squareness	Thickness, in. - 1/2, 3/4, 7/8, 1, 1 1/4, 1 1/2, 2 and 4 Sheet size, ft - 3, 3 1/2 or 4 x 8 and 4 x 10
Other Qualifications	Uniform cell structure with max 10% open cells for Type A. No voids having any dimensions exceeding 1/4". No distortion or volume change, or loss of compressive strength after exposure at 140 F and 80% relative humidity for 15 days. Water absorption max 0.03% by volume after being subjected to 90 F, 90% relative humidity for 15 days and max 4% by volume into a 2" x 2" x 1" skin-free piece immersed in water just under the surface for 5 days, then wiped with a wet cloth and weighed, with no delay between steps. Not resistant to solvents other than alcohol	Sanded both sides, may be used unpainted for interior use. When painted, use water base or epoxy coating
The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their products meet the above specifications. These manufacturers' materials also are acceptable under other vendor's labels upon certification as to their identity.		
* Available in the form of pipe and fitting insulation from fabricators.	*Type A: Styrofoam FR** Dow Chemical Co	*Norinite 36 (Type 4)* Johns-Manville Sales Corp
	Type B: Vapor - Lock MMM Div, Insular Products Co	*Unarco Board 36* Chambers Div Unarco Industries, Inc

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DU 046112

PREFORMED BLOCK AND PIPE INSULATION

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REV. NOV 1978

Code	135	131	
Material Designation	Asbestos board	High-density calcium silicate board	
Purpose	Use where high structural strength insulation is required	Use where high structural strength insulation is required	
Material Description	Weather-resistant board consisting of asbestos fibers, diatomaceous silica, and inorganic binder. Service on both sides	Asbestos-free, fireproof, high-density structural insulation board consisting of calcium silicate, wool fibers, and reinforcing agents. Service on both sides	
Suitable for Use On Unprotected Aluminum	No	No	
In direct contact with austenitic stainless steel at or above 140°F	No	No	
Recommended Temperature Range	To 1200°F max	To 1200°F max	
K Factor Btu·in/(hr·sq ft·°F/in.)	0.77 at 200°F mean 0.79 at 400°F mean 0.81 at 600°F mean	0.81 at 200°F mean 0.82 at 400°F mean 0.87 at 600°F mean	
Moisture Resistance or Water Vapor Permeability	Fair	Fair. Must be painted for outdoor use	
Density	35 lb per cu ft	45 lb per cu ft	
Compressive Strength Specimen 6 in. × 6 in. × 2 in. Load Rate 0.10 per min	Compressive, ultimate 14 000 psi Torsion parallel to fiber 430 psi Shear normal to fiber 700 psi Shear parallel to fiber 350 psi	1 000 psi at 5 percent compression Modulus of rupture 600 psi	
Resistance to Handling Breakage	Very good	Very good	
Dimensions	Sheet size, ft: 2, 3, or 4 × 8 and 4 × 10 Thickness, in.: ½, ¾, 1, 1¼, 1½, 2, and 4	Sheet size, ft: 4 × 8 standard Thickness, in.: ½, ¾, 1, 1¼, 1½, and 2	
Flame-Spread Rating	Flame-spread rating of 0	Flame-spread rating of 0	
Specifications, Qualifications, Limitations	May be used unpainted for interior use. When painted, use water base or epoxy coating. Aluminum must be protected per SN1A. Austenitic stainless steel at or above 140°F must be protected per SN1A.	Self-supporting service holding strength at 1200°F in perpendicular to plane of board. May be used unpainted for interior use. When painted on the exposed side for hot service, use breathing-type water base paint only. Aluminum must be protected per SN1A. Austenitic stainless steel at or above 140°F must be protected per SN1A.	
Approved Materials and Vendors	Manville 36 (Type 34) Johns-Manville Sales Corp	Manville 12 Johns-Manville Sales Corp	

L. Burkhart-28

JUN 23 1981

JOSEPH L. HECHT

R-190

DUP 0990312

DU 046113

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PREFORMED BLOCK AND PIPE INSULATION

SH 100

Page

Code	120	130
Material	Polystyrene foam	Asbestos board
Material Description	Preformed polystyrene foam block, pipe, and fitting insulation cut from extruded polystyrene foam (pipe insulation available with a variety of different joint designs), or pipe and fitting insulation molded to final shape from expanded polystyrene beads with tongue-and-groove side longitudinal joints and ship lap butt joints.	Asbestos fibers, diatomaceous silica, and inorganic binder. Flame-spread rating 0. Weather-resistant.
Recommended Temperature Range	− 100 F to + 140 F	1200 max
K Factor, Max Btu/(hr) (sq ft) (°F/in.)	0.24 at 50 F 0.26 at 75 F 0.28 at 100 F	0.77 at 200 F 0.79 at 400 F 0.81 at 600 F
Density	1.5 lb per cu ft minimum	36 lb per cu ft
Compressive Strength Specimen size 6" x 6" x 2"; load rate 0.10" per min	Min 25 lb per sq in. at 5% deformation	Compressive, ultimate − 14,000 psi Tensile parallel to face − 420 psi Shear normal to face − 700 p Shear parallel − 320 p
Dimensions	SN2D. All dimensions to be ± 1/16" including straightness and squareness	Thickness, in. − 1/2, 3/4, 7, 1, 1 1/4, 1 1/2, 2 and 4 Sheet size, ft − 3, 3 1/2 or 4 x 8 and 4 x 10
Qualifications and Limitations	Uniform cell structure with max 10% open cells. No distortion or volume change, or loss of compressive strength after exposure at 140 F and 80% relative humidity for 15 days. Water absorption max 0.02% by volume after being subjected to 90 F, 90% relative humidity for 15 days and max 4% by volume into a 2" x 2" x 1" skin-free piece immersed in water just under the surface for 5 days, then wiped with a wet cloth and weighed, with no delay between steps. See SN2D for flame-spread rating limitations. Not resistant to solvents other than alcohol.	Sanded both sides, may be used unpainted for interior use. When painted, use water base or epoxy coating.

The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their products meet the above specifications. These manufacturers' materials also are acceptable under other vendor's labels upon certification as to their identity.

♦ Available in the form of fitting covers (see Code 114.1) from fabricators	*Styrofoam FR* ♦ Dow Chemical Co	*Hartmite 36 (Type A)* Johns-Manville Sales Corp
	Vapo-Lock Insuldyne Corp	
	Expanded Polystyrene Insulation Min Density 1.5 lb/ft³ Dyplast of Florida Inc	

R-191

J-B-38A

DUP 0990313

048338

DU 046114

PREFORMED BLOCK AND PIPE

Code	120	130
Material	Polystyrene foam	Asbestos board
Material Description	Preformed polystyrene foam block, pipe, and fitting insulation cut from extruded polystyrene foam (pipe insulation available with a variety of different joint designs), or pipe and fitting insulation molded to final shape from expanded polystyrene beads with tongue-and-groove side longitudinal joints and ship lap butt joints.	Asbestos fibers, diatom silica, and inorganic bi... Flame-spread rating 0. Weather-resistant.
Recommended Temperature Range	- 100 F to + 140 F	1200 max
K Factor, Max Btu/(hr) (sq ft) (°F/in.)	0.24 at 50 F 0.26 at 75 F 0.28 at 100 F	0.77 at 200 F 0.79 at 400 F 0.81 at 600 F
Density	1.5 lb per cu ft minimum	36 lb per cu ft
Compressive Strength Specimen size 6" x 6" x 2"; load rate 0.10" per min	Min 25 lb per sq in. at 5% deformation	Compressive, ultimate - 14,000 psi Tensile parallel to face - 420 psi Shear normal to face - 70... Shear parallel - 32...
Dimensions	SN3D. All dimensions to be ± 1/16" including straightness and squareness	Thickness, in. - 1/2, 3/... 1, 1 1/4, 1 1/2, 2 and 4 Sheet size, ft - 3, 3 1/2 ... 4 x 8 and 4 x 10
Qualifications and Limitations	Uniform cell structure with max 10% open cells. No distortion or volume change, or loss of compressive strength after exposure at 140 F and 80% relative humidity for 15 days. Water absorption max 0.02% by volume after being subjected to 90 F, 90% relative humidity for 15 days and max 4% by volume into a 2" x 2" x 1" skin-free piece immersed in water just under the surface for 5 days, then wiped with a wet cloth and weighed, with no delay between steps. Not resistant to solvents other than alcohol.	Sanded both sides, may be used unpainted for interior use. When painted, use we... base or epoxy coating.

The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that the products meet the above specifications. These manufacturers' materials also are acceptable under other vendor's labels upon certification as to their identity.

♦ Available in the form of fitting covers (see Code 174.1) from fabricators	*Styrofoam FR* ♦ Dow Chemical Co	*Marinite 36 (Type A)* Johns-Manville Sales Corp
	Vapo-Lock Insuldyne Corp	

REV. JUL 1975

DUP 0990314

R-192

J-B-38B

048339

DU 046115

Code	120	138
Material	Polystyrene foam	Asbestos board
Material Description	Preformed polystyrene foam block, pipe, and fitting insulation are from extruded polystyrene foam (pipe insulation available with a variety of different joint designs), or pipe and fitting insulation molded to final shape from expanded polystyrene beads with tongue-and-groove side longitudinal joints and shiplap butt joints.	Asbestos fibers, diatomaceous silica, and inorganic binder. Flame-spread rating 0. Weather-resistant.
Recommended Temperature Range	- 100 F to + 140 F	1200 max
K Factor, Max Btu/(hr) (sq ft) (°F/in.)	0.24 at 50 F 0.26 at 75 F 0.28 at 100 F	0.77 at 200 F 0.79 at 400 F 0.81 at 600 F
Density	1.5 lb per cu ft minimum	36 lb per cu ft
Compressive Strength Specimen size 6" x 6" x 2"; load rate 0.10" per min	Min 25 lb per sq in. at 5% deformation	Compressive, ultimate - 14,000 psi Tensile parallel to face - 420 psi Shear normal to face - 700 psi Shear parallel - 320 psi
Dimensions	SM2D. All dimensions to be ± 1/10" including straightness and squareness	Thickness, in. - 1/2, 3/4, 1, 1 1/4, 1 1/2, 2 and 4 Sheet size, ft - 3, 3 1/2 or 4 x 8 and 4 x 10
Qualifications and Limitations	Uniform cell structure with max 10% open cells. No distortion or volume change, or loss of compressive strength after exposure at 140 F and 80% relative humidity for 15 days. Water absorption max 0.02% by volume after being subjected to 90 F, 90% relative humidity for 15 days and max 4% by volume into a 2" x 2" x 1" thickness piece immersed in water just under the surface for 5 days, then wiped with a wet cloth and weighed, with no delay between steps. Not resistant to solvents other than alcohol.	Sanded both sides, may be used unpainted for interior use. When painted, use water base or epoxy coating.

The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their products meet the above specifications. These manufacturers' materials also are acceptable under other vendor's labels upon certification as to their identity.

◊ Available in the form of fitting covers (see Code 174.1) from fabricators	Styrofoam FR ◊ Dow Chemical Co	Marinite 38 (Type A) Johns-Manville Sales Corp
	Vapo-Lock Insulpipe Corp	

REV. JUN 1974

R-193

J-B-38C

DUP 0990315

DU 046116