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C. V. AUG 1972

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MATERIALS		THERMAL INSULATION STANDARD ENGINEERING SPECIFICATION	
MATERIAL SPECIFICATION SERIES 100 PREFORMED BLOCK AND PIPE		ISSUED	SN 100 M
		OCT 1954	Page 1 of 6
		THIS PAGE REVISED FEB 1972	
Code	102.0	102.1	
Material	Calcium silicate	Calcium silicate — inhibited	
Material Description	Reacted hydrated calcium silicate reinforced with mineral fibers.	Reacted hydrated calcium silicate with inhibitor for chloride stress corrosion cracking and reinforced with mineral fibers.	
Recommended Temperature Range	1200 F max		
K Factor, Max Btu (hr) (sq ft) (°F in.)	0.38 at 200 F, 0.46 at 400 F, and 0.57 at 600 F		
Density	14 lb per cu ft max		
Compressive Strength Specimen size 6" x 6" x 2", load rate 0.1" per min	60 lb per sq in. min at 5% deformation	50 lb per sq in. min at 5% deformation	
Dimensions	See SN3D		
Qualifications and Limitations	Not recommended for use on austenitic stainless steel or on above 140 F, see SN102D. Where used on aluminum, coat the letter with Code 709, fibroed asphalt curback (300 F temp limit). All materials listed under Code 102.1 are approved where Code 102 is specified.	Recommended for use on austenitic stainless steel. Where used on aluminum, coat the letter with Code 709, fibroed asphalt curback (300 F temp limit). Stressed Type 304 stainless steel U-bend specimens at 100 C, when in contact with this insulating material in the Du Pont work test with 1500 ppm chloride as NaCl in the test water, shall show no cracking at the end of 144 hours exposure.	
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.			
For 12" IPS and larger, there is an additional charge for 2-oz canvas cover. Material should be specified "without 2-oz canvas" to avoid extra charge. Code 104 is an acceptable alternate unless noted on the Project Specifications. Expanded Perlite insulation may be used on unprotected aluminum to 300 F. Molded two-piece fitting covers are available in screwed, welded, and sweat types. Available only as fittings. Max size approved, 10" pipe size.	Thermalit Ind Insul Div. Keene Corp	Thermalit (1) Ind Insul Div. Keene Corp	
	Thermabestos Johns-Manville Sales Corp	Silicated Thermabestos (2) Johns-Manville Sales Corp	
	Keylo (3) Owens-Corning Corp		
	Super Caltemp, Type NA(4) Fiberboard Paper Products		
	Coretemp 1500? (6) Philo Cerov Mfg Co	Silipam Fittings ?? (5) Band 8 Insulation Co	
1. Thermalit is off-white with longitudinal extrusion marks on block and pipe covering. The ends and no more than one edge of block and edges and ends of pipe covering will show cutting marks. 2. Silicated Thermabestos is a darker material than white Thermabestos. Silicated Thermabestos will appear as the name on all cartons to distinguish it from Thermabestos. Both products have ribbed mold marks. 3. Keylo is white. 4. Super Caltemp, Type NA, is off-white. 5. Silipam fittings are pale green. 6. Coretemp 1500 is pale pink. 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. 35



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SUBCOMMITTEE NO. 35



DUP 0991300

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DU 047120

SN 100 M		MATERIAL SPECIFICATION - SERIES 100		OCTOBER 1954
Page 2		PREFORMED BLOCK AND PIPE		This Page Rev. Feb 1972
Code	104	111	112	
Material	Inorganic silicates	Cellular glass	Glass fiber	
Material Description	Inorganic silicates and asbestos fibers, normally used on hot surfaces operating in the temperature range shown below	Cellular glass foamed and fused into unicellular form	Glass fiber bonded insulation for pipe and fittings. Pipe sections are precast. Plain, without jacket	
Binder			Thermosetting resin	
Recommended Temperature Range	1800 F max	-200 F to +100 F +300 F for dual temper	40 F to 375 F	
K Factor, Max Btu (hr)(sq ft)(°F in.)	0.52 at 200 F 0.67 at 600 F 0.82 at 1000 F	0.35 at 50 F 0.37 at 75 F 0.39 at 100 F	0.23 at 100 F 0.27 at 250 F 0.31 at 300 F	
Density	14 lb per cu ft	9 lb per cu ft	Nominal 4 lb per cu ft	
Compressive Strength Specimen size 6 x 6 x 2", load rate 0.10" per min	65 lb per sq in. min at 5% deformation	30 lb per sq in. min at 5% deformation	Nominal bearing inserts required where pipe is supported by insulation	
Dimensions	See SN3D			
Qualifications and Limitations	Good mechanical strength. Shrinkage less than 2% at 1800 F. Also available in pipe covering on special order. Colored pink for identification. Do not use on austenitic stainless steel at or above 140 F or unprotected aluminum.		Not recommended for pre-insulation because it is easily damaged in handling. Has poor resistance to abuse. Specify whether for pipe or tubing on order. Available with factory-applied finishes. When specified, consult vendors' catalogs and include on order. Available as molded fittings as noted below. For field fabrication of fittings, it is recommended that glass fiber insulation with nominal 7 1/4 lb per cu ft density be used. Molded fittings will be lower cost in most cases and are preferred. Do not use on austenitic stainless steel at or above 140 F or unprotected aluminum.	
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.				
a Molded fitting covers only	Kaylo 30 Owens-Corning Corp	Foamglas Pittsburgh Corning Corp	Snap-on Pipe Covering Certa-insulated St. Gobain Insulation Corp	
			Micro-Lok Johns-Manville Sales Corp	
			1-Piece Pipe Covering Owens-Corning Corp	
			PPG Pipe Insulation Pittsburgh Plate Glass Co	
			Insul-Sure Insul-Coustic Div. Birmo Prod	

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OCTOBER 1954			
MATERIAL SPECIFICATION - SERIES 100			
PREFORMED BLOCK AND PIPE			
This Page Rev. Feb 1972			
Page 2			
Code	112.6		114
Material	Glass fiberboard		Mineral Wool
Material Description	Glass fiber bonded board, plain, without covering.		Mineral slag wool with high temperature binder
Recommended Temperature Range	40 F to 375 F		1700 F max
K Factor Max Btu (hr)(sq ft)(°F in)	0.24 at 100 F 0.30 at 200 F 0.37 at 300 F		0.36 at 200 F 0.51 at 600 F 0.76 at 1000 F
Density	Nominal 3 lb per cu ft		19.2 lb per cu ft max
Compressive Strength Specimen size 6" x 6" x 2", load rate 0.10 per min	Nonload bearing		12 lb per sq in min at 10% deformation
Dimensions	Standard is 24" x 48", in thicknesses 1", 1 1/2", 2"		Standard sizes up to 24" x 24" thickness 1" to 4"
Qualifications and Limitations	Available with factory-applied finishes. When specified, consult vendor's catalogs and include on order. Nominal 41-6 lb per cu ft density material is available and is recommended for fabrication involving considerable shaping and fitting. Not recommended for use on austenitic stainless steel at or above 140 F or unprotected aluminum.		Not recommended for use on austenitic stainless steel at or above 140 F or unprotected aluminum.
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.			
	K-230-3 Certain-teed St. Gobain Insulation Corp		Pl Superemp Esqio-Picher
	Yo. 814 Spin-Glas Johns-Manville Sales Corp		Nono-Block Ind Insul Div. Keene Corp
	Type 703 Owens-Corning Corp		
	Type 5 Rigid Board Pittsburgh Plate Glass Co		

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SN 100 M		MATERIAL SPECIFICATION - SERIES 100		OCTOBER 1954	
Page 4		PREFORMED BLOCK AND PIPE		This Page Rev. Feb. 1972	
Code	118				
Material	Polyurethane foam rigid				
Material Description	Preformed rigid urethane foam block, pipe, and fitting insulation manufactured with polyester or polyether resins with fluorocarbon blowing agent.				
Recommended Temperature Range	- 100 to + 180 F				
K Factor Max Btu. (hr) (sq ft) (°F in.)	0.15 at 50 F 0.15 at 75 F 0.16 at 100 F				
Density	1.8 to 2.5 lb per cu ft				
Compressive Strength Specimen size 6" x 6" x 2", load rate 0.10" per min	Min 25 psi at 5% deformation, measured parallel to the direction in which the foam rose during manufacture or min 20 psi at 5% deformation in all directions.				
Dimensions	See SN3D. All dimensions to be ± 1/16" including straightness and squareness.				
Qualifications and Limitations	Uniform cell structure with max 10% open cells. No voids having any dimensions exceeding 1/4". After aging test: Block 1" square by 7" long, cut from near outer surface, on rests 6" apart with 70 gm weight having 1" square base in middle of span shall not distort block more than 1/16" in 1 hour at 225 F. Flame-spread rating per ASTM E 162 shall not exceed 75 when coated with Hypalon A mastic 1/32" dry thickness reinforced by 10 x 10 mesh glass cloth, 10 lb per 100 sq yd. Water absorption max 4% by volume into a 2" x 2" x 1" skin-free piece, immersed in water just under the surface for 5 days and then wiped with a wet cloth and weighed, with no delay between steps.				
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.					
	Type 24 Urethane Quens-Corning Corp				
	Zero-Gel Green National Gypsum				
	Thurane Dow Chemical Co				
	U-Phone 200 The Union Carbide Corp				

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OCTOBER 1954		
MATERIAL SPECIFICATION - SERIES 100		
This Page Rev Feb 1972		
PREFORMED BLOCK AND PIPE		
SM 100 m		
Page 5		
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 psi; Shear parallel - 320 psi.
Dimensions	SN3D. All dimensions to be $\pm 1/16"$ including straightness and squareness	Thickness, in. = 1/2, 3/4, 1, 1 1/4, 1 1/2, 2 and 4 Sheet size, in. = 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 0.03% 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" skinfree piece immersed in water just under the surface for 5 days, then dried 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.	Styrofoam FR 8 Dow Chemical Co	Manitex 36 Type 4 John-Manville Sales Corp
		Fyrecor Owens-Corning Corp

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OBSOLETE CODES

Code	Material	Date Cancelled	Superseded by Code
101	85% Magnesia	Feb 1964	102, 102.1
103	Diatomaceous earth	Feb 1964	102, 102.1
105	Asbestos milled	Dec 1956	106
106	Asbestos fiber and sodium silicate	Feb 1972	
107	Asbestos sponge	Feb 1964	
109	Corrugated asbestos prestruck	Feb 1964	
110	Vegetable cork	Jun 1966	111, 118, 120
111.1	Cellular glass	Jun 1966	111
111.2	Cellular glass	Jun 1966	111
111.3	Cellular glass	Jun 1966	111
112	Glass fiber	Apr 1956	Reinstated Sept 1969
112.01	Glass fiber	Sept 1969	112
112.02	Glass fiber	Oct 1956	112.01
112.11	Glass fiber	Sept 1969	112
112.12	Glass fiber	Mar 1959	112.11
112.16	Glass fiber	Sept 1969	112
112.17	Glass fiber	Sept 1969	112
112.21	Glass fiber	Jan 1961	
112.22	Glass fiber	Sept 1969	112
112.23	Glass fiber	Apr 1963	
112.61	Glass fiberboard	Sept 1969	112.6
112.66	Glass fiberboard	Feb 1964	
112.71	Glass fiberboard	Sept 1969	112.6
112.81	Glass fiberboard	Sept 1969	112.6
113	Glass fiber - neoprene coated	Apr 1956	
115	Mineral wool - asphalt impregnated	Apr 1956	
116	Flexible foamed plastic	Jun 1962	
117	Urethane foam resilient	Jun 1963	
117.1	Urethane foam resilient	Dec 1960	
117.2	Urethane foam resilient	Feb 1960	
117.3	Urethane foam resilient	June 1963	
117.4	Urethane foam resilient	Feb 1960	
117.5	Urethane foam resilient	Apr 1960	
117.6	Urethane foam resilient	July 1963	

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DUP 0991305

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MATERIALS		THERMAL INSULATION STANDARD ENGINEERING SPECIFICATION	
MATERIAL SPECIFICATION SERIES 100 PREFORMED BLOCK AND PIPE		ISSUED	SN 100 M Page 1 of 6
		OCT 1954	
		THIS PAGE REVISED AUG 1972	
Code	102	102.1	
Material	Calcium silicate	Calcium silicate - inhibited	
Material Description	Reconstituted hydrous calcium silicate reinforced with mineral fibers.	Reconstituted hydrous calcium silicate with inhibitor for chloride stress corrosion cracking and reinforced with mineral fibers.	
Recommended Temperature Range	1200 F max		
K Factor, Max Btu (hr) (sq ft) (°F/in.)	0.38 at 200 F, 0.46 at 400 F, and 0.57 at 600 F		
Density	14 lb per cu ft max		
Compressive Strength Specimen size 6" x 6" x 2"; load rate 0.10" per min	60 lb per sq in. min at 5% deformation	50 lb per sq in. min at 5% deformation	
Dimensions	See SN3D		
Qualifications and Limitations	Not recommended for use on austenitic stainless steel at or above 140 F, see SN102D. Where used on aluminum, coat the latter with Code 709, fibroed asphalt curbace (300 F temp limit). All materials listed under Code 102.1 are approved where Code 102 is specified.	Recommended for use on austenitic stainless steel. For an alternate to purchased inhibited calcium silicate, see SN102.1D (S). Where used on aluminum, coat the latter with Code 709, fibroed asphalt curbace (300 F temp limit). Stressed Type 304 stainless steel U-bend specimens at 100 C, when in contact with this insulating material in the Du Pont web test with 1500 ppm chloride as NaCl in the test water, shall show no cracking at the end of 144 hours exposure.	
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.			
For 12 IPS and larger, there is an additional charge for 2-oz canvas cover. Material should be specified "without 2-oz canvas" to avoid extra charge. Code 104 is an acceptable alternate unless noted on the Project Specifications. Expanded Perlite insulation may be used on uncoated aluminum to 300 F. Molded two-piece fitting covers are available in screwed, welded, and sweat types. These materials are asbestos free.	Thermafil Ind Insul Div. Keene Corp	Thermafil (1) Ind Insul Div. Keene Corp	
	Thermobestos Johns-Manville Sales Corp	Silicated Thermobestos (2) Johns-Manville Sales Corp	
	Kaylo Owens-Corning Corp (3)		
	Super Caltemp, Type NA (4) Fiberboard Paper Products		
	Caretemp 1500 (5) Philip Carey Mfg Co		
1. Thermafil is off-white with longitudinal extrusion marks on block and pipe covering. The ends and no more than one edge of block and edges and ends of pipe covering will show cutting marks. 2. Silicated Thermobestos is a darker material than white Thermobestos. Silicated Thermobestos will appear as the name on all cartons to distinguish it from Thermobestos. Both products have ribbed mold marks. 3. Kaylo is white. 4. Super Caltemp, Type NA, is off-white. 5. Caretemp 1500 is pale pink.			
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.			

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DU 047126

SN 100 M

MATERIAL SPECIFICATION - SERIES 100

OCTOBER 1954

Page 2

PREFORMED BLOCK AND PIPE

This Page Rev. Feb. 1955

Code	104	111	112
Material	Inorganic silicates	Cellular glass	Glass fiber
Material Description	Inorganic silicates and asbestos fibers, normally used on hot surfaces operating in the temperature range shown below	Cellular glass foamed and fused into unicellular form	Glass fiber bonded insulation for pipe and fittings. Pipe sections and pipe hangers. Plain, without sheet
Binder			Thermosetting resin
Recommended Temperature Range	1800 F max	-200 F to +100 F to +300 F for dual temp	60 F to 375 F
K Factor Max Btu (hr)(sq ft)(°F in)	0.52 at 200 F 0.47 at 400 F 0.42 at 600 F	0.35 at 50 F 0.37 at 75 F 0.39 at 100 F	0.23 at 100 F 0.27 at 200 F 0.33 at 300 F
Density	14 lb per cu ft	9 lb per cu ft	Nominal 4 lb per cu ft
Compressive Strength Specimen size 6 x 6 x 2", load rate 0.10" per min	65 lb per sq in. min at 5% deformation	30 lb per sq in. min at 5% deformation	Nonload bearing inserts required where pipe is supported by insulation
Dimensions	See SN3D		
Qualifications and Limitations	Good mechanical strength. Shrinkage less than 2% at 1600 F. Also available in pipe covering on special order. Colored pink for identification. Do not use on austenitic stainless steel or on above 140 F or unprotected aluminum.		Not recommended for pre-insulation because it is easily damaged in handling. Has poor resistance to abuse. Specify whether for pipe or tubing on order. Available with factory-applied finishes. When specified, consult vendors' catalogs and include on order. Available as molded fittings as noted below. For field fabrication of fittings, it is recommended that glass fiber insulation with nominal 7 1/2 lb per cu ft density be used. Molded fittings will be lower cost in most cases and are preferred. Do not use on austenitic stainless steel or above 140 F or unprotected aluminum.
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 vendors' labels upon certification as to their identity.			
6 Molded fitting covers only	Kevlar 30 Owens-Corning Corp	Foamglas Pittsburgh Corning Corp	Snap-on Pipe Covering Carmelwood St. Gabein Insulation Corp
			Micro-Lok Johns-Manville Sales Corp
			1-Piece Pipe Covering Owens-Corning Corp
			PPG Pipe Insulation Pittsburgh Plate Glass Co
			6 Insul-Sure Insul-Coastal Div. Bruma Prod

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OCTOBER 1954 MATERIAL SPECIFICATION - SERIES 100 This Page Rev Aug 1972				SM 100 M
Page 2				
Code	112.6	114	114.1	
Material	Glass fiberboard	Mineral wool	Mineral wool pipe fitting covers - sodium silicate coated	
Material Description	Glass fiber bonded board, plain, without covering.	Mineral slag wool with high-temperature binder.	Mineral wool fibers with high-temperature binders. Material laminated in two thick layers to form block thicknesses thru 4" x 2" x 2" fitting covers formed from laminated block and a p coated with Code 802.1 sodium silicate. Covers usable on austenitic stainless steel.	
Recommended Temperature Range	40 F to 375 F	1700 F max	900 F max - limited by sodium silicate coating.	
K Factor, Max Btu/(hr) (sq ft) (°F/in.)	0.24 at 100 F 0.30 at 200 F 0.37 at 300 F	0.36 at 200 F 0.51 at 600 F 0.76 at 1000 F	0.42 at 400 F 0.51 at 600 F 0.61 at 800 F	
Density	Nominal 3 lb per cu ft	19.2 lb per cu ft max	16 to 19 lb per cu ft	
Compressive Strength Specimen size 6" x 6" x 2"; load rate 0.10" per min	Nonload bearing	12 lb per sq in. min at 10% deformation	17 lb per sq in. at 10% deformation	
Dimensions	Standards is 24 x 48 in thicknesses 1", 1 1/2", 2"	Standard sizes up to 24 x 36 thickness 1" to 4"	Fitting covers available 1/2 in. thru 6 in. x 1 in. and 1/2 in. thru 4 in. x 1 1/2 in. Covers have 1-in. tangent legs.	
Qualifications and Limitations	Available with factory-applied finishes. When specified, consult vendor's catalogs and include on order. Nominal 4 1/8 lb per cu ft density material is available and is recommended for fabrication involving considerable shaping and fitting. Not recommended for use on austenitic stainless steel at or above 140 F or unprotected aluminum.	Not recommended for use on austenitic stainless steel at or above 140 F or unprotected aluminum.	Suitable for use with Codes 102, 102.1, or 104 pipe covering at temperatures of 140 to 900 F. When used on aluminum, coat the latter with Code 709, fibrous asphalt cutback (300 F temperature limit). Stressed Type 304 stainless steel U-bend specimens at 100 C, when in contact with the coated surface of this insulating material in the D. Pent wick test with 1500 ppm chloride as NaCl in the test water, shall show no sign of cracking after 144 hours exposure. Fitting covers to be made only from U. S. Gypsum Co. K-Fac 19, mineral wool blocks.	
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.				
Contract Purchasing for vendor's names	K-230-3 Certain-teed St. Gobain Insulation Corp	PI Superemp Eagle-Picher	Filins. K-Fac 19 U. S. Gypsum Co	870
	No. 816 Spin-Glas Johns-Manville Sales Corp	Monoblock Insul Div. Keene Corp		
	Type 703 Owens-Corning Corp			
	Type 5 Rigid Board Pittsburgh Plate Glass Co			

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DU 047128

SN 100 M		MATERIAL SPECIFICATION - SERIES 100		OCTOBER 1954	
Page 4		PREFORMED BLOCK AND PIPE		This Page Rev Feb 1972	
Code	118				
Material	Polyurethane foam rigid				
Material Description	Preformed rigid urethane foam block, pipe, and fitting insulation manufactured with polyester or polyether resins with fluorocarbon blowing agent				
Recommended Temperature Range	- 100 to + 180 F				
K Factor, Max Btu/(hr) (sq ft) (°F/in.)	0.15 at 50 F 0.15 at 75 F 0.16 at 100 F				
Density Compressive Strength Specimen size 6" x 6" x 2", load rate 0.10" per min	1.8 to 2.5 lb per cu ft Min 25 psi at 5% deformation, measured parallel to the direction in which the foam rose during manufacture or min 20 psi at 5% deformation in all directions.				
Dimensions	See SN3D. All dimensions to be ± 1/16" including straightness and squareness.				
Qualifications and Limitations	Uniform cell structure with max 10% open cells. No voids having any dimensions exceeding 1/8". Moist aging test: Block 1" square by 7" long, cut from near outer surface, on rests 6" apart with 70 gm weight having 1" square base in middle of open shell not distort block more than 1/16" in 1 hour at 225 F. Flame-spread rating per ASTM E 162 shall not exceed 75 when coated with Hypalon 6 marine 1/32" dry thickness reinforced by 10 x 10 mesh glass cloth, 10 lb per 100 sq yd. Water absorption max 4% by volume into a 2" x 2" x 1" skin-free piece, immersed in water just under the surface for 5 days and then wiped with a wet cloth and weighed, with no delay between steps.				
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.					
	Type 13 Urethane Owens-Corning Corp				
	Zen-O-Gel Green National Gypsum				
	Thurane Dow Chemical Co				
	U-Thane 300 The Upjohn Co				

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OCTOBER 1954		
MATERIAL SPECIFICATION - SERIES 100		
This Page Rev Aug 1972		
SM 100 M		
Page 5		
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 psi Shear parallel - 320 psi
Dimensions	SNJD. All 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
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 0.03% by volume after being subjected to 90 F, 90% relative humidity for 13 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 fitting covers (see Code 114.1) from fabricators	Styrofoam FR 6 Dow Chemical Co	Marinite 36 (Type A) Johns-Manville Sales Corp
		Firecor Quon-Corning Corp

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OBSOLETE CODES

Code	Material	Date Cancelled	Superseded by Code
101	85% Magnesia	Feb 1964	102, 102.1
103	Diatomaceous earth	Feb 1964	102, 102.1
105	Asbestos molded	Dec 1956	106
106	Asbestos fiber and sodium silicate	Feb 1972	
107	Asbestos sponge	Feb 1964	
109	Corrugated asbestos preshrunk	Feb 1964	
110	Vegetable cork	Jun 1966	111, 118, 120
111.1	Cellular glass	Jun 1966	111
111.2	Cellular glass	Jun 1966	111
111.2	Cellular glass	Jun 1966	111
112	Glass fiber	Apr 1956	Reinstated Sept 1969
112.01	Glass fiber	Sept 1969	112
112.02	Glass fiber	Oct 1956	112.01
112.11	Glass fiber	Sept 1969	112
112.12	Glass fiber	Mar 1959	112.11
112.16	Glass fiber	Sept 1969	112
112.17	Glass fiber	Sept 1969	112
112.21	Glass fiber	Jan 1961	
112.22	Glass fiber	Sept 1969	112
112.23	Glass fiber	Apr 1963	
112.61	Glass fiberboard	Sept 1969	112.6
112.66	Glass fiberboard	Feb 1964	
112.71	Glass fiberboard	Sept 1969	112.6
112.81	Glass fiberboard	Sept 1969	112.6
113	Glass fiber - neoprene coated	Apr 1956	
115	Mineral wool - asphalt impregnated	Apr 1956	
116	Flexible foamed plastic	Jun 1962	
117	Urethane foam resilient	Jun 1963	
117.1	Urethane foam resilient	Dec 1960	
117.2	Urethane foam resilient	Feb 1960	
117.3	Urethane foam resilient	June 1963	
117.4	Urethane foam resilient	Feb 1960	
117.5	Urethane foam resilient	Apr 1960	
117.6	Urethane foam resilient	July 1963	

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MATERIALS		THERMAL INSULATION STANDARD ENGINEERING SPECIFICATION	
MATERIAL SPECIFICATION SERIES 100 PREFORMED BLOCK AND PIPE		ISSUED	SN 100 M
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		THIS PAGE REVISED OCT 1972	
Code	102	102.1	
Material	Calcium silicate	Calcium silicate - inhibited	
Material Description	Reactive hydrous calcium silicate reinforced with mineral fibers.	Reactive hydrous calcium silicate with inhibitor for chloride stress corrosion cracking and reinforced with mineral fibers.	
Recommended Temperature Range	1200 F max		
K Factor, Max Btu (hr) (sq ft) (°F/in.)	0.38 at 200 F, 0.46 at 400 F, and 0.57 at 600 F		
Density	14 lb per cu ft max		
Compressive Strength Specimen size 6" x 6" x 2"; load rate 0.10" per min	60 lb per sq in. min at 5% deformation	50 lb per sq in. min at 5% deformation	
Dimensions	See SN3D		
Qualifications and Limitations	Not recommended for use on austenitic stainless steel at or above 140 F, see SN102D. Where used on aluminum, coat the latter with Code 709, fibroed asphalt curbuck (300 F temp limit). All materials listed under Code 102.1 are approved where Code 102 is specified.	Recommended for use on austenitic stainless steel. For an alternate to purchased inhibited calcium silicate, see SN102.1D (5). Where used on aluminum, coat the latter with Code 709, fibroed asphalt curbuck (300 F temp limit). Stressed Type 304 stainless steel U-bend specimens at 100 C, when in contact with this insulating material in the Du Pont wick test with 1500 ppm chloride as NaCl in the test water, shall show no cracking at the end of 144 hours exposure.	
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.			
For 12" IPS and larger, there is an additional charge for 2-oz canvas cover. Material should be specified "without 2-oz canvas" to avoid extra charge. * Expanded Perlite insulation may be used on unprotected aluminum to 300 F. Molded two-piece fitting covers are available in screwed, welded, and sweat types. * These materials are asbestos free	Thermal Ind Insul Div, Keene Corp	Thermal (1) Ind Insul Div, Keene Corp	DUP 0991312
	Thermobestos Johns-Manville Sales Corp	Silicated Thermobestos (2) Johns-Manville Sales Corp	
	Keyle Owens-Corning Corp		
	Super Caltemp, Type NA (4) & Fiberboard Corp		
	Careytemp 1500 (5) & Philip Carey Mfg Co		
1. Thermal is off-white with longitudinal extrusion marks on block and pipe covering. The ends and no more than one edge of block and ends of pipe covering will show cutting marks. 2. Silicated Thermobestos is a darker material than white Thermobestos. Silicated Thermobestos will appear as the name on all cartons to distinguish it from Thermobestos. Both products have ribbed mold marks. 3. Keyle is white. 4. Super Caltemp, Type NA, is off-white. 5. Careytemp 1500 is pale pink.			

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Vendors and merchandise designations are given to describe materials and are

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Code		111	112
Material		Cellular glass	Glass fiber
Material Description		Cellular glass foamed and fused into unicellular form	Glass fiber bonded insulation for pipe and fittings. Pipe sections and pipe hinged. Plain, without jacket.
Binder			Thermosetting resin
Recommended Temperature Range		-200 F to +100 F -300 F for dual foam	40 F to 375 F
K Factor Max Btu (hr)(sq ft)(°F/in.)		0.23 at 50 F 0.37 at 75 F 0.39 at 100 F	0.23 at 100 F 0.27 at 200 F 0.33 at 300 F
Density		9 lb per cu ft	Nominal 4 lb per cu ft
Compressive Strength Specimen size 6" x 6" x 2", load rate 0.10" per min		30 lb per sq in. min at 5% deformation	Nonload bearing. Inserts required where pipe is supported by insulation.
Dimensions		See SN3D	
Qualifications and Limitations			Not recommended for pre-insulation because it is easily damaged in handling. Has poor resistance to abuse. Specify whether for pipe or tubing on order. Available with factory-applied finishes and lag adhesives. When specified, consult vendors' catalogs and include an order. Available as molded fittings as noted below. For field fabrication of fittings, it is recommended that glass fiber insulation with nominal 2 1/4 lb per cu ft density be used. Molded fittings will be lower cost in most cases and are preferred. Do not use on austenitic stainless steel or on above 140 F or unprotected aluminum.
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.			
† Molded fitting covers only		Foamglas Pittsburgh Corning Corp	Snap-on Pipe Covering Carmichael St. Gobain Insulation Corp
			Micro-Lex Johns-Manville Sales Corp
			1-Piece Pipe Covering Owens-Corning Corp
			PPG Pipe Insulation Pittsburgh Plate Glass Co
			† Insul-Sure Insul-Coustic Div., Birmo Prod

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Code	112.6	114	114.1
Material	Glass fiberboard	Mineral wool	Mineral wool pipe fitting covers - sodium silicate coated
Material Description	Glass fiber bonded board, plain, without covering.	Mineral slag wool, with high-temperature binder.	Mineral wool fibers with high-temperature binders. Material laminated in thin, thick layers to form block thicknesses thru 4" 2-in. Fitting covers formed from laminated block and d.p. coated with Code 802.1 sodium silicate. Covers usable on austenitic stainless steel.
Recommended Temperature Range	40 F to 373 F	1700 F max	900 F max - limited by sodium silicate coating.
K Factor, Max Btu/(hr) (sq ft) (°F/in.)	0.24 at 100 F 0.30 at 200 F 0.37 at 300 F	0.36 at 200 F 0.51 at 600 F 0.76 at 1000 F	0.42 at 400 F 0.51 at 600 F 0.61 at 800 F
Density	Nominal 3 lb per cu ft	19.2 lb per cu ft max	16 to 19 lb per cu ft
Compressive Strength Specimen size 6" x 6" x 2"; load rate 0.10" per min	Nonload bearing	12 lb per sq in. min at 10% deformation	17 lb per sq in. at 10% deformation
Dimensions	Standard is 24" x 48", in thicknesses 1", 1 1/2", 2"	Standard sizes up to 24" x 36" thickness 1" to 4"	Fitting covers available: 2 in. thru 6 in. x 1 in. and 1 1/2 in. thru 4 in. x 1 1/2 in. Covers have 1-in. tangential legs.
Qualifications and Limitations	Available with factory-applied finishes. When specified, consult vendor's catalogs and include on order. Nominal 4 1/2 lb per cu ft density material is available and is recommended for fabrication involving considerable shaping and fitting. Not recommended for use on austenitic stainless steel at or above 140 F or unprotected aluminum.	Not recommended for use on austenitic stainless steel at or above 140 F or unprotected aluminum.	Suitable for use with Codes 102, 102.1, or 104 pipe covering at temperatures of 140 to 900 F. Where used on aluminum, coat the latter with Code 709, fibreglass asphalt curbcoat (200 F temperature limit). Stressed Type 304 stainless steel U-bend specimens at 100 C, when in contact with the coated surface of this insulating material in the Du Pont test test with 1500 ppm chloride as NaCl in the test water, shall show no sign of cracking after 144 hours exposure. Fitting covers to be made only from U. S. Gypsum Co. K-Fac 19, mineral wool block.

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.

Contract Purchasing for vendor's names	K-230-J Carnegie-St. Gobain Insulation Corp	PI' Supertemp Eagle-Picher	Fit.Ins. K-Fac 19 U. S. Gypsum Co
	No. 814 Spin-Glas Johns-Manville Sales Corp	Nonp-Block Ind Insul Div. Keene Corp	876
	Type 703 Owens-Corning Corp		
	Type 5 Rigid Board Pittsburgh Plate Glass Co		



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Code		118			
Material		Polyurethane foam rigid			
Material Description		Preformed rigid urethane foam block, pipe, and fitting insulation manufactured with polyester or polyether resins with fluorocarbon blowing agent			
Recommended Temperature Range		-100 to +180 F			
K Factor Max Btu (hr sq ft) (°F in.)		0.15 or 50 F 0.15 or 75 F 0.16 or 100 F			
Density		1.8 to 2.5 lb per cu ft			
Compressive Strength Specimen size 6" x 6" x 2", load rate 0.10" per min		Min 25 psi at 5% deformation, measured parallel to the direction in which the foam rose during manufacture or min 20 psi at 5% deformation in all directions.			
Dimensions		See SN3D All dimensions to be ± 1/16" including straightness and squareness.			
Qualifications and Limitations		Uniform cell structure with max 10% open cells. No voids having any dimensions exceeding 1/4". Moist aging test: Block 1" square by 7" long, cut from near outer surface, on rests 6" apart with 70 gm weight having 1" square base in middle of open shell nor distort block more than 1/16" in 1 hour at 225 F. Flame-spread rating per ASTM E 162 shall not exceed 75 when coated with Hypalon # mastics 1/32" dry thickness reinforced by 10 x 10 mesh glass cloth, 10 lb per 100 sq yd. Water absorption max 4% by volume into a 2" x 2" x 1" skin-free piece, immersed in water just under the surface for 5 days and then wiped with a wet cloth and weighed, with no delay between steps.			
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.					
		Type 34 Urethane Owens-Corning Corp			
		Zen-O-Cel Green National Gypsum			
		Thurane Dow Chemical Co			
		U-Thane 200 The Urethane Co			

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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 or 50 F 0.26 or 75 F 0.28 or 100 F	0.77 or 100 F 0.79 or 400 F 0.81 or 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 - 120 psi.
Dimensions	SM3D. All 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 Shear 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 3 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 114.1) from fabricators	Styrofoam FR 6 Dow Chemical Co	Marinite 36 (Type A) Johns-Manville Sales Corp

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OBSOLETE CODES

Code	Material	Date Cancelled	Superseded by Code
101	85% Magnesite	Feb 1964	102, 102.1
103	Diatomaceous earth	Feb 1964	102, 102.1
104	Inorganic silicates	Oct 1972	
105	Asbestos molded	Dec 1956	106
106	Asbestos fiber and sodium silicate	Feb 1972	
107	Asbestos sponge	Feb 1964	
109	Corrugated asbestos preshrunk	Feb 1964	
110	Vegetable cork	Jun 1966	111, 118, 120
111.1	Cellular glass	Jun 1966	111
111.2	Cellular glass	Jun 1966	111
111.3	Cellular glass	Jun 1966	111
112	Glass fiber	Apr 1956	Reinstated Sept 1969
112.01	Glass fiber	Sept 1969	112
112.02	Glass fiber	Oct 1956	112.01
112.11	Glass fiber	Sept 1969	112
112.12	Glass fiber	Mar 1959	112.11
112.16	Glass fiber	Sept 1969	112
112.17	Glass fiber	Sept 1969	112
112.21	Glass fiber	Jan 1961	
112.22	Glass fiber	Sept 1969	112
112.23	Glass fiber	Apr 1963	
112.61	Glass fiberboard	Sept 1969	112.6
112.66	Glass fiberboard	Feb 1964	
112.71	Glass fiberboard	Sept 1969	112.6
112.81	Glass fiberboard	Sept 1969	112.6
113	Glass fiber - neoprene coated	Apr 1956	
115	Mineral wool - asphalt impregnated	Apr 1956	
116	Flexible foamed plastic	Jun 1962	
117	Urethane foam resilient	Jun 1963	
117.1	Urethane foam resilient	Dec 1960	
117.2	Urethane foam resilient	Feb 1960	
117.3	Urethane foam resilient	June 1963	
117.4	Urethane foam resilient	Feb 1960	
117.5	Urethane foam resilient	Apr 1960	
117.6	Urethane foam resilient	July 1963	

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