PLAINTIFF'S EXHIBIT
DUP-104I

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MATERIALS MATERIAL SPECIFICATION - SERIES 100 PREFORMED BLOCK AND PIPE		THERMAL INSULATION STANDARD ENGINEERING SPECIFICATION ISSUED OCT 1954 REVISED FEB 1964	SN 100 M Page 1 of 13
Code		102* †	
Material		Calcium silicate	
Material Description		Staple, cellular, calcined fire clay base	
Filler			
Binder			
Temperature Range		100°F to 1200°F	
K Factor		500°F – 0.54 max	
Density		11 lb per cu ft	
Compressive Strength		65 lb per sq in. min at 5% deformation	
Manufacturing Process		Machine extruded. Pipe mach cut on diameter	
Resistance to Breakage in Handling	Block must average 3" or greater in drop test per ASTM C 487, tentative method of test for resistance to dropping of preformed block thermal insulation.		
Dimensions		ASTM **	
Other Qualifications		Good mechanical strength with low shrinkage	

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

*Bands are supplied at extra cost. Order must state "without bands" if not required. For 11" 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. **New Simplified Dimensional System sponsored by ASTM ***Fiber Board Paper Products Corp † Codes 104 and 106 are acceptable alternates unless noted on the Project Specifications. †Fittings available in screwed, welded, and sweat types.		*Calsilite* The Ruberoid Co	
		Kayle Owens-Corning Corp	
		Thermobestos Johns-Manville Sales Corp	
		Kaytherm Keasbey & Mattison Co	
		Tricalite Mundet Cork Corp	
		Caltemp Pabco Ind Ins Div ***	
		Careytemp† Philip Carey Mfg Co	
		Thermasil Baldwin-Ehret-Hill, Inc	

DUP 0990065

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848898

Code	104		106
Material	Inorganic silicates		Asbestos fiber and sodium silicate
Material Description	Inorganic silicas and asbestos fibers		Compressed fluffy amosite asbestos fiber sprayed with sodium silicate to form a mat containing a minimum of 20% sodium silicate by weight. Asbestos mat is then sprinkled with diatomaceous earth to provide an integral refractory coating
Filler			
Binder			
Temperature Range	100°F to 1800°F		200°F to 1200°F
K Factor	Block – 500°F – 0.58 max		500°F – 0.54 max
Density	Block – 14 lb per cu ft		18 lb per cu ft
Compressive Strength	65 lb per sq in. min at 5% deformation		27 psi at 10%* deformation – dry
Manufacturing Process			Formed and compressed on mandrel. Pipe mech cut on die
Resistance to Breakage in Handling	Block must average 3" or greater in drop test per ASTM C 487, tentative method of test for resistance to dropping of preformed block thermal insulation.		
Dimensions			
Other Qualifications	Good mechanical strength. Shrinkage less than 2% at 1600°F		Formed on a mandrel 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.			
			Unibestos Pittsburgh Corning Corp
	Kaylo 20* Owens-Corning Corp		
* Min thickness available 1½", also available in pipe covering on special order.			
* Pipe covering only.			

DUP 0990066

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MATERIALS MATERIAL SPECIFICATION SERIES 100 PREFORMED BLOCK AND PIPE		THERMAL INSULATION STANDARD ENGINEERING SPECIFICATION ISSUED OCT 1954 REVISED OCT 1964	SN 100 M Page 1 of 13
Code		102*♦	
Material		Calcium silicate	
Material Description		Staple, cellular, calcined fire clay base	
Filler			
Binder			
Temperature Range		100°F to 1200°F	
K Factor		500°F – 0.54 max	
Density	—	11 lb per cu ft	
Compressive Strength		65 lb per sq in. min at 5% deformation	
Manufacturing Process		Machine extruded. Pipe mech cut on diameter	
Resistance to Breakage in Handling	Block must average 3" or greater in drop test per ASTM C 487, tentative method of test for resistance to dropping of preformed block thermal insulation.		
Dimensions		ASTM **	
Other Qualifications		Good mechanical strength with low shrinkage	

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

*Bands are supplied at extra cost. Order must state "without bands" if not required. For 11" 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. **New Simplified Dimensional System sponsored by ASTM ***Fiber Board Paper Products Corp ♦ Codes 104 and 106 are acceptable alternates unless noted on the Project Specifications. † Fittings available in screwed, welded, and sweat types.		*Calsilite* The Ruberoid Co	
		Kaylo Owens-Corning Corp	
		Thermobestos Johns-Manville Sales Corp	
		Tricalite Mundet Cork Corp	
		Caltemp Pabco Ind Ins Div ***	
		Careytemp† Philip Carey Mfg Co	
		Thermasil Baldwin-Ehret-Hill, Inc	DUP 0990067

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048892

Code	104		104
Material	Inorganic silicates		Asbestos fiber and sodium silicate
Material Description	Inorganic silicas and asbestos fibers		Compressed fluffy amosite asbestos fiber sprayed with sodium silicate to form a mat containing a minimum of 20% sodium silicate by weight. Asbestos mat is then sprinkled with diatomaceous earth to provide an integral refractory coating
Filler			
Binder			
Temperature Range	100°F to 1800°F		200°F to 1200°F
K Factor	Block - 500°F - 0.58 max		500°F - 0.54 max
Density	Block - 14 lb per cu ft		18 lb per cu ft
Compressive Strength	65 lb per sq in. min at 5% deformation		27 psi at 10%* deformation - dry
Manufacturing Process			Formed and come on mandrel. Pipe mech cut on die
Resistance to Breakage in Handling	Block must average 3° or greater in drop test per ASTM C 487, tentative method of test for resistance to dressing of preformed block thermal insulation.		
Dimensions			
Other Qualifications	Good mechanical strength. Shrinkage less than 2% at 1600°F		Formed on a mandrel 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.			
* Min thickness available 1½", also available in pipe covering on special order. * Pipe covering only.			*Unibestos* Pittsburgh Corning Corp
	Kaylo 20° Owens-Corning Corp		

DUP 0990068

848893

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MATERIALS

MATERIAL SPECIFICATION SERIES 100 PREFORMED BLOCK AND PIPE

THERMAL INSULATION STANDARD ENGINEERING SPECIFICATION

ISSUED OCT 1954

REVISED OCT 1964

SN 100 M

Code		102*†	
Material		Calcium silicate	
Material Description		Staple, cellular, calcined fire clay base	
Filler			
Binder			
Temperature Range		100°F to 1200°F	
K Factor		500°F – 0.54 max	
Density		11 lb per cu ft	
Compressive Strength		65 lb per sq in. min at 5% deformation	
Manufacturing Process		Machine extruded. Pipe mach cut on diameter	
Resistance to Breakage in Handling	Block must average 3" or greater in drop test per ASTM C 487, tentative method of test for resistance to dropping of preformed block thermal insulation.		
Dimensions		ASTM **	
Other Qualifications		Good mechanical strength with low shrinkage	

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

*Bands are supplied at extra cost. Order must state "without bands" if not required. For 11" 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.		*Calsilite* The Ruberoid Co	
		Kaylo Owens-Corning Corp	
		Thermobestos Johns-Manville Sales Corp	
**New Simplified Dimensional System sponsored by ASTM		*Tricalite* Mundet Cork Corp	
***Fiber Board Paper Products Corp		*Caltemp* Pabco Ind Ins Div***	
†Codes 104 and 106 are acceptable alternates unless noted on the Project Specifications.		*Careytemp*† Philip Carey Mfg Co	
†Fittings available in screwed, welded, and sweat types.		*Thermasil* Baldwin-Ehret-Hill, Inc	

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DUP 0990146

848171

MATERIAL SPECIFICATION – SERIES 100

Code	104		106
Material	Inorganic silicates		Asbestos fiber and sodium silicate
Material Description	Inorganic silicas and asbestos fibers		Compressed fluffy amosite asbestos fiber sprayed with sodium silicate to form a mat containing a minimum of 20% sodium silicate by weight. Asbestos mat is then sprinkled with diatomaceous earth to provide an integral refractory coating
Filler			
Binder			
Temperature Range	100°F to 1800°F		200°F to 1200°F
K Factor	Block – 500°F – 0.58 max		500°F – 0.54 max
Density	Block – 14 lb per cu ft		18 lb per cu ft
Compressive Strength	65 lb per sq in. min at 5% deformation		27 psi at 10%* deformation – dry
Manufacturing Process			Formed and come on mandrel. Pipe mech cut on die
Resistance to Breakage in Handling	Block must average 3" or greater in drop test per ASTM C 487, tentative method of test for resistance to dressing of preformed block thermal insulation.		
Dimensions			
Other Qualifications	Good mechanical strength. Shrinkage less than 2% at 1600°F		Formed on a mandrel 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.			
* Min thickness available 1½", else available in pipe covering on special order. * Pipe covering only.			*Unibestos* Pittsburgh Corning Corp
	*Kaylo 20** Owens-Corning Corp		

DUP 0990147

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MATERIALS MATERIAL SPECIFICATION SERIES 100 PREFORMED BLOCK AND PIPE		THERMAL INSULATION STANDARD ENGINEERING SPECIFICATION ISSUED OCT 1954 REVISED FEB 1964	SN 100 M Page 1 of 13
Code		102*	
Material		Calcium silicate	
Material Description		Staple, cellular, calcined fire clay base	
Filler			
Binder			
Temperature Range		100°F to 1200°F	
K Factor		500°F – 0.54 max	
Density		11 lb per cu ft	
Compressive Strength		65 lb per sq in. min at 5% deformation	
Manufacturing Process		Machine extruded. Pipe mach cut on diameter	
Resistance to Breakage in Handling	Block must average 3" or greater in drop test per ASTM C 487, tentative method of test for resistance to dropping of preformed block thermal insulation.		
Dimensions		ASTM **	
Other Qualifications		Good mechanical strength with low shrinkage	

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

*Bands are supplied at extra cost. Order must state "without bands" if not required. For 11" 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. **New Simplified Dimensional System sponsored by ASTM ***Fiber Board Paper Products Corp * Codes 104 and 106 are acceptable alternates unless noted on the Project Specifications. †Fittings available in screwed, welded, and sweat types.		*Calsilite* The Ruberoid Co	
		Kaylo Owens-Corning Corp	
		Thermobestos Johns-Manville Sales Corp	
		Kaytherm Keasbey & Mattison Co	
		Trialite Mundet Cork Corp	
		Caltemp Pabco Ind Ins Div ***	
		Careytemp† Philip Carey Mfg Co	
		Thermasil Baldwin-Ehret-Hill, Inc	

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

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DUP 0990148

048173

MATERIAL SPECIFICATION - SERIES 100

Code	104		106
Material	Inorganic silicates		Asbestos fiber and sodium silicate
Material Description	Inorganic silicas and asbestos fibers		Compressed fluffy amosite asbestos fiber sprayed with sodium silicate to form a mat containing a minimum of 20% sodium silicate by weight. Asbestos mat is then sprinkled with diatomaceous earth to provide an integral refractory coating
Filler			
Binder			
Temperature Range	100°F to 1800°F		200°F to 1200°F
K Factor	Block - 500°F - 0.58 max		500°F - 0.56 max
Density	Block - 14 lb per cu ft		18 lb per cu ft
Compressive Strength	65 lb per sq in. min at 5% deformation		27 psi at 10%* deformation - dry
Manufacturing Process			Formed and come on mandrel. Pipe mach cut on die
Resistance to Breakage in Handling	Block must average 3" or greater in drop test per ASTM C 487, tentative method of test for resistance to dropping of preformed block thermal insulation.		
Dimensions			
Other Qualifications	Good mechanical strength. Shrinkage less than 2% at 1600°F		Formed on a mandrel 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.			
			Unibestos Pittsburgh Corning Corp
	Kaylo 20* Owens-Corning Corp		

* Min thickness available 1½", also available in pipe covering on special order.

* Pipe covering only.

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DUP 0990149

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MATERIALS

MATERIAL SPECIFICATION SERIES 100 PREFORMED BLOCK AND PIPE

THERMAL INSULATION STANDARD ENGINEERING SPECIFICATION

ISSUED OCT 1954

REVISED OCT 1964

SN 100 M

Code		102* ♦	
Material		Calcium silicate	
Material Description		Staple, cellular, calcined fire clay base	
Filler			
Binder			
Temperature Range		100°F to 1200°F	
K Factor		500°F - 0.54 max	
Density		11 lb per cu ft	
Compressive Strength		65 lb per sq in. min at 5% deformation	
Manufacturing Process		Machine extruded. Pipe mach cut on diameter	
Resistance to Breakage in Handling	Block must average 3" or greater in drop test per ASTM C 487, tentative method of test for resistance to dropping of preformed block thermal insulation.		
Dimensions		ASTM **	
Other Qualifications		Good mechanical strength with low shrinkage	

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

*Bands are supplied at extra cost. Order must state "without bands" if not required. For 11" 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.		*Calsilite* The Ruberoid Co	
		Kaylo Owens-Corning Corp	
		Thermobestos Johns-Manville Sales Corp	
**New Simplified Dimensional System sponsored by ASTM		*Trisolite* Mundet Cork Corp	
***Fiber Board Paper Products Corp		*Caltemp* Pabco Ind Ins Div ***	
♦ Codes 104 and 106 are acceptable alternates unless noted on the Project Specifications.		*Careytemp* † Philip Carey Mfg Co	
† Fittings available in screwed, welded, and sweat types.		*Thermasil* Baldwin-Ehret-Hill, Inc	

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DUP 0990259

R-162

048284

Code	104	106	
Material	Inorganic silicates	Asbestos fiber and sodium silicate	
Material Description	Inorganic silicas and asbestos fibers	Compressed fluffy amosite asbestos fiber sprayed with sodium silicate to form a mat containing a minimum of 20% sodium silicate by weight. Asbestos mat is then sprinkled with diatomaceous earth to provide an integral refractory coating	
Temperature Range	100°F to 1800°F	1200°F max	
K Factor	Block - 500°F - 0.58 max	400°F - 0.54 max 600°F - 0.65 max	
Density	Block - 14 lb per cu ft	20 lb per cu ft max	
Compressive Strength	65 lb per sq in. min at 5% deformation	27 lb per sq in. at 10% ♦ deformation - dry	
Manufacturing Process		Formed and coma on mandrel. Pipe mech cut on die	
Resistance to Breakage in Handling	Block must average 3" or greater in drop test per ASTM C 487, tentative method of test for resistance to dropping of preformed block thermal insulation.		
Other Qualifications	Good mechanical strength. Shrinkage less than 2% at 1600°F	Formed on a mandrel to a predetermined weight. Pressed to obtain the desired density, and baked. 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 product meets the above specifications.			
* Minimum thickness available 1 1/2", also available in pipe covering on special order ♦ Pipe covering only	Kaylo 20* Owens-Corning Corp	Unibestos Pittsburgh Corning Corp	

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MATERIALS

MATERIAL SPECIFICATION SERIES 100 PREFORMED BLOCK AND PIPE

THERMAL INSULATION STANDARD ENGINEERING SPECIFICAT

ISSUED OCT 1954

REVISED FEB 1964

SN 100 M

Code		102*	
Material		Calcium silicate	
Material Description		Staple, cellular, calcined fire clay base	
Filler			
Binder			
Temperature Range		100°F to 1200°F	
K Factor		500°F – 0.54 max	
Density		11 lb per cu ft	
Compressive Strength		65 lb per sq in. min at 5% deformation	
Manufacturing Process		Machine extruded. Pipe mech cut on diameter	
Resistance to Breakage in Handling	Block must average 3" or greater in drop test per ASTM C 487, tentative metho of test for resistance to dropping of preformed block thermal insulation.		
Dimensions		ASTM **	
Other Qualifications		Good mechanical strength with low shrinkage	

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

	Calsilite The Ruberoid Co	
	Kaylo Owens-Corning Corp	
	Thermobestos Johns-Manville Sales Corp	
	Kaytherm Keasbey & Morrison Co	
	Trialite Mundet Cork Corp	
	Calsamp Pabco Ind Ins Div***	
	Careytemp† Philip Carey Mfg Co	
	Thermasil Baldwin-Ehret-Hill, Inc	

*Bands are supplied at extra cost. Order must state "without bands" if not required.

For 11" IPS and larger there is an additional charge for 2-ea canvas cover. Material should be specified "without 2-ea canvas" to avoid extra charge.

**New Simplified Dimensional System sponsored by ASTM

***Fiber Board Paper Products Corp

* Codes 104 and 106 are acceptable alternates unless noted on the Project Specifications.

†Fittings available in screwed, welded, and sweat types.

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DUP 0990261

MATERIAL SPECIFICATION - SERIES 100

OCTOBER 1954

Rev Feb 1964

Code	104		106
Material	Inorganic silicates		Asbestos fiber and sodium silicate
Material Description	Inorganic silicas and asbestos fibers		Compressed fluffy amosite asbestos fiber sprayed with sodium silicate to form a mat containing a minimum of 20% sodium silicate by weight. Asbestos mat is then sprinkled with diatomaceous earth to provide an integral refractory coating
Filler			
Binder			
Temperature Range	100°F to 1800°F		200°F to 1200°F
K Factor	Block - 500°F - 0.58 max		500°F - 0.54 max
Density	Block - 14 lb per cu ft		18 lb per cu ft
Compressive Strength	65 lb per sq in. min at 5% deformation		27 psi at 10%* deformation - dry
Manufacturing Process			Formed and comp on mandrel. Pipe mech cut on die
Resistance to Breakage in Handling	Block must average 3" or greater in drop test per ASTM C 487, tentative method of test for resistance to dressing of preformed block thermal insulation.		
Dimensions			
Other Qualifications	Good mechanical strength. Shrinkage less than 2% at 1600°F		Formed on a mandrel 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.			
* Min thickness available 1½", also available in pipe covering on special order. * Pipe covering only.			Unibestos Pittsburgh Corning Corp
	Kaylo 20* Owens-Corning Corp		

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MATERIALS

MATERIAL SPECIFICATION SERIES 100 PREFORMED BLOCK AND PIPE

THERMAL INSULATION STANDARD ENGINEERING SPECIFICATIO

ISSUED OCT 1954

REVISED OCT 1964

SN 100 M

Code		102*†	
Material		Calcium silicate	
Material Description		Staple, cellular, calcined fire clay base	
Filler			
Binder			
Temperature Range		100°F to 1200°F	
K Factor		500°F – 0.54 max	
Density		11 lb per cu ft	
Compressive Strength		65 lb per sq in. min at 5% deformation	
Manufacturing Process		Machine extruded. Pipe mech cut on diameter	
Resistance to Breakage in Handling	Block must average 3" or greater in drop test per ASTM C 487, tentative method of test for resistance to dropping of preformed block thermal insulation.		
Dimensions		ASTM **	
Other Qualifications		Good mechanical strength with low shrinkage	

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

*Bands are supplied at extra cost. Order must state "without bands" if not required. For 11" 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.		*Calsilite* The Ruberoid Co	
		Kaylo Owens-Corning Corp	
		Thermobestos Johns-Manville Sales Corp	
**New Simplified Dimensional System sponsored by ASTM			
***Fiber Board Paper Products Corp		*Tricolite* Mundet Cork Corp	
‡ Codes 104 and 106 are acceptable alternates unless noted on the Project Specifications.		*Caltemp* Pabco Ind Ins Div ***	
† Fittings available in screwed, welded, and sweat types.		*Careytemp* † Philip Carey Mfg Co	
		Thermasil Baldwin-Ehret-Hill, Inc	

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DUP 0990348

MATERIAL SPECIFICATION - SERIES 100

OCTOBER 1954
Rev Feb 1964

Code	104		106
Material	Inorganic silicates		Asbestos fiber and sodium silicate
Material Description	Inorganic silicas and asbestos fibers		Compressed fluffy amesite asbestos fiber sprayed with sodium silicate to form a mat containing a minimum of 20% sodium silicate by weight. Asbestos mat is then sprinkled with diatomaceous earth to provide an integral refractory coating
Filler			
Binder			
Temperature Range	100°F to 1800°F		200°F to 1200°F
K Factor	Block - 500°F - 0.58 max		500°F - 0.56 max
Density	Block - 14 lb per cu ft		18 lb per cu ft
Compressive Strength	65 lb per sq in. min at 5% deformation		27 psi at 10% deformation - dry
Manufacturing Process			Formed and comp on mandrel. Pipe mech cut on die
Resistance to Breakage in Handling	Block must average 3" or greater in drop test per ASTM C 487, tentative method of test for resistance to dressing of preformed block thermal insulation.		
Dimensions			
Other Qualifications	Good mechanical strength. Shrinkage less than 2% at 1600°F		Formed on a mandrel 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.			
* Min thickness available 1½", also available in pipe covering on special order. * Pipe covering only.			*Unibestos* Pittsburgh Corning Corp
	*Kaylo 20** Owens-Corning Corp		

DUP 09903049

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MATERIALS

MATERIAL SPECIFICATION SERIES 100 PREFORMED BLOCK AND PIPE

THERMAL INSULATION STANDARD ENGINEERING SPECIFICAT

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SN 100 M

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Code		102*♦	
Material		Calcium silicate	
Material Description		Staple, cellular, calcined fire clay base	
Filler			
Binder			
Temperature Range		100°F to 1200°F	
K Factor		500°F – 0.54 max	
Density		11 lb per cu ft	
Compressive Strength		65 lb per sq in. min at 5% deformation	
Manufacturing Process		Machine extruded. Pipe mach cut on diameter	
Resistance to Breakage in Handling	Block must average 3" or greater in drop test per ASTM C 487, tentative metho of test for resistance to dropping of preformed block thermal insulation.		
Dimensions		ASTM **	
Other Qualifications		Good mechanical strength with low shrinkage	

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

*Bands are supplied at extra cost. Order must state "without bands" if not required. For 11" 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.		*Calcilite* The Ruberoid Co	
		Kaylo Owens-Corning Corp	
		Thermobestos Johns-Manville Sales Corp	
**New Simplified Dimensional System sponsored by ASTM		*Kaytherm* Keasbey & Mattison Co	
***Fiber Board Paper Products Corp		*Tricalite* Mundet Cork Corp	
♦ Codes 104 and 106 are acceptable alternates unless noted on the Project Specifications.		*Caltemp* Pabco Ind Ins Div ***	
†Fittings available in screwed, welded, and sweat types.		*Careytemp*† Philip Carey Mfg Co	
		Thermasil Baldwin-Ehret-Hill, Inc	

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DUP 0990350

MATERIAL SPECIFICATION - SERIES 100

OCTOBER 1954

Rev Feb 1964

Code	104		106
Material	Inorganic silicates		Asbestos fiber and sodium silicate
Material Description	Inorganic silicas and asbestos fibers		Compressed fluffy amosite asbestos fiber sprayed with sodium silicate to form a mat containing a minimum of 20% sodium silicate by weight. Asbestos mat is then sprinkled with diatomaceous earth to provide an integral refractory coating
Filler			
Binder			
Temperature Range	100°F to 1800°F		200°F to 1200°F
K Factor	Block - 500°F - 0.58 max		500°F - 0.56 max
Density	Block - 14 lb per cu ft		18 lb per cu ft
Compressive Strength	65 lb per sq in. min at 5% deformation		27 psi at 10%* deformation - dry
Manufacturing Process			Formed and cured on mandrel. Pipe mech cut on die
Resistance to Breakage in Handling	Blocks must average 3" or greater in drop test per ASTM C 487, tentative method of test for resistance to dressing of preformed block thermal insulation.		
Dimensions			
Other Qualifications	Good mechanical strength. Shrinkage less than 2% at 1600°F		Formed on a mandrel 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.

			Cassessos Pittsburgh Corning Corp
	Kaylo 20* Owens-Corning Corp		

* Min thickness available 1½", else available in pipe covering on special order.

* Pipe covering only.

DUP 0990351

848376

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MATERIALS

MATERIAL SPECIFICATION SERIES 100 PREFORMED BLOCK AND PIPE

THERMAL INSULATION STANDARD ENGINEERING SPECIFICATION

ISSUED OCT 1954

REVISED OCT 1964

SN 100 M

Code		102*♦	
Material		Calcium silicate	
Material Description		Staple, cellular calcined fire clay base	
Filler			
Binder			
Temperature Range		100°F to 1200°F	
K Factor		500°F – 0.54 max	
Density		11 lb per cu ft	
Compressive Strength		65 lb per sq in. min at 5% deformation	
Manufacturing Process		Machine extruded. Pipe mach cut on diameter	
Resistance to Breakage in Handling	Block must average 3" or greater in drop test per ASTM C 487, tentative method of test for resistance to dropping of preformed block thermal insulation.		
Dimensions		ASTM **	
Other Qualifications		Good mechanical strength with low shrinkage	

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

*Bands are supplied at extra cost. Order must state "without bands" if not required. For 11" 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.		*Calsilite* The Ruberoid Co	
		Kaylo Owens-Corning Corp	
		Thermobestos Johns-Manville Sales Corp	
**New Simplified Dimensional System sponsored by ASTM		*Tricalite* Mundet Cork Corp	
***Fiber Board Paper Products Corp		*Caltemp* Pabco Ind Ins Div***	
♦ Codes 104 and 106 are acceptable alternates unless noted on the Project Specifications.		*Carytemp*† Philip Carey Mfg Co	
†Fittings available in screwed, welded, and sweat types.		*Thermasil* Baldwin-Ehret-Hill, Inc	

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

SUBCOMMITTEE NO. 19

R-259

DUP 0990432

848457

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MATERIAL SPECIFICATION – SERIES 100

OCTOBER 1964

Rev Jan 1965

Code	104	106	
Material	Inorganic silicates	Asbestos fiber and sodium silicate	
Material Description	Inorganic silicas and asbestos fibers	Compressed fluffy amosite asbestos fiber sprayed with sodium silicate to form a mat containing a minimum of 20% sodium silicate by weight. Asbestos mat is then sprinkled with diatomaceous earth to provide an integral refractory coating	
Temperature Range	100°F to 1800°F	1200°F max	
K Factor	Block – 500°F – 0.58 max	400°F – 0.54 max 600°F – 0.65 max	
Density	Block – 14 lb per cu ft	20 lb per cu ft max	
Compressive Strength	65 lb per sq in. min at 5% deformation	27 lb per sq in. at 10% ♦ deformation – dry	
Manufacturing Process		Formed and comp on mandrel. Pipe mach cut on die	
Resistance to Breakage in Handling	Block must average 3" or greater in drop test per ASTM C 487, tentative method of test for resistance to dropping of preformed block thermal insulation.		
Other Qualifications	Good mechanical strength. Shrinkage less than 2% at 1600°F	Formed on a mandrel to a predetermined weight. Pressed to obtain the desired density, and baked. 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 product meets the above specifications.			
* Minimum thickness available 1 1/2", also available in pipe covering on special order ♦ Pipe covering only	*Kaylo 20* *Owens-Corning Corp*	*Unibestos* Pittsburgh Corning Corp	

SUP. BY

DUP 0990433

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MATERIALS

MATERIAL SPECIFICATION SERIES 100 PREFORMED BLOCK AND PIPE

THERMAL INSULATION STANDARD ENGINEERING SPECIFICATION

ISSUED OCT 1954
REVISED FEB 1964

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Page 1 of 13

Code		102*	
Material		Calcium silicate	
Material Description		Steam, cellular, calcined fire clay base	
Filler			
Binder			
Temperature Range		100°F to 1200°F	
K Factor		500°F – 0.54 max	
Density		11 lb per cu ft	
Compressive Strength		65 lb per sq in. min at 5% deformation	
Manufacturing Process		Machine extruded. Pipe mech cut on diameter	
Resistance to Breakage in Handling	Block must average 3" or greater in drop test per ASTM C 487, tentative method of test for resistance to dropping of preformed block thermal insulation.		
Dimensions		ASTM **	
Other Qualifications		Good mechanical strength with low shrinkage	

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

	Calsilite The Ruberoid Co	
	Kaylo Owens-Corning Corp	
	Thermobestos Johns-Manville Sales Corp	
	Raytherm Keasbey & Mattison Co	
	Trialite Mundet Cork Corp	
	Caltemp Pabco Ind Ins Div***	
	Careytempt Philip Carey Mfg Co	
	Thermasil Baldwin-Ehret-Hill, Inc	

*Bands are supplied at extra cost. Order must state "without bands" if not required.

For 11" IPS and larger there is an additional charge for 2-ply canvas cover. Material should be specified "without 2-ply canvas" to avoid extra charge.

**New Simplified Dimensional System sponsored by ASTM

***Fiber Board Paper Products Corp

* Codes 104 and 106 are acceptable alternates unless noted on the Project Specifications.

†Fittings available in screwed, welded, and sweat types.

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

SUBCOMMITTEE NO. 20

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REV. OCT 1964 SUP. 1-Y

DUP 0990434

848459

MATERIAL SPECIFICATION - SERIES 100

Code	104		106
Material	Inorganic silicates		Asbestos fiber and sodium silicate
Material Description	Inorganic silicas and asbestos fibers		Compressed fluffy amosite asbestos fiber sprayed with sodium silicate to form a mat containing a minimum of 20% sodium silicate by weight. Asbestos mat is then sprinkled with diatomaceous earth to provide an integral refractory coating
Filler			
Binder			
Temperature Range	100°F to 1800°F		200°F to 1200°F
K Factor	Block - 500°F - 0.58 max		500°F - 0.54 max
Density	Block - 14 lb per cu ft		18 lb per cu ft
Compressive Strength	65 lb per sq in. min at 5% deformation		27 psi at 10%* deformation - dry
Manufacturing Process			Formed and comp on mandrel. Pipe mech cut on die
Resistance to Breakage in Handling	Block must average 3" or greater in drop test per ASTM C 487, tentative method of test for resistance to dressing of preformed block thermal insulation.		
Dimensions			
Other Qualifications	Good mechanical strength. Shrinkage less than 2% at 1600°F		Formed on a mandrel 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.			
* Min thickness available 1½", else available in pipe covering on special order. * Pipe covering only.			*Unibestos* Pittsburgh Corning Corp
	Kaylo 20° Owens-Corning Corp		

DUP 0990435

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MATERIALS

MATERIAL SPECIFICATION
SERIES 100
PREFORMED BLOCK AND PIPE

THERMAL INSULATION
STANDARD ENGINEERING SPECIFICATION

ISSUED OCT 1954
REVISED OCT 1964

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Code		102*†	
Material		Calcium silicate	
Material Description		Staple, cellular, calcined fire clay base	
Filler			
Binder			
Temperature Range		100°F to 1200°F	
K Factor		500°F – 0.54 max	
Density		11 lb per cu ft	
Compressive Strength		65 lb per sq in. min at 5% deformation	
Manufacturing Process		Machine extruded. Pipe mech cut on diameter	
Resistance to Breakage in Handling	Block must average 3" or greater in drop test per ASTM C 487, tentative method of test for resistance to dropping of preformed block thermal insulation.		
Dimensions		ASTM **	
Other Qualifications		Good mechanical strength with low shrinkage	

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

*Bands are supplied at extra cost. Order must state "without bands" if not required. For 11" 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.		*Calsilite* The Ruberoid Co	
		Kaylo Owens-Corning Corp	
		Thermobestos Johns-Manville Sales Corp	
**New Simplified Dimensional System sponsored by ASTM		*Tricalite* Mundet Cork Corp	
***Fiber Board Paper Products Corp		*Caltemp* Pabco Ind Ins Div***	
† Codes 104 and 106 are acceptable alternates unless noted on the Project Specifications.		*Careytemp*† Philip Carey Mfg Co	
†Fittings available in screwed, welded, and sweat types.		*Thermasil* Baldwin-Ehret-Hill, Inc	

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

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DUP 0990517

R-307

048544

Code	104		106
Material	Inorganic silicates		Asbestos fiber and sodium silicate
Material Description	Inorganic silicas and asbestos fibers		Compressed fluffy amosite asbestos fiber sprayed with sodium silicate to form a mat containing a minimum of 20% sodium silicate by weight. Asbestos mat is then sprinkled with diatomaceous earth to provide an integral refractory coating
Filler			
Binder			
Temperature Range	100°F to 1800°F		200°F to 1200°F
K Factor	Block - 500°F - 0.58 max		500°F - 0.54 max
Density	Block - 14 lb per cu ft		18 lb per cu ft
Compressive Strength	65 lb per sq in. min at 5% deformation		27 psi at 10%* deformation - dry
Manufacturing Process			Formed and comp on mandrel. Pipe mach cut on die
Resistance to Breakage in Handling	Block must average 3" or greater in drop test per ASTM C 487, tentative method of test for resistance to dropping of preformed block thermal insulation.		
Dimensions			
Other Qualifications	Good mechanical strength. Shrinkage less than 2% at 1600°F		Formed on a mineral 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.			
* Min thickness available 1½", also available in pipe covering on special order. * Pipe covering only.			*Unibestos* Pittsburgh Corning Corp
	Kaylo 20 Owens-Corning Corp		

DUP 0990518

Code	113	114	115
Material	See Code 112.81	Mineral wool (Block only)	Mineral wool – asphalt impregnated
Material Description		Mineral slag wool	Mineral wool fibers homogeneously impregnated with an asphalt binder.
Filler			
Binder		High temp. binder	Asphalt
Temperature Range		500°F to 1700°F	–200°F to 100°F
K Factor		500°F – 0.45 max.	100°F – 0.34 max.
Density		19.2 lb. per cu. ft.	
Compressive Strength		12 lb. per sq. in.	
Manufacturing Process		Machine molded	Machine molded
Resistance to Breakage in Handling		Good	Good
Dimensions			
Other Qualifications			

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

	PV Supertemp Eagle-Picher	*Rock Cork* Johns-Manville Sales Corp.
	Mono-Block Baldwin Hill Co.	*Mineral Wool Board* Armstrong Cork Co.
	Armatemp Armstrong Cork Co.	*Koldboard* Baldwin Hill Co.
	M F Block M. H. Detrick Co.	

DUP 09908006

090392

Code			116
Material			Flexible foamed plastic
Material Description			Flexible aerated resin with a closed cellular structure. Pipe and tubing only.
Filler			
Binder			
Temperature Range			32°F to 200°F
K Factor			0.28 at 75°F
Density			
Compressive Strength			
Manufacturing Process			Medium molded
Resistance to breakage in handling			Nonbreakable
Dimensions			
Other Qualifications			Chemically inert and nontoxic

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

			Armaflex Armstrong Cork Co.

DUP 090807

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MATERIALS

MATERIAL SPECIFICATION SERIES 100 PREFORMED BLOCK AND PIPE

THERMAL INSULATION STANDARD ENGINEERING SPECIFICATION

ISSUED OCT 1954
REVISED FEB 1964

SN 100 M
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Code		102* ◊	
Material		Calcium silicate	
Material Description		Staple, cellular, calcined fire clay base	
Filler			
Binder			
Temperature Range		100°F to 1200°F	
K Factor		500°F – 0.54 max	
Density		11 lb per cu ft	
Compressive Strength		65 lb per sq in. min at 5% deformation	
Manufacturing Process		Machine extruded. Pipe mech cut on diameter	
Resistance to Breakage in Handling	Block must average 3" or greater in drop test per ASTM C 487, tentative method of test for resistance to dropping of preformed block thermal insulation.		
Dimensions		ASTM **	
Other Qualifications		Good mechanical strength with low shrinkage	

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

	Calsilite The Ruberoid Co	
	Kaylo Owens-Corning Corp	
	Thermobestos Johns-Manville Sales Corp	
	Kaytherm Keasbey & Mattison Co	
	Tricalite Mundet Cork Corp	
	Caltemp Pabco Ind Ins Div ***	
	Careytemp † Philip Carey Mfg Co	
	Thermasil Baldwin-Ehret-Hill, Inc	

*Bands are supplied at extra cost. Order must state "without bands" if not required.
For 11" 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.
**New Simplified Dimensional System sponsored by ASTM
***Fiber Board Paper Products Corp
◊ Codes 104 and 106 are acceptable alternates unless noted on the Project Specifications.
† Fittings available in screwed, welded, and sweat types.

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DUP 0991145

Code	104		106
Material	Inorganic silicates		Asbestos fiber and sodium silicate
Material Description	Inorganic silicas and asbestos fibers		Compressed fluffy amosite asbestos fiber sprayed with sodium silicate to form a mat containing a minimum of 20% sodium silicate by weight. Asbestos mat is then sprinkled with diatomaceous earth to provide an integral refractory coating
Filler			
Binder			
Temperature Range	100°F to 1800°F		200°F to 1200°F
K Factor	Block - 500°F - 0.58 max		500°F - 0.54 max
Density	Block - 14 lb per cu ft		18 lb per cu ft
Compressive Strength	65 lb per sq in. min at 5% deformation		27 psi at 10%* deformation - dry
Manufacturing Process			Formed and comp on mandrel. Pipe mach cut on dia
Resistance to Breakage in Handling	Block must average 3" or greater in drop test per ASTM C 487, tentative method of test for resistance to dropping of preformed block thermal insulation.		
Dimensions			
Other Qualifications	Good mechanical strength. Shrinkage less than 2% at 1600°F		Formed on a mandrel 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.			
			Unibestos Pittsburgh Corning Corp
	*Kaylo 20** Owens-Corning Corp		

* Min thickness available 1½", also available in pipe covering on special order.

* Pipe covering only.

DUP 0991146
090732

Code	110	111	111.1
Material	Vegetable cork	Cellular glass	Cellular glass
Material Description	Vegetable cork, granulated and compressed into cork-board or molded forms, from material of vegetable origin for low and medium temperature insulation.	Cellular glass foamed and fused into unicellular form.	Cellular glass foamed and fused into unicellular form. Factory-applied jacket having white kraft paper outer jacket (60 lb per 3000 sq ft) backed by 0.00035" aluminum foil with fire-resistant adhesive.
Filler			
Binder	Natural resin in cork		
Temperature Range	-200°F to 100°F	-200°F to 100°F (+300°F for dual temp)	+35°F to +300°F
K Factor	100°F – 0.29 max	100°F – 0.43 max	100°F – 0.43 max
Density	9 – 11 lb per cu ft	10 – 11 lb per cu ft	9 lb per cu ft
Compressive Strength	15 lb per sq in. min	30 lb per sq in. min at 5 percent deformation	30 lb per sq in. min at 5 percent deformation
Manufacturing Process	Machine comp or molded. Baked at moderate temp		
Resistance to Breakage in Handling	Good		
Dimensions			
Other Qualifications	Pipe covering shall be coated on the outside with heavy mastic		

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

	Cork Armstrong C&S Corp	*Foamglas* Pittsburgh Corning Corp	*Foamglas Stay-Dry* Pittsburgh Corning Corp
	Cork Mundet Cork Co		
		709	

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JUN 1966

DUP 0991147

090733

124

Code	111.2	111.3	112
Material	Cellular glass	Cellular glass	Glass fiber
Material Description	Cellular glass foamed and fused into unicellular form. Factory applied jacket having 0.00035" aluminum foil outer jacket backed by kraft paper (60 lb per 3000 sq ft)	Cellular glass foamed and fused into unicellular form. Plain - without jacket.	See Codes 112.01 through 112.81.
Filler			
Binder			
Temperature Range	+35°F to +300°F	+35°F to +300°F	
K Factor			
Density	9 lb per cu ft	9 lb per cu ft	
Compressive Strength	30 lb per sq in. min at 5 percent deformation	30 lb per sq in. min at 5 percent deformation	
Manufacturing Process			
Resistance to Breakage in Handling			
Dimensions			
Other Qualifications			

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

Foamglas Stay-Dry Pittsburgh Corning Corp	*Foamglas Stay-Dry* Pittsburgh Corning Corp	

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DUP 0991148

090734

125

Code	112.01	112.02	
Material	Glass fiber	See Code 112.01	
Material Description	Textile-type fine glass fiber pipe and fitting insulation, plain, with medium-temperature binder		
Filler			
Binder	Phenol-formaldehyde or Di-Cy		
Temperature Range	80°F to 350°F		
K Factor	100°F – 0.25		
Density	3* and 6** lb per cu ft		
Compressive Strength	Compressive strength and resilience are very low. Inserts are required where pipe is supported by the insulation. Has poor resistance to abuse.		
Resistance to Breakage in Handling	Very good		
Other Qualifications	Specify whether for iron pipe or copper tubing		

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

* Fittings only as follows For 125-lb cast iron screwed ells and tees Size — Thickness 1/2 thru 4 — 1/2, 1, 1 1/2 For butt-welding long-radius 90° and 45° ells Size — Thickness 2 thru 6 — 1/2, 1 2 thru 12 — 1 1/2, 2 Available factory finished with Code 731 "Hypalon" mastic on request	*Ultrafine Snap-on Gustin-Bacon Mfg Co		
	*Mono-Kover Baldwin-Ehret-Hill, Inc		
	*Thermoglas Philip Carey Mfg Co		
	**Fiberglas Owens-Corning Corp		
	**Armaglas PF Pipe Insn Armstrong C&S Corp		
	*Micro-Lok Johns-Manville Sales Corp		
	* FIT-rite Fibrous Glass Products, Inc. Micheville, NY Crestwood Ind Park, Mountain Top, Pa.		
	*Insul-Sure Insul-Coustic Corp Mespath 78, NY		
	* PPG Glass Fiber Pitts Plate Glass Co		
	* Superfine The Ruberoid Co		

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DUP 0991149

711

090735

MATERIAL SPECIFICATION – SERIES 100

Code	112.11	112.12	
Material	Glass fiber	See 112.11	
Material Description	Textile type fine glass fiber bonded pipe insulation with 45-lb factory-applied roofing felt finish. Code 701 asbestos felt must be used.		
Filler			
Binder	Phenol-formaldehyde or Di–Cy		
Temperature Range	80°F to 350°F		
K Factor	100°F – 0.25		
Density	3" and 6"" lb per cu ft		
Compressive Strength	Compressive strength and resilience are very low. Inserts are required where pipe is supported by the insulation. Has poor resistance to abuse.		
Resistance to Breakage in Handling	Very good		
Dimensions			
Other Qualifications	Specify whether for iron pipe or copper tubing.		

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

* Order must specify finish noted under Material Description.	**Ultrafine Snap-on* Gustin-Bacon Mfg Co		
	**Mono-Kover* Baldwin-Ehret-Hill, Inc		
	**Thermoglas* Philip Carey Mfg Co		
	***Fiberglas* Owens-Corning Corp		
	***Armaglas PF Pipe Insu* Armstrong C&S Corp		
	Micro-Lok Johns-Manville Sales Corp		
	**PPG Glass Fiber* Pitts Plate Glass Co		
	**Superfine* The Ruberoid Co		

REV. MAR 1965 SUP. BY
DUP 0991150
090736

Code	112.16	112.17	
Material	Glass fiber	Glass fiber	
Material Description	Textile type fine glass fiber banded pipe insulation with 4-oz factory-applied canvas finish.	Textile type fine glass fiber banded pipe insulation with 8-oz factory-applied canvas finish.	
Filler			
Binder	Phenol-formaldehyde or Di-Cy	Phenol-formaldehyde or Di-Cy	
Temperature Range	80°F to 300°F	80°F to 300°F	
K Factor	100°F - 0.25	100°F - 0.25	
Density	3" and 6" lb per cu ft	3" and 6" lb per cu ft	
Compressive Strength	Compressive strength and resilience are very low. Inserts are required where pipe is supported by the insulation. Has poor resistance to abuse.	Compressive strength and resilience are very low. Inserts are required where pipe is supported by the insulation. Has poor resistance to abuse.	
Resistance to Breakage in Handling	Very good	Very good	
Dimensions			
Other Qualifications	Specify whether for iron pipe or copper tubing	Specify whether for iron pipe or copper tubing	

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

	*Ultrafine Snap-on Gustin-Bacon Mfg Co	*Ultrafine Snap-on Gustin-Bacon Mfg Co
	*Vono-Kover Baldwin-Ehret-Hill, Inc	*Vono-Kover Baldwin-Ehret-Hill, Inc
	*Thermoglas Philip Carey Mfg Co	*Thermoglas Philip Carey Mfg Co
	**Fiberglas Owens-Corning Corp	**Fiberglas Owens-Corning Corp
	**Armaglas PF Pipe Insu Armstrong C&S Corp	**Armaglas PF Pipe Insu Armstrong C&S Corp
	*Micro-Lok Johns-Manville Sales Corp	*Micro-Lok Johns-Manville Sales Corp
	*PPG Glass Fiber Pitts Plate Glass Co	*PPG Glass Fiber Pitts Plate Glass Co
	*Superfine The Ruberoid Co	*Superfine The Ruberoid Co

DUP 0991151

090737

Code	112.22	
Material	Glass fiber	
Material Description	Preformed pipe covering composed of glass fibers bonded together by inert thermosetting resin with factory-applied 35-lb minimum per 3000 sq ft white bleached kraft paper, laminated to 0.0007" aluminum foil by fire-retardent adhesive (moisture vapor transmission rate shall not exceed 0.015 perms - wet cup test) and reinforced by glass threads in both directions, maximum spacing 1/4". Finish includes lap 2", ± 1/4", long and butt strips 4", ± 1/4", wide. Paper to be creased or embossed sufficiently to conceal wrinkles without requiring excessive lap adhesive to make a right seal. Type A - one-piece Type B - two-piece	
Filler		
Binder	Phenol-formaldehyde or Di-Cy	
Temperature Range	40°F to 250°F	
K Factor	100°F - 0.25, 250°F - 0.33	
Density	Type A - 3 lb per cu ft min Type B - 6 lb per cu ft min	
Compressive Strength*	Compressive strength and resilience are very low. Inserts are required where pipe is supported by insulation. Type B has more resistance to abuse than Type A.	
Resistance to Breakage in Handling	Very good	
Dimensions	3-ft sections Type A - 1/2", 3/4", 1", 1 1/2", 2", 2 1/2", and 3" thick Type B - 1/2", 1", 1 1/2", 2", and 2 1/2" thick	
Other Qualifications	Specify whether for iron pipe or copper tubing. Weather protection is required for outside service.	

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

Ultrafine Snap-on (Type A) Gustin-Bacon Mfg Co	
Mono-Kover (Type A) Baldwin-Ehret-Hill, Inc	
Fiberglas (Type A and Type B) Owens-Corning Corp	
Armaglas PF Pipe Insulation (Type A and Type B) Armstrong C&S Corp	
Micro-Lok (Type A) Johns-Manville Sales Corp	
PPG Glass Fiber (Type A) Pittsburgh Plate Glass Co	
Superfine (Type A) The Ruberoid Co	
Thermaglas (Type A) Philip Carey Mfg Co	

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DUP 0991152
090738

(27

Code	112.61		
Material	Glass fiber		
Material Description	Plain semi-rigid board, formed from fibrous glass or mineral fibers.		
Filler			
Binder	Phenol-formaldehyde		
Temperature Range	40°F to 350°F		
K Factor	100°F – 0.25 to 0.30		
Density	6 and 9 lb per cu ft		
Compressive Strength	Compressive strength and resilience are very low. Inserts are required where pipe is supported by the insulation. Has poor resistance to abuse.		
Resistance to Breakage in Handling	Very good		
Dimensions	Std 24" x 48" Thickness PF615 (6-lb density) 1/2" through 3". PF617 (9-lb density), 1/2" through 2 1/4".		

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

	Fiberglas PF615 or 617 Insulation Owens-Corning Corp		
	Armaglas PF Insulation Armstrong C&S Corp		
	Spintex No. 414 or 415 Johns-Manville Sales Corp		
	E-Z Ply Duct Insulation Baldwin-Ehret-Hill, Inc		

DUP 09911153

090739

SN 100 M

OCTOBER 1954

Rev April 1963

MATERIAL SPECIFICATION – SERIES 100

Code	112.71		112.81
Material	Glass fiber		Glass fiber
Material Description	Bonded board insulation formed from fibrous glass or mineral fibers, with asphalt and kraft paper vapor-barrier finish.		Bonded acoustical board formed from fibrous glass or mineral fibers with a thin neoprene compound on one surface.
Filler			
Binder	Phenol-formaldehyde		Phenol-formaldehyde
Temperature Range	40°F to 150°F		40°F to 150°F
K Factor	100°F – 0.26		100°F – 0.26
Density	3 and 6 lb per cu ft		6 lb per cu ft
Compressive Strength			
Manufacturing Process	Machine molded		Machine molded
Resistance to Breakage in Handling	Very good		Very good
Dimensions	24" x 48" boards 3/4" to 2" thickness		24" x 48" boards 5/8" to 2" thickness
Other Qualifications	Higher density material is more resistant to abuse		Neoprene coating on side of board exposed to air flow

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

* 3-lb density. High-density outer layers.	*Fiberglas Vapor Seal Duct Insu* Owens-Corning Corp		*Fiberglas Coated Duct Insu* Owens-Corning Corp
	Armaglas Vapor Seal Duct Insu Armstrong C&S Corp		*Armaglas Coated Duct Insu* Armstrong C&S Corp
	Spintex No. 414VS Johns-Manville Sales Corp		*Coated Duct Insulation* Baldwin-Ehret-Hill, Inc
	E-Z Ply Duct Insu Baldwin-Ehret-Hill, Inc		
	*Fiberglass Board** Gustin-Bacon Mfg Co		

DUP 0991154

090740

Code	113	114	115
Material	See Code 112.81	Mineral wool (Block only)	Mineral wool – asphalt impregnated (block only)
Material Description		Mineral slag wool	Mineral wool fibers homogeneously impregnated with an asphal. binder.
Filler			
Binder		High temp binder	Asphalt
Temperature Range		500°F to 1700°F	–200°F to 100°F
K Factor		500°F – 0.45 max	100°F – 0.34 max
Density		19.2 lb per cu ft	
Compressive Strength		12 lb per sq in.	
Manufacturing Process		Machine molded	Machine molded
Resistance to Breakage in Handling		Good	Good
Dimensions			
Other Qualifications			

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

		PV Supertemp Eagle-Picher	
		Mono-Block Baldwin-Ehret-Hill, Inc	*Mineral Wool Board* Armstrong C&S Corp
		Armatemp Armstrong C&S Corp	*Koldboard* Baldwin-Ehret-Hill, Inc
		M W Block M. H. Detrick Co	

REV. AUG 1964 SUP. BY

DUP 0991155

Code	118 *	
Material	Urethane Foam Rigid	
Material Description	Preformed rigid urethane foam block, pipe, and fitting insulation manufactured with Du Pont "Hylene" and polyester or polyether resins	
Filler		
Binder		
Temperature Range	−100°F to +150°F	
K Factor	0.17 max at 75°F	
Density	1 1/2 to 4 lb per cu ft	
Compressive Strength	Min 20 lb per sq in. at 10% deformation, measured parallel to the direction in which the foam rose during manufacture	
Manufacturing Process	Molded or cut from molded billet	
Resistance to Breakage in Handling	Excellent	
Dimensions	+ 1/16" – 0" on insulation ID, all other dimensions to be ± 1/16" including straightness and squareness	
Other Qualifications	Uniform cell structure with max 10% open cells. No voids having any dimensions exceeding 1/8". Heat aging tests max 3.5% volume change; humid aging test max 5% volume change and max 20% compressive strength change in accordance with MIL-P-21929 (SHIPS). Nonburning in accordance with ASTM D 1692. Water absorption max 2% by volume into a 2" x 2" x 1" skin-free piece immersed in water just under the surface for 5 days	
The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.		
* Vendors listed are rigid urethane foam billet manufacturers	*U-200* Union Asbestos & Rubber Co	
	Zerocel National Gypsum	
	Thurane FR Dow Chemical	

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REV. SUP. L1
DUP 0991156
090742

Code	120		
Material	Polystyrene		
Material Description	Preformed rigid cellular polystyrene block, pipe, and fitting insulation.		
Filler			
Binder			
Temperature Range	−100°F to +160°F		
K Factor	0.29 max at 75°F		
Density	1.7 to 2.3		
Compressive Strength	Min 20 lb per sq in. at 10% deformation		
Manufacturing Process	Cut from molded logs		
Resistance to Breakage in Handling	Excellent		
Dimensions	$+\frac{1}{16}" - 0"$ on insulation ID, all other dimensions to be $\pm\frac{1}{16}"$ including straightness and squareness		
Other Qualifications	Uniform cell structure with max 10% open cells. No voids having any dimensions exceeding $\frac{1}{8}"$. No distortion or volume change, or loss of compressive strength after exposure at 160°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.		

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

	Styrofoam 33 MMM Co, Houston, Texas	
	Styrofoam 33 Tufflite Plastics, Inc	

DUP 0991157

090743

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MATERIALS

MATERIAL SPECIFICATION SERIES 100 PREFORMED BLOCK AND PIPE

THERMAL INSULATION STANDARD ENGINEERING SPECIFICATION

ISSUED OCT 1954

REVISED FEB 1964

SN 100 M

Code		102*	
Material		Calcium silicate	
Material Description		Staple, cellular, calcined fire clay base	
Filler			
Binder			
Temperature Range		100°F to 1200°F	
K Factor		500°F – 0.54 max	
Density		11 lb per cu ft	
Compressive Strength		65 lb per sq in. min at 5% deformation	
Manufacturing Process		Machine extruded. Pipe mech cut on diameter	
Resistance to Breakage in Handling	Block must average 3" or greater in drop test per ASTM C 487, tentative method of test for resistance to dropping of preformed block thermal insulation.		
Dimensions		ASTM **	
Other Qualifications		Good mechanical strength with low shrinkage	

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

	Calsilite The Ruberoid Co	
	Kaylo Owens-Corning Corp	
	Thermobestos Johns-Manville Sales Corp	
	Kaytherm Keasbey & Mattison Co	
	Tricalite Mundet Cork Corp	
	Caltemp Pabco Ind Ins Div***	
	Careytemp† Philip Carey Mfg Co	
	Thermasil Baldwin-Ehret-Hill, Inc	

*Bands are supplied at extra cost. Order must state "without bands" if not required.

For 11" 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.

**New Simplified Dimensional System sponsored by ASTM

***Fiber Board Paper Products Corp

* Codes 104 and 106 are acceptable alternates unless noted on the Project Specifications.

†Fittings available in screwed, welded, and sweat types.

Vendors and merchandise designations are given to describe materials and may not include all acceptable products. Substitutions are to be made only on approval of the authority initiating the use of this specification. 720

990744

DUP 0991158

REV. OCT 1964 SUP. BY

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SN 100 M

MATERIAL SPECIFICATION - SERIES 100

OCTOBER 1954

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Code	104		106
Material	Inorganic silicates		Asbestos fiber and sodium silicate
Material Description	Inorganic silicas and asbestos fibers		Compressed fluffy amosite asbestos fiber sprayed with sodium silicate to form a mat containing a minimum of 20% sodium silicate by weight. Asbestos mat is then sprinkled with diatomaceous earth to provide an integral refractory coating
Filler			
Binder			
Temperature Range	100°F to 1800°F		200°F to 1200°F
K Factor	Block - 500°F - 0.58 max		500°F - 0.54 max
Density	Block - 14 lb per cu ft		18 lb per cu ft
Compressive Strength	65 lb per sq in. min at 5% deformation		27 psi at 10%* deformation - dry
Manufacturing Process			Formed and comp on mandrel. Pipe mach cut on dia
Resistance to Breakage in Handling	Block must average 3" or greater in drop test per ASTM C 487, tentative method of test for resistance to dropping of preformed block thermal insulation.		
Dimensions			
Other Qualifications	Good mechanical strength. Shrinkage less than 2% at 1600°F		Formed on a mandrel 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.			
			Unibestos Pittsburgh Corning Corp
	*Kaylo 20** Owens-Corning Corp		
* Min thickness available 1½", also available in pipe covering on special order. * Pipe covering only.			

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DUP 0991159

090745

OCTOBER 1954 — MATERIAL SPECIFICATION – SERIES 100 — SN 100 M

Rev Feb 1964 — Page 1

Code	110	111	111.1
Material	Vegetable cork	Cellular glass	Cellular glass
Material Description	Vegetable cork, granulated and compressed into cork-board or molded forms, from material of vegetable origin for low and medium temperature insulation.	Cellular glass foamed and fused into unicellular form.	Cellular glass foamed and fused into unicellular form. Factory-applied jacket having white kraft paper outer jacket (60 lb per 3000 sq ft) backed by 0.00035" aluminum foil with fire-resistant adhesive.
Filler			
Binder	Natural resin in cork		
Temperature Range	–200°F to 100°F	–200°F to 100°F (+300°F for dual temp.)	+35°F to +300°F
K Factor	100°F – 0.29 max	100°F – 0.43 max	100°F – 0.43 max
Density	9 – 11 lb per cu ft	10 – 11 lb per cu ft	9 lb per cu ft
Compressive Strength	15 lb per sq in. min	30 lb per sq in. min at 5 percent deformation	30 lb per sq in. min at 5 percent deformation
Manufacturing Process	Machine comp or molded. Baked at moderate temp		
Resistance to Breakage in Handling	Good		
Dimensions			
Other Qualifications	Pipe covering shall be coated on the outside with heavy mastic		

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

	Cork Armstrong C&S Corp	*Foamglas* Pittsburgh Corning Corp	*Foamglas Stay-Dry* Pittsburgh Corning Corp
	Cork Mundet Cork Co		

DUP 0991160

890746

Code	111.2	111.3	112
Material	Cellular glass	Cellular glass	Glass fiber
Material Description	Cellular glass foamed and fused into unicellular form. Factory applied jacket having 0.00035" aluminum foil outer jacket backed by kraft paper (60 lb per 3000 sq ft)	Cellular glass foamed and fused into unicellular form. Plain - without jacket.	See Codes 112.01 through 112.81.
Filler			
Binder			
Temperature Range	+35°F to +300°F	+35°F to +300°F	
K Factor			
Density	9 lb per cu ft	9 lb per cu ft	
Compressive Strength	30 lb per sq in. min at 5 percent deformation	30 lb per sq in. min at 5 percent deformation	
Manufacturing Process			
Resistance to Breakage Handling			
Dimensions			
Other Qualifications			

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

	Foamglas Stay-Dry Pittsburgh Corning Corp	*Foamglas Stay-Dry* Pittsburgh Corning Corp	

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REV. JUN 1966
DUP 0991161
090747

Code	112.01	112.02	
Material	Glass fiber	See Code 112.01	
Material Description	Textile-type fine glass fiber pipe and fitting insulation, plain, with medium-temperature binder		
Filler			
Binder	Phenol-formaldehyde or Di-Cy		
Temperature Range	80°F to 350°F		
K Factor	100°F - 0.25		
Density	3* and 6** lb per cu ft		
Compressive Strength	Compressive strength and resilience are very low. Inserts are required where pipe is supported by the insulation. Has poor resistance to abuse.		
Resistance to Breakage in Handling	Very good		
Other Qualifications	Specify whether for iron pipe or copper tubing		

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

* Fittings only as follows: For 125-lb cast iron screwed ells and tees — Size: 1/2 thru 4; Thickness: 1/2, 1, 1 1/2. For butt-welding long-radius 90° and 45° ells — Size: 2 thru 6, 2 thru 12; Thickness: 1/2, 1 / 1 1/2, 2. Available factory finished with Code 731 "Hypalon" mastic on request	*Ultrafine Snap-on Gustin-Bacon Mfg Co		
	*Nano-Kover Baldwin-Ehret-Hill, Inc		
	*Thermoglas Philip Carey Mfg Co		
	**Fiberglas Owens-Corning Corp		
	**Armaglas PF Pipe Insu Armstrong C&S Corp		
	*Micro-Lok Johns-Manville Sales Corp		
	*FIT-rite Fibrous Glass Products, Inc, Hicksville, NY Crestwood Ind Park, Mountain Top, Pa.		
	*Insul-Sure Insul-Caustic Corp Mespeth 78, NY		
	* PPG Glass Fiber Pitts Plate Glass Co		
	* Superfine The Ruberoid Co		

DUP 0991162
090748

MATERIAL SPECIFICATION – SERIES 100

Code	112.11	112.12	
Material	Glass fiber	See 112.11	
Material Description	Textile type fine glass fiber bonded pipe insulation with 45-lb factory-applied roofing felt finish. Code 701 asbestos felt must be used.		
Filler			
Binder	Phenol-formaldehyde or Di-Cy		
Temperature Range	80°F to 350°F		
K Factor	100°F – 0.25		
Density	3" and 6"" lb per cu ft		
Compressive Strength	Compressive strength and resilience are very low. Inserts are required where pipe is supported by the insulation. Has poor resistance to abuse.		
Resistance to Breakage in Handling	Very good		
Dimensions			
Other Qualifications	Specify whether for iron pipe or copper tubing.		
The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.			
* Order must specify finish noted under Material Description.	*Ultrafine Snap-on Gustin-Bacon Mfg Co		
	*Mono-Kover Baldwin-Ehret-Hill, Inc		
	*Thermoglas Philip Carey Mfg Co		
	**Fiberglas Owens-Corning Corp		
	**Armaglas PF Pipe Insu Armstrong C&S Corp		
	Micro-Lok Johns-Manville Sales Corp		
	*PPG Glass Fiber Pitts Plate Glass Co		
	*Superfine The Ruberoid Co		

REV. MAR 1955 SUP. BY
DUP 0991163
090749

Code	112.16	112.17	
Material	Glass fiber	Glass fiber	
Material Description	Textile type fine glass fiber bonded pipe insulation with 4-oz factory-applied canvas finish.	Textile type fine glass fiber bonded pipe insulation with 8-oz factory-applied canvas finish.	
Filler			
Binder	Phenol-formaldehyde or Di-Cy	Phenol-formaldehyde or Di-Cy	
Temperature Range	80°F to 300°F	80°F to 300°F	
K Factor	100°F - 0.25	100°F - 0.25	
Density	3" and 6" lb per cu ft	3" and 6" lb per cu ft	
Compressive Strength	Compressive strength and resilience are very low. Inserts are required where pipe is supported by the insulation. Has poor resistance to abuse.	Compressive strength and resilience are very low. Inserts are required where pipe is supported by the insulation. Has poor resistance to abuse.	
Resistance to Breakage in Handling	Very good	Very good	
Dimensions			
Other Qualifications	Specify whether for iron pipe or copper tubing	Specify whether for iron pipe or copper tubing	
The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.			
	*Ultrafine Snap-on Gustin-Bacon Mfg Co	*Ultrafine Snap-on Gustin-Bacon Mfg Co	
	*Mono-Kover Baldwin-Ehret-Hill, Inc	*Mono-Kover Baldwin-Ehret-Hill, Inc	
	*Thermoglas Philip Carey Mfg Co	*Thermoglas Philip Carey Mfg Co	
	**Fiberglas Owens-Corning Corp	**Fiberglas Owens-Corning Corp	
	**Armaglas PF Pipe Insu Armstrong C&S Corp	**Armaglas PF Pipe Insu Armstrong C&S Corp	
	*Micro-Lok Johns-Manville Sales Corp	*Micro-Lok Johns-Manville Sales Corp	
	*PPG Glass Fiber Pitts Plate Glass Co	*PPG Glass Fiber Pitts Plate Glass Co	
	*Superfine The Ruberoid Co	*Superfine The Ruberoid Co	

DUP 0991164

090750

Code	112.22	
Material	Glass fiber	
Material Description	Preformed pipe covering composed of glass fibers bonded together by inert thermosetting resin with factory-applied 35-lb minimum per 3000 sq ft white bleached kraft paper, laminated to 0.0007" aluminum foil by fire-retardant adhesive (moisture vapor transmission rate shall not exceed 0.015 perms - wet cup test) and reinforced by glass threads in both directions, maximum spacing 1/4". Finish includes lap 2", ± 1/4", long and butt strips 4", ± 1/4", wide. Paper to be creased or embossed sufficiently to conceal wrinkles without requiring excessive lap adhesive to make a tight seal. Type A - one-piece Type B - two-piece	
Filler		
Binder	Phenol-formaldehyde or Di-Cy	
Temperature Range	40°F to 250°F	
K Factor	100°F - 0.25, 250°F - 0.33	
Density	Type A - 3 lb per cu ft min Type B - 6 lb per cu ft min	
Compressive Strength*	Compressive strength and resilience are very low. Inserts are required where pipe is supported by insulation. Type B has more resistance to abuse than Type A.	
Resistance to Breakage in Handling	Very good	
Dimensions	3-ft sections Type A - 1/2", 3/4", 1", 1 1/2", 2", 2 1/2", and 3" thick Type B - 1/2", 1", 1 1/2", 2", and 2 1/2" thick	
Other Qualifications	Specify whether for iron pipe or copper tubing. Weather protection is required for outside service.	
The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.		
	Ultrafine Snap-on (Type A) Gustin-Bacon Mfg Co	
	Mono-Kover (Type A) Baldwin-Ehret-Hill, Inc	
	Riberglas (Type A and Type B) Owens-Corning Corp	
	Armaglas PF Pipe Insulation (Type A and Type B) Armstrong C&S Corp	
	Micro-Lok (Type A) Johns-Manville Sales Corp	
	PPG Glass Fiber (Type A) Pittsburgh Plate Glass Co	
	Superfine (Type A) The Ruberoid Co	
	Thermaglas (Type A) Philip Carey Mfg Co	

REV. SEP 1967 SUP. 17
DUP 0991165
990751

Code	112.61		
Material	Glass fiber		
Material Description	Plain semi-rigid board, formed from fibrous glass or mineral fibers.		
Filler			
Binder	Phenol-formaldehyde		
Temperature Range	40°F to 350°F		
K Factor	100°F - 0.25 to 0.30		
Density	6 and 9 lb per cu ft		
Compressive Strength	Compressive strength and resilience are very low. Inserts are required where pipe is supported by the insulation. Has poor resistance to abuse.		
Resistance to Breakage in Handling	Very good		
Dimensions	Std 24" x 48" Thickness PF615 (6-lb density) 1/2" through 3". PF617 (9-lb density), 1/2" through 2 1/4".		

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

	Fiberglas PF615 or 617 Insulation Owens-Corning Corp		
	Armaglas PF Insulation Armstrong C&S Corp		
	Spintex No. 614 or 615 Johns-Manville Sales Corp		
	E-Z Ply Duct Insulation Baldwin-Ehret-Hill, Inc		

DUP 0991166

090752

SN 100 M

OCTOBER 1954

Rev April 1962

MATERIAL SPECIFICATION – SERIES 100

Code	112.71		112.81
Material	Glass fiber		Glass fiber
Material Description	Bonded board insulation formed from fibrous glass or mineral fibers, with asphalt and kraft paper vapor-barrier finish.		Bonded acoustical board formed from fibrous glass or mineral fibers with a thin neoprene compound on one surface.
Filler			
Binder	Phenol-formaldehyde		Phenol-formaldehyde
Temperature Range	40°F to 150°F		40°F to 150°F
K Factor	100°F – 0.26		100°F – 0.26
Density	3 and 6 lb per cu ft		6 lb per cu ft
Compressive Strength			
Manufacturing Process	Machine molded		Machine molded
Resistance to Breakage in Handling	Very good		Very good
Dimensions	24" x 48" boards 3/4" to 2" thickness		24" x 48" boards 5/8" to 2" thickness
Other Qualifications	Higher density material is more resistant to abuse		Neoprene coating on side of board exposed to air flow

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

* 3-lb density. High-density outer layers.	*Fiberglas Vapor Seal Duct Insu* Owens-Corning Corp		*Fiberglas Coated Duct Insu* Owens-Corning Corp
	Armaglas Vapor Seal Duct Insu Armstrong C&S Corp		*Armaglas Coated Duct Insu* Armstrong C&S Corp
	Spintex No. 414VS Johns-Manville Sales Corp		*Coated Duct Insulation* Baldwin-Ehret-Hill, Inc
	E-Z Ply Duct Insu Baldwin-Ehret-Hill, Inc		
	*Fiberglass Board** Gustin-Bacon Mfg Co		

DUP 0991167

090753

Code		114	
Material		Mineral wool (Block only)	
Material Description		Mineral slag wool	
Filler			
Binder		High temp binder	
Temperature Range		500°F to 1700°F	
K Factor		500°F - 0.45 max	
Density		19.2 lb per cu ft	
Compressive Strength		12 lb per sq in.	
Manufacturing Process		Machine molded	
Resistance to Breakage in Handling		Good	
Dimensions			
Other Qualifications			

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

		PV Supertemp Eagle-Picher	
		Mono-Block Baldwin-Ehret-Hill, Inc	
		Armatemp Armstrong C&S Corp	
		M W Block M. H. Detrick Co	

REV. ___ SUP. BY ___

DUP 0991168

156

Code	118
Material	Urethane Foam, Rigid
Material Description	Preformed rigid urethane foam block, pipe, and fitting insulation manufactured with polyester or polyether resins with fluorocarbon blowing agent
Temperature Range	-270°F to +150°F
K Factor	0.17 max at 75°F
Density	1.7 to 2.5 lb per cu ft
Compressive Strength	Min 30 psi at 6.6% deformation, measured parallel to the direction in which the foam rose during manufacture or min 24 psi at 6.6% deformation in all directions
Manufacturing Process	Molded or cut from molded billet
Resistance to Breakage in Handling	Excellent
Dimensional Tolerances	Inside Diameter (In.)

Pipe Size of Insulation ID (In.)	Minimum Diameter (In.)	Maximum Diameter (In.)
1/2 - 6	IPS OD	IPS OD + 1/16
7 - 12	IPS OD	IPS OD + 1/8
14 and up	IPS OD + 1/16	IPS OD + 3/16

Outside Diameter (In.)

Pipe Size of Insulation OD (In.)	Minimum Diameter (In.)	Maximum Diameter (In.)
1/2 - 6	IPS OD - 1/8	IPS OD - 1/16
7 - 12	IPS OD - 1/8	IPS OD
14 and up	IPS OD - 1/16	IPS OD + 1/16

All other dimensions to be ± 1/16" including straightness and squareness

Other Qualifications	Uniform cell structure with max 10% open cells. No voids having any dimensions exceeding 1/4". Heat 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 60 when coated with PVA mastic 3/32" dry thickness reinforced by 10 x 10 mesh glass cloth, 10 lb per 100 sq yd. Water absorption max 2% by volume into a 2" x 2" x 1" skin-free piece immersed in water just under the surface for 5 days

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

	U-200 Unarco Industries
	Zerocel NB200 National Gypsum
	731

DUP 0991169

Code	120		
Material	Polystyrene		
Material Description	Preformed rigid cellular polystyrene block, pipe, and fitting insulation.		
Filler			
Binder			
Temperature Range	−100°F to +160°F		
K Factor	0.29 max at 75°F		
Density	1.7 to 2.3		
Compressive Strength	Min 20 lb per sq in. at 10% deformation		
Manufacturing Process	Cut from molded logs		
Resistance to Breakage in Handling	Excellent		
Dimensions	+ 1/16" – 0" on insulation ID, all other dimensions to be ± 1/16" including straightness and squareness		
Other Qualifications	Uniform cell structure with max 10% open cells. No voids having any dimensions exceeding 1/4". No distortion or volume change, or loss of compressive strength after exposure at 160°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.		
The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.			
	Styrofoam 33 MMM Co, Houston, Texas		
	Styrofoam 33 Tufflite Plastics, Inc		

DUP 0991170

090756

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MATERIALS MATERIAL SPECIFICATION SERIES 100 PREFORMED BLOCK AND PIPE		THERMAL INSULATION STANDARD ENGINEERING SPECIFICATION ISSUED OCT 1954 REVISED OCT 1964	SN 100 M Page 1 of 13
Code		102*†	
Material		Calcium silicate	
Material Description		Staple, cellular, calcined fire clay base	
Filler			
Binder			
Temperature Range		100°F to 1200°F	
K Factor		500°F – 0.54 max	
Density		11 lb per cu ft	
Compressive Strength		65 lb per sq in. min at 5% deformation	
Manufacturing Process		Machine extruded. Pipe mach cut on diameter	
Resistance to Breakage in Handling	Block must average 3" or greater in drop test per ASTM C 487, tentative method of test for resistance to dropping of preformed block thermal insulation.		
Dimensions		ASTM **	
Other Qualifications		Good mechanical strength with low shrinkage	
The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.			
*Bands are supplied at extra cost. Order must state "without bands" if not required. For 11" IPS and larger there is an additional charge for 2-oz canvas cover. Material should be specifice "without 2-oz canvas" to avoid extra charge.		*Calsilite* The Ruberoid Co	
		Kaylo Owens-Corning Corp	
		Thermobestos Johns-Manville Sales Corp	
**New Simplified Dimensional System sponsored by ASTM			
***Fiber Board Paper Products Corp		*Tricalite* Mundet Cork Corp	
†Codes 104 and 106 are acceptable alternates unless noted on the Project Specifications.		*Caltemp* Pabco Ind Ins Div ***	
†Fittings available in screwed, welded, and sweat types.		*Careytemp*† Philip Carey Mfg Co	
		Thermasil Baldwin-Ehret-Hill, Inc	

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

DUPONT

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DUP 0991171

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REV. JAN 1965 SUP. BY

090757

MATERIAL SPECIFICATION – SERIES 100

152

Code	104		106
Material	Inorganic silicates		Asbestos fiber and sodium silicate
Material Description	Inorganic silicas and asbestos fibers		Compressed fluffy amosite asbestos fiber sprayed with sodium silicate to form a mat containing a minimum of 20% sodium silicate by weight. Asbestos mat is then sprinkled with diatomaceous earth to provide an integral refractory coating
Filler			
Binder			
Temperature Range	100°F to 1800°F		200°F to 1200°F
K Factor	Block – 500°F – 0.58 max		500°F – 0.54 max
Density	Block – 14 lb per cu ft		18 lb per cu ft
Compressive Strength	65 lb per sq in. min at 5% deformation		27 psi at 10%* deformation – dry
Manufacturing Process			Formed and comp on mandrel. Pipe mach cut on dia
Resistance to Breakage in Handling	Block must average 3" or greater in drop test per ASTM C 487, tentative method of test for resistance to dropping of preformed block thermal insulation.		
Dimensions			
Other Qualifications	Good mechanical strength. Shrinkage less than 2% at 1600°F		Formed on a mandrel 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.			
			Unibestos Pittsburgh Corning Corp
	*Kaylo 20** Owens-Corning Corp		
* Min thickness available 1½", also available in pipe covering on special order. * Pipe covering only.			

734

DUP 0991172

Code	110	111	111.1
Material	Vegetable cork	Cellular glass	Cellular glass
Material Description	Vegetable cork, granulated and compressed into cork-board or molded forms, from material of vegetable origin for low and medium temperature insulation.	Cellular glass foamed and fused into unicellular form.	Cellular glass foamed and fused into unicellular form. Factory-applied jacket having white kraft paper outer jacket 50 lb per 3000 sq ft) backed by 0.00035" aluminum foil with fire-resistant adhesive.
Filler			
Binder	Natural resin in cork		
Temperature Range	–200°F to 100°F	–200°F to 100°F (+300°F for dual temp.)	+35°F to +300°F
K Factor	100°F – 0.29 max	100°F – 0.43 max	100°F – 0.43 max
Density	9 – 11 lb per cu ft	10 – 11 lb per cu ft	9 lb per cu ft
Compressive Strength	15 lb per sq in. min	30 lb per sq in. min at 5 percent deformation	30 lb per sq in. min at 5 percent deformation
Manufacturing Process	Machine comp or molded. Baked at moderate temp		
Resistance to Breakage in Handling	Good		
Dimensions			
Other Qualifications	Pipe covering shall be coated on the outside with heavy mastic		

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

	Cork Armstrong C&S Corp	*Foamglas* Pittsburgh Corning Corp	*Foamglas Stay-Dry* Pittsburgh Corning Corp
	Cork Mundet Cork Co		

DUP 0991173

DUP

090759

MATERIAL SPECIFICATION – SERIES 100

124

Code	111.2	111.3	112
Material	Cellular glass	Cellular glass	Glass fiber
Material Description	Cellular glass foamed and fused into unicellular form. Factory applied jacket having 0.00035" aluminum foil outer jacket backed by kraft paper (60 lb per 3000 sq ft)	Cellular glass foamed and fused into unicellular form. Plain – without jacket.	See Codes 112.01 through 112.81.
Filler			
Binder			
Temperature Range	+35°F to +300°F	+35°F to +300°F	
K Factor			
Density	9 lb per cu ft	9 lb per cu ft	
Compressive Strength	30 lb per sq in. min at 5 percent deformation	30 lb per sq in. min at 5 percent deformation	
Manufacturing Process			
Resistance to Breakage in Handling			
Dimensions			
Other Qualifications			
The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.			
	Foamglas Stay-Dry Pittsburgh Corning Corp	*Foamglas Stay-Dry* Pittsburgh Corning Corp	

REV. JUN 1966
DUP 0991174
090760

Code	112.01	112.02	
Material	Glass fiber	See Code 112.01	
Material Description	Textile-type fine glass fiber pipe and fitting insulation, plain, with medium-temperature binder		
Filler			
Binder	Phenol-formaldehyde or Di–Cy		
Temperature Range	80°F to 350°F		
K Factor	100°F – 0.25		
Density	3# and 6## lb per cu ft		
Compressive Strength	Compressive strength and resilience are very low. Inserts are required where pipe is supported by the insulation. Has poor resistance to abuse.		
Resistance to Breakage in Handling	Very good		
Other Qualifications	Specify whether for iron pipe or copper tubing		

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

* Fittings only as follows:

For 125-lb cast iron screwed ells and tees

Size	Thickness
1/2 thru 4	1/2, 1, 1 1/2

For butt-welding long-radius 90° and 45° ells

Size	Thickness
2 thru 6	1/2, 1
2 thru 12	1 1/2, 2

Available factory finished with Code 731 "Hypalon" mastic on request

- *Ultrafine Snap-on — Gustin-Bacon Mfg Co
- *Mono-Kover — Baldwin-Ehret-Hill, Inc
- *Thermoglas — Philip Carey Mfg Co
- **Fiberglas — Owens-Corning Corp
- **Armaglas PF Pipe Insn — Armstrong C&S Corp
- *Micro-Lok — Johns-Manville Sales Corp
- * FIT-rite — Fibrous Glass Products, Inc, Hicksville, NY; Crestwood Ind Park Mountain Top, Pa.
- *Insul-Sure — Insul-Caustic Corp, Mesporth 78, NY
- * PPG Glass Fiber — Pitts Plate Glass Co
- * Superfine — The Ruberoid Co

737

DUPLICATE

DUP 0991175

090761

Code	112.11	112.12	
Material	Glass fiber	See 112.11	
Material Description	Textile type fine glass fiber banded pipe insulation with 45-lb factory-applied roofing felt finish. Code 701 asbestos felt must be used.		
Filler			
Binder	Phenol-formaldehyde or Di-Cy		
Temperature Range	80°F to 350°F		
K Factor	100°F – 0.25		
Density	3" and 6"" lb per cu ft		
Compressive Strength	Compressive strength and resilience are very low. Inserts are required where pipe is supported by the insulation. Has poor resistance to abuse.		
Resistance to Breakage in Handling	Very good		
Dimensions			
Other Qualifications	Specify whether for iron pipe or copper tubing.		
The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.			
* Order must specify finish noted under Material Description.	*Ultrafine Snap-on Gustin-Bacon Mfg Co		
	*Mono-Kover Baldwin-Ehret-Hill, Inc		
	*Thermoglas Philip Carey Mfg Co		
	**Fiberglas Owens-Corning Corp		
	**Armaglas PF Pipe Insn Armstrong C&S Corp		
	Micro-Lok Johns-Manville Sales Corp		
	*PPG Glass Fiber Pitts Plate Glass Co		
	* Superfine The Ruberoid Co		

DUP 0991176
REV. MAR 1965 SUP. BY
890762

Code	112.16	112.17	
Material	Glass fiber	Glass fiber	
Material Description	Textile type fine glass fiber bonded pipe insulation with 4-oz factory-applied canvas finish.	Textile type fine glass fiber bonded pipe insulation with 8-oz factory-applied canvas finish.	
Filler			
Binder	Phenol-formaldehyde or Di-Cy	Phenol-formaldehyde or Di-Cy	
Temperature Range	80°F to 300°F	80°F to 300°F	
K Factor	100°F - 0.25	100°F - 0.25	
Density	3" and 6" lb per cu ft	3" and 6" lb per cu ft	
Compressive Strength	Compressive strength and resilience are very low. Inserts are required where pipe is supported by the insulation. Has poor resistance to abuse.	Compressive strength and resilience are very low. Inserts are required where pipe is supported by the insulation. Has poor resistance to abuse.	
Resistance to Breakage in Handling	Very good	Very good	
Dimensions			
Other Qualifications	Specify whether for iron pipe or copper tubing	Specify whether for iron pipe or copper tubing	
The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.			
	*Ultrafine Snap-on Gustin-Bacon Mfg Co	*Ultrafine Snap-on Gustin-Bacon Mfg Co	
	*Vane-Kover Baldwin-Ehret-Hill, Inc	*Vane-Kover Baldwin-Ehret-Hill, Inc	
	*Thermoglas Philip Carey Mfg Co	*Thermoglas Philip Carey Mfg Co	
	**Fiberglas Owens-Corning Corp	**Fiberglas Owens-Corning Corp	
	**Armaglas PF Pipe Insu Armstrong C&S Corp	**Armaglas PF Pipe Insu Armstrong C&S Corp	
	*Micro-Lok Johns-Manville Sales Corp	*Micro-Lok Johns-Manville Sales Corp	
	*PPG Glass Fiber Pitts Plate Glass Co	*PPG Glass Fiber Pitts Plate Glass Co	
	* Superfine The Ruberoid Co	* Superfine The Ruberoid Co	

739

DUP 0991177

MATERIAL SPECIFICATION – SERIES 100

Code	112.22	
Material	Glass fiber	
Material Description	Preformed pipe covering composed of glass fibers bonded together by inert thermosetting resin with factory-applied 35-lb minimum per 3000 sq ft white bleached kraft paper, laminated to 0.0007" aluminum foil by fire-retardant adhesive (moisture vapor transmission rate shall not exceed 0.015 perms – wet cup test) and reinforced by glass threads in both directions, maximum spacing 1/4". Finish includes lap 2", ± 1/4", long and butt strips 4", ± 1/4", wide. Paper to be creped or embossed sufficiently to conceal wrinkles without requiring excessive lap adhesive to make a tight seal. Type A – one-piece Type B – two-piece	
Filler		
Binder	Phenol-formaldehyde or Di-Cy	
Temperature Range	40°F to 250°F	
K Factor	100°F – 0.25, 250°F – 0.33	
Density	Type A – 3 lb per cu ft min Type B – 6 lb per cu ft min	
Compressive Strength*	Compressive strength and resilience are very low. Inserts are required where pipe is supported by insulation. Type B has more resistance to abuse than Type A.	
Resistance to Breakage in Handling	Very good	
Dimensions	3-ft sections Type A – 1/2", 3/4", 1", 1 1/2", 2", 2 1/2", and 3" thick Type B – 1/2", 1", 1 1/2", 2", and 2 1/2" thick	
Other Qualifications	Specify whether for iron pipe or copper tubing. Weather protection is required for outside service.	
The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.		
	Ultrafine Snap-on (Type A) Gustin-Bacon Mfg Co	
	Mono-Kover (Type A) Baldwin-Ehret-Hill, Inc	
	Fiberglas (Type A and Type B) Owens-Corning Corp	
	Armaglas PF Pipe Insulation (Type A and Type B) Armstrong C&S Corp	
	Micro-Lok (Type A) Johns-Manville Sales Corp	
	PPG Glass Fiber (Type A) Pittsburgh Plate Glass Co	
	Superfine (Type A) The Ruberoid Co	
	Thermaglas (Type A) Philip Carey Mfg Co	

DUPONT

DUP 0991178
090764

Code	112.61		
Material	Glass fiber		
Material Description	Plain semi-rigid board, formed from fibrous glass or mineral fibers.		
Filler			
Binder	Phenol-formaldehyde		
Temperature Range	40°F to 350°F		
K Factor	100°F – 0.25 to 0.30		
Density	6 and 9 lb per cu ft		
Compressive Strength	Compressive strength and resilience are very low. Inserts are required where pipe is supported by the insulation. Has poor resistance to abuse.		
Resistance to Breakage in Handling	Very good		
Dimensions	Std 24" x 48" Thickness PF615 (6-lb density) 1/2" through 3". PF617 (9-lb density), 1/2" through 2 1/4".		

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

	Fiberglas PF615 or 617 Insulation Owens-Corning Corp		
	Armaglas PF Insulation Armstrong C&S Corp		
	Spintex No. 414 or 415 Johns-Manville Sales Corp		
	E-2 Ply Duct Insulation Baldwin-Ehret-Hill, Inc		

DUP 091179

090765

SN 100 M

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MATERIAL SPECIFICATION – SERIES 100

OCTOBER 1954

Rev April 1963

Code	112.71		112.81
Material	Glass fiber		Glass fiber
Material Description	Bonded board insulation formed from fibrous glass or mineral fibers, with asphalt and kraft paper vapor-barrier finish.		Bonded acoustical board formed from fibrous glass or mineral fibers with a thin neoprene compound on one surface.
Filler			
Binder	Phenol-formaldehyde		Phenol-formaldehyde
Temperature Range	40°F to 150°F		40°F to 150°F
K Factor	100°F – 0.26		100°F – 0.26
Density	3 and 6 lb per cu ft		6 lb per cu ft
Compressive Strength			
Manufacturing Process	Machine molded		Machine molded
Resistance to Breakage in Handling	Very good		Very good
Dimensions	24" x 48" boards 3/4" to 2" thickness		24" x 48" boards 5/8" to 2" thickness
Other Qualifications	Higher density material is more resistant to abuse		Neoprene coating on side of board exposed to air flow
The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.			
* 3-lb density. High-density outer layers.	*Fiberglas Vapor Seal Duct Insu* Owens-Corning Corp		*Fiberglas Coated Duct Insu* Owens-Corning Corp
	Armaglas Vapor Seal Duct Insu Armstrong C&S Corp		*Armaglas Coated Duct Insu* Armstrong C&S Corp
	Spintex No. 414VS Johns-Manville Sales Corp		*Coated Duct Insulation* Baldwin-Ehret-Hill, Inc
	E-Z Ply Duct Insu Baldwin-Ehret-Hill, Inc		
	*Fiberglass Board** Gustin-Bacon Mfg Co		

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DUP 0991180

090766

155

Code		114	
Material		Mineral wool (Block only)	
Material Description		Mineral slag wool	
Filler			
Binder		High temp binder	
Temperature Range		500°F to 1700°F	
K Factor		500°F - 0.45 max	
Density		19.2 lb per cu ft	
Compressive Strength		12 lb per sq in.	
Manufacturing Process		Machine molded	
Resistance to Breakage in Handling		Good	
Dimensions			
Other Qualifications			

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

	PV Supertemp Eagle-Picher	
	Mono-Block Baldwin-Ehret-Hill, Inc	
	Armasamp Armstrong C&S Corp	
	M W Block M. H. Detrick Co	

REV. ___ SUP. BY ___

DUP 0991181

890767

136

Code	118
Material	Urethane Foam, Rigid
Material Description	Preformed rigid urethane foam block, pipe, and fitting insulation manufactured with polyester or polyether resins with fluorocarbon blowing agent
Temperature Range	-270°F to +150°F
K Factor	0.17 max at 75°F
Density	1.7 to 2.5 lb per cu ft
Compressive Strength	Min 30 psi at 6.6% deformation, measured parallel to the direction in which the foam rose during manufacture or min 24 psi at 6.6% deformation in all directions
Manufacturing Process	Molded or cut from molded billet
Resistance to Breakage in Handling	Excellent
Dimensional Tolerances	Inside Diameter (In.)

Pipe Size of Insulation ID (In.)	Minimum Diameter (In.)	Maximum Diameter (In.)
1/2 - 6	IPS OD	IPS OD + 1/16
7 - 12	IPS OD	IPS OD + 1/8
14 and up	IPS OD + 1/16	IPS OD + 3/16

Outside Diameter (In.)

Pipe Size of Insulation OD (In.)	Minimum Diameter (In.)	Maximum Diameter (In.)
1/2 - 6	IPS OD - 1/8	IPS OD - 1/16
7 - 12	IPS OD - 1/8	IPS OD
14 and up	IPS OD - 1/16	IPS OD + 1/16

All other dimensions to be ± 1/16" including straightness and squareness

Other Qualifications	Uniform cell structure with max 10% open cells. No voids having any dimensions exceeding 1/4". Heat 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 60 when coated with PVA mastic 3/32" dry thickness reinforced by 10 x 10 mesh glass cloth, 10 lb per 100 sq yd. Water absorption max 2% by volume into a 2" x 2" x 1" skin-free piece immersed in water just under the surface for 5 days

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

U-200 Unarco Industries
Zerocel NB200 National Gypsum
744

DUP 0991182

098768

Code	120		
Material	Polystyrene		
Material Description	Preformed rigid cellular polystyrene block, pipe, and fitting insulation.		
Filler			
Binder			
Temperature Range	-100°F to +160°F		
K Factor	0.29 max at 75°F		
Density	1.7 to 2.3		
Compressive Strength	Min 20 lb per sq in. at 10% deformation		
Manufacturing Process	Cut from molded logs		
Resistance to Breakage in Handling	Excellent		
Dimensions	+ 1/16" - 0" on insulation ID, all other dimensions to be ± 1/16" including straightness and squareness		
Other Qualifications	Uniform cell structure with max 10% open cells. No voids having any dimensions exceeding 1/4". No distortion or volume change, or loss of compressive strength after exposure at 160°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.		
The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.			
	Styrofoam 33 MMM Co, Houston, Texas		
	Styrofoam 33 Tufflite Plastics, Inc		

DUP 0991183

090769

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MATERIALS

MATERIAL SPECIFICATION SERIES 100 PREFORMED BLOCK AND PIPE

THERMAL INSULATION STANDARD ENGINEERING SPECIFICATION

ISSUED OCT 1954
REVISED FEB 1964

SH 100 M
Page 1 of 13

Code		102* †	
Material		Calcium silicate	
Material Description		Steam, cellular, calcined fire clay base	
Filler			
Binder			
Temperature Range		100°F to 1200°F	
K Factor		500°F – 0.54 max	
Density		11 lb per cu ft	
Compressive Strength		65 lb per sq in. min at 5% deformation	
Manufacturing Process	none	Machine extruded. Pipe mech cut on diameter	
Resistance to Breakage in Handling	Block must average 3" or greater in drop test per ASTM C 487, tentative method of test for resistance to dropping of preformed block thermal insulation.		
Dimensions		ASTM **	
Other Qualifications		Good mechanical strength with low shrinkage	

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

	Calsilite The Ruberoid Co	
	Kaylo Owens-Corning Corp	
	Thermobestos Johns-Manville Sales Corp	
	Kaytherm Keasbey & Mattison Co	
	Tricalite Mundet Cork Corp	
	Calsomp Pabco Ind Ins Div ***	
	Careytemp † Philip Carey Mfg Co	
	Thermasil Baldwin-Ehret-Hill, Inc	

*Bands are supplied at extra cost. Order must state "without bands" if not required.

For 11" 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.

**New Simplified Dimensional System sponsored by ASTM

***Fiber Board Paper Products Corp

† Codes 104 and 106 are acceptable alternates unless noted on the Project Specifications.

†Fittings available in screwed, welded, and sweat types.

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

SUBCOMMITTEE NO. 10

R-308

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REV. OCT 1964 SUP. KY

DUP 0990519

848546

Code	104		106
Material	Inorganic silicates		Asbestos fiber and sodium silicate
Material Description	Inorganic silicas and asbestos fibers		Compressed fluffy amosite asbestos fiber sprayed with sodium silicate to form a mat containing a minimum of 20% sodium silicate by weight. Asbestos mat is then sprinkled with diatomaceous earth to provide an integral refractory coating
Filler			
Binder			
Temperature Range	100°F to 1800°F		200°F to 1200°F
K Factor	Block - 500°F - 0.58 max		500°F - 0.54 max
Density	Block - 14 lb per cu ft		18 lb per cu ft
Compressive Strength	65 lb per sq in. min at 5% deformation		27 psi at 10%* deformation - dry
Manufacturing Process			Formed and cured on mandrel. Pipe mech cut on die
Resistance to Breakage in Handling	Block must average 3" or greater in drop test per ASTM C 487, tentative method of test for resistance to dropping of preformed block thermal insulation.		
Dimensions			
Other Qualifications	Good mechanical strength. Shrinkage less than 2% at 1600°F		Formed on a mandrel 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.			
			Unibestos Pittsburgh Corning Corp
	Kaylo 20* Owens-Corning Corp		
* Min thickness available 1½", else available in pipe covering on special order. * Pipe covering only.			

DUP 0990520