MATERIALS

MATERIAL SPECIFICATION
SERIES 100
PREFORMED BLOCK AND PIPE

THERMAL INSULATION
STANDARD ENGINEERING SPECIFICATION

ISSUED OCT 1954
REVISED JUNE 1962

SN 100 M
Page 1 of 15

Code	101*	102**	103
Material	85% Magnesia	Calcium silicate	Diatomaceous ear-
Material Description	Hydrated basic magnesium carbonate 80% by weight minimum	Staple, cellular, calcined fire clay base	Diatomaceous earth, asbestos fiber, with bent clay and cementing materials
Filler	Asbestos or glass fiber		
Binder	Clay or other cementing materials 5% by weight		
Temperature Range	100°F to 500°F	100°F to 1200°F	500°F to 1800°F
K Factor	200°F - 0.4, 500°F - 0.5	500°F - 0.54 max	500°F - 0.77 max
Density	11-14 lb per cu ft	11 lb per cu ft	24-27 lb per cu ft
Compressive Strength			
Manufacturing Process	Machine molded or extru. Pipe mach cut on diameter	Machine extruded. Pipe mach cut on diameter	Machine molded. Pipe mac: 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 ***	ASTM ***	To Specification
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-ea canvas cover. Material should be specified "without 2-ea canvas" to avoid extra charge.	*85% Mag* Philip Carey Mfg Co	*Calcilite* The Ruberoid Co	*High Temp No. 19* Philip Carey Mfg Co
	Thermalite 85% Baldwin-Ehret-Hill, Inc	*Kaylo* Owens-Corning Corp	*Endure Hi-Temp* Baldwin-Ehret-Hill, Inc
	85% Mag Johns-Manville Sales Corp	*Thermobestos* Johns-Manville Sales Corp	*J/M Superex* Johns-Manville Sales Corp
		Kaytherm Keasbey & Mattison Co	*High Temp* Keasbey & Mattison Co
**New Simplified Dimensional System sponsored by ASTM	*Featherweight* Keasbey & Mattison Co	*Tricalite* Mundet Cork Corp	
***Fiber Board Paper Products Corp	*85% Mag* Mundet Cork Corp	*Calsamp* Pabco Ind Ins Div ****	
* Codes 104 and 106 are accessible elsewhere unless noted on the Project Specifications.	*Precision-molded* Pabco Ind Ins Div ****	*Caroytemp* Philip Carey Mfg Co	

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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Code	104		106
Material	Inorganic silicates		Asbestos and diatomaceous earth molded
Material Description	Inorganic silicas and asbestos fibers		Compressed fluffy asbestos sprayed with sodium silicate and diatomaceous earth sprinkled on the asbestos mat. External finish consists of an integral refractory coating*
Filler			
Binder			
Temperature Range	100°F to 1600°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		11 PSI at 5% deformation - Dry
Manufacturing Process			Formed and wrap on mandrel. Pipe mech cut or 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.			
			Unibestos Union Asbestos & Rubber Co
	Kaylo 20 Block *** Owens-Corning Corp		

* Available for field mixing to repair joints and seams.

** Max temp of *Kaylo 20* is 1800°F

*** Min thickness available 1 1/2"

DUP 0990052

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MATERIALS

MATERIAL SPECIFICATION SERIES 100 PREFORMED BLOCK AND PIPE

THERMAL INSULATION STANDARD ENGINEERING SPECIFICATION

ISSUED OCT 1954

REVISED JUNE 1962

SN 100 M

Code -	101*	102**	103
Material	85% Magnesia	Calcium silicate	Diatomaceous earth
Material Description	Hydrated basic magnesium carbonate 80% by weight minimum	Staple, cellular, calcined fire clay base	Diatomaceous earth, asbestos fiber, with bond clay and cementing materials
Filler	Asbestos or glass fiber		
Binder	Clay or other cementing materials 5% by weight		
Temperature Range	100°F to 500°F	100°F to 1200°F	500°F to 1800°F
K Factor	200°F – 0.4, 500°F – 0.5	500°F – 0.56 max	500°F – 0.77 max
Density	11–14 lb per cu ft	11 lb per cu ft	24–27 lb per cu ft
Compressive Strength			
Manufacturing Process	Machine molded or extru. Pipe mech cut on diameter	Machine extruded. Pipe mech cut on diameter	Machine molded. 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 ***	ASTM ***	To Specification
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.

85% Mag Philip Carey Mfg Co	*Calsilite* The Ruberoid Co	*High Temp No. 19* Philip Carey Mfg Co
Thermalite 85% Baldwin-Ehret-Hill, Inc	*Kaylo* Owens-Corning Corp	*Endure Hi-Temp* Baldwin-Ehret-Hill, Inc
85% Mag Johns-Manville Sales Corp	*Thermobestos* Johns-Manville Sales Corp	*I/M Superex* Johns-Manville Sales Corp
	Kaytherm Keasbey & Mattison Co	*High Temp* Keasbey & Mattison Co
Featherweight Keasbey & Mattison Co	*Tricalite* Mundet Cork Corp	
85% Mag Mundet Cork Corp	*Calsetemp* Pabco Ind Ins Div ****	
Pressure-molded Pabco Ind Ins Div ****	*Careytemp* Philip Carey Mfg Co	

*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.

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

SUBCOMMITTEE NO. 28

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DUP 0990156

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MATERIAL SPECIFICATION - SERIES 100

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Code	104		106
Material	Inorganic silicates		Asbestos and diatomaceous earth molded
Material Description	Inorganic silicas and asbestos fibers		Compressed fluffy asbestos sprayed with sodium silicate and diatomaceous earth sprinkled on the asbestos mat. External finish consists of an integral refractory coating*
Filler			
Binder			
Temperature Range	100°F to 1600°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		11 PSI at 5% deformation - Dry
Manufacturing Process			Formed and cama 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 mandril to a predetermined wt. Pressed to obtain the desired density, and baked.
The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.			
			Unibestos Union Asbestos & Rubber Co
	Kaylo 20 Block *** Owens-Corning Corn		

* Available for field mixing to repair joints and seams.

** Max temp of Kaylo 20 is 1800°F

*** Min thickness available 1 1/2"

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MATERIALS

MATERIAL SPECIFICATION SERIES 100 PREFORMED BLOCK AND PIPE

THERMAL INSULATION
STANDARD ENGINEERING SPECIFICATION

ISSUED	OCT 1954	SH 100 M
REVISED	JUNE 1962	Page 1 of 15

Code	101*	102*♦	103
Material	85% Magnesia	Calcium silicate	Diatomaceous ear[th]
Material Description	Hydrated basic magnesium carbonate 80% by weight minimum	Staple, cellular, calcined fire clay base	Diatomaceous earth, asbestos fiber, with ba[ll] clay and cementing materials
Filler	Asbestos or glass fiber		
Binder	Clay or other cementing materials 5% by weight		
Temperature Range	100°F to 500°F	100°F to 1200°F	500°F to 1800°F
K Factor	200°F – 0.4, 500°F – 0.5	500°F – 0.54 max	500°F – 0.77 max
Density	11–14 lb per cu ft	11 lb per cu ft	24–27 lb per cu ft
Compressive Strength			
Manufacturing Process	Machine molded or extru. Pipe mach cut on diameter	Machine extruded. Pipe mach cut on diameter	Machine molded. Pipe ma[ch] 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 **	ASTM **	To Specification
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.

Notes	101	102	103
*Bands are supplied at extra cost. Order must state "without bands" if not required.	*85% Mag* Philip Carey Mfg Co	*Calsilite* The Ruberoid Co	*High Temp No. 19* Philip Carey Mfg Co
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.	*Thermalite 85%* Baldwin-Ehret-Hill, Inc	*Kaylo* Owens-Corning Corp	*Endure Hi-Temp* Baldwin-Ehret-Hill, Inc
	85% Mag Johns-Manville Sales Corp	*Thermobestos* Johns-Manville Sales Corp	*J/M Superex* Johns-Manville Sales Corp
		Kaytherm Keasbey & Mattison Co	*High Temp* Keasbey & Mattison
**New Simplified Dimensional System sponsored by ASTM	*Featherweight* Keasbey & Mattison Co	*Triculite* Mundet Cork Corp	
***Fiber Board Paper Products Corp	*85% Mag* Mundet Cork Corp	*Calsamp* Pabco Ind Ins Div ***	
♦ Codes 104 and 106 are acceptable alternates unless noted on the Project Specifications.	*Precision-molded* Pabco Ind Ins Div ***	*Careytemp* Philip Carey Mfg Co	

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. 10

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MATERIALS

MATERIAL SPECIFICATION SERIES 100 PREFORMED BLOCK AND PIPE

THERMAL INSULATION STANDARD ENGINEERING SPECIFICATION

ISSUED OCT 1954

REVISED JUNE 1962

SN 100 M

Page 1 of 15

Code.	101*	102**	103
Material	85% Magnesia	Calcium silicate	Diatomaceous ear
Material Description	Hydrated basic magnesium carbonate 80% by weight minimum	Staple, cellular, calcined fire clay base	Diatomaceous earth, asbestos fiber, with bo clay and cementing materials
Filler	Asbestos or glass fiber		
Binder	Clay or other cementing materials 5% by weight		
Temperature Range	100°F to 500°F	100°F to 1200°F	500°F to 1800°F
K Factor	200°F – 0.4, 500°F – 0.5	500°F – 0.54 max	500°F – 0.77 max
Density	11–14 lb per cu ft	11 lb per cu ft	24–27 lb per cu ft
Compressive Strength			
Manufacturing Process	Machine molded or extru. Pipe mach cut on diameter	Machine extruded. Pipe mach cut on diameter	Machine molded. Pipe mac 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 ***	ASTM ***	To Specification
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.

	85% Mag Philip Carey Mfg Co	Calcilite The Ruberoid Co	High Temp No. 19 Philip Carey Mfg Co
	Thermalite 85% Baldwin-Ehret-Hill, Inc	Kaylo Owens-Corning Corp	Endure Hi-Temp Baldwin-Ehret-Hill, Inc
	85% Mag Johns-Manville Sales Corp	Thermobestos Johns-Manville Sales Corp	J/M Superex Johns-Manville Sales Corp
		Keytherm Keasbey & Mattison Co	High Temp Keasbey & Mattison
	Featherweight Keasbey & Mattison Co	Trialite Mundet Cork Corp	
	85% Mag Mundet Cork Corp	Calsamp Pabco Ind Ins Div ****	
	Precision-molded Pabco Ind Ins Div ****	Careysamp Philip Carey Mfg Co	

*Bands are supplied on 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.

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

SUPERSEDES SPEC. NO. 35

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DUP 0990358

MATERIAL SPECIFICATION - SERIES 100

OCTOBER 1954
Rev June 1962

Code	104		106
Material	Inorganic silicates		Asbestos and diatomaceous earth molded
Material Description	Inorganic silicas and asbestos fibers		Compressed fluffy asbestos sprayed with sodium silicate and diatomaceous earth sprinkled on the asbestos mat. External finish consists of an integral refractory coating*
Filler			
Binder			
Temperature Range	100°F to 1600°F**		200°F to 1200°F
K Factor	Block - 500°F - 0.58 max		300°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		11 PSI at 5% 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 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.

			Unibestos Union Asbestos & Rubber Co
	Kaylo 20 Block *** Owens-Corning Corp		

* Available for field mixing to repair joints and seams.

** Max temp of *Kaylo 20* is 1800°F

*** Min thickness available 1/2"

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MATERIALS

MATERIAL SPECIFICATION SERIES 100 PREFORMED BLOCK AND PIPE

THERMAL INSULATION STANDARD ENGINEERING SPECIFICATION

ISSUED OCT 1954

REVISED JUNE 1962

SH 100 M

Code -	101*	102**	103
Material	85% Magnesia	Calcium silicate	Diatomaceous earth
Material Description	Hydrated basic magnesium carbonate 80% by weight minimum	Steple, cellular, calcined fire clay base	Diatomaceous earth, asbestos fiber, with some clay and cementing materials
Filler	Asbestos or glass fiber		
Binder	Clay or other cementing materials 5% by weight		
Temperature Range	100°F to 500°F	100°F to 1200°F	500°F to 1800°F
K Factor	200°F - 0.4, 500°F - 0.5	500°F - 0.54 max	500°F - 0.77 max
Density	11-14 lb per cu ft	11 lb per cu ft	24-27 lb per cu ft
Compressive Strength			
Manufacturing Process	Machine molded or extru. Pipe mach cut on diameter	Machine extruded. Pipe mach cut on diameter	Machine molded. Pipe mac. 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 ***	ASTM ***	To Specification
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.

85% Mag Philip Carey Mfg Co	*Calsilite* The Ruberoid Co	*High Temp No. 19* Philip Carey Mfg Co
Thermalite 85% Baldwin-Ehret-Hill, Inc	*Kaylo* Owens-Corning Corp	*Enduro Hi-Temp* Baldwin-Ehret-Hill, Inc
85% Mag Johns-Manville Sales Corp	*Thermobestos* Johns-Manville Sales Corp	*J/M Superex* Johns-Manville Sales Corp
	Kaytherm Keasbey & Mattison Co	*High Temp* Keasbey & Mattison
Featherweight Keasbey & Mattison Co	*Trialite* Mundet Cork Corp	
85% Mag Mundet Cork Corp	*Calsamp* Pabco Ind Ins Div ****	
Pressure-molded Pabco Ind Ins Div ****	*Careytemp* Philip Carey Mfg Co	

*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

**** Pabco Ind Ins Div

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

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. 16

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MATERIALS

MATERIAL SPECIFICATION SERIES 100 PREFORMED BLOCK AND PIPE

THERMAL INSULATION STANDARD ENGINEERING SPECIFICATION

ISSUED OCT 1954

REVISED JUNE 1962

SN 100 M

Code	101*	102* ◊	103
Material	85% Magnesia	Calcium silicate	Diatomaceous earth
Material Description	Hydrated basic magnesium carbonate 80% by weight minimum	Stable, cellular, calcined fire clay base	Diatomaceous earth, asbestos fiber, with bonding clay and cementing materials
Filler	Asbestos or glass fiber		
Binder	Clay or other cementing materials 5% by weight		
Temperature Range	100°F to 500°F	100°F to 1200°F	500°F to 1800°F
K Factor	200°F – 0.4, 500°F – 0.5	500°F – 0.54 max	500°F – 0.77 max
Density	11–14 lb per cu ft	11 lb per cu ft	24–27 lb per cu ft
Compressive Strength			
Manufacturing Process	Machine molded or extru. Pipe mach cut on diameter	Machine extruded. Pipe mach cut on diameter	Machine molded. 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 **	ASTM **	To Specification
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.

	85% Mag Philip Carey Mfg Co	*Calcilite* The Ruberoid Co	*High Temp No. 19* Philip Carey Mfg Co
	Thermalite 85% Baldwin-Ehret-Hill, Inc	*Kaylo* Owens-Corning Corp	*Enduro Hi-Temp* Baldwin-Ehret-Hill, Inc
	85% Mag Johns-Manville Sales Corp	*Thermobestos* Johns-Manville Sales Corp	*J/M Superex* Johns-Manville Sales Corp
		Kaytherm Keasbey & Mattison Co	*High Temp* Keasbey & Mattison
	Featherweight Keasbey & Mattison Co	*Tricalite* Mundet Cork Corp	
	85% Mag Mundet Cork Corp	*Caltemp* Pabco Ind Ins Div ***	
	Precision-molded Pabco Ind Ins Div ***	*Careytemp* Philip Carey Mfg Co	

"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.

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

SUBCOMMITTEE NO. 25

601

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SM 100 M — OCTOBER 1954

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92

Code	104		106
Material	Inorganic silicates		Asbestos and diatomaceous earth molded
Material Description	Inorganic silicas and asbestos fibers		Compressed fluffy asbestos sprayed with sodium silicate and diatomaceous earth sprinkled on the asbestos mat. External finish consists of an integral refractory coating*
Filler			
Binder			
Temperature Range	100°F to 1600°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		11 PSI at 5% deformation – Dry
Manufacturing Process			Formed and cure 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 prefabricated block thermal insulation.		
Dimensions			
Other Qualifications	Good mechanical strength. Shrinkage less than 2% at 1600°F		Formed on a mandril to a predetermined wt. Pressed to obtain the desired density, and baked.

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

			Unibestos Union Asbestos & Rubber Co
	Kaylo 20 Block *** Owens-Corning Corp		

* Available for field mixing to repair joints and seams.

** Max temp of *Kaylo 20* is 1800°F

*** Min thickness available 1 1/2"

602

DUP 0991040

090626

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

Rev Sept 1961 — Page 3

Code	107	108	109
Material	Asbestos sponge		Corrugated asbestos preshrunk
Material Description	Asbestos sheets separated by finely ground sponged material banded with adhesive strips.		Alternate layers of plain and corrugated asbestos sheets. Outer covering asbestos felt.
Filler			
Binder			
Temperature Range	100°F to 700°F		100°F to 400°F
K Factor	500°F - 0.60 max		200°F - 0.58 max
Density	30 lb max		
Compressive Strength			
Manufacturing Process	Laminated - 38 to 42 layers per in. of thickness		3-ply laminate
Resistance to Breakage in Handling	Very good		Good
Dimensions	To Specification		
Other Qualifications	Must be a flexible product		Preshrunk
The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.			
* *Aircell* —4-ply *Excel* —6-ply *Cavacel*—8-ply			*Preshrunk Asbestocel* Johns-Manville Sales Corp
	Asbestos Sponge Philip Carey Mfg Co		*Aircell* * Philip Carey Mfg Co
	Sponge Felt The Ruberoid Co		*K & M - Aircell* Keasbey & Mattison Co
	Sponge Felt Baldwin-Ehret-Hill, Inc		*B-H Aircell* Baldwin-Ehret-Hill, Inc
	Sponge Felt Smith and Kanzler Corp		

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603

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090627

MATERIAL SPECIFICATION - SERIES 100

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	100 lb per sq in. min	100 lb per sq in. min
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 CAS Core	*Foamglas* Pittsburgh Corning Corp	*Foamglas Stay-Dry* Pittsburgh Corning Corp
Cork Mundet Cork Co		

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	100 lb per sq in. min	100 lb per sq in. min	
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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090629

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	*Ultrafine Snap-on Gustin-Bacon Mfg Co		
	*Mono-Kover Baldwin-Ehret-Hill, Inc		
	*Thermaglas 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-Coustic Corp Maspeth 78, NY		
	* PPG Glass Fiber Pitts Plate Glass Co		
	* Superfine The Ruberoid Co		

KK LL MM

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 30-lb factory-applied asbestos roofing felt finish on sizes 6" and smaller and 45-lb asbestos felt on sizes above 6" outside diameter.		
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, 30-lb felt used up to 6" OD of insulation		

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. † Asbestos felt must be Code 701	*Ultrafine Snap-on Gustin-Bacon Mfg Co		
	*Mono-Kover Baldwin-Ehret-Hill, Inc		
	*Thermaglas 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		

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 Insn Armstrong C&S Corp	**Armaglas PF Pipe Insn 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

JJ KK

MATERIAL SPECIFICATION - SERIES 100

Code	112.21	112.22	112.23
Material		Glass fiber	Glass fiber
Material Description		Textile type fine glass fiber bonded pipe insulation with white factory-applied aluminum laminate vapor-barrier finish per Code 723.1.	Textile type fine glass fiber bonded pipe insulation with factory-applied 60 lb per 3000 sq ft white bleached kraft paper, laminated to 0.0007" aluminum foil with fire-retardant adhesive (moisture-vapor transmission rate shall not exceed 0.015 perms - wet cup test) and reinforced with glass fiber mesh 1/4" x 1/8".
Filler			
Binder		Phenol-formaldehyde or Di-Cy	Phenol-formaldehyde
Temperature Range		40°F to 200°F	100°F to 250°F
K Factor		100°F - 0.25	100°F - 0.25
Density		3° and 6°° lb per cu ft	3 lb per cu ft min
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			1/2 and 3/4 thick 3 ft sections
Other Qualifications		Specify whether for iron pipe or copper tubing. Weather protection is required for outside service.	Low cost insulation for limited services such as hot water.

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

	*Ulrafine Snap-on Gustin-Bacon Mfg Co	*Flame-Retardant Jacket (FRJ) Owens-Corning Corp
	*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 Pittsburgh Plate Glass Co	
	*Superfine The Ruberoid Co	

Code	112.61		112.66
Material	Glass fiber		Glass fiber
Material Description	Plain semi-rigid board, formed from fibrous glass or mineral fibers.		Short, coarse steam-blown glass fibers preformed into semirigid board, sanded on one side and cut into lagging sizes for ease of application to curved surfaces.
Filler			
Binder	Phenol-formaldehyde		Phenol-formaldehyde
Temperature Range	40°F to 350°F		40°F to 350°F
K Factor	100°F – 0.25 to 0.30		100°F – 0.25
Density	6 and 9 lb per cu ft		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.		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	Std 24" x 48" Thickness PF615 (6-lb density) 1/2" through 3". PF617 (9-lb density), 1/2" through 2 1/4".		Length – 36" Width – 6" or 12" Thickness – 3/4", 1", 1 1/4", 1 1/2", and 2".

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		*Fiberglas Block Insulation* Owens-Corning Corp
			Armaglas Block Insulation Armstrong C&S Corp
	Armatemp Spun Tool Duct – Plain Armstrong C&S Corp		
	Spintex No. 414 or 415 Johns-Manville Sales Corp		
	Spunduct Baldwin-Ehret-Hill, Inc		

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	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			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.			
	Fiberglas Vapor Seal Duct Insu Owens-Corning Corp		*Fiberglas Coated Duct Insu* Owens-Corning Corp
	Armasemp Spun Wool Duct – Faced VB Armstrong C&S Corp		*Armasemp Spun Wool Duct – Coated* Armstrong C&S Corp
	Spinsex No. 414VS Johns-Manville Sales Corp		*Coated Duct Insulation* Baldwin-Ehret-Hill, Inc
	Spunduct Baldwin-Ehret-Hill, Inc		

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 Supersamp Eagle-Picher	*Rock Cork* Johns-Manville Sales Corp
	Mono-Block Baldwin-Ehret-Hill, Inc	*Mineral Wool Board* Armstrong C&S Corp
	Armasamp Armstrong C&S Corp	*Koldboard* Baldwin-Ehret-Hill, Inc
	M W Block M. H. Detrick Co	

KELLMAN

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Code	116	117	
Material		Urethane Foam Resilient	
Material Description		See Codes 117.1 through 117.5.	
Filler			
Binder			
Temperature Range			
K Factor			
Density			
Compressive Strength			
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.

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Code	117.1	117.3	
Material	Urethane Foam Resilient	Urethane Foam Resilient	
Material Description	Preformed resilient urethane snap-on foam pipe insulation manufactured with Du Pont "Hylene" and polyester or polyether resins	Preformed resilient urethane snap-on foam pipe insulation manufactured with Du Pont "Hylene" and polyester or polyether resins and kraft aluminum factory-applied vapor-barrier jacket incorporating a fire-snuff adhesive	
Filler			
Binder			
Recommended Service Temperature Range	45°F to 150°F	45°F to 150°F	
K Factor	0.27 max at 75°F	0.27 max at 75°F	
Density	2 to 4 lb per cu ft	2 to 4 lb per cu ft	
Compressive Strength	Min 0.25 psi at 25% deformation measured parallel to the direction in which the foam rose during manufacture		
Manufacturing Process	Molded and stabilized dimensionally	Molded and stabilized dimensionally	
Resistance to Breakage in Handling	Excellent	Excellent	
Dimensions	$+\frac{1}{16}^{\circ}_{\circ} - 0^{\circ}$ on insulation ID, all others to be accurate to $\pm\frac{1}{16}$		
Other Qualifications	Uniform cell structure. No voids with any dimension exceeding 3/8	Uniform cell structure. No voids with any dimension exceeding 3/8	

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

Flexfoam Delaware Ins Co	*Flexfoam* Delaware Ins Co	
Thermax Am. Cellular Products, Inc		

DUP 0931052

090638

MATERIAL SPECIFICATION – SERIES 100

Code	117.6	118	
Material	Urethane Foam Resilient	Urethane Foam Rigid	
Material Description	Preformed resilient urethane foam pipe and fitting insulation manufactured from polyether resin and Du Pont "Hylene" and factory-applied jacket consisting of glass skrim bonded between 1 mil aluminum foil and 1 mil "Tesler"	Preformed rigid urethane foam block, pipe, and fitting insulation manufactured with Du Pont "Hylene" and polyester or polyether resins	
Filler			
Binder			
Recommended Service Temperature Range	45°F to 150°F	−100°F to +150°F	
K Factor	0.27 max at 75°F	0.17 max at 75°F	
Density	2 to 4 lb per cu ft	1½ 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 and stabilized dimensionally	Molded or cut from molded billet	
Resistance to Breakage in Handling	Excellent	Excellent	
Dimensions	+1/16" – 0" on insulation ID, all others to be accurate to ±1/16"	+1/16" – 0" on insulation ID, all other dimensions to be ±1/16" including straightness and squareness	
Other Qualifications	Uniform cell structure. No voids with any dimension exceeding 3/8"	Uniform cell structure with max 10% open cells. No voids having any dimensions exceeding 1/4". 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.

* Pipe covering only ** Block only	*Flexifoam* Delaware Ins Co	*U-200* Union Asbestos & Rubber Co	
		*Gem Foam** Baldwin-Ehret-Hill Co	
		Exp Plastic Qd195.2 ** The Dow Chemical Co	
		*Foam*** Pittsburgh Corning Corp	

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MATERIAL SPECIFICATION - SERIES 100

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Code	120		
Material	Polystyrene		
Material Description	Preformed rigid cellular polystyrene block, pipe, and fitting insulation.		
Filler			
Binder			
Recommended Service 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 [illegible]		
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 to 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 Dow Chemical Co		
	Tuff-Lite Tuff-Lite Plastics, Inc		

DUP 0991054

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MATERIALS **MATERIAL SPECIFICATION SERIES 100 PREFORMED BLOCK AND PIPE**	**THERMAL INSULATION STANDARD ENGINEERING SPECIFICATION**	
	ISSUED OCT 1954 REVISED JUNE 1962	SN 100 M Page 1 of 15

Code	101*	102**	103
Material	85% Magnesia	Calcium silicate	Diatomaceous earth
Material Description	Hydrated basic magnesium carbonate 80% by weight minimum	Staple, cellular, calcined fire clay base	Diatomaceous earth, asbestos fiber, with bonding clay and cementing materials
Filler	Asbestos or glass fiber		
Binder	Clay or other cementing materials 5% by weight		
Temperature Range	100°F to 500°F	100°F to 1200°F	500°F to 1800°F
K Factor	200°F – 0.4, 500°F – 0.5	500°F – 0.54 max	500°F – 0.77 max
Density	11–14 lb per cu ft	11 lb per cu ft	24–27 lb per cu ft
Compressive Strength			
Manufacturing Process	Machine molded or extru. Pipe mach cut on diameter	Machine extruded. Pipe mach cut on diameter	Machine molded. 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 **	ASTM **	To Specification
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.

Notes	101	102	103
*Bends are supplied at extra cost. Order must state "without bends" 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.	*85% Mag* Philip Carey Mfg Co	*Calcilite* The Ruberoid Co	*High Temp No. 19* Philip Carey Mfg Co
	Thermalite 85% Baldwin-Ehret-Hill, Inc	*Kaylo* Owens-Corning Corp	*Enduro Hi-Temp* Baldwin-Ehret-Hill, Inc
	85% Mag Johns-Manville Sales Corp	*Thermobestos* Johns-Manville Sales Corp	*J/M Superex* Johns-Manville Sales Corp
		Kaytherm Keasbey & Mattison Co	*High Temp* Keasbey & Mattison
	Featherweight Keasbey & Mattison Co	*Tricalite* Mundet Cork Corp	
	85% Mag Mundet Cork Corp	*Caltemp* Pabco Ind Ins Div***	
	Precision-molded Pabco Ind Ins Div ***	*Careytemp* Philip Carey Mfg Co	

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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MATERIAL SPECIFICATION – SERIES 100

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Code	104		106
Material	Inorganic silicates		Asbestos and diatomaceous earth molded
Material Description	Inorganic silicas and asbestos fibers		Compressed fluffy asbestos sprayed with sodium silicate and diatomaceous earth sprinkled on the asbestos mat. External finish consists of an integral refractory coating*
Filler			
Binder			
Temperature Range	100°F to 1600°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		11 PSI at 5% 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 mandril to a predetermined wt. Pressed to obtain the desired density, and baked.

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

			Unibestos Union Asbestos & Rubber Co
	Kaylo 20 Block *** Owens-Corning Corp		

* Available for field mixing to repair joints and seams.

** Max temp of *Kaylo 20* is 1800°F

*** Min thickness available 1 1/2"

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Code	107	108	109
Material	Asbestos sponge		Corrugated asbestos preshrunk
Material Description	Asbestos sheets separated by finely ground sponged material banded with adhesive strips.		Alternate layers of plain and corrugated asbestos sheets. Outer covering asbestos felt.
Filler			
Binder			
Temperature Range	100°F to 700°F		100°F to 400°F
K Factor	500°F – 0.60 max		200°F – 0.58 max
Density	30 lb max		
Compressive Strength			
Manufacturing Process	Laminated – 38 to 42 layers per in. of thickness		3–ply laminate
Resistance to Breakage in Handling	Very good		Good
Dimensions	To Specification		
Other Qualifications	Must be a flexible product		Preshrunk
The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.			
* *Aircell* –4-ply *Excel* –6-ply *Cawcel*–8-ply			*Preshrunk Asbestocel* Johns-Manville Sales Corp
	Asbestos Sponge Philip Carey Mfg Co		*Aircell* * Philip Carey Mfg Co
	Sponge Felt The Ruberoid Co		*K & M – Aircell* Keasbey & Mattison Co
	Sponge Felt Baldwin-Ehret-Hill, Inc		*B–H Aircell* Baldwin-Ehret-Hill, Inc
	Sponge Felt Smith and Kenzler Corp		

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DUP 0991057

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MATERIAL SPECIFICATION - SERIES 100

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	100 lb per sq in. min	100 lb per sq in. min
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 CAS Corp	*Foamglas* Pittsburgh Corning Corp	*Foamglas Stay-Dry* Pittsburgh Corning Corp
	Cork Mundet Cork Co		

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MATERIAL SPECIFICATION – SERIES 100

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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	100 lb per sq in. min	100 lb per sq in. min	
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 0991059

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Rev June 1962

MATERIAL SPECIFICATION - SERIES 100

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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	*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		

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MATERIAL SPECIFICATION – SERIES 100

Rev June 1962

Code	112.11	112.12	
Material	Glass fiber	See 112.11	
Material Description	Textile type fine glass fiber bonded pipe insulation with 30-lb factory-applied asbestos roofing felt finish on sizes 6" and smaller and 45-lb asbestos felt on sizes above 6" outside diameter.		
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, 30-lb felt used up to 6" OD of insulation		

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. † Asbestos felt must be Code 701	*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		

DUP 0991061

898647

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	
	*Vono-Kover Baldwin-Ehret-Hill, Inc	*Vono-Kover Baldwin-Ehret-Hill, Inc	
	*Thermaglas Philip Carey Mfg Co	*Thermaglas Philip Carey Mfg Co	
	**Fiberglas Owens-Corning Corp	**Fiberglas Owens-Corning Corp	
	**Armaglas PF Pipe Insn Armstrong C&S Corp	**Armaglas PF Pipe Insn 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	

MATERIAL SPECIFICATION – SERIES 100

Code	112.21	112.22	112.23
Material		Glass fiber	Glass fiber
Material Description		Textile type fine glass fiber bonded pipe insulation with white factory-applied aluminum laminate vapor-barrier finish per Code 723.1.	Textile type fine glass fiber bonded pipe insulation with factory-applied 60 lb per 3000 sq ft white bleached kraft paper, laminated to 0.0007" aluminum foil with fire-retardant adhesive (moisture-vapor transmission rate shall not exceed 0.015 perms – wet cup test) and reinforced with glass fiber mesh ½" x ½".
Filler			
Binder		Phenol-formaldehyde or Di-Cy	Phenol-formaldehyde
Temperature Range		40°F to 200°F	100°F to 250°F
K Factor		100°F – 0.25	100°F – 0.25
Density		3# and 6## lb per cu ft	3 lb per cu ft min
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. Weather protection is required for outside service.	Low cost insulation for limited services such as hot water.

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	*Flame-Resistant Jacket (FRJ) Owens-Corning Corp
	*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 Pittsburgh Plate Glass Co	
	* Superfine The Ruberoid Co	

Code	112.61		112.66
Material	Glass fiber		Glass fiber
Material Description	Plain semi-rigid board, formed from fibrous glass or mineral fibers.		Short, coarse steam-blown glass fibers preformed into semirigid board, sanded on one side and cut into lagging sizes for ease of application to curved surfaces.
Filler			
Binder	Phenol-formaldehyde		Phenol-formaldenyde
Temperature Range	40°F to 350°F		40°F to 350°F
K Factor	100°F – 0.25 to 0.30		100°F – 0.25
Density	6 and 9 lb per cu ft		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.		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	Std 24" x 48" Thickness PF615 (6-lb density) 1/2" through 3". PF617 (9-lb density), 1/2" through 2 1/4".		Length – 36" Width – 6" or 12" Thickness – 3/4", 1", 1 1/4", 1 1/2", and 2".
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		*Fiberglas Block Insulation* Owens-Corning Corp
			Armaglas Block Insulation Armstrong C&S Corp
	Armatemp Spun Wool Duct – Plain Armstrong C&S Corp		
	Spintex No. 414 or 415 Johns-Manville Sales Corp		
	Spunduct Baldwin-Ehret-Hill, Inc		

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	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			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.

	Fiberglas Vapor Seal Duct Insu Owens-Corning Corp		*Fiberglas Coated Duct Insu* Owens-Corning Corp
	Armasamp Spun Wool Duct - Faced VB Armstrong C&S Corp		*Armasamp Spun Wool Duct - Coated* Armstrong C&S Corp
	Spintex No. 414VS Johns-Manville Sales Corp		*Coated Duct Insulation* Baldwin-Ehret-Hill, Inc
	Spunduct Baldwin-Ehret-Hill, Inc		
			627

Code	113	114	115
Material	See Code 112.81	Mineral wool (Black 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			

SUP. BY NOV 1962 REV.

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 Supersamp Eagle-Picher	*Rock Cork* Johns-Manville Sales Corp
	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	

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KELLMAN

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MATERIAL SPECIFICATION - SERIES 100

OCTOBER 1954
Rev June 1962

9132

Code	116	117	
Material		Urethane Foam Resilient	
Material Description		See Codes 117.1 through 117.5.	
Filler			
Binder			
Temperature Range			
K Factor			
Density			
Compressive Strength			
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.

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DUP 0991067

090653

117

Code	117.1	117.3	
Material	Urethane Foam Resilient	Urethane Foam Resilient	
Material Description	Preformed resilient urethane snap-on foam pipe insulation manufactured with Du Pont "Hylene" and polyester or polyether resins	Preformed resilient urethane snap-on foam pipe insulation manufactured with Du Pont "Hylene" and polyester or polyether resins and kraft aluminum factory-applied vapor-barrier jacket incorporating a fire-snuff adhesive	
Filler			
Binder			
Recommended Service Temperature Range	45°F to 150°F	45°F to 150°F	
K Factor	0.27 max at 75°F	0.27 max at 75°F	
Density	2 to 4 lb per cu ft	2 to 4 lb per cu ft	
Compressive Strength	Min 0.25 psi at 25% deformation measured parallel to the direction in which the foam rose during manufacture		
Manufacturing Process	Molded and stabilized dimensionally	Molded and stabilized dimensionally	
Resistance to Breakage in Handling	Excellent	Excellent	
Dimensions	$+\frac{1}{16}'' - 0''$ on insulation ID, all others to be accurate to $\pm\frac{1}{16}''$		
Other Qualifications	Uniform cell structure. No voids with any dimension exceeding 3/8	Uniform cell structure. No voids with any dimension exceeding 3/8	

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

Flexfoam Delaware Ins Co	*Flexfoam* Delaware Ins Co	
Thermax Am. Cellular Products, Inc		

DUP 0991068

090654

Code	117.6	118	
Material	Urethane Foam Resilient	Urethane Foam Rigid	
Material Description	Preformed resilient urethane foam pipe and fitting insulation manufactured from polyether resin and Du Pont "Hylene" and factory-applied jacket consisting of glass skrim bonded between 1 mil aluminum foil and 1 mil "Tesler"	Preformed rigid urethane foam block, pipe, and fitting insulation manufactured with Du Pont "Hylene" and polyester or polyether resins	
Filler			
Binder			
Recommended Service Temperature Range	45°F to 150°F	–100°F to +150°F	
K Factor	0.27 max at 75°F	0.17 max at 75°F	
Density	2 to 4 lb per cu ft	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 and stabilized dimensionally	Molded or cut from molded billet	
Resistance to Breakage in Handling	Excellent	Excellent	
Dimensions	+1/16" – 0" on insulation ID, all others to be accurate to ±1/16"	+1/16" – 0" on insulation ID, all other dimensions to be ±1/16" including straightness and squareness	
Other Qualifications	Uniform cell structure. No voids with any dimension exceeding 3/8"	Uniform cell structure with max 10% open cells. No voids having any dimensions exceeding 1/8". Heat aging tests max 3.3% volume change; humid aging test max 3% 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.

* Pipe covering only
** Block only

Flexifoam Delaware Ins Co	*U-200* Union Asbestos & Rubber Co	
	Gem Foam * Baldwin-Ehret-Hill Co	
	Exp Plastic Q6195.2 ** The Dow Chemical Co	
	*Foam*** Pittsburgh Corning Corp	

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DUP 0991069

Code	120		
Material	Polystyrene		
Material Description	Preformed rigid cellular polystyrene block, pipe, and fitting insulation.		
Filler			
Binder			
Recommended Service 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 [illegible]		
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 to 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 Dow Chemical Co		
	Tuff-Lite Tuff-Lite Plastics, Inc		

DUP 0991070

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MATERIALS

MATERIAL SPECIFICATION SERIES 100 PREFORMED BLOCK AND PIPE

THERMAL INSULATION STANDARD ENGINEERING SPECIFICATION

ISSUED OCT 1954

REVISED JUNE 1962

SN 100 M

Code	101*	102*◊	103
Material	85% Magnesia	Calcium silicate	Diatomaceous earth
Material Description	Hydrated basic magnesium carbonate 80% by weight minimum	Staple, cellular, calcined fire clay base	Diatomaceous earth, asbestos fiber, with bonding clay and cementing materials
Filler	Asbestos or glass fiber		
Binder	Clay or other cementing materials 5% by weight		
Temperature Range	100°F to 500°F	100°F to 1200°F	500°F to 1800°F
K Factor	200°F – 0.4, 500°F – 0.5	500°F – 0.54 max	500°F – 0.77 max
Density	11–14 lb per cu ft	11 lb per cu ft	24–27 lb per cu ft
Compressive Strength			
Manufacturing Process	Machine molded or extru. Pipe mach cut on diameter	Machine extruded. Pipe mach cut on diameter	Machine molded. 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 **	ASTM **	To Specification
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.

	85% Mag Philip Carey Mfg Co	*Calcilite* The Ruberoid Co	*High Temp No. 19* Philip Carey Mfg Co
	Thermalite 85% Baldwin-Ehret-Hill, Inc	*Kaylo* Owens-Corning Corp	*Endure Hi-Temp* Baldwin-Ehret-Hill, Inc
	85% Mag Johns-Manville Sales Corp	*Thermobestos* Johns-Manville Sales Corp	*J/M Superex* Johns-Manville Sales Corp
		Kaytherm Keasbey & Mattison Co	*High Temp* Keasbey & Mattisen
	Featherweight Keasbey & Mattisen Co	*Tricalite* Mundet Cork Corp	
	85% Mag Mundet Cork Corp	*Caltemp* Pabco Ind Ins Div***	
	Precision-molded Pabco Ind Ins Div ***	*Careytemp* Philip Carey Mfg Co	

*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.

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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SN 100 M

MATERIAL SPECIFICATION – SERIES 100

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Code	104		106
Material	Inorganic silicates		Asbestos and diatomaceous earth molded
Material Description	Inorganic silicas and asbestos fibers		Compressed fluffy asbestos sprayed with sodium silicate and diatomaceous earth sprinkled on the asbestos mat. External finish consists of an integral refractory coating*
Filler			
Binder			
Temperature Range	100°F to 1600°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		11 PSI at 5% 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 mandril to a predetermined wt. Pressed to obtain the desired density, and baked.
The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.			
			Unibestos Union Asbestos & Rubber Co
	Kaylo 20 Block *** Owens-Corning Corp		

* Available for field mixing to repair joints and seams.

** Max temp of *Kaylo 20* is 1800°F

*** Min thickness available 1 1/2"

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

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Code	107	108	109
Material	Asbestos sponge		Corrugated asbestos preshrunk
Material Description	Asbestos sheets separated by finely ground sponged material banded with adhesive strips.		Alternate layers of plain and corrugated asbestos sheets. Outer covering asbestos felt.
Filler			
Binder			
Temperature Range	100°F to 700°F		100°F to 400°F
K Factor	500°F – 0.60 max		200°F – 0.58 max
Density	30 lb max		
Compressive Strength			
Manufacturing Process	Laminated – 38 to 42 layers per in. of thickness		3-ply laminate
Resistance to Breakage in Handling	Very good		Good
Dimensions	To Specification		
Other Qualifications	Must be a flexible product		Preshrunk
The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.			
* *Aircell* –4-ply *Excel* –6-ply *Cavocel*–8-ply			*Preshrunk Asbestocel* Johns-Manville Sales Corp
	Asbestos Sponge Philip Carey Mfg Co		*Aircell* * Philip Carey Mfg Co
	Sponge Felt The Ruberoid Co		*K & M – Aircell* Keasbey & Mattison Co
	Sponge Felt Baldwin-Ehret-Hill, Inc		*B–H Aircell* Baldwin-Ehret-Hill, Inc
	Sponge Felt Smith and Kanaler Corp		

REV. [redacted] 1964 SUP. BY 635

DUP 0991073

890659

MATERIAL SPECIFICATION - SERIES 100

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	100 lb per sq in. min	100 lb per sq in. min
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 CRS Corp	*Foamglas* Pittsburgh Corning Corp	*Foamglas Stay-Dry* Pittsburgh Corning Corp
Cork Mundet Cork Co		

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Rev April 1960

MATERIAL SPECIFICATION - SERIES 100

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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	100 lb per sq in. min	100 lb per sq in. min	
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 09910175

090661

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	*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-Coustic Corp Mesgoth 78, NY		
	* PPG Glass Fiber Pitts Plate Glass Co		
	* Superfine The Ruberoid Co		

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 30-lb factory-applied asbestos† roofing felt finish on sizes 6" and smaller and 45-lb asbestos† felt on sizes above 6" outside diameter.		
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, 30-lb felt used up to 6" OD of insulation		

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.

† Asbestos felt must be Code 701

*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		

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 Insn Armstrong C&S Corp	**Armaglas PF Pipe Insn 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

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MATERIAL SPECIFICATION - SERIES 100

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Code	112.21	112.22	112.23
Material		Glass fiber	Glass fiber
Material Description		Textile type fine glass fiber bonded pipe insulation with white factory-applied aluminum laminate vapor-barrier finish per Code 723.1.	Textile type fine glass fiber bonded pipe insulation with factory-applied 60 lb per 3000 sq ft white bleached kraft paper, laminated to 0.0007" aluminum foil with fire-resistant adhesive (moisture-vapor transmission rate shall not exceed 0.015 perms - wet cup test) and reinforced with glass fiber mesh ½" X ½".
Filler			
Binder		Phenol-formaldehyde or Di-Cy	Phenol-formaldehyde
Temperature Range		40°F to 200°F	100°F to 250°F
K Factor		100°F - 0.25	100°F - 0.25
Density		3° and 6°° lb per cu ft	3 lb per cu ft min
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. Weather protection is required for outside service.	Low cost insulation for limited services such as hot water.

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	*Flame-Resistant Jackets (FRJ) Owens-Corning Corp
	*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 Pittsburgh Plate Glass Co	
	*Superfine The Ruberoid Co	

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SUP. BY
REV. APR

DUP 0991079

090665

Code	112.61		112.66
Material	Glass fiber		Glass fiber
Material Description	Plain semi-rigid board, formed from fibrous glass or mineral fibers.		Short, coarse steam-blown glass fibers preformed into semirigid board, sanded on one side and cut into lagging sizes for ease of application to curved surfaces.
Filler			
Binder	Phenol-formaldehyde		Phenol-formaldehyde
Temperature Range	40°F to 350°F		40°F to 350°F
K Factor	100°F – 0.25 to 0.30		100°F – 0.25
Density	6 and 9 lb per cu ft		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.		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	Std 24" x 48" Thickness PF615 (6-lb density) 1/2" through 3". PF617 (9-lb density), 1/2" through 2 1/4".		Length – 36" Width – 6" or 12" Thickness – 3/4", 1", 1 1/4", 1 1/2", and 2".

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		*Fiberglas Block Insulation* Owens-Corning Corp
			Armaglas Block Insulation Armstrong C&S Corp
	Armatemp Spun Wool Duct – Plain Armstrong C&S Corp		
	Spintex No. 414 or 415 Johns-Manville Sales Corp		
	Spunduct Baldwin-Ehret-Hill, Inc		

DUP 0991080

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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	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			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.			
	Fiberglas Vapor Seal Duct Insu Owens-Corning Corp		*Fiberglas Coated Duct Insu* Owens-Corning Corp
	Armasamp Spun Foil Duct – Faced VB Armstrong C&S Corp		*Armasamp Spun Foil Duct – Coated* Armstrong C&S Corp
	Spinex No. 414VS Johns-Manville Sales Corp		*Coated Duct Insulation* Baldwin-Ehret-Hill, Inc
	Spunduct Baldwin-Ehret-Hill, Inc		

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MATERIAL SPECIFICATION – SERIES 100

SM 100 M

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

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MATERIAL SPECIFICATION - SERIES 100

Code	116	117	
Material		Urethane Foam Resilient	
Material Description		See Codes 117.1 through 117.5.	
Filler			
Binder			
Temperature Range			
K Factor			
Density			
Compressive Strength			
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.

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MATERIAL SPECIFICATION - SERIES 100

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116	117	
	Urethane Foam Resilient	
	See Codes 117.1 through 117.5.	

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

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MATERIAL SPECIFICATION - SERIES 100

Code	117.6	118	
Material	Urethane Foam Resilient	Urethane Foam Rigid	
Material Description	Preformed resilient urethane foam pipe and fitting insulation manufactured from polyether resin and Du Pont "Hylene" and factory-applied jacket consisting of glass skrim bonded between 1 mil aluminum foil and 1 mil "Tesler"	Preformed rigid urethane foam block, pipe, and fitting insulation manufactured with Du Pont "Hylene" and polyester or polyether resins	
Filler			
Binder			
Recommended Service Temperature Range	45°F to 150°F	-100°F to +150°F	
K Factor	0.27 max at 75°F	0.17 max at 75°F	
Density	2 to 4 lb per cu ft	1½ 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 and stabilized dimensionally	Molded or cut from molded billet	
Resistance to Breakage in Handling	Excellent	Excellent	
Dimensions	+1/16" - 0" on insulation ID, all others to be accurate to ±1/16"	+1/16" - 0" on insulation ID, all other dimensions to be ±1/16" including straightness and squareness	
Other Qualifications	Uniform cell structure. No voids with any dimension exceeding 3/8"	Uniform cell structure with max 10% open cells. No voids having any dimensions exceeding 1/4". Heat aging tests max 3.3% volume change; humid aging test max 3% 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.

* Pipe covering only ** Block only	*Flexifoam* Delaware Ins Co	*U-200* Union Asbestos & Rubber Co	

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Code.	120		
Material	Polystyrene		
Material Description	Preformed rigid cellular polystyrene block, pipe, and fitting insulation.		
Filler			
Binder			
Recommended Service 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 to 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		

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MATERIALS

MATERIAL SPECIFICATION SERIES 100 PREFORMED BLOCK AND PIPE

THERMAL INSULATION STANDARD ENGINEERING SPECIFICATION

ISSUED OCT 1954

REVISED JUNE 1962

SN 100 M

Code	101*	102**	103
Material	85% Magnesia	Calcium silicate	Diatomaceous earth
Material Description	Hydrated basic magnesium carbonate 80% by weight minimum	Staple, cellular, calcined fire clay base	Diatomaceous earth, asbestos fiber, with ben clay and cementing materials
Filler	Asbestos or glass fiber		
Binder	Clay or other cementing materials 5% by weight		
Temperature Range	100°F to 500°F	100°F to 1200°F	500°F to 1800°F
K Factor	200°F – 0.4, 500°F – 0.5	500°F – 0.54 max	500°F – 0.77 max
Density	11–14 lb per cu ft	11 lb per cu ft	24–27 lb per cu ft
Compressive Strength			
Manufacturing Process	Machine molded or extru. Pipe mech cut on diameter	Machine extruded. Pipe mech cut on diameter	Machine molded. Pipe mec 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 **	ASTM **	To Specification
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-ply canvas cover. Material should be specified "without 2-ply canvas" to avoid extra charge.	*85% Mag* Philip Carey Mfg Co	*Celolite* The Ruberoid Co	*High Temp No. 19* Philip Carey Mfg Co
	Thermalite 85% Baldwin-Ehret-Hill, Inc	*Kaylo* Owens-Corning Corp	*Endure Hi-Temp* Baldwin-Ehret-Hill, Inc
	85% Mag Johns-Manville Sales Corp	*Thermobestos* Johns-Manville Sales Corp	*J/M Superex* Johns-Manville Sales Corp
		Kaytherm Keasbey & Morrison Co	*High Temp* Keasbey & Morrison
	Featherweight Keasbey & Morrison Co	*Trieslite* Mundet Cork Corp	
	85% Mag Mundet Cork Corp	*Calsomp* Pabco Ind Ins Div ***	
	Precision-molded Pabco Ind Ins Div ***	*Careytemp* Philip Carey Mfg Co	

**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.

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 approving the use of this Specification.

SUBCOMMITTEE NO. 20

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MATERIAL SPECIFICATION - SERIES 100

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Code	104		106
Material	Inorganic silicates		Asbestos and diatomaceous earth molded
Material Description	Inorganic silicas and asbestos fibers		Compressed fluffy asbestos sprayed with sodium silicate and diatomaceous earth sprinkled on the asbestos mat. External finish consists of an integral refractory coating*
Filler			
Binder			
Temperature Range	100°F to 1600°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		11 PSI at 5% deformation - Dry
Manufacturing Process			Formed and sawn 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 mandril to a predetermined wt. Pressed to obtain the desired density, and baked.
The following materials have proven satisfactory in field tests and proof has been furnished by the manufacturers that their product meets the above specifications.			
			Unibestos Union Asbestos & Rubber Co
	Kaylo 20 Block *** Owens-Corning Corp		

* Available for field mixing to repair joints and seams.

** Max temp of *Kaylo 20* is 1800°F

*** Min thickness available 1 1/2"

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