PLAINTIFF'S EXHIBIT

UC-4036

DESIGN AND CONSTRUCTION
UNION CARBIDE CHEMICALS COMPANY
Division of
UNION CARBIDE CORPORATION

THERMAL INSULATION AND ACCESSORIES MANUAL

October 1962

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ERRATA

Thermal Insulation and Accessories Manual

The following corrections should be made:

Page 8, Generic Class No. 20, Thermal Conductivity

0.29 @ 800 F should be 0.29 @ 200 F
0.35 @ 1000 F should be 0.35 @ 300 F

Page 8, Generic Class No. 21, Thermal Conductivity

0.29 @ 800 F should be 0.29 @ 200 F
0.35 @ 1000 F should be 0.35 @ 300 F

Page 11, Generic Class No. 29, Insulation Trade Names

"Magnesium" should be "Magnesia"

Page 59, Generic Class No. 29, Trade Names

"Magnesium" should be "Magnesia"

Page 83, Resin Emulsion

"Foster 81-92W" should be "Foster 81-42"

Page 84, Synthetic Rubber (Solvent Type)

"Foster No. 716" should be "Flintkote No. 716"

Add	Foster 81-71	-20	200
	Foster 81-81	-20	200
	Foster 81-91	-20	200

Page II-5, Correct street address for Insul-Coustic Corporation is 42-23 54th Road

November 9, 1962

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INTRODUCTION

This manual was prepared for the use of Design and Construction, Union Carbide Chemicals Company, as a guide for the selection and procurement of thermal insulations and accessories. It is only a listing of available manufactured products and in no way does it imply that the individual materials have been approved by Union Carbide Chemicals Company for any general or specific use. Nor does it present any evaluation of one manufacturer's material as compared to another.

The manual contains two main sections, the first covering insulations and the second covering insulation accessories. The insulation section contains a tabulation of the characteristics of more than one hundred and fifty generic classifications of insulation. For each classification, as many manufacturers as possible are listed as sources of material.

The accessories section contains a number of generic classifications of materials used with insulation materials in an installation. Descriptions and sources of supply are given for each classification.

The information contained in this manual was tabulated from data furnished by the manufacturers of the products. Some inconsistencies may exist, as relatively few manufacturers presented complete information on their products. Where differences in values were presented by two or more producers, the minimum and maximum values of accumulated data are listed. In some instances these are due to actual differences in the material produced, whereas in other instances the listed difference may be traced to the method used in testing the material.

Materials listed in a particular group are not necessarily all of the same quality, and as manufacturers improve their materials the order of quality may change; thus after a generic selection of material has been made, the latest specific data on the individual material should be obtained from the manufacturers. By this method the most desirable insulations and accessories for an individual application can be chosen.

To our knowledge no tabulation similar to this manual exists.

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INSULATIONS

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CHARACTERISTICS

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CHARACTERISTICS

BLOCK, BOARD AND PREFORMED PIPE COVERING

GENERIC CLASS NUMBER		1	2	3
INSULATION TRADE NAMES		Fiberfrax F-13	Fiberfrax XB Board	Fiberfrax T-30 Tubes
BASIC MATERIAL		Alumina-silica fiber and binder	Alumina silica fiber and binder	Alumina-silica fiber and binder
GENERAL FORM		Rigid block	Rigid board	Rigid tubes, 1/2" ID to 40" ID, wall thickness 0.05" to 1.0"
ABRASION RESISTANCE % weight loss	1st RUN 2nd RUN	30 60		
ALKALINITY, pH				
CAPILLARITY, % by weight				
COEFFICIENT OF EXPANSION				
COMBUSTIBILITY	FLASH FLAME MELTING	Incombustible 3200 F	Incombustible 3200 F	Paper binder burns out. Does not explode. 3200 F
CORROSION - RUSTING				
CORROSION - STRESS				
CRACKING - HOT SURFACE				
DENSITY, lb / cu ft		12 to 20	25	30 to 43.2
DROP RESISTANCE				
HARDNESS, m m penetration				
HYGROSCOPICITY, % by weight				
RESISTANCE TO ACIDS		Good at room temperature except HF and H_3PO_4	Good	Good at room temperatures except HF and H_3PO_4
RESISTANCE TO CAUSTICS		Fair to poor at room temperature	Poor	Fair to poor at room temperature
RESISTANCE TO SOLVENTS		Excellent		Excellent
SHRINKAGE - HEAT	LINEAR VOLUMETRIC	0.5 % @ 1500 F 4.0 % @ 2000 F	0.4 % @ 1500 F 4.0 % @ 2000 F	6.4 % @ 2300 F 3.1 % @ 1632 F
SPECIFIC GRAVITY	REAL APPARENT	0.19 to 0.32	0.40	0.45 to 0.69
SPECIFIC HEAT, btu / lb				
STRENGTH - COMPRESSIVE, psi				
STRENGTH - FLEXURAL, psi				
STRENGTH - SHEAR, psi				
STRENGTH - TENSILE, psi				
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	Atmos Min 2000 F Max Atmos Min 2300 F Max Atmos Min 2300 F Max	Atmos Min 2000 F Max Atmos Min 2300 F Max Atmos Min 2300 F Max	Atmos Min 2000 F Max Atmos Min 2300 F Max Atmos Min 2300 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)		0.36 @ 400 F 1.48 @ 1600 F 0.88 @ 1000 F 1.67 @ 1800 F 1.25 @ 2000 F 1.87 @ 2000 F	0.5 @ 500 F 1.4 @ 2000 F 0.9 @ 1000 F 1.1 @ 1500 F	0.60 @ 600 F 1.34 @ 1600 F 0.80 @ 1000 F 1.49 @ 2000 F 1.04 @ 1400 F
THERMAL DIFFUSIVITY, sq ft / hour				
THERMAL SHOCK RESISTANCE		Excellent	Excellent	Good
VIBRATION RESISTANCE				
WARPAGE - IN SERVICE				
WATER ABSORPTION , % by weight		300	100	Saturates
WATER VAPOR TRANSMISSION				
ADVANTAGES		Excellent thermal shock resistance. Will withstand flame impingement.	Can be readily machined. Not softened by water. Excellent thermal shock resistance.	Can be machined. Used for flue tubes, combustion chamber liners, furnace liners and insulating sleeves.
LIMITATIONS				

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CHARACTERISTICS

BLOCK, BOARD AND PREFORMED PIPE COVERING

GENERIC CLASS NUMBER		4	5	6
INSULATION TRADE NAMES		Caposite, Unibestos No. 1200	Linaco Insutube	Asbestos Sponge Felt, Best Felt, Asbestos Sponge.
BASIC MATERIAL		Amosite asbestos and diatomaceous silicate	Glass fiber contained between inner and outer braided asbestos	Asbestos fiber
GENERAL FORM		Rigid pipe covering	Seamless, flexible insulation, for tubing up to 2" OD.	Flexible block and pipe covering
ABRASION RESISTANCE % weight loss	1st RUN		Not applicable	
	2nd RUN			
ALKALINITY, pH		10 to 11	7 to 8	9.4
CAPILLARITY, % by weight		High	High	High
COEFFICIENT OF EXPANSION		20 x 10^{-6}		
COMBUSTIBILITY	FLASH	Incombustible		Incombustible
	FLAME			
	MELTING			
CORROSION - RUSTING		Does not contribute	Does not contribute	
CORROSION - STRESS		Inhibits stress corrosion	Does not contribute	
CRACKING - HOT SURFACE		None	None	
DENSITY, lb / cu ft		13 to 20	12 to 14	26 to 33
DROP RESISTANCE			Not applicable	
HARDNESS, m m penetration		Less than 0.40	Not applicable	
HYGROSCOPICITY, % by weight		3.5	3.0	
RESISTANCE TO ACIDS		Resistant to most common acids	Resistant to most common acids	
RESISTANCE TO CAUSTICS		Resistant to most common caustics	Resistant to most common caustics	
RESISTANCE TO SOLVENTS		Resistant to all solvents	Resistant to all solvents	
SHRINKAGE - HEAT	LINEAR	0.01 % @ 750 F 0.05 % @ 1200 F		4.3 % @ 200 F
	VOLUMETRIC			
SPECIFIC GRAVITY	REAL	0.21 to 0.32	0.207	0.42 to 0.53
	APPARENT			
SPECIFIC HEAT, btu / lb		0.25	0.24	0.25
STRENGTH - COMPRESSIVE, psi		11 @ 5 % deformation 43 @ 10% deformation	Low	
STRENGTH - FLEXURAL, psi		120	Not applicable	
STRENGTH - SHEAR, psi			Not applicable	
STRENGTH - TENSILE, psi			Not applicable	
TEMPERATURE LIMITS	CONTINUOUS	Atmos Min 1200 F Max	Atmos Min 500 F Max	Atmos Min 700 F Max
	SHORT PERIOD	Atmos Min 1200 F Max	Atmos Min 500 F Max	Atmos Min 700 F Max
	CYCLIC	Atmos Min 1200 F Max	Atmos Min 500 F Max	Atmos Min 700 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING		No evidence	No evidence	
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)		0.32 @ 100 F 0.47 @ 400 F 0.37 @ 200 F 0.52 @ 500 F 0.42 @ 300 F 0.57 @ 600 F	0.25 @ 100 F 0.33 @ 200 F 0.39 @ 300 F	0.36 @ 100 F 0.54 @ 400 F 0.42 @ 200 F 0.46 @ 300 F
THERMAL DIFFUSIVITY, sq ft / hour		0.009 @ 400 F and 17 lbs	0.21 @ 200 F	0.005 @ 300 F and 30 lbs
THERMAL SHOCK RESISTANCE		Excellent	Excellent	Good
VIBRATION RESISTANCE		Excellent	Excellent	Good
WARPAGE - IN SERVICE		None	None	
WATER ABSORPTION, % by weight		300	High	High
WATER VAPOR TRANSMISSION		300 to 500 perm-inches	300 to 500 perm-inches	
ADVANTAGES		Relatively high strength. Can be prefabricated. Resists fracture.	For use on tubes and bent piping. Available in plain or waterproof jacket.	Fairly high tensile strength.
LIMITATIONS		Looses some of its strength when when wet. Only partly satisfactory for bridging gaps.	Must be pushed over pipes and tubes before their erection.	Will not stay in true round on horizontal lines.

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BLOCK, BOARD AND PREFORMED PIPE COVERING

GENERIC CLASS NUMBER		7	8	9
INSULATION TRADE NAMES		Defenlex, U Dent	Air Cell, Asbestocel	Asbestocite, Deluxe Stonewall, Pila-F-Lax
BASIC MATERIAL		Asbestos fiber	Asbestos fiber	Asbestos fiber and cement
GENERAL FORM		Semi-rigid block and pipe covering	Semi-rigid block, board and pipe covering	Semi-rigid board
ABRASION RESISTANCE % weight loss	1st RUN 2nd RUN			
ALKALINITY, pH			10.4	7 to 13
CAPILLARITY, % by weight				
COEFFICIENT OF EXPANSION				
COMBUSTIBILITY	FLASH FLAME MELTING	Incombustible	Incombustible	Incombustible 2500 F
CORROSION - RUSTING				Does not contribute
CORROSION - STRESS				
CRACKING - HOT SURFACE				
DENSITY, lb / cu ft			9 to 17	95 to 115
DROP RESISTANCE				
HARDNESS, m m penetration				
HYGROSCOPICITY, % by weight				5
RESISTANCE TO ACIDS				Not acid resistant
RESISTANCE TO CAUSTICS				Fair
RESISTANCE TO SOLVENTS			Not affected	Good
SHRINKAGE - HEAT	LINEAR VOLUMETRIC		1 - 7 % @ 200 F	
SPECIFIC GRAVITY	REAL APPARENT		0.15 to 0.27	1.5 to 1.8
SPECIFIC HEAT, btu / lb				
STRENGTH - COMPRESSIVE, psi				14000
STRENGTH - FLEXURAL, psi				
STRENGTH - SHEAR, psi				
STRENGTH - TENSILE, psi				1775 and 2350
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	Atmos Min 550 F Max Atmos Min 550 F Max Atmos Min 550 F Max	Atmos Min 300 F Max Atmos Min 300 F Max Atmos Min 300 F Max	To -50 F Min 600 F Max To -100 F Min 1000 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)		0.45 @ 100 F 0.67 @ 400 F 0.52 @ 200 F 0.60 @ 300 F	0.47 @ 100 F to 0.53 @ 100 F 0.53 @ 200 F to 0.64 @ 200 F 0.60 @ 300 F to 0.75 @ 300 F	4.0 @ 100 F
THERMAL DIFFUSIVITY, sq ft / hour				
THERMAL SHOCK RESISTANCE			Good	Poor
VIBRATION RESISTANCE				
WARPAGE - IN SERVICE				
WATER ABSORPTION , % by weight				22 to 25
WATER VAPOR TRANSMISSION				
ADVANTAGES		Available in special shapes to cover two or more pipes.	Can be reused. Lightweight.	Weather resistant. Good strength. Fireproof. Flat or precurved. Used as protective facing.
LIMITATIONS			Becomes soft when wet. Low strength. Will not withstand abuse.	

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CHARACTERISTICS

BLOCK, BOARD AND PREFORMED PIPE COVERING

GENERIC CLASS NUMBER		10	11	12
INSULATION TRADE NAMES		Transite, Permaboard	Asbestos Millboards, Asbestos Millboard 106, 102, 219 and "C", Detroc Board	L. K., Thermasil, Thermobestos, Kay-Therm, Tri-Calite, Kaylo, Caltemp, Calsilite, Calcium Silicate, Hylo
BASIC MATERIAL		Asbestos fiber and cement	Asbestos fiber and binder	Calcium-silicate and asbestos fibers
GENERAL FORM		Rigid board	Rigid board	Rigid block and pipe covering
ABRASION RESISTANCE % weight loss	1st RUN 2nd RUN			10 to 20 20 to 40
ALKALINITY, pH		7 to 13		8 to 11
CAPILLARITY, % by weight				412 to 535
COEFFICIENT OF EXPANSION				2.6×10^{-6}
COMBUSTIBILITY	FLASH FLAME MELTING	Incombustible 2500 F	Incombustible	Incombustible
CORROSION - RUSTING				Will not cause steel to rust
CORROSION - STRESS				Stainless must be protected
CRACKING - HOT SURFACE				Some manufacturers' products will hot surface crack
DENSITY, lb / cu ft		109 to 125	50 to 60	10 to 13
DROP RESISTANCE				
HARDNESS, m m penetration				
HYGROSCOPICITY, % by weight				
RESISTANCE TO ACIDS		Not acid resistant	Good	Poor to fair
RESISTANCE TO CAUSTICS		Fair		Moderate
RESISTANCE TO SOLVENTS		Good		Good
SHRINKAGE - HEAT	LINEAR VOLUMETRIC			1.5 % @ 1200 F 0.9 % @ 1000 F 2.6 % to 9.9 %
SPECIFIC GRAVITY	REAL APPARENT	1.6 to 2.0	0.80 to 0.96	2.3 to 2.6 0.18 to 0.22
SPECIFIC HEAT, btu / lb				0.22 to 0.28
STRENGTH - COMPRESSIVE, psi				75 to 165 @ 5 % deformation 120 to 265 @10 % deformation
STRENGTH - FLEXURAL, psi				50 to 75
STRENGTH - SHEAR, psi				59 to 222
STRENGTH - TENSILE, psi				7 to 37
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	-50 F Min 600 F Max -100 F Min 1000 F Max	Atmos Min 800 to 1200 F Max Atmos Min	Atmos Min 1200 to 1350 F Max Atmos Min 1200 to 1350 F Max Atmos Min 1200 to 1350 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING				No evidence of self heating unless contaminated
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)		4.0 @ 100 F to 4.5 @ 100 F		0.29 @ 100 F to .33 @ 100 F 0.45 @ 400 F to 0.51 @ 400 F 0.53 @ 600 F to 0.63 @ 600 F
THERMAL DIFFUSIVITY, sq ft / hour				0.013 to 0.016 @ 400 F and 12 lbs
THERMAL SHOCK RESISTANCE		Poor		Good
VIBRATION RESISTANCE				Good
WARPAGE - IN SERVICE				Some manufacturers' products will warp when used above 750 F
WATER ABSORPTION, % by weight		25		430 to 550
WATER VAPOR TRANSMISSION				21 perm-inches
ADVANTAGES		Hard and dense. Good mechanical strength.		Good compressive strength. Maintains shape and most of strength when wet. Can be prefabricated.
LIMITATIONS		Will not withstand fire exposure		When broken, pieces fall apart. Not suitable for bridging gaps.

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BLOCK, BOARD AND PREFORMED PIPE COVERING

GENERIC CLASS NUMBER		13	14	15
INSULATION TRADE NAMES		Kaylo-20, Calsilite-Hi, L.K.-20.	Novoid Cork, Jointite, LT Cork, Corkboard, BB Corkboard.	Enduro, Hi Temp No 19, Superex, Hy Temp, Type 19, Prasco 19-C, No 19.
BASIC MATERIAL		Calcium-silicate and asbestos fibers	Cork	Diatomaceous silica, and binders.
GENERAL FORM		Rigid block and pipe covering	Board and pipe covering	Rigid block and pipe covering
ABRASION RESISTANCE % weight loss	1st RUN	3 to 20	Good	30 to 37
	2nd RUN	6 to 40		53 to 65
ALKALINITY, pH		8 to 10.5	7	7 to 9
CAPILLARITY, % by weight		High		240
COEFFICIENT OF EXPANSION			5×10^{-5}	12×10^{-6} Reheated
COMBUSTIBILITY	FLASH	Incombustible	Will burn.	Incombustible
	FLAME		Softens @ 200 F	
	MELTING			
CORROSION - RUSTING		Will not cause steel to rust	Steel should be protected	Will not cause steel to rust
CORROSION - STRESS		Stainless must be protected		Stainless must be protected
CRACKING - HOT SURFACE				
DENSITY, lb / cu ft		11 to 13	6 to 10	21 to 25
DROP RESISTANCE				
HARDNESS, m m penetration		60	Resilient	0.60 to 0.90
HYGROSCOPICITY, % by weight		5	1.0	2 to 6
RESISTANCE TO ACIDS		Poor to fair	Poor	Good
RESISTANCE TO CAUSTICS		Good		Good
RESISTANCE TO SOLVENTS		Good		Not affected
SHRINKAGE - HEAT	LINEAR	1.7 % @ 1600 F 0.7 % @ 1200 F		2.5 % @ 1900 F
	VOLUMETRIC			6 to 10 % @ 1300 F
SPECIFIC GRAVITY	REAL	0.17 to 0.22	0.10 to 0.16	2.2 to 2.3
	APPARENT			0.34 to 0.40
SPECIFIC HEAT, btu / lb		0.22	0.43	0.22 to 0.28
STRENGTH - COMPRESSIVE, psi		120 to 130 @ 5 % deformation 150 @ 10 % deformation	5 @ 5 % deformation 25 @ 25 % deformation	62 to 125 @ 5% deformation 87 to 200 @ 10% deformation
STRENGTH - FLEXURAL, psi		40 to 90	16 to 21	50 to 67
STRENGTH - SHEAR, psi				43 to 300
STRENGTH - TENSILE, psi				15 to 20
TEMPERATURE LIMITS	CONTINUOUS	Atmos Min 1800 F Max	-250 F Min 200 F Max	Atmos Min 1900 F Max
	SHORT PERIOD	Atmos Min 1800 F Max	-300 F Min 220 F Max	Atmos Min 1900 F Max
	CYCLIC	Atmos Min 1600 F Max	-300 F Min 220 F Max	Atmos Min 1900 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING		No evidence of self heating unless contaminated.		No evidence of self heating unless contaminated
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)		0.46 @ 200 F to 0.52 @ 200 F 0.54 @ 400 F to 0.60 @ 400 F 0.80 @ 900 F to 0.90 @ 900 F	0.23 @ -30 F 0.24 @ 0 F 0.26 @ 60 F to 0.27 @ 80 F	0.69 @ 500 F to 0.72 @ 500 F 0.73 @ 600 F to 0.74 @ 600 F 0.77 @ 800 F to 0.81 @ 800 F
THERMAL DIFFUSIVITY, sq ft / hour		0.016 @ 200 F and 12 lbs	0.0066 @ 0 F and 7 lbs	0.009 to 0.012 @ 500 F
THERMAL SHOCK RESISTANCE		Excellent	Good	Excellent
VIBRATION RESISTANCE		Good	Excellent	Good
WARPAGE - IN SERVICE				
WATER ABSORPTION, % by weight		460		240 to 250
WATER VAPOR TRANSMISSION		High	3.0 to 7.0 perm-inches	20 to 212 perm-inches
ADVANTAGES		Good compressive strength. Low shrinkage. Maintains shape and most of strength when wet. Can be pre-fabricated.	Resilient. Will withstand contraction and expansion. Can be prefabricated.	Handles well, particularly where required as inner layer covering.
LIMITATIONS		When broken, pieces fall apart. Not suitable for bridging gaps.	Will burn slowly and punk afterward. Depends on vapor barrier for effective low temperature service.	Looses most of strength when wet. Unsuitable to bridge gaps. Difficult to prefabricate.

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CHARACTERISTICS

BLOCK, BOARD AND PREFORMED PIPE COVERING

GENERIC CLASS NUMBER		16	17	18
INSULATION TRADE NAMES		Superex M, Type M, Prasco 15-C.	Marinite No. 23, Marinite No. 36, Marinite No. 65, Unarcoboard.	Foamglas
BASIC MATERIAL		Diatomaceous silica, and binders.	Diatomaceous silicate and asbestos fibers	Cellular glass
GENERAL FORM		Rigid block and pipe covering	Rigid board	Rigid block and pipe covering
ABRASION RESISTANCE % weight loss	1st RUN 2nd RUN	26 to 30 48 to 55		Poor
ALKALINITY, pH		9	9 to 11	7.5
CAPILLARITY, % by weight		240	High	None
COEFFICIENT OF EXPANSION		28×10^{-7} Reheated	5×10^{-6}	46×10^{-7}
COMBUSTIBILITY	FLASH FLAME MELTING	Incombustible	Incombustible	Incombustible 1600 F
CORROSION - RUSTING		Will not cause steel to rust	Will not cause steel to rust	Will not cause steel to rust
CORROSION - STRESS		Stainless must be protected	Stainless must be protected	Does not contribute
CRACKING - HOT SURFACE				Will stress crack
DENSITY, lb / cu ft		21 to 25	No 23-23, No 36 and UB-36, No 65-65	8 to 10
DROP RESISTANCE				
HARDNESS, m m penetration		0.50 to 0.60	0.10	
HYGROSCOPICITY, % by weight			0	0
RESISTANCE TO ACIDS		Good	Resistant to dilute acids	Good except HF and H_3PO_4
RESISTANCE TO CAUSTICS		Good	Resistant to most common caustics	Good from pH 7 to 10
RESISTANCE TO SOLVENTS		Resistant	Good	Excellent
SHRINKAGE - HEAT	LINEAR VOLUMETRIC	2 % @ 1500 F 5 to 7 % @ 1500 F		0 % @ 800 F
SPECIFIC GRAVITY	REAL APPARENT	2.2 to 2.3 0.34 to 0.40	No 23-0.36, No 36-0.56, No 65-1.0	2.5 0.128 to 0.160
SPECIFIC HEAT, btu / lb		0.22 to 0.28	0.22	0.20
STRENGTH - COMPRESSIVE, psi		120 @ 5 % deformation 210 @ 10 % deformation		100 @ 0 % deformation
STRENGTH - FLEXURAL, psi		65 to 75	UB - 1000	75
STRENGTH - SHEAR, psi		105 to 115	UB - 400	64
STRENGTH - TENSILE, psi		15	No 23-18.5, No 36-460, No 65-750	84
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	Atmos Min 1500 to 1600 F Max Atmos Min 1500 to 1600 F Max Atmos Min 1500 to 1600 F Max	Atmos Min 800 to 1200 F Max Atmos Min 800 to 1200 F Max Atmos Min	-450 F Min 800 F Max -450 F Min 800 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING		No evidence of self heating unless contaminated	No evidence of self heating unless contaminated	No self internal heating
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)		0.59 @ 500 F to 0.64 @ 500 F 0.67 @ 800 F to 0.73 @ 800 F 0.74 @ 1000 F to 0.75 @ 1000 F	0.59 @ 300 F to 1.59 @ 300 F 0.62 @ 500 F to 1.72 @ 500 F	0.32 @ -50 F 0.48 @ 200 F 0.35 @ 0 F 0.60 @ 400 F 0.39 @ 70 F 0.84 @ 600 F
THERMAL DIFFUSIVITY, sq ft / hour		0.008 to 0.01 @ 500 F	0.0045 to 0.01 @ 300 F	0.016 @ 70 F
THERMAL SHOCK RESISTANCE		Excellent	Good	Poor
VIBRATION RESISTANCE		Good	Good	Poor
WARPAGE - IN SERVICE				Will not warp
WATER ABSORPTION, % by weight		240	150	0
WATER VAPOR TRANSMISSION				0
ADVANTAGES		Handles well	Used as fireproofing of steel and side panels of oven. Can be fabricated like wood. Useful as fire protection insulation.	Dimensionally stable. Impervious to water and vapor. Can be prefabricated.
LIMITATIONS		Looses most of strength when wet. Unsuitable to bridge gaps. Difficult to prefabricate.	Not recommended under freezing-thawing conditions.	Not abrasion resistant. Must provide for expansion and contraction.

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CHARACTERISTICS

BLOCK, BOARD AND PREFORMED PIPE COVERING

GENERIC CLASS NUMBER		19	20	21
INSULATION TRADE NAMES		Foamglas Roof Insulation	Heavy Density Sectional, Armaglas PF, Dual Temp, Superglas	Fiberglas Low Pressure, Armaglas Low Pressure, Superglas Low Pressure,
BASIC MATERIAL		Cellular glass	Fibrous glass and binder	Fibrous glass and binder
GENERAL FORM		Rigid roof insulation	Semi-rigid pipe covering	Semi-rigid pipe covering
ABRASION RESISTANCE % weight loss	1st RUN 2nd RUN	Poor	40	40
ALKALINITY, pH		7.5	8 to 10	8 to 10
CAPILLARITY, % by weight		None	Negligible	Negligible
COEFFICIENT OF EXPANSION		46×10^{-7}		
COMBUSTIBILITY	FLASH FLAME MELTING	Incombustible 1600 F	1400 F	1400 F
CORROSION - RUSTING		Will not cause steel to rust	Will not cause steel to rust	Will not cause steel to rust
CORROSION - STRESS		Does not contribute	Stainless should be protected	Stainless should be protected
CRACKING - HOT SURFACE		Will stress crack		
DENSITY, lb / cu ft		8 to 10	5 to 10, 7 1/4 Average	5 to 10, 7 1/4 Average
DROP RESISTANCE				
HARDNESS, m m penetration				
HYGROSCOPICITY, % by weight		0	0	0
RESISTANCE TO ACIDS		Good except HF and H_3PO_4	Good from pH 5 to 7 except HF and H_3PO_4	Good from pH 5 to 7 except HF and H_3PO_4
RESISTANCE TO CAUSTICS		Good from pH 7 to 10	Good from pH 7 to 10	Good from pH 7 to 10
RESISTANCE TO SOLVENTS		Excellent		
SHRINKAGE - HEAT	LINEAR VOLUMETRIC	0 % @ 800 F		
SPECIFIC GRAVITY	REAL APPARENT	2.5 0.128 to 0.160	2.5 0.12 Average	2.5 0.12 Average
SPECIFIC HEAT, btu / lb		0.20	0.20	0.20
STRENGTH - COMPRESSIVE, psi		100 @ 0 % deformation		
STRENGTH - FLEXURAL, psi		75	60	60
STRENGTH - SHEAR, psi		64		
STRENGTH - TENSILE, psi		84		
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	-450 F Min 800 F Max -450 F Min 800 F Max	To -320 F Min 200 to 450 F Max To -320 F Min 200 to 500 F Max	Atmos Min 250 F Max Atmos Min 250 F Max Atmos Min 250 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING		No self internal heating		
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)		0.32 @ - 50 F 0.45 @ 200 F 0.35 @ - 0 F 0.60 @ 400 F 0.39 @ 70 F 0.84 @ 600 F	0.24 @ 70 F 0.29 @ 600 F 0.25 @ 100 F 0.35 @ 1000 F	0.24 @ 70 F 0.29 @ 800 F 0.25 @ 100 F 0.35 @ 1000 F
THERMAL DIFFUSIVITY, sq ft / hour		0.018 @ 70 F	0.015 @ 75 F	0.015 @ 75 F
THERMAL SHOCK RESISTANCE		Poor	Good	Good
VIBRATION RESISTANCE		Poor	Good	Good
WARPAGE - IN SERVICE		Will not warp		
WATER ABSORPTION , % by weight		0	300	350
WATER VAPOR TRANSMISSION		0	100 perm-inches	100 perm-inches
ADVANTAGES		Impervious to water	Resilient. Available with a variety of facings. Light weight.	For low pressure steam lines.
LIMITATIONS		Not abrasion resistant. Must provide for expansion and contraction.	Low compressive strength. Depends on vapor barrier for low temperature service.	

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CHARACTERISTICS

BLOCK, BOARD AND PREFORMED PIPE COVERING

GENERIC CLASS NUMBER		22	23	24
INSULATION TRADE NAMES		One Piece, Mono-Kover, Fiber Glass Pipe Insul, Thermoglas, Superglas, Snap-On, Micro-Lok.	Fiberglas I.S. Board, Armaglas I.S. Board.	Fiberglas All Purpose Duct Insulation, Armaglas Duct Insulation, Superglas.
BASIC MATERIAL		Fibrous glass and binder	Fibrous glass and binder	Fibrous glass
GENERAL FORM		Semi-rigid pipe covering	Semi-rigid board	Semi-rigid board
ABRASION RESISTANCE % weight loss	1st RUN			
	2nd RUN			
ALKALINITY, pH		6 to 10	8 to 10	8 to 10
CAPILLARITY, % by weight		0.08 to 0.35		0
COEFFICIENT OF EXPANSION				
COMBUSTIBILITY	FLASH	450 F for binders		Depends on facing
	FLAME		1200 F	1200 F
	MELTING	1200 F		
CORROSION - RUSTING		Will not cause steel to rust	Will not cause steel to rust	
CORROSION - STRESS		Stainless must be protected	Stainless must be protected	
CRACKING - HOT SURFACE				
DENSITY, lb / cu ft		3 to 6, 4 Average	3 to 3 1/2	1.5 to 3.2
DROP RESISTANCE				
HARDNESS, m m penetration				
HYGROSCOPICITY, % by weight		0	0	0
RESISTANCE TO ACIDS		Good from pH 5 to 7 except HF and H_3PO_4	Good from pH 5 to 7 except HF and H_3PO_4	Good from pH 5 to 7
RESISTANCE TO CAUSTICS		Good from pH 7 to 10	Good from pH 7 to 10	Good from pH 7 to 10 except for foil facing
RESISTANCE TO SOLVENTS		Good	Good	Good except for asphalt coating
SHRINKAGE - HEAT	LINEAR			
	VOLUMETRIC			
SPECIFIC GRAVITY	REAL	2.4	2.5	2.50
	APPARENT	0.046 to 0.097	0.046 to 0.056	0.05
SPECIFIC HEAT, btu / lb		0.20	0.20	0.20
STRENGTH - COMPRESSIVE, psi		0.35 @ 5% deformation	0.7 @ 10 % deformation 1.5 @ 20 % deformation	1/2 @ 10 % deformation 1 1/2 @ 25 % deformation
STRENGTH - FLEXURAL, psi		Low	Low	10
STRENGTH - SHEAR, psi				
STRENGTH - TENSILE, psi		Length - 120, Crosswise - 53		
TEMPERATURE LIMITS	CONTINUOUS	-30 F Min 350 to 400 F Max	-120 F Min 700 F Max	250 F Max
	SHORT PERIOD	-30 F Min 350 to 400 F Max	-120 F Min 800 F Max	350 F Max
	CYCLIC			
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY, / (hr) (sq ft) (deg F / in.)		0.22 @ 70 F 0.35 @ 300 F 0.24 @ 100 F 0.29 @ 200 F	0.23 @ 70 F 0.36 @ 300 0.25 @ 100 F 0.44 @ 400 0.29 @ 200 F	At 3 lb density 0.20 @ 30 F 0.24 @ 100 F 0.23 @ 70 F 0.29 @ 200 F
THERMAL DIFFUSIVITY, sq ft / hour		0.024 @ 100 F	0.032 @ 70 F	0.031 @ 75 F
THERMAL SHOCK RESISTANCE		Good	Good	
VIBRATION RESISTANCE		Good	Good	
WARPAGE - IN SERVICE				
WATER ABSORPTION , % by weight		400	400	400
WATER VAPOR TRANSMISSION		100 perm-inches	100 perm-inches	
ADVANTAGES		Lightweight. Easy to apply. Resilient.	Lightweight. For boilers, duct and other heated equipment. Non-punking binder.	
LIMITATIONS		Soft. Will not resist mechanical abuse. Depends on vapor barrier for low temperature service.		Depends on vapor barrier for low temperature service.

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CHARACTERISTICS

BLOCK, BOARD AND PREFORMED PIPE COVERING

GENERIC CLASS NUMBER		25	26	27
INSULATION TRADE NAMES		Fiberglas PF-600 series, Armaglas PF-600 series, JM Microlite, EPF – 600 series, Pabco – 600 series.	AE Board AE-6 Board	Armaglas Roof Insulation Fiberglas Roof Insulation
BASIC MATERIAL		Fibrous glass and binder	Fibrous glass and binder. Asphalt coating.	Fibrous glass, binder and asphalt cover.
GENERAL FORM		Semi-rigid board	Rigid board	Board
ABRASION RESISTANCE % weight loss	1st RUN 2nd RUN	40	40	40
ALKALINITY, pH		8 to 10	8 to 10	8 to 10
CAPILLARITY, % by weight		Low	Low	Low
COEFFICIENT OF EXPANSION				8×10^{-5}
COMBUSTIBILITY	FLASH FLAME MELTING		550 F 150 F Asphalt	425 F Asphalt 150 F Asphalt, 1400 Glass
CORROSION - RUSTING		Will not cause steel to rust	Will not cause steel to rust	
CORROSION - STRESS		Stainless must be protected	Stainless must be protected	
CRACKING - HOT SURFACE				
DENSITY, lb / cu ft		1 1/2 thru 10 1/2	5 to 7 (Wool)	11 to 16
DROP RESISTANCE				
HARDNESS, m m penetration				
HYGROSCOPICITY, % by weight		0	0	Less than 1
RESISTANCE TO ACIDS		Good from pH 5 to 7 except HF and H_3PO_4	Good from pH 5 to 7 except HF and H_3PO_4	Good from pH 5 to 7 except HF and H_3PO_4
RESISTANCE TO CAUSTICS		Good from pH 7 to 10	Good from pH 7 to 10	Good from pH 7 to 10
RESISTANCE TO SOLVENTS		Good	Poor to hydrocarbon solvents	Good (excluding cover)
SHRINKAGE - HEAT	LINEAR VOLUMETRIC			0 % @ 200 F
SPECIFIC GRAVITY	REAL APPARENT	2.5	2.5 Glass 0.08 to 0.11	2.5 Glass 0.18 to 0.30
SPECIFIC HEAT, btu / lb		0.20	0.24	0.20
STRENGTH - COMPRESSIVE, psi		0.07 @ 10 % deformation for 2 lbs to 3.5 @ 10 % deformation for 10 1/2 lbs	3 @ 10 % deformation 0.9 @ 5 % deformation	10 @ 10 % deformation 20 @ 25 % deformation
STRENGTH - FLEXURAL, psi		3 at 2 lbs to 40 at 9 lbs	30	80
STRENGTH - SHEAR, psi				
STRENGTH - TENSILE, psi		0.2 to 1.0	0.70 Flatwise	
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	-300 to -50 F Min 250 to 450 F Max -300 to -50 F Min 250 to 450 F Max	-50 F Min 90 to 100 F Max -50 F Min 90 to 100 F Max 90 to 100 F Max	Atmos Min 175 F Max Atmos Min 200 F Max Atmos Min 200 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)		0.28 @ 100 F to 0.31 @ 100 F 0.32 @ 200 F to 0.43 @ 200 F 0.38 @ 300 F to 0.60 @ 300 F	0.27 @ 70 F	0.24 @ 0 F 0.26 @ 100 F 0.25 @ 30 F 0.27 @ 70 F
THERMAL DIFFUSIVITY, sq ft / hour		0.022 @ 200 F and 6 lbs	0.016 @ 70 F and 6 lbs	0.009 @ 70 F and 12 lbs
THERMAL SHOCK RESISTANCE		Good	Good	Will puncture
VIBRATION RESISTANCE		Good	Good	Good
WARPAGE - IN SERVICE				
WATER ABSORPTION, % by weight		400 to 1000	600	
WATER VAPOR TRANSMISSION		100 perm-inches	3 perm-inches	Less than 0.05 perm-inches
ADVANTAGES		Resilient. Low conductivity. Wide range of densities and strengths for varied usage.	Lightweight. Resilient.	Lightweight. Resilient.
LIMITATIONS		Low mechanical strength. Depends on vapor barrier for low temperature application.	Will not resist mechanical abuse. Depends upon vapor barrier. Will burn.	Depends on vapor barrier installed prior to application. Does not retard water flow. Will not resist fire.

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CHARACTERISTICS

BLOCK, BOARD AND PREFORMED PIPE COVERING

GENERIC CLASS NUMBER		28	29	30
INSULATION TRADE NAMES		Frost Proof, Zero, Non Frost, Built Up Hairfelt, Protecto.	85% Mag., Thermalite, Super Light, Custom Molded Magnesium, Precision Molded Magnesium.	Block Insul, Armatemp MW Block, Mono-Block, Grip Tex, PV Super-temp, Webers HT Block, Unitblock. See materials list for more.
BASIC MATERIAL		Hair and wool felt	Magnesium carbonate and asbestos	Mineral wool and binders
GENERAL FORM		Semi-rigid pipe covering	Rigid block and pipe covering	Rigid block
ABRASION RESISTANCE % weight loss	1st RUN 2nd RUN		25 to 30 50 to 55	50 to 55 80 to 85
ALKALINITY, pH			9 to 11	7 to 9
CAPILLARITY, % by weight		High	540	Low
COEFFICIENT OF EXPANSION			28×10^{-7} Reheat	
COMBUSTIBILITY	FLASH FLAME MELTING	Will burn	Incombustible	Incombustible 2000 F
CORROSION - RUSTING				
CORROSION - STRESS			Stainless must be protected	Stainless must be protected
CRACKING - HOT SURFACE				
DENSITY, lb / cu ft		20 to 22	10 to 12	14 to 22
DROP RESISTANCE				
HARDNESS, m m penetration			0.71 to 1.10	
HYGROSCOPICITY, % by weight			1.5 to 4.0	
RESISTANCE TO ACIDS		Not resistant	Not resistant	Requires protection
RESISTANCE TO CAUSTICS		Not resistant	Resistant to dilute caustics	Requires protection
RESISTANCE TO SOLVENTS		Not resistant	Fair	Excellent
SHRINKAGE - HEAT	LINEAR VOLUMETRIC		0.5 % @ 500 F 1.0 % @ 600 F	1 % @ 1200 F 2 % @ 1900 F
SPECIFIC GRAVITY	REAL APPARENT	0.30 to 0.35	2.2 0.16 to 0.19	2.6 0.22 to 0.35
SPECIFIC HEAT, btu / lb			0.28	0.22 to 0.23
STRENGTH - COMPRESSIVE, psi			60 @ 5 % deformation 80 @ 10 % deformation	15 to 30 @ 5 % deformation
STRENGTH - FLEXURAL, psi			40 to 50	30 to 70
STRENGTH - SHEAR, psi			28 to 160	43
STRENGTH - TENSILE, psi			15 to 17	20-Parallel to face, 3 normal
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	0 F Min 90 F Max 0 F Min 90 F Max 0 F Min 90 F Max	Atmos Min 550 to 600 F Max Atmos Min 800 F Max Atmos Min	Atmos Min 1700 to 1900 F Max Atmos Min 1700 to 1900 F Max Atmos Min 1700 to 1900 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING				Some products will
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)		0.31 @ 50 F	0.34 @ 100 F to 0.35 @ 100 F 0.36 @ 200 F to 0.39 @ 200 F 0.43 @ 400 F to 0.49 @ 400 F	0.29 @ 100 F to 0.34 @ 100 F 0.40 @ 400 F to 0.46 @ 400 F 0.51 @ 600 F to 0.70 @ 600 F
THERMAL DIFFUSIVITY, sq ft / hour			0.006 to 0.012	0.009 @ 400 F and 18 lbs
THERMAL SHOCK RESISTANCE			Good	Good
VIBRATION RESISTANCE		Good	Fair	Poor
WARPAGE - IN SERVICE				
WATER ABSORPTION , % by weight		High	540	260
WATER VAPOR TRANSMISSION			3 perm-inches	High
ADVANTAGES		Can be used to retard freezing of water pipes for a period of time at temperatures moderately below freezing.	Handles well. Asbestos fibers hold curved pieces together in good hinging action.	Easily fitted. Flexible to a degree. Withstands considerable expansion and contraction.
LIMITATIONS		Very absorbant. Must be protected against moisture. Will burn. Poor insulator when wet.	Sharp clean edges cannot be maintained. Loses most of strength when wet. Difficult to prefabricate.	Will not resist excessive mechanical abuse. Soft. Unsuitable for fabrication of fitting covers.

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CHARACTERISTICS

BLOCK, BOARD AND PREFORMED PIPE COVERING

GENERIC CLASS NUMBER		31	32	33
INSULATION TRADE NAMES		Rock Cork	LT-4 Felt, LT-6 Felt, LT-8 Felt.	...roc M, MT Board, Therma-K, Templite.
BASIC MATERIAL		Mineral wool and asphaltic binder	Mineral wool	Mineral wool and binder
GENERAL FORM		Rigid board	Semi-rigid board	Semi-rigid block and board
ABRASION RESISTANCE % weight loss	1st RUN 2nd RUN	15 26		
ALKALINITY, pH		8 to 8 1/2		7 to 9
CAPILLARITY, % by weight		Negligible		
COEFFICIENT OF EXPANSION		4.5×10^{-6}		
COMBUSTIBILITY	FLASH FLAME MELTING	Incombustible		700 F 1000 F
CORROSION - RUSTING		Will not cause steel to rust		Will not cause steel to rust
CORROSION - STRESS		Stainless must be protected		Stainless must be protected
CRACKING - HOT SURFACE				
DENSITY, lb / cu ft		14 to 15	4, 6 and 8	8 to 10
DROP RESISTANCE				
HARDNESS, m m penetration				
HYGROSCOPICITY, % by weight				
RESISTANCE TO ACIDS		Poor		Fair
RESISTANCE TO CAUSTICS		Fair		Fair
RESISTANCE TO SOLVENTS		Poor		Fair
SHRINKAGE - HEAT	LINEAR VOLUMETRIC	Low		0 % @ 700 F
SPECIFIC GRAVITY	REAL APPARENT	2.4 0.22 to 0.24		2.6 0.12 to 0.16
SPECIFIC HEAT, btu / lb		0.27		0.22
STRENGTH - COMPRESSIVE, psi		12 @ 5 % deformation 14 @ 10 % deformation		1 @ 10 % deformation
STRENGTH - FLEXURAL, psi		30		25 to 30
STRENGTH - SHEAR, psi		10		
STRENGTH - TENSILE, psi		24		
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	-300 F Min 350 F Max	-300 F Min 450 F Max	Atmos Min 700 to 1000 F Max Atmos Min 700 to 1000 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)		0.27 @ -50 F 0.33 @ 70 F 0.29 @ 0 F 0.34 @ 100 F 0.31 @ 30 F		0.26 @ 100 F 0.39 @ 400 F 0.30 @ 200 F 0.48 @ 500 F 0.34 @ 300 F 0.85 @ 700 F
THERMAL DIFFUSIVITY, sq ft / hour		0.0067 @ 70 F		0.013 @ 100 F
THERMAL SHOCK RESISTANCE		Good		Good
VIBRATION RESISTANCE		Fair		Fair
WARPAGE - IN SERVICE				
WATER ABSORPTION, % by weight		15		
WATER VAPOR TRANSMISSION		16 to 22 perm-inches		
ADVANTAGES		Easily fitted.		Resilient.
LIMITATIONS		Soft. Dependent upon outer vapor barrier in low temperature service.		Unsuitable for prefabrication. Dependent upon outer vapor barrier.

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CHARACTERISTICS

BLOCK, BOARD AND PREFORMED PIPE COVERING

GENERIC CLASS NUMBER		34	35	36
INSULATION TRADE NAMES		N-700 Board, N-700 Pipe Covering, N-700 Block, U.S. Mineral Wool 9-lb Felt Board	Duct Insulation, Insulation Board, Spintex Board, Spun Wool Insulation Board, Spun Wood Duct, USM Felt.	No 12 Insulation Block
BASIC MATERIAL		Mineral wool and binders	Mineral wool and binder	Perlite, asbestos fibers and hydraulic binder
GENERAL FORM		Semi-rigid block, board and pipe covering.	Semi-rigid board	Rigid block
ABRASION RESISTANCE % weight loss	1st RUN 2nd RUN			30 50
ALKALINITY, pH			7 to 9	
CAPILLARITY, % by weight				
COEFFICIENT OF EXPANSION				
COMBUSTIBILITY	FLASH FLAME MELTING	Incombustible 2000 F	700 F for some, others are incombustible. 1900 F	Incombustible
CORROSION - RUSTING			Will not cause steel to rust	
CORROSION - STRESS			Stainless must be protected	
CRACKING - HOT SURFACE				
DENSITY, lb / cu ft		9.5 to 10.5	3 to 9	14 to 16
DROP RESISTANCE				
HARDNESS, m m penetration				
HYGROSCOPICITY, % by weight				
RESISTANCE TO ACIDS		Fair	Fair	Not resistant
RESISTANCE TO CAUSTICS		Fair	Fair	
RESISTANCE TO SOLVENTS		Excellent	Fair	
SHRINKAGE - HEAT	LINEAR VOLUMETRIC	0 % @ 700 F	Low	0.2 % @ 1200 F
SPECIFIC GRAVITY	REAL APPARENT	2.6 0.16	2.4 0.05 to 0.12	0.22 to 0.26
SPECIFIC HEAT, btu / lb		0.22	0.22 to 0.25	
STRENGTH - COMPRESSIVE, psi			3/4 @ 10 % deformation	80 @ 10 % deformation
STRENGTH - FLEXURAL, psi			10	40
STRENGTH - SHEAR, psi				
STRENGTH - TENSILE, psi				
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	-300 F Min 600 - 700 F Max -300 F Min 600 - 700 F Max	Atmos Min 450 F Max Atmos Min 450 F Max Atmos Min 450 F Max	Atmos Min 1200 F Max Atmos Min 1200 F Max Atmos Min 1200 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)		0.25 @ 100 F 0.37 @ 400 F 0.29 @ 200 F 0.33 @ 300 F	0.23 @ 50 F to 0.26 @ 50 F 0.29 @ 200 F to 0.39 @ 200 F 0.35 @ 300 F to 0.52 @ 300 F	0.40 @ 300 F 0.43 @ 400 F 0.57 @ 800 F 0.47 @ 500 F
THERMAL DIFFUSIVITY, sq ft / hour			0.013 @ 100	
THERMAL SHOCK RESISTANCE			Good	
VIBRATION RESISTANCE			Fair	
WARPAGE - IN SERVICE				
WATER ABSORPTION , % by weight				
WATER VAPOR TRANSMISSION				
ADVANTAGES			Resilient. Lightweight. Used as duct insulation	
LIMITATIONS			Soft	Dusty, grainy surface.

UCC 022084

BLOCK, BOARD AND PREFORMED PIPE COVERING

GENERIC CLASS NUMBER		37	38	39
INSULATION TRADE NAMES		Tufflite Expanded Polyethylene	Armalite, Dyfoam, Alumifoam, J Foam, Expanded Polystyrene, US Cellofoam, Uni-Crest	Tufflite High Density Board
BASIC MATERIAL		Expanded polyethylene	Expanded polystyrene (bead)	Expanded polystyrene
GENERAL FORM		Flexible board	Rigid block, board and pipe covering	Rigid board
ABRASION RESISTANCE % weight loss	1st RUN 2nd RUN			
ALKALINITY, pH		6.5 to 7.5	6.5 to 7.5	6.5 to 7.5
CAPILLARITY, % by weight			0	0
COEFFICIENT OF EXPANSION			35 - 40 x 10^{-6}	
COMBUSTIBILITY	FLASH FLAME MELTING	645 F 675 F 220 F	670 F Self-snuffing grade available 690 F 230 F	670 F 690 F 230 F
CORROSION - RUSTING				
CORROSION - STRESS				
CRACKING - HOT SURFACE				
DENSITY, lb / cu ft		1.9 to 2.2	0.9 to 1.2	4.3 to 4.7
DROP RESISTANCE				
HARDNESS, m m penetration				
HYGROSCOPICITY, % by weight		Negligible	Negligible	Negligible
RESISTANCE TO ACIDS		Good	Good except oxidizing acids	Good except oxidizing acids
RESISTANCE TO CAUSTICS		Good	Good	Good
RESISTANCE TO SOLVENTS		Good except aromatics	Poor for hydrocarbons	Poor for hydrocarbons
SHRINKAGE - HEAT	LINEAR VOLUMETRIC	0 % @ 120 F 1 % @ 140 F	2 % @ 175 F	
SPECIFIC GRAVITY	REAL APPARENT	0.03 to 0.035	0.014 to 0.020	0.06 to 0.07
SPECIFIC HEAT, btu / lb		0.30 @ 40 F	0.32	0.27
STRENGTH - COMPRESSIVE, psi		7 @ 10 % deformation 5 @ 5 % deformation	3 to 16 @ 2 % deformation	120 @ 3% deformation
STRENGTH - FLEXURAL, psi			12 to 34	
STRENGTH - SHEAR, psi			30	
STRENGTH - TENSILE, psi		20 to 30	10 to 40	
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	-50 F Min 160 F Max -50 F Min 195 F Max 195 F Max	-400 F Min 175 to 180 F Max 175 F Max 175 F Max	-400 F Min 175 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)		0.29 @ 0 F 0.35 @ 70 F	0.19 @ -50 F to 0.21 @ -50 F 0.20 @ 0 F to 0.22 @ 0 F 0.26 @ 100 F to 0.28 @ 100 F	0.25 @ 40 F
THERMAL DIFFUSIVITY, sq ft / hour		0.05 @ 40 F	0.063 @ 70 F	0.017 @ 40 F
THERMAL SHOCK RESISTANCE				
VIBRATION RESISTANCE		Excellent	Excellent	Excellent
WARPAGE - IN SERVICE				
WATER ABSORPTION , % by weight		0.2	Low	Low
WATER VAPOR TRANSMISSION		0.4 (Dry Cup) perm-inch	2.0 to 5 perm-inches	0.7 perm-inch
ADVANTAGES		Resistant to physical abuse. Flexible. Withstands constant water immersion.	Easily fabricated. Low conductivity. Very lightweight. Low water absorption and transmission.	Good strength. Low conductivity. Can be used for pipe saddles and tank supports.
LIMITATIONS		Will burn.	Will burn but can be obtained in self-snuffing grades.	Will burn.

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CHARACTERISTICS

BLOCK, BOARD AND PREFORMED PIPE COVERING

GENERIC CLASS NUMBER		40	41	42
INSULATION TRADE NAMES		Styrofoam, Tufflite.	Stayfoam, Gold Bond Therms Thane, Urethane Insulation.	Stayfoam, Tufflite Urethane, Gold Bond Therma Thane, Foamthane, Unarco U-200, One ? Cel, *JM M-thane.*
BASIC MATERIAL		Expanded polystyrene	Expanded polyurethane	Expanded polyurethane
GENERAL FORM		Rigid block, board, billet, and pipe covering.	Rigid block and board	Rigid block, board and pipe covering.
ABRASION RESISTANCE % weight loss	1st RUN 2nd RUN			
ALKALINITY, pH		6.7 to 7.5	6.5 to 7.5	6.5 to 7.5
CAPILLARITY, % by weight		Negligible	Negligible	Negligible
COEFFICIENT OF EXPANSION		35 x 10^{-6}	6 x 10^{-5}	45 x 10^{-6}
COMBUSTIBILITY	FLASH FLAME MELTING	855 F Self-snuffing 890 F 260 F	890 F Will burn 550 F 800 F	Self extinguishing 800 F
CORROSION - RUSTING		Does not contribute		Does not contribute
CORROSION - STRESS		Does not contribute		Does not contribute
CRACKING - HOT SURFACE				None
DENSITY, lb / cu ft		1.5 to 2.1	1.5 to 2	1.6 to 3
DROP RESISTANCE				
HARDNESS, m m penetration				
HYGROSCOPICITY, % by weight		Negligible		5 to 6
RESISTANCE TO ACIDS		Good	Resistant to dilute acid	Resistant to dilute acid
RESISTANCE TO CAUSTICS		Good	Resistant to dilute caustic	Resistant to dilute caustic
RESISTANCE TO SOLVENTS		Poor for hydrocarbons	Resistant to most	Resistant to most
SHRINKAGE - HEAT	LINEAR VOLUMETRIC			
SPECIFIC GRAVITY	REAL APPARENT	0.03	0.024 to 0.032	0.026 to 0.048
SPECIFIC HEAT, btu / lb		0.27	0.40	0.40
STRENGTH - COMPRESSIVE, psi		27 @ 2 % deformation 35 @ 5 % deformation	30 @ 3 % deformation	15 to 30 @ 5% deformation
STRENGTH - FLEXURAL, psi		41 to 46	30 to 60	30 to 60
STRENGTH - SHEAR, psi		30 to 35		
STRENGTH - TENSILE, psi		50 to 70	40	
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	-400 F Min 170 F Max -400 F Min 205 F Max -400 F Min 205 F Max	To -350 F Min 190 to 200 F Max To -350 F Min 190 to 200 F Max	-400 to -20 F Min 175 to 250 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)		0.19 @ -50 F to 0.24 @ -50 F 0.23 @ 30 F to 0.29 @ 30 F 0.27 @ 100 F to 0.34 @ 100 F	0.12 @ -50 F 0.13 @ 40 F 0.15 @ 70 F	0.12 @ -50 F 0.13 @ 0 F 0.15 @ 70 F
THERMAL DIFFUSIVITY, sq ft / hour				0.011 to 0.27 @ 0 F
THERMAL SHOCK RESISTANCE		Excellent	Excellent	Excellent
VIBRATION RESISTANCE		Good	Good	Good
WARPAGE - IN SERVICE		None		
WATER ABSORPTION, % by weight		Negligible	35	35
WATER VAPOR TRANSMISSION		0.74 to 0.82 (Wet Cup) perm-inch	0.4 to 1.5 perm-inch	0.4 to 1.5 perm-inch
ADVANTAGES		Dimensionally stable. Resilient. Withstands constant immersion. Low perm rating. Can be formed and fabricated.	Low thermal conductivity	Self-snuffing. Low thermal conductivity.
LIMITATIONS		Will burn, but is self-snuffing when flame is removed.	Not self-snuffing.	Will burn, but is self-snuffing when flame is removed.

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BLOCK, BOARD AND PREFORMED PIPE COVERING

GENERIC CLASS NUMBER		43	44	45
INSULATION TRADE NAMES		Urethane Roof Insulation	Flexible Stayfoam, Thermax.	Rigid Armaflex, JM Rigid Aerotub
BASIC MATERIAL		Expanded polyurethane and roofing membrane	Expanded polyurethane	Expanded rubber
GENERAL FORM		Rigid roof insulation	Flexible board and pipe covering	Rigid pipe covering
ABRASION RESISTANCE % weight loss	1st RUN 2nd RUN			
ALKALINITY, pH				
CAPILLARITY, % by weight		0		
COEFFICIENT OF EXPANSION				
COMBUSTIBILITY	FLASH FLAME MELTING	Will burn	*Self-snuffing* grade available	Self-snuffing
CORROSION - RUSTING				
CORROSION - STRESS				
CRACKING - HOT SURFACE				
DENSITY, lb / cu ft		1.9	1.3 to 3.8	7.5 to 8.5
DROP RESISTANCE				
HARDNESS, m m penetration				
HYGROSCOPICITY, % by weight				
RESISTANCE TO ACIDS				Good
RESISTANCE TO CAUSTICS				Good
RESISTANCE TO SOLVENTS				Fair to poor
SHRINKAGE - HEAT	LINEAR VOLUMETRIC			3 % @ 200 F 5 % @ 220 F
SPECIFIC GRAVITY	REAL APPARENT			0.126 to 0.136
SPECIFIC HEAT, btu / lb				
STRENGTH - COMPRESSIVE, psi		25 @ 5 % deformation 35 @ 10 % deformation	1 1/2 @ 50 % deformation	
STRENGTH - FLEXURAL, psi		140		
STRENGTH - SHEAR, psi				
STRENGTH - TENSILE, psi			31	
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	Atmos Min	-300 F Min 275 F Max	-400 F Min 220 F M
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)		0.13 @ Atmos Temp	0.29 @ 75 F	0.24 @ 75 F to 0.26 @ 75 F 0.26 @ 100 F to 0.29 @ 100 F
THERMAL DIFFUSIVITY, sq ft / hour				
THERMAL SHOCK RESISTANCE				
VIBRATION RESISTANCE				
WARPAGE - IN SERVICE				
WATER ABSORPTION, % by weight				65
WATER VAPOR TRANSMISSION		0.08 perm-inch		0.1 perm-inch
ADVANTAGES		Does not absorb water. Roofing membrane on each side of urethane.		Can be used underground
LIMITATIONS		Will burn		

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CHARACTERISTICS

BLOCK, BOARD AND PREFORMED PIPE COVERING

GENERIC CLASS NUMBER		46	47	48
INSULATION TRADE NAMES		Rubatex R-103-B	Armaflex, Cell-Tite, Ultra Foam, Acrotube, Foamed Plastic Tubing, O-C Flex Tubing and Sheet, Rubatex Pipe Insul. See material list for more.	Careystamp
BASIC MATERIAL		Expanded rubber	Expanded rubber	Expanded silica
GENERAL FORM		Rigid board	Flexible board and pipe covering	Rigid block and pipe covering
ABRASION RESISTANCE % weight loss	1st RUN 2nd RUN	Poor		
ALKALINITY, pH				9.5
CAPILLARITY, % by weight		10		
COEFFICIENT OF EXPANSION		34×10^{-6}	8×10^{-5}	
COMBUSTIBILITY	FLASH FLAME MELTING	Will burn Does not melt	Self-snuffing	Incombustible
CORROSION - RUSTING				Will not cause rusting of steel
CORROSION - STRESS				Will not contribute
CRACKING - HOT SURFACE				
DENSITY, lb / cu ft		4 to 5	6 to 11	9 to 10
DROP RESISTANCE				
HARDNESS, m m penetration				
HYGROSCOPICITY, % by weight		5	Low	0.2
RESISTANCE TO ACIDS		Resistant to most common acids.	Resistant to most acids	Excellent
RESISTANCE TO CAUSTICS		Resistant to most common caustics	Resistant to most caustics	Excellent
RESISTANCE TO SOLVENTS			Good to poor	Good
SHRINKAGE - HEAT	LINEAR VOLUMETRIC	10% @ 200 F	2 to 5 @ 200 F	0.7 % @ 1200 F 1.2 % @ 1600 F
SPECIFIC GRAVITY	REAL APPARENT	0.07	0.10 to 0.18	0.14 to 0.16
SPECIFIC HEAT, btu / lb		0.198		
STRENGTH - COMPRESSIVE, psi		40 @ 5 % deformation	2 to 5 @ 25 % deformation	65 @ 1 % deformation
STRENGTH - FLEXURAL, psi				
STRENGTH - SHEAR, psi		25		
STRENGTH - TENSILE, psi		50	To 150	
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	-300 F Min 140 F Max -300 F Min 180 F Max -300 F Min 180 F Max	-300 to 0 F Min 160 to 220 F Max 220 F Max 220 F Max	Atmos Min 1600 F Max Atmos Min 1800 F Max Atmos Min 1600 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)		0.20 @ -50 F 0.22 @ 70 F 0.21 @ 0 F 0.23 @ 100 F 0.22 @ 30 F	0.26 @ -50 F 0.29 @ 75 F 0.27 @ 0 F 0.26 @ 30 F	0.33 @ 100 F 0.51 @ 500 F 0.66 @ 800 F 0.77 @ 1000 F
THERMAL DIFFUSIVITY, sq ft / hour				
THERMAL SHOCK RESISTANCE		Resistant		Good
VIBRATION RESISTANCE				
WARPAGE - IN SERVICE				
WATER ABSORPTION, % by weight		10	5 to 12	0.8
WATER VAPOR TRANSMISSION			0.3 perm-inch	
ADVANTAGES		Water resistant. Resilient. Good mechanical strength.	Very flexible. Water resistant. Can be purchased with longitudinal split.	Low shrinkage. Low water absorption. Can be fabricated. Acid resistant.
LIMITATIONS		Will burn. Not too weather resistant.		Will fracture into pieces.

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BLOCK, BOARD AND PREFORMED PIPE COVERING

GENERIC CLASS NUMBER		49	50	51
INSULATION TRADE NAMES		JM Fibrocel	Quartz Foam	Glasrock No. 25 Foam
BASIC MATERIAL		Bonded inert silica	Cellular silica	Fused silica
GENERAL FORM		Rigid pipe covering	Block	Block
ABRASION RESISTANCE % weight loss	1st RUN 2nd RUN		Poor if bare	Poor if bare
ALKALINITY, pH			6 to 7	6 to 7
CAPILLARITY, % by weight			0	80
COEFFICIENT OF EXPANSION			0.3×10^{-6}	0.3×10^{-6}
COMBUSTIBILITY	FLASH FLAME MELTING	Flame Resistant	Not combustible 3100 F	Not combustible 3100 F
CORROSION - RUSTING				
CORROSION - STRESS				
CRACKING - HOT SURFACE				
DENSITY, lb / cu ft		9	10 to 50, to order	23 to 27
DROP RESISTANCE				
HARDNESS, m m penetration				
HYGROSCOPICITY, % by weight				0
RESISTANCE TO ACIDS			Excellent except HF and hot H_3PO_4	Excellent except HF and hot H_3PO_4
RESISTANCE TO CAUSTICS			Fair to cold solutions and spillage	Resistant to light exposure
RESISTANCE TO SOLVENTS			Good	Excellent
SHRINKAGE - HEAT	LINEAR VOLUMETRIC	1.4 % Moist to dry	0 % @ 1800 F	0 % @ 1800 F
SPECIFIC GRAVITY	REAL APPARENT	0.14	2.2 0.15 to 0.8	2.2 0.4
SPECIFIC HEAT, btu / lb			0.27 to 0.30	0.27 to 0.30
STRENGTH - COMPRESSIVE, psi			200 @ 2 % deformation to 3000 @ 2 % deformation	150 @ 2 % deformation 225 @ 5 % deformation
STRENGTH - FLEXURAL, psi		50	100 to 1000	500
STRENGTH - SHEAR, psi				
STRENGTH - TENSILE, psi				50
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	Atmos Min 300 F Max Atmos Min 300 F Max Atmos Min 300 F Max	2000 F Max 3000 F Max	Atmos Min 1800 F M Atmos Min 2200 F M Atmos Min
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)		0.34 @ 50 F 0.41 @ 200 F 0.37 @ 100 F 0.39 @ 150 F	0.40 @ -50 F to 0.60 @ -50 F 0.48 @ 100 F to 0.90 @ 100 F 1.0 @ 500 F to 2.0 @ 800 F	0.45 @ -50 F 1.4 @ 1000 0.80 @ 300 F 1.0 @ 500 F
THERMAL DIFFUSIVITY, sq ft / hour				
THERMAL SHOCK RESISTANCE				
VIBRATION RESISTANCE				
WARPAGE - IN SERVICE				
WATER ABSORPTION , % by weight			0	50
WATER VAPOR TRANSMISSION		0.3 perm-inch	0	High
ADVANTAGES		Will not disintegrate in water	Closed cells	
LIMITATIONS		Low mechanical strength. Difficult to prefabricate fitting covers.		

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CHARACTERISTICS

BLOCK, BOARD AND PREFORMED PIPE COVERING

GENERIC CLASS NUMBER		52	53	54
INSULATION TRADE NAMES		Glasrock No. 50 Foam	Masrock	Gold Bond Fiberboard Roof Insulation, JM Roof Insulation.
BASIC MATERIAL		Fused silica	Fused silica	Wood fibers
GENERAL FORM		Block	Block and shapes	Rigid board
ABRASION RESISTANCE % weight loss	1st RUN 2nd RUN			
ALKALINITY, pH				4.5 to 6
CAPILLARITY, % by weight				
COEFFICIENT OF EXPANSION		0.3×10^{-6}	0.3×10^{-6}	
COMBUSTIBILITY	FLASH FLAME MELTING	Incombustible	Incombustible	Comparable to wood
CORROSION - RUSTING				
CORROSION - STRESS				
CRACKING - HOT SURFACE				
DENSITY, lb / cu ft		50	115	15 to 18
DROP RESISTANCE				
HARDNESS, m m penetration				
HYGROSCOPICITY, % by weight				14
RESISTANCE TO ACIDS		Excellent except to HF and hot H_3PO_4	Excellent except to HF and hot H_3PO_4	
RESISTANCE TO CAUSTICS				
RESISTANCE TO SOLVENTS				
SHRINKAGE - HEAT	LINEAR VOLUMETRIC	0.06 % @ 2000 F	0.06 % @ 2000 F	
SPECIFIC GRAVITY	REAL APPARENT	2.2 0.78	2.2 1.85	0.24 to 0.29
SPECIFIC HEAT, btu / lb		0.28 @ 1300 F	0.28 @ 1300 F	
STRENGTH - COMPRESSIVE, psi		1200 @ 0 % deformation		
STRENGTH - FLEXURAL, psi		175	2000	
STRENGTH - SHEAR, psi				
STRENGTH - TENSILE, psi				
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	Atmos Min 2000 F Max Atmos Min 2000 F Max Atmos Min 2000 F Max	Atmos Min 2000 F Max Atmos Min 2000 F Max Atmos Min 2000 F Max	Atmos Min Atmos Max Atmos Min Atmos Max Atmos Min Atmos Max
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)		0.75 @ 300 F 1.8 @ 1600 F 1.0 @ 500 F 2.10 @ 1800 F 1.4 @ 1000 F 2.75 @ 2000 F	2.25 @ 300 F 5.40 @ 1600 F 3.00 @ 500 F 6.84 @ 1800 F 4.00 @ 1000 F 7.80 @ 2000 F	0.36 @ 70 F
THERMAL DIFFUSIVITY, sq ft / hour				
THERMAL SHOCK RESISTANCE		Excellent	Excellent	
VIBRATION RESISTANCE				
WARPAGE - IN SERVICE		None		
WATER ABSORPTION , % by weight		23 to 30	7	
WATER VAPOR TRANSMISSION				
ADVANTAGES		Excellent thermal shock resistance. Good dimensional stability.	Excellent thermal shock resistance. Good dimensional stability.	
ADTATIONS				Will burn

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CHARACTERISTICS

BLOCK, BOARD AND PREFORMED PIPE COVERING

GENERIC CLASS NUMBER		55	56	57
INSULATION TRADE NAMES		Anti-Sweat, Non Sweat, Impervo	Wool felt, Pre Shrunk, Duplex, Perfecto, Wool Felt	
BASIC MATERIAL		Wool felt	Wool felt	
GENERAL FORM		Semi-rigid pipe covering	Semi-rigid pipe covering	
ABRASION RESISTANCE % weight loss	1st RUN 2nd RUN			
ALKALINITY, pH				
CAPILLARITY, % by weight		High	High	
COEFFICIENT OF EXPANSION				
COMBUSTIBILITY	FLASH FLAME MELTING	Combustible	Combustible	
CORROSION - RUSTING				
CORROSION - STRESS				
CRACKING - HOT SURFACE				
DENSITY, lb / cu ft		22 to 25	18 to 20	
DROP RESISTANCE				
HARDNESS, m m penetration				
HYGROSCOPICITY, % by weight				
RESISTANCE TO ACIDS				
RESISTANCE TO CAUSTICS				
RESISTANCE TO SOLVENTS				
SHRINKAGE - HEAT	LINEAR VOLUMETRIC	5 % @ 200 F		
SPECIFIC GRAVITY	REAL APPARENT	0.35 to 0.40	0.29 to 0.32	
SPECIFIC HEAT, btu / lb				
STRENGTH - COMPRESSIVE, psi				
STRENGTH - FLEXURAL, psi				
STRENGTH - SHEAR, psi				
STRENGTH - TENSILE, psi				
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	40 F Min 90 F Max 40 F Min 90 F Max 40 F Min 90 F Max	Atmos Min 212 to 225 F Max 212 to 225 F Max 212 to 225 F Max	
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)			0.38 @ 200 F to 0.64 @ 200 F	
THERMAL DIFFUSIVITY, sq ft / hour				
THERMAL SHOCK RESISTANCE				
VIBRATION RESISTANCE				
WARPAGE - IN SERVICE				
WATER ABSORPTION , % by weight		High	High	
WATER VAPOR TRANSMISSION				
ADVANTAGES				
LIMITATIONS		Dependent on vapor barrier. Will burn.	Little resistance to moisture. Soft. Will burn.	

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BLANKET, FELT, TAPE AND ROPE

GENERIC CLASS NUMBER		58	59	60
INSULATION TRADE NAMES		Kaowool, Fiberfrax XV Felt, Fiberfrax XSW Blanket, Cerafelt, Fiberfrax XLF, Fiberfrax XLM, Fiberfrax XSWF	Fiberfrax 970 Series Paper	Fiberfrax Rope, Fiberfrax Cord and Yarn.
BASIC MATERIAL		Alumina-silica	Alumina-silica	Alumina-silica
GENERAL FORM		Blanket and felt	Paper	Rope, cord and yarn.
ALKALINITY, pH				
CAPILLARITY, % by weight				
COMBUSTIBILITY	FLASH FLAME MELTING	Incombustible except for binder burn out. 3000 F	Incombustible 3200 F	Incombustible except for organic carrier which burns out. 3200 F
COMPACTION			30 to 40 % @ 8 psi	
CORROSION - RUSTING				
CORROSION - STRESS				
DENSITY, lb / cu ft		3 to 24	9.4 to 10.5	25
HYGROSCOPICITY, % by weight		3		
RESISTANCE TO ACIDS		Good at room temperature except HF and H_3PO_4	Good at room temperature except HF and H_3PO_4.	Good at room temperature except HF and H_3PO_4.
RESISTANCE TO CAUSTICS		Good to poor	Fair to poor	Fair to poor at room temperature
RESISTANCE TO SOLVENTS		Excellent	Excellent	Excellent
SHRINKAGE-HEAT	LINEAR VOLUMETRIC	0.5 % @ 1500 F 2.5 % @ 2200 F		
SPECIFIC GRAVITY	REAL APPARENT	0.048 to 0.38	0.15 to 0.17	0.40
SPECIFIC HEAT, btu / lb		0.25		
STRENGTH - COMPRESSIVE, psi				
STRENGTH - TENSILE, psi				80 lbs for 1/2" diameter rope
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	Atmos Min 2000 F Max Atmos Min 2300 F Max Atmos Min 2300 F Max	Atmos Min 2000 F Max Atmos Min 2300 F Max Atmos Min 2300 F Max	Atmos Min 2000 F Max Atmos Min 2300 F Max Atmos Min
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY (at indicated mean temp and density) btu / (hr) (sq ft) (deg F / in.)		Density 6 0.90 @ 1000 F 0.35 @ 300 F 1.14 @ 1200 F 0.47 @ 500 F 1.43 @ 1400 F 0.71 @ 800 F 1.99 @ 1800 F	Density 10 0.73 @ 1000 F 0.35 @ 200 F 0.84 @ 1200 F 0.43 @ 400 F 0.96 @ 1400 F 0.52 @ 600 F 1.22 @ 1800 F	
THERMAL DIFFUSIVITY, sq ft / hour		0.03 @ 600 F and 6 lbs		
THERMAL SHOCK RESISTANCE				
VIBRATION RESISTANCE				
WATER ABSORPTION, % by weight		Saturates	Saturates	Saturates
WATER VAPOR TRANSMISSION				
ADVANTAGES		Soft. Resilient.	Available in thicknesses of 20 to 80 mils. Available with or without inorganic binder.	Used in boilers, furnaces, hot gas chambers and expansion joints.
LIMITATIONS		Little mechanical strength.		

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CHARACTERISTICS

BLANKET, FELT, TAPE AND ROPE

GENERIC CLASS NUMBER		61	62	63
INSULATION TRADE NAMES		Fiberfrax Cloth, Fiberfrax Tape.	Insubestos Felt Type A.	Insubestos Felt Type B.
BASIC MATERIAL		Alumina-silica	Asbestos	Asbestos fibers in water repellent blanket.
GENERAL FORM		Cloth and tape	Felt	Felt
ALKALINITY, pH				
CAPILLARITY, % by weight				
COMBUSTIBILITY	FLASH FLAME MELTING	Incombustible except for carrier which burns out. 3200 F	2500 F	
COMPACTION				
CORROSION - RUSTING				
CORROSION - STRESS				
DENSITY, lb / cu ft			9 to 12	9 to 12
HYGROSCOPICITY, % by weight				
RESISTANCE TO ACIDS		Good at room temperature except HF and H_3PO_4	Resistant to most common acids	
RESISTANCE TO CAUSTICS		Fair to poor at room temperature	Resistant to most common caustics	
RESISTANCE TO SOLVENTS		Excellent	Excellent	Excellent
SHRINKAGE-HEAT	LINEAR VOLUMETRIC	10 % @ 2000 F		
SPECIFIC GRAVITY	REAL APPARENT		0.14 to 0.19	0.14 to 0.19
SPECIFIC HEAT, btu / lb			0.24	0.24
STRENGTH - COMPRESSIVE, psi				
STRENGTH - TENSILE, psi		117 lbs ASTM-Grab		
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	Atmos Min 2000 F Max Atmos Min 2300 F Max Atmos Min	Atmos Min 750 F Max Atmos Min 750 F Max Atmos Min 750 F Max	40 F Min 90 F Max 40 F Min 90 F Max 40 F Min 90 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY (at indicated mean temp and density) btu / (hr) (sq ft) (deg F / in.)			Density 9.0 0.50 @ 200 F 0.61 @ 400 F 0.72 @ 600 F	Density 9.0 0.50 @ 200 F 0.61 @ 400 F 0.72 @ 600 F
THERMAL DIFFUSIVITY, sq ft / hour				
THERMAL SHOCK RESISTANCE			Excellent	Excellent
VIBRATION RESISTANCE			Excellent with jacket	Excellent with jacket
WATER ABSORPTION, % by weight		Saturates	500	500
WATER VAPOR TRANSMISSION			High	High
ADVANTAGES				For cold water lines
LIMITATIONS				

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CHARACTERISTICS

BLANKET, FELT, TAPE AND ROPE

GENERIC CLASS NUMBER		64	65	66
INSULATION TRADE NAMES		Kay N M Tape, Thermotape, Unarco Insutape	Thermowrap	Asbestos Blanket
BASIC MATERIAL		Asbestos	Asbestos	Asbestos
GENERAL FORM		Tape	Tape	Blanket
ALKALINITY, pH				
CAPILLARITY, % by weight				
COMBUSTIBILITY	FLASH FLAME MELTING	400 F For waterproof 400 F coating 350 F		2500 F
COMPACTION				
CORROSION - RUSTING				
CORROSION - STRESS				
DENSITY, lb / cu ft				8 to 12
HYGROSCOPICITY, % by weight				
RESISTANCE TO ACIDS		Fair	Fair	Resistant to most common acids
RESISTANCE TO CAUSTICS		Moderate	Moderate	Resistant to most common caustics
RESISTANCE TO SOLVENTS		Poor depending on type (For coating)		
SHRINKAGE-HEAT	LINEAR VOLUMETRIC			
SPECIFIC GRAVITY	REAL APPARENT			
SPECIFIC HEAT, btu / lb				
STRENGTH - COMPRESSIVE, psi				
STRENGTH - TENSILE, psi				
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	Atmos Min 400 to 500 F Max Atmos Min 400 to 600 F Max Atmos Min 400 to 500 F Max	Atmos Min 450 F Max Atmos Min 450 F Max Atmos Min 450 F Max	50 F Min 750 to 850 F Max 750 to 850 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY (at indicated mean temp and density) btu / (hr) (sq ft) (deg F / in.)		0.68 @ 100 F 0.81 @ 300 F 0.75 @ 200 F		0.50 @ 200 F 0.74 @ 600 F 0.61 @ 400 F
THERMAL DIFFUSIVITY, sq ft / hour				
THERMAL SHOCK RESISTANCE		Resistant		Resistant
VIBRATION RESISTANCE		Excellent		
WATER ABSORPTION, % by weight				600
WATER VAPOR TRANSMISSION				
ADVANTAGES		Flexible, can be wrapped around pipes, tubes, and heat piping.	Flexible	
LIMITATIONS		Soft. Little mechanical strength.	Soft. Little mechanical strength.	

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CHARACTERISTICS

BLANKET, FELT, TAPE AND ROPE

GENERIC CLASS NUMBER		67	68	69
INSULATION TRADE NAMES		Asbestos Roll Fire Felt, Roll Felt.	Commercial Asbestos Paper	Unarco Wovenstone
BASIC MATERIAL		Asbestos	Asbestos	Asbestos fibers in asbestos jacket
GENERAL FORM		Felt	Paper	Prefabricated pipe covering blanket
ALKALINITY, pH				
CAPILLARITY, % by weight				
COMBUSTIBILITY	FLASH FLAME MELTING			
COMPACTION				
CORROSION - RUSTING				Does not contribute
CORROSION - STRESS				
DENSITY, lb / cu ft		40		9 to 12
HYGROSCOPICITY, % by weight				
RESISTANCE TO ACIDS				Resistant to most common acids
RESISTANCE TO CAUSTICS				Resistant to most common caustics
RESISTANCE TO SOLVENTS				
SHRINKAGE-HEAT	LINEAR VOLUMETRIC			
SPECIFIC GRAVITY	REAL APPARENT			
SPECIFIC HEAT, btu / lb				0.24
STRENGTH - COMPRESSIVE, psi				
STRENGTH - TENSILE, psi				
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	Atmos Min 1000 F Max	Atmos Min 400 F Max Atmos Min 400 F Max Atmos Min 400 F Max	Atmos Min 750 F Max Atmos Min 750 F Max Atmos Min 750 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY (at indicated mean temp and density) btu / (hr) (sq ft) (deg F / in.)		1.11 @ 300 F 1.40 @ 600 F 1.70 @ 800 F		Density 10 0.50 @ 200 F 0.61 @ 400 F 0.72 @ 600 F
THERMAL DIFFUSIVITY, sq ft / hour				
THERMAL SHOCK RESISTANCE				Excellent
VIBRATION RESISTANCE				Excellent
WATER ABSORPTION, % by weight				5.0
WATER VAPOR TRANSMISSION				High
ADVANTAGES		Good mechanical strength.		Easily removable. Prefabricated with hooks for lacing in place.
LIMITATIONS		High conductivity.		Must be prefabricated at factory.

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CHARACTERISTICS

BLANKET, FELT, TAPE AND ROPE

GENERIC CLASS NUMBER		70	71	72
INSULATION TRADE NAMES		Grade VDF	Armaglas TWL and TW-F, Fiberglas TWL and TW-F, Pabco TWF.	TWL Metal Mesh, TW-F Metal Mesh, Pabco Metal Mesh.
BASIC MATERIAL		Carbon	Fibrous glass	Fibrous glass and metal fabric
GENERAL FORM		Carbon felt	Blanket	Metal mesh blanket
ALKALINITY, pH		8 to 10	8 to 10	8 to 10
CAPILLARITY, % by weight				
COMBUSTIBILITY	FLASH FLAME MELTING	Oxidizes in air without flame above 600 F Sublimes at 6600.	1400 F	1400 F
COMPACTION				
CORROSION - RUSTING				
CORROSION - STRESS				
DENSITY, lb / cu ft		5 to 10	2 1/2 to 7 1/2	2 1/2 to 7 1/2
HYGROSCOPICITY, % by weight		11	2	
RESISTANCE TO ACIDS		Inert to all except strongly oxidizing.	Good from pH 5 to 7 except HF and H_3PO_4	Good from pH 5 to 7 except HF and H_3PO_4
RESISTANCE TO CAUSTICS		Inert to all caustics	Good from pH 7 to 10	Good from pH 7 to 10
RESISTANCE TO SOLVENTS		Inert to all solvents except nitroparafins and ketones	Good	Good
SHRINKAGE-HEAT	LINEAR VOLUMETRIC	1 % @ 1300 F 3 % @ 4500 F		
SPECIFIC GRAVITY	REAL APPARENT	1.35 0.077	2.5 0.05 to 0.12	2.5 0.05 to 0.12
SPECIFIC HEAT, btu / lb		Mean to 1800 F - 0.37, 0.18 @ 70 F	0.20	0.20
STRENGTH - COMPRESSIVE, psi				
STRENGTH - TENSILE, psi		6	Low	Low
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	-455 F Min 4500 F Max 4500 F Max	-300 F Min 1000 F Max -300 F Min -300 F Min	Atmos Min 1000 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY (at indicated mean temp and density) btu / (hr) (sq ft) (deg F / in.)		Density 5 0.25 @ 70 F in air @ 1 atmos 5.0 @ 3500 in Argon @ 1 atmos 7.0 @ 4350 in H_2 @ 1 atmos	Density 4 1/4 0.26 @ 70 F 0.36 @ 200 F 0.27 @ 100 F 0.47 @ 300 F	Density 4 1/4 0.26 70 F 0.36 @ 200 F 0.27 100 F 0.47 @ 300 F
THERMAL DIFFUSIVITY, sq ft / hour		0.2 @ 1800	0.035 @ 200 F	0.035 @ 200 F
THERMAL SHOCK RESISTANCE			Good	
VIBRATION RESISTANCE				
WATER ABSORPTION, % by weight			800	800
WATER VAPOR TRANSMISSION				100 perm-inches
ADVANTAGES		Generally used at temperatures above 1800 F in vacuum or inert gas atmosphere.	Resilient.	
LIMITATIONS		Has 8 % volatile material at 5000 F.	Soft. Little strength.	

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CHARACTERISTICS

BLANKET, FELT, TAPE AND ROPE

GENERIC CLASS NUMBER		73	74	75
INSULATION TRADE NAMES		Unimat Glass Blanket	Unarco Woven Glass Felt	Ultralite
BASIC MATERIAL		Fibrous glass	Fibrous glass and wire mesh	Textile-type glass fibers
GENERAL FORM		Needled felt blanket	Felt	Blanket
ALKALINITY, pH		6 to 7	6 to 7	7 to 8 1/2
CAPILLARITY, % by weight		High	High	
COMBUSTIBILITY	FLASH FLAME MELTING			700 F 1100 F 1100 F
COMPACTION				
CORROSION - RUSTING		Does not contribute	Does not contribute	
CORROSION - STRESS				
DENSITY, lb / cu ft		7 1/2 to 8 1/2	8 1/2 to 9 1/2	1/2 to 3
HYGROSCOPICITY, % by weight		2 to 3	2 to 3	1
RESISTANCE TO ACIDS		Good except HF and H_3PO_4	Good except HF and H_3PO_4	Good except for HF
RESISTANCE TO CAUSTICS		Resistant to most caustics	Resistant to most caustics	Poor
RESISTANCE TO SOLVENTS		Excellent	Excellent	Good
SHRINKAGE-HEAT	LINEAR VOLUMETRIC			
SPECIFIC GRAVITY	REAL APPARENT	0.13	0.14	2.58 0.012 to 0.048
SPECIFIC HEAT, btu / lb		0.20	0.20	0.20
STRENGTH - COMPRESSIVE, psi				1/50 @ 10 % deformation @ 1/2 lb 1/3 @ 10 % deformation @ 3 lbs
STRENGTH - TENSILE, psi				
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	Atmos Min 1200 F Max Atmos Min 1200 F Max	Atmos Min 1200 F Max Atmos Min 1200 F Max	Atmos Min 375 F Max Atmos Min 400 F Max Atmos Min 400 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING		No evidence	No evidence	
THERMAL CONDUCTIVITY (at indicated mean temp and density) btu / (hr) (sq ft) (deg F / in.)		Density 8 0.31 @ 200 F 0.57 @ 600 F 0.40 @ 400 F	Density 9 0.33 @ 200 F 0.55 @ 600 F 0.44 @ 400 F	Density 1/2 0.25 @ 0 F 0.34 @ 100 F 0.27 @ 30 F 0.49 @ 200 F 0.30 @ 70 F 0.66 @ 300 F
				Density 3 0.20 @ 0 F 0.24 @ 100 F 0.21 @ 30 F 0.32 @ 200 F 0.23 @ 70 F 0.40 @ 300 F
THERMAL DIFFUSIVITY, sq ft / hour		0.019 @ 400 F	0.02 @ 400 F	0.030 to 0.160 @ 70 F
THERMAL SHOCK RESISTANCE		Excellent	Excellent	
VIBRATION RESISTANCE		Excellent	Excellent	
WATER ABSORPTION, % by weight		High	High	
WATER VAPOR TRANSMISSION		High	High	100 perm-inches
ADVANTAGES			Can be encased in stainless steel or inconel wire mesh. Can be used as prefabricated turbine blanket.	3/4 lb density recommended for tanks, 2 and 3 lb density recommended for duct liners. Very resilient.
LIMITATIONS				

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CHARACTERISTICS

BLANKET, FELT, TAPE AND ROPE

GENERIC CLASS NUMBER		76	77	78
INSULATION TRADE NAMES		Microtex, Supertex, Textrafine.	Armaglas Flex Duct, Fine Fyber, Ultrafine, Microlite, Superfine, Aercore, Fiberglas Flexible Duct, Thermoglas.	Micro-Bar, Superface
BASIC MATERIAL		Textile glass fibers and fine glass fibers.	Fine glass fibers and binder.	Fibrous glass.
GENERAL FORM		Blanket	Blanket	Blanket
ALKALINITY, pH		6 to 8	6 to 10	6 to 8
CAPILLARITY, % by weight		None	None	None
COMBUSTIBILITY	FLASH FLAME MELTING		450 F to 700 F for resin 1100 F for resin 880 F to 1300 F	Base material is incombustible 1200 F
COMPACTION		None	None	None
CORROSION - RUSTING		Will not cause steel to rust	Will not cause steel to rust	Will not cause steel to rust
CORROSION - STRESS		Stainless must be protected	Stainless must be protected	Stainless must be protected
DENSITY, lb / cu ft		1/2 to 3	1/2 to 20	1 lb density core, 4 lb skin
HYGROSCOPICITY, % by weight		5	2 to 5	
RESISTANCE TO ACIDS		Good except HF	Good except HF and H_3PO_4	Good for most acids from pH 5 to 7
RESISTANCE TO CAUSTICS		Poor to good	Poor to good	Good from pH 7 to 10
RESISTANCE TO SOLVENTS		Good	Good	Unaffected by most solvents
SHRINKAGE-HEAT	LINEAR VOLUMETRIC			
SPECIFIC GRAVITY	REAL APPARENT	2.34 0.012 to 0.032	2.5	
SPECIFIC HEAT, btu / lb		0.20	0.20	0.20
STRENGTH - COMPRESSIVE, psi			0.02 @ 10 % deformation to 0.20 @ 10 % deformation	
STRENGTH - TENSILE, psi				
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	Atmos Min 350 F Max Atmos Min 350 F Max Atmos Min 350 F Max	370 F Max 370 F Max 370 F Max	200 F Max 250 F Max 250 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY (at indicated mean temp and density) btu / (hr) (sq ft) (deg F / in.)		Density 3/4 0.34 @ 100 F 0.48 @ 200 F	Density 1/2 0.30 @ 100 F to 0.34 @ 100 F 0.40 @ 200 F to 0.48 @ 200 F 0.56 @ 300 F to 0.70 @ 300 F	Thermal Conductance at 75 F 1" thickness = 0.23 1/2" thickness = 0.45
		Density 2 0.26 @ 100 F 0.35 @ 200 F	Density 2 0.23 @ 100 F to 0.24 @ 100 F 0.29 @ 200 F to 0.30 @ 200 F 0.35 @ 300 F to 0.38 @ 300 F	
THERMAL DIFFUSIVITY, sq ft / hour		0.18 to 0.052 @ 180 F	0.10 @ 100 F and 1 lb	0.10 @ 100 F
THERMAL SHOCK RESISTANCE		Excellent	Excellent	Excellent
VIBRATION RESISTANCE		Excellent	Excellent	Excellent
WATER ABSORPTION, % by weight		High	High	High
WATER VAPOR TRANSMISSION		100 perm-inches	100 perm-inches	
ADVANTAGES		High tensile strength. Very resilient.	Very resilient. Good tensile strength.	Resists air velocities to 5000 fpm. Durable and resilient.
LIMITATIONS		Soft. Poor compressive strength.	Soft. Poor compressive strength.	

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CHARACTERISTICS

BLANKET, FELT, TAPE AND ROPE

GENERIC CLASS NUMBER		79	80	81
INSULATION TRADE NAMES		Fiberglas Mat-Faced Duct Liner, Armaglas Mat-Faced Duct Liner.	Fiberglas Foil Faced Building Insulation	Grade WDF
BASIC MATERIAL		Fibrous glass with mat surface	Fibrous glass	Graphite
GENERAL FORM		Blanket	Blanket in roll or batt form	Graphite felt
ALKALINITY, pH		8 to 10	8 to 10	7 to 8
CAPILLARITY, % by weight			0	
COMBUSTIBILITY	FLASH FLAME MELTING	1200 F	Low for kraft paper 1200 F for glass	Oxidizes in air without flame above 650 F. Sublimes at 6600 F.
COMPACTION				
CORROSION - RUSTING				
CORROSION - STRESS				
DENSITY, lb / cu ft		1.5 to 2.5	0.65 to 0.85	5 to 10
HYGROSCOPICITY, % by weight		0	0	0.1
RESISTANCE TO ACIDS		Good from pH 5 to 7	Good from pH 5 to 7	Inert to all except strongly oxidizing
RESISTANCE TO CAUSTICS		Good from pH 7 to 10	Good from pH 7 to 10	Inert to all caustics
RESISTANCE TO SOLVENTS		Limited by properties of neoprene coating	Good	Inert to all solvents
SHRINKAGE-HEAT	LINEAR VOLUMETRIC			0.1 % @ 1300 F 0.1 % @ 4500 F
SPECIFIC GRAVITY	REAL APPARENT		2.5 0.01	1.50 0.070
SPECIFIC HEAT, btu / lb		0.20	0.20	Mean to 1800 F - 0.37 0.18 @ 70 F
STRENGTH - COMPRESSIVE, psi		Low		
STRENGTH - TENSILE, psi		30	Low	2.5
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	-300 F Min 180 F Max -300 F Min 250 F Max -300 F Min 250 F Max	Atmos Min 350 F Max	-455 F Min 4500 F Max -455 F Min 4500 F Max 4500 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY (at indicated mean temp and density) btu / (hr) (sq ft) (deg F / in.)		0.25 @ 70 F 0.27 @ 100 F 0.35 @ 200 F	0.25 @ 30 F 0.29 @ 70 F 0.31 @ 100 F	Density 5 1.2 @ 70 F in air @ 1 atmos 0.8 @ 2100 F in vacuum @ 10 microns 2.0 @ 3500 F in vacuum @ 10 microns
THERMAL DIFFUSIVITY, sq ft / hour		0.05 @ 75 F		0.2 @ 1800
THERMAL SHOCK RESISTANCE				
VIBRATION RESISTANCE				
WATER ABSORPTION, % by weight		High	Very high	
WATER VAPOR TRANSMISSION			0.5 perm-inch	
ADVANTAGES		Used as duct liner for low and high velocities.	Used as residential and commercial building insulation.	Useful for graphite tube and induction furnaces above 1800 F in vacuum or inert gas atmosphere. Has nil volatile at 5000 F.
LIMITATIONS				

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CHARACTERISTICS

BLANKET, FELT, TAPE AND ROPE

GENERIC CLASS NUMBER		82	83	84
INSULATION TRADE NAMES		Hair Felt	HD Hair Felt	Spun Wool Blanket, Metal Mesh Blanket, E.P. Blanket, Copr-Fibre, Banroc Blanket, Mineral Wool Blanket. See materials list for more.
BASIC MATERIAL		Hair felt	Hair Felt	Mineral wool and metal backing
GENERAL FORM		Felt	Felt	Blanket
ALKALINITY, pH		6 to 8		7 to 9
CAPILLARITY, % by weight				
COMBUSTIBILITY	FLASH FLAME MELTING	Chars at 200 F	Combustible	Incombustible 1900 F
COMPACTION				
CORROSION - RUSTING				Will not cause steel to rust
CORROSION - STRESS				
DENSITY, lb / cu ft		8 to 10	15	8 to 12
HYGROSCOPICITY, % by weight				0.5 to 1.0
RESISTANCE TO ACIDS		Not resistant	Not resistant	Poor to fair
RESISTANCE TO CAUSTICS		Not resistant	Not resistant	Poor to good
RESISTANCE TO SOLVENTS				Good to excellent
SHRINKAGE-HEAT	LINEAR VOLUMETRIC			0 % @ 1200 F
SPECIFIC GRAVITY	REAL APPARENT	0.15 to 0.18	0.24	2.60 0.12 to 0.19
SPECIFIC HEAT, btu / lb			0.33 (70 F to 219 F)	0.20 to 0.22
STRENGTH - COMPRESSIVE, psi			1 @ 5 % deformation	4.6 @ 10 % deformation
STRENGTH - TENSILE, psi			Length 42, Crosswise 45.	
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	-150 F Min 200 F Max -150 F Min 200 F Max -150 F Min 200 F Max	-150 F Min 200 F Max -150 F Min 200 F Max -150 F Min 200 F Max	-300 F Min 1000 to 1200 F Max -300 F Min 1000 to 1200 F Max -300 F Min 1000 to 1200 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING				Some will self internal heat
THERMAL CONDUCTIVITY (at indicated mean temp and density) btu / (hr) (sq ft) (deg F / in.)		0.28 @ 70 F	0.28 @ 50 F 0.28 @ 100 F	0.34 @ 300 F to 0.40 @ 300 F 0.30 @ 400 F to 0.50 @ 400 F 0.45 @ 500 F to 0.59 @ 500 F 0.35 @ 600 F to 0.69 @ 600 F
THERMAL DIFFUSIVITY, sq ft / hour				0.012 @ 200 F
THERMAL SHOCK RESISTANCE		Good	Resistant	Good
VIBRATION RESISTANCE				Fair
WATER ABSORPTION, % by weight		High	High	47
WATER VAPOR TRANSMISSION		70 perm-inches	20 perm-inches	High
ADVANTAGES		Flexible. Easy to handle. Adaptability to any shape or size.	Flexible. Adaptable to any shape or size.	Flexible. Resilient.
LIMITATIONS		Excessive compressibility. Will burn. Depends on vapor barrier for service life.	Depends on vapor barrier for service life. Will burn.	Soft. Little mechanical strength. Depends on vapor barrier for service life in low temperature service.

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CHARACTERISTICS

BLANKET, FELT, TAPE AND ROPE

GENERIC CLASS NUMBER		85	86	87
INSULATION TRADE NAMES		Spun Felt, Wool Felt, Mineral Wool Felt, Copr-Fibre LT Felt, Spintex, Spun Wool Felt, Gold Bond M.W. Felt.	E.P. Bonded Blanket	Armatemp 100 and 101, Copr-Fibre No 46, Mundet Type 1200, Tab-Lok, Detrick Mineral Wool, BEH 100, BEH 101.
BASIC MATERIAL		Mineral wool and binders	Mineral wool, binders and metal backing.	Mineral wool and metal fabric
GENERAL FORM		Felt	Blanket	Prefabricated blanket pipe covering
ALKALINITY, pH		5 to 9	7 to 8.5	7 to 9
CAPILLARITY, % by weight				
COMBUSTIBILITY	FLASH FLAME MELTING	500 F Some are incombustible. 1400 F to 200 F		Incombustible 2000 F
COMPACTION				
CORROSION - RUSTING		Will not cause steel to rust	Will not cause steel to rust	
CORROSION - STRESS				
DENSITY, lb / cu ft		2 to 9	6 to 8	6 to 12
HYGROSCOPICITY, % by weight		0.5 to 1.0	0.5 to 1.0	1 to 5
RESISTANCE TO ACIDS		Poor	Poor	Requires protection
RESISTANCE TO CAUSTICS		Poor	Poor	Requires protection
RESISTANCE TO SOLVENTS		Good	Good	Excellent
SHRINKAGE-HEAT	LINEAR VOLUMETRIC	0 % @ 450 F		0 % @ 1200 F
SPECIFIC GRAVITY	REAL APPARENT	0.08 to 0.13	0.10 to 0.13	2.6 0.10 to 0.20
SPECIFIC HEAT, btu / lb		0.22	0.20 to 0.22	0.22
STRENGTH - COMPRESSIVE, psi				
STRENGTH - TENSILE, psi				
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	-150 F Min 450 to 600 F Max 450 to 600 F Max	Atmos Min 450 F Max Atmos Min 450 F Max Atmos Min 450 F Max	Atmos Min 1200 F Max Atmos Min 1200 F Max Atmos Min 1200 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING		Some will self internal heat		
THERMAL CONDUCTIVITY (at indicated mean temp and density) btu / (hr) (sq ft) (deg F / in.)		Density 4 0.28 @ 100 F to 0.29 @ 100 F 0.30 @ 200 F to 0.33 @ 200 F 0.36 @ 300 F to 0.43 @ 300 F	0.36 @ 300 F 0.59 @ 500 F	0.28 @ 100 F to 0.29 @ 100 F 0.39 @ 400 F to 0.49 @ 400 F 0.49 @ 600 F to 0.69 @ 800 F
THERMAL DIFFUSIVITY, sq ft / hour		0.01 to 0.026 @ 100 F		0.013 @ 100 F
THERMAL SHOCK RESISTANCE		Good	Good	
VIBRATION RESISTANCE		Fair	Fair	
WATER ABSORPTION, % by weight		47		
WATER VAPOR TRANSMISSION				
ADVANTAGES		Flexible. Resilient. Adaptable to any shape or size.		Flexible. Easily applied over bends.
LIMITATIONS		Soft. Little mechanical strength. Depends on vapor barrier for service life in low temperature service.		Little compressive strength.

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CHARACTERISTICS

BLANKET, FELT, TAPE AND ROPE

GENERIC CLASS NUMBER		88	89	90
INSULATION TRADE NAMES		Micro-Quartz	Refrasil A-100 Batt, Refrasil B-100 Felt.	
BASIC MATERIAL		Quart fibers	Fibrous silica	
GENERAL FORM		Felt	Blanket and felt	
ALKALINITY, pH			5 to 7	
CAPILLARITY, % by weight			Several times weight	
COMBUSTIBILITY	FLASH	Incombustible	Incombustible	
	FLAME			
	MELTING		3000 F	
COMPACTION			Resists compaction to densities greater than 4	
CORROSION - RUSTING				
CORROSION - STRESS				
DENSITY, lb / cu ft		3 to 6	4 1/2 to 6 installed	
HYGROSCOPICITY, % by weight			10	
RESISTANCE TO ACIDS			Good except HF and H_3PO_4	
RESISTANCE TO CAUSTICS			Poor	
RESISTANCE TO SOLVENTS			Resistant to all common organic solvents	
SHRINKAGE-HEAT	LINEAR	2 1/2 % @ 1600 F 5 % @ 2000 F	1 % @ 1600 F 5 % @ 2000 F	
	VOLUMETRIC			
SPECIFIC GRAVITY	REAL		2.2	
	APPARENT	0.048	0.07 to 0.10	
SPECIFIC HEAT, btu / lb			0.19	
STRENGTH - COMPRESSIVE, psi		5 @ 5 % deformation	25 @ 65 % deformation	
STRENGTH - TENSILE, psi			Very low	
TEMPERATURE LIMITS	CONTINUOUS	Atmos Min 2500 F Max	-320 F Min 2000 F Max	
	SHORT PERIOD	Atmos Min 2500 F Max	-320 F Min 3000 F Max	
	CYCLIC	Atmos Min 2500 F Max	-320 F Min 2500 F Max	
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY (at indicated mean temp and density) btu / (hr) (sq ft) (deg F / in.)		0.28 @ 200 F 0.42 @ 400 F 0.72 @ 800 F	0.43 @ 800 F to 0.50 @ 800 F 0.53 @ 800 F to 0.67 @ 800 F	
			0.65 @ 1000 F to 0.90 @ 1000 F 0.78 @ 1200 F to 1.20 @ 1200 F 0.92 @ 1400 F to 1.50 @ 1400 F	
THERMAL DIFFUSIVITY, sq ft / hour			0.039 to 0.054 @ 1000 F	
THERMAL SHOCK RESISTANCE				
VIBRATION RESISTANCE				
WATER ABSORPTION, % by weight			High	
WATER VAPOR TRANSMISSION			No resistance	
ADVANTAGES		Soft. Resilient.	Soft. Resilient. Contains no organic binder. Available with facings. Pure SiO_2. Also available in fabric, tape, sleeving, yarn, cordage and rope.	
LIMITATIONS		Little mechanical strength.	Little mechanical strength.	

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CHARACTERISTICS

CEMENT

GENERIC CLASS NUMBER		91	92	93
INSULATION TRADE NAMES		Fiberfrax Coating Cement	Kaolite-20, L.W. Blazecrete, Kaolite 22.	Vitrical, E.P. No 106.
BASIC MATERIAL		Alumina-silica	Alumina-silica	Alumina-silica and asbestos fibers
GENERAL FORM		Semi-refractory coating cement	Semi-refractory, fireproofing hydraulic cement.	Semi-refractory hydraulic cement.
ABRASION RESISTANCE % weight loss	1st RUN	Increases 25 % after exposing to 1600 F		4
	2nd RUN			6
ADHESION	WET			
	DRY			2 to steel
ALKALINITY, pH		9 to 10		
CAPILLARITY, % by weight				
COEFFICIENT OF EXPANSION		3×10^{-6}		
COMBUSTIBILITY	FLASH	Incombustible	Incombustible	Incombustible
	FLAME			
	MELTING	3200 F		
CORROSION - RUSTING				
CORROSION - STRESS				
COVERAGE, board ft / 100 lb			15 to 25	17
DENSITY, lb / cu ft		115 to 122	48 to 70 as set	54 to 56
HARDNESS, mm penetration				
HYGROSCOPICITY, % by weight				
RESISTANCE TO ACIDS		Good at room temperature except HF and H_3PO_4		
RESISTANCE TO CAUSTICS		Fair to poor at room temperature		
RESISTANCE TO SOLVENTS		Excellent		
SHRINKAGE - HEAT	LINEAR	2 % @ 1800 F 3 % @ 2200 F		
	VOLUMETRIC			
SHRINKAGE - WET TO DRY VOLUMETRIC, %				0 to 1
SPECIFIC GRAVITY	REAL	1.8 Average		0.87
	APPARENT			
SPECIFIC HEAT, btu / lb		0.273 @ 1022 F 0.248 @ 212 F		
STRENGTH - COMPRESSIVE, psi				
STRENGTH - FLEXURAL, psi				
STRENGTH - SHEAR, psi				
STRENGTH - TENSILE, psi				
TEMPERATURE LIMITS	CONTINUOUS	Atmos Min 2000 F Max	Atmos Min 2000 to 2200 F Max	Atmos Min 1900 to 2000 F Max
	SHORT PERIOD	Atmos Min 2300 F Max	Atmos Min 2000 to 2200 F Max	Atmos Min 1900 to 2000 F Max
	CYCLIC	Atmos Min 2300 F Max	Atmos Min 2000 to 2200 F Max	Atmos Min 1900 to 2000 F Max
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)		2.44 @ 600 F 3.44 @ 1800 F 2.58 @ 1000 F 3.96 @ 2000 F 2.89 @ 1400 F	1.42 @ 600 F 1.76 @ 1200 F 1.52 @ 800 F 1.89 @ 1400 F 1.64 @ 1000 F 2.01 @ 1600 F	
THERMAL DIFFUSIVITY, sq ft / hour				
THERMAL SHOCK RESISTANCE		Excellent		
VIBRATION RESISTANCE				
WATER ABSORPTION, % by weight				
WATER VAPOR TRANSMISSION				
ADVANTAGES		Coating for metals, graphite, and refractories.	Can be troweled or gunned.	Low shrinkage.
LIMITATIONS		Limited shelf life.		

NOTE: Unless otherwise indicated, cement characteristics apply to dry set conditions.

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CHARACTERISTICS

CEMENT

GENERIC CLASS NUMBER		94	95	96
INSULATION TRADE NAMES		Hi Therm	7 M Short Fiber, E.P. No. 20, 7 M Short	Carey 303, B.E.H. No. 200, 3M No. 352, K and M No. 152, Ruberoid No. 115, Comineo Finishing, 7-M, EP-99.
BASIC MATERIAL		Alumina-silica and asbestos	Mine run asbestos	Asbestos and bonding clays
GENERAL FORM		Insulating cement	Finishing cement	General utility finishing cement.
ABRASION RESISTANCE % weight loss	1st RUN 2nd RUN			
ADHESION	WET DRY			
ALKALINITY, pH		9		
CAPILLARITY, % by weight				
COEFFICIENT OF EXPANSION				
COMBUSTIBILITY	FLASH FLAME MELTING	Incombustible	Incombustible	Incombustible
CORROSION - RUSTING				
CORROSION - STRESS				
COVERAGE, board ft / 100 lb		68.5		18
DENSITY, lb / cu ft		18.5		40 to 70
HARDNESS, mm penetration				0.65
HYGROSCOPICITY, % by weight				
RESISTANCE TO ACIDS				Fair
RESISTANCE TO CAUSTICS				*Moderate*
RESISTANCE TO SOLVENTS				Good
SHRINKAGE - HEAT	LINEAR VOLUMETRIC			
SHRINKAGE - WET TO DRY VOLUMETRIC, %		8 to 10		
SPECIFIC GRAVITY	REAL APPARENT	.295		0.64 to 1.1
SPECIFIC HEAT, btu / lb				0.22
STRENGTH - COMPRESSIVE, psi				
STRENGTH - FLEXURAL, psi				
STRENGTH - SHEAR, psi				
STRENGTH - TENSILE, psi				
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	2300 F Max 2300 F Max 2300 F Max	Atmos Min 1000 F Max Atmos Min 1000 F Max Atmos Min 1000 F Max	Atmos Min 1000 F Max Atmos Min 1000 F Max Atmos Min 1000 F Max
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)				0.9 @ 100 F to 1.5 @ 100 F 1.2 @ 300 F to 1.9 @ 300 F 1.4 @ 500 F to 2.13 @ 500 F
THERMAL DIFFUSIVITY, sq ft / hour				
THERMAL SHOCK RESISTANCE				
VIBRATION RESISTANCE				
WATER ABSORPTION, % by weight				0.136
WATER VAPOR TRANSMISSION				
ADVANTAGES		An extremely high temperature insulating cement often used as expansion joint.		Sticks to all surfaces. Finishes medium hard.
LIMITATIONS				

NOTE: Unless otherwise indicated, cement characteristics apply to dry set conditions.

UCC 022104

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CHARACTERISTICS

CEMENT

GENERIC CLASS NUMBER		97	98	99
INSULATION TRADE NAMES		LF-20, E. P. No. 43, JM-No. 302, Ruberoid No. 214, ES-11, C-10	Carey No. 100, MHD Finish, Hi Glos.	Carey No. 707, Ambierex No. 2.
BASIC MATERIAL		Long asbestos fibers and binder	Asbestos fibers and bonding clay	Asbestos fibers
GENERAL FORM		High grade finishing cement	Hard finish cement	Insulating cement
ABRASION RESISTANCE % weight loss	1st RUN 2nd RUN	19 49	16 to 30 32 to 60	
ADHESION	WET DRY			
ALKALINITY, pH		7 to 9		
CAPILLARITY, % by weight				
COEFFICIENT OF EXPANSION				
COMBUSTIBILITY	FLASH FLAME MELTING	Incombustible	Incombustible 1900 F	Incombustible
CORROSION - RUSTING				
CORROSION - STRESS				
COVERAGE, board ft / 100 lb		20	20 to 25 dry	
DENSITY, lb / cu ft		35 to 60	42 to 60	
HARDNESS, mm penetration				0.37 to 0.55
HYGROSCOPICITY, % by weight				
RESISTANCE TO ACIDS			Poor	Fair
RESISTANCE TO CAUSTICS			Fair	Moderate
RESISTANCE TO SOLVENTS			Good	Good
SHRINKAGE - HEAT	LINEAR VOLUMETRIC			5 % @ 1000 F
SHRINKAGE - WET TO DRY VOLUMETRIC, %			3 to 35	
SPECIFIC GRAVITY	REAL APPARENT		0.67 - 0.97	
SPECIFIC HEAT, btu / lb				
STRENGTH - COMPRESSIVE, psi			179 @ 5 % deformation	150 @ 5 % deformation
STRENGTH - FLEXURAL, psi				
STRENGTH - SHEAR, psi				
STRENGTH - TENSILE, psi				
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	Atmos Min 1000 F Max Atmos Min 1000 F Max Atmos Min 1000 F Max	Atmos Min 1000 F Max Atmos Min 1000 F Max Atmos Min 1000 F Max	Atmos Min 750 to 1000 F Max Atmos Min 750 to 1000 F Max Atmos Min 750 to 1000 F Max
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)		0.81 @ 100 F to 1.8 @ 100 F 0.92 @ 300 F to 1.8 @ 300 F to 2.13 @ 500 F	0.95 @ 200 F to 1.4 @ 200 F 1.15 @ 400 F to 1.7 @ 400 F	to 1.00 @ 100 F 0.73 @ 200 F to 1.08 @ 200 F 0.81 @ 500 F to 1.34 @ 500 F
THERMAL DIFFUSIVITY, sq ft / hour				
THERMAL SHOCK RESISTANCE				
VIBRATION RESISTANCE				
WATER ABSORPTION, % by weight				
WATER VAPOR TRANSMISSION				
ADVANTAGES		High resistance to vibration cracking and expansion strains.	Hard smooth white surface.	Very smooth finish.
LIMITATIONS			For finish work only.	

NOTE: Unless otherwise indicated, cement characteristics apply to dry set conditions.

UCC 022105

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CHARACTERISTICS

CEMENT

GENERIC CLASS NUMBER		100	101	102
INSULATION TRADE NAMES		Careytemp Asbestos Cement	Caltemp Cement	Hy Temp No. 19, Superex, Hy Temp, Prasco H. T. Cement
BASIC MATERIAL		Asbestos fibers	Calcium silicate	Diatomaceous silica
GENERAL FORM		Careytemp finishing cement	Insulating cement	Insulating Cement
ABRASION RESISTANCE % weight loss	1st RUN 2nd RUN		14 28	10 20
ADHESION	WET DRY			
ALKALINITY, pH				9
CAPILLARITY, % by weight			224	240
COEFFICIENT OF EXPANSION				
COMBUSTIBILITY	FLASH FLAME MELTING	Incombustible	Incombustible	Incombustible
CORROSION - RUSTING				
CORROSION - STRESS				
COVERAGE, board ft / 100 lb		25 dry, 29 wet.	35	
DENSITY, lb / cu ft		50 to 60	19 to 22	23 to 32
HARDNESS, mm penetration			0.35	0.45 to 1.20
HYGROSCOPICITY, % by weight			6	
RESISTANCE TO ACIDS			Resistant to dilute acids	Moderate
RESISTANCE TO CAUSTICS			Resistant to dilute caustics	Good
RESISTANCE TO SOLVENTS			Resistant	Resistant
SHRINKAGE - HEAT	LINEAR VOLUMETRIC		1 % @ 1200 F	1 to 2 % @ 1500 F
SHRINKAGE - WET TO DRY VOLUMETRIC, %		10	22	14 to 29
SPECIFIC GRAVITY	REAL APPARENT		2.2 0.32	2.3 0.37 to 0.51
SPECIFIC HEAT, btu / lb			0.26	0.22 to 0.28
STRENGTH - COMPRESSIVE, psi			100 @ 5 % deformation	
STRENGTH - FLEXURAL, psi				
STRENGTH - SHEAR, psi				
STRENGTH - TENSILE, psi				
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	Atmos Min 1000 F Max	1200 F Max	Atmos Max 1800 F Max Atmos Max 1900 F Max Atmos Max
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)			0.30 @ 100 F 0.62 @ 600 F 0.37 @ 200 F 0.74 @ 800 F 0.55 @ 500 F 0.85 @ 1000 F	0.70 @ 200 F to 0.75 @ 200 F 0.79 @ 500 F to 0.90 @ 500 F 0.85 @ 800 F to 0.95 @ 800 F
THERMAL DIFFUSIVITY, sq ft / hour			0.0055 @ 200 F	0.01 @ 500 F
THERMAL SHOCK RESISTANCE				Good
VIBRATION RESISTANCE				
WATER ABSORPTION, % by weight			224	240
WATER VAPOR TRANSMISSION				
ADVANTAGES		The only asbestos cement that can be used with Careytemp.		Good for high temperature.
LIMITATIONS			Not recommended for hard finishes.	Soft. Little mechanical strength.

NOTE: Unless otherwise

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CEMENT

GENERIC CLASS NUMBER		103	104	105
INSULATION TRADE NAMES		Thermalite, 85% Magnesium Cement, Magnesium Cement.	Armatemp No. 166, BEH No.1, MW-50, Super 711, Super 66, Webers Super 48, JM No. 450, Stic-Tite, Mundet A-1, Holmes No. 1, Green Insul C, Unarco 330, O.C.-660, Comineo No. 2, One Shot. See materials list for more.	Armatemp No. 10, Super Powerhouse Utility Thermal Finish, Hilite, One Coat, Quik-Set, No. 412, No. 301, NE Plus Ultra. See materials list for more.
BASIC MATERIAL		Magnesium cabonate and asbestos fibers	Mineral wool	Mineral wool, binders and hydraulic setting cement
GENERAL FORM		Insulating cement	Insulating cement	Hydraulic setting insulating cement
ABRASION RESISTANCE % weight loss	1st RUN 2nd RUN	28 50	24 to 45 49 to 70	15 to 35 25 to 65
ADHESION	WET DRY		1 to 5 7 to 12	5
ALKALINITY, pH		10 to 11	8.5 to 11	8 1/2 to 12 1/2
CAPILLARITY, % by weight		238	High	High
COEFFICIENT OF EXPANSION				
COMBUSTIBILITY	FLASH FLAME MELTING	Incombustible	Incombustible 2000 F	Incombustible 1900 F
CORROSION - RUSTING				None
CORROSION - STRESS				
COVERAGE, board ft / 100 lb		55 to 70	45 to 60	30 to 40
DENSITY, lb / cu ft		18 to 20	22 to 30	27 to 44
HARDNESS, mm penetration		1.10	1 to 2.5	
HYGROSCOPICITY, % by weight		4	2 to 2.5	0.8 to 1.5
RESISTANCE TO ACIDS		Not resistant	Poor	Not resistant
RESISTANCE TO CAUSTICS		Resistant to dilute caustics only	Poor	Poor
RESISTANCE TO SOLVENTS		Resistant	Excellent	Good
SHRINKAGE - HEAT	LINEAR VOLUMETRIC	1 % @ 550 F		1 to 2 % @ 1200 F
SHRINKAGE - WET TO DRY VOLUMETRIC, %		22	13 to 27	0 to 8
SPECIFIC GRAVITY	REAL APPARENT	2.2 0.29 to 0.32	0.33 to 0.42	2.5 0.43 to 0.70
SPECIFIC HEAT, btu / lb		0.28	0.22 to 0.23	0.22 to 0.23
STRENGTH - COMPRESSIVE, psi		110 @ 10 % deformation	23 to 50 @ 5 deformation 31 to 60 @ 10 deformation	45 to 235 @ 5 % deformation
STRENGTH - FLEXURAL, psi			150 to 200	
STRENGTH - SHEAR, psi				
STRENGTH - TENSILE, psi				
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	Atmos Min 550 to 800 F Max Atmos Min 800 F Max Atmos Min 600 F Max	Atmos Min 1600 to 2100 F Max Atmos Min 1800 to 2100 F Max Atmos Min 1500 to 2100 F Max	Atmos Min 1000 to 1800 F Max Atmos Min Atmos Min
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)		0.38 @ 100 F to @ 100 F 0.43 @ 200 F to 0.51 @ 200 F 0.48 @ 300 F to 0.54 @ 300 F	0.44 @ 200 F to 0.67 @ 200 F 0.52 @ 400 F to 0.76 @ 400 F 0.62 @ 600 F to 0.86 @ 600 F	0.46 @ 200 F to 0.75 @ 200 F 0.61 @ 600 F to 0.96 @ 600 F 0.68 @ 800 F to 1.03 @ 800 F
THERMAL DIFFUSIVITY, sq ft / hour		0.0055 @ 100 F	0.006 to 0.01 @ 200 F	0.007 @ 200 F
THERMAL SHOCK RESISTANCE		Good	Good	Good
VIBRATION RESISTANCE				
WATER ABSORPTION, % by weight		236		
WATER VAPOR TRANSMISSION				
ADVANTAGES		Good for patching 85% Magnesium insulation	Good base coat insulating cement	Hydraulic setting.
LIMITATIONS		High shrinkage. Not moisture resistant.	Will soften when wet.	Poor adhesion to hot surfaces.

NOTE: Unless otherwise indicated, cement characteristics apply to dry set conditions.

UCC 022107

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CHARACTERISTICS

CEMENT

GENERIC CLASS NUMBER		106	107	108
INSULATION TRADE NAMES		Pyro-Seal Cement, Fireproofing Cement	Glasrock Cement	E.P. No. 33, No. 500, Cominco No. 3, Zonolite High Temp.
BASIC MATERIAL		Mineral wool, asbestos fibers and hydraulic binder	Fused silica	Expanded vermiculite
GENERAL FORM		Hydraulic setting fireproofing cement	Bonding and facing cement	Insulating cement
ABRASION RESISTANCE % weight loss	1st RUN 2nd RUN	15 to 35 25 to 60		35 60
ADHESION	WET DRY	10		Poor on hot surface 6.9 Good on cold surface
ALKALINITY, pH		8 to 10		
CAPILLARITY, % by weight				
COEFFICIENT OF EXPANSION			0.3×10^{-6}	
COMBUSTIBILITY	FLASH FLAME MELTING	Incombustible 2200 F	Incombustible	Incombustible
CORROSION - RUSTING				
CORROSION - STRESS				
COVERAGE, board ft / 100 lb		30		65 Wet
DENSITY, lb / cu ft		38 to 55	115	18 to 19
HARDNESS, mm penetration				
HYGROSCOPICITY, % by weight				
RESISTANCE TO ACIDS		Excellent	Excellent except to HF and hot H_3PO_4	
RESISTANCE TO CAUSTICS		Excellent		
RESISTANCE TO SOLVENTS		Excellent		
SHRINKAGE - HEAT	LINEAR VOLUMETRIC	1 to 4 % @ 1500 F		
SHRINKAGE - WET TO DRY VOLUMETRIC, %		1 to 9		15
SPECIFIC GRAVITY	REAL APPARENT	0.61 to 0.88		0.29
SPECIFIC HEAT, btu / lb		0.22	0.28 @ 1300 F	0.22
STRENGTH - COMPRESSIVE, psi		115 @ 5 deformation		
STRENGTH - FLEXURAL, psi			125	
STRENGTH - SHEAR, psi				
STRENGTH - TENSILE, psi				
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	Atmos Min 2000 F Max Atmos Min 2000 F Max Atmos Min 2000 F Max	Atmos Min 2000 F Max Atmos Min 2000 F Max Atmos Min 2000 F Max	Atmos Min 1800 F Max Atmos Min 1800 F Max Atmos Min 1800 F Max
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)		0.98 @ 500 F to @ 800 F 1.12 @ 800 F to @ 800 F 1.23 @ 1000 F to 1.50 @ 1000 F	2.25 @ 300 F 5.4 @ 1600 F 3.00 @ 500 F 6.64 @ 1800 F 4.00 @ 1000 F 7.80 @ 2000 F	0.70 @ 200 F 1.16 @ 1000 F 0.96 @ 600 F
THERMAL DIFFUSIVITY, sq ft / hour		0.0106 @ 800 F and 40 lbs		0.015 @ 200 F
THERMAL SHOCK RESISTANCE			Excellent	
VIBRATION RESISTANCE				
WATER ABSORPTION, % by weight			?	
WATER VAPOR TRANSMISSION				
ADVANTAGES		1" provides approximately two hours fire protection. Can be applied by spraying casting or trowelling.	Excellent thermal shock resistance.	Good coverage.
LIMITATIONS				Soft. Little mechanical strength.

Ref.. Unless otherwise indicated, cement characteristics apply to dry set conditions.

UCC 022108

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CHARACTERISTICS

LOOSE AND FILL

GENERIC CLASS NUMBER		109	110	111
INSULATION TRADE NAMES		Kaowool, JM Cerafiber, Fiberfrax Bulk Short Staple Fiber.	Kaolite L.W. Fill, JM 2400 L.W. Aggregate, JM Zalle L.W. Aggregate.	Asbestos Fibers, Carded Crysotile.
BASIC MATERIAL		Alumina-silica	Alumina-silica	Asbestos
GENERAL FORM		Bulk fibers	Aggregate	Bulk fibers
ALKALINITY, pH				7 to 8
COMBUSTIBILITY	FLASH FLAME MELTING	Incombustible 3200 F	Incombustible 3200 F	Incombustible 2700 F
COMPACTION				
DENSITY, lb / cu ft		4 to 12 installed	30 to 50 installed	20 to 50
HYGROSCOPICITY, % by weight				3
RESISTANCE TO ACIDS		Good for most at room temperature except HF and H_3PO_4		Poor
RESISTANCE TO CAUSTICS		Fair to poor		Fair
RESISTANCE TO SOLVENTS		Excellent		Good
SPECIFIC GRAVITY	REAL APPARENT	2.73		
SPECIFIC HEAT, btu / lb				0.27
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	Atmos Min 2000 to 2400 F Max Atmos Min Atmos Min	Atmos Min 2000 to 2400 F Max Atmos Min Atmos Min	Atmos Min 900 to 1200 F Max Atmos Min 1200 F Max Atmos Min
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)		Density 6 0.69 @ 600 F 2.22 @ 1800 F 1.24 @ 1000 F 2.58 @ 1800 F 1.89 @ 1400 F 2.92 @ 2000 F		0.50 @ 70 F
THERMAL DIFFUSIVITY, sq ft / hour				
THERMAL SHOCK RESISTANCE		Excellent		Good
VIBRATION RESISTANCE				
WATER ABSORPTION, % by weight		Saturates		50
ADVANTAGES		High temperature limits. Good resistance to thermal shock.	Used as fill and as an aggregate.	Numerous grades and sizes available Can be made into insulation, textiles or pack insulation.
LIMITATIONS		Low mechanical strength.		

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CHARACTERISTICS

LOOSE AND FILL

GENERIC CLASS NUMBER		112	113	114
INSULATION TRADE NAMES		Witc... A, Witcolite B-1, Witcolite B-2.	Thermax	Granulated Cork, Novoid Granulated.
BASIC MATERIAL		Bituminous petroleum resin	MT Carbon Black	Vegetable
GENERAL FORM		Granular	Loose Powder	Granular
ALKALINITY, pH		7	8 to 10	
COMBUSTIBILITY	FLASH FLAME MELTING	600 F	See disadvantages. Does not melt.	Combustible
COMPACTION				
DENSITY, lb / cu ft		40 bulk	30 approximately	12 to 14
HYGROSCOPICITY, % by weight		Approaches 0		
RESISTANCE TO ACIDS		Good except Nitric	Inert except strongly oxidizing	
RESISTANCE TO CAUSTICS		Good	Inert	
RESISTANCE TO SOLVENTS		Little or none in alcohols. Soluable in hydrocarbon solvents.	Inert	
SPECIFIC GRAVITY	REAL APPARENT	1.64 0.64	1.8 0.5	0.19 to 0.22
SPECIFIC HEAT, btu / lb		0.43 @ 100 F, 0.48 @ 200 F, 0.53 @ 300 F.	0.18	
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	40 to 300 F Min 212 to 300 F Max	-455 F Min 5000 + F Max -455 F Min 6000 F Max -455 F Min 5000 F Max	-200 F Min 200 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)		Density 40 0.4 to 0.8	Density 32.8 0.4 @ 1000 F	0.30 @ 70 F
THERMAL DIFFUSIVITY, sq ft / hour				
THERMAL SHOCK RESISTANCE		Cooling rate below 150 F should not exceed 3 F per minute.		Good
VIBRATION RESISTANCE				
WATER ABSORPTION, % by weight		0.7		
ADVANTAGES		Used as fill insulation for underground hot lines.	Used for graphite tube resistance and induction furnaces above 1800 F in vacuum and inert gas atmospheres.	Can be poured into cavity spaces. Useful for insulation at low temperature.
LIMITATIONS		Must be heat cured after installation.	Oxidizes in air without a flame above 600 F. Oxidization stops when source of heat is removed. Sublimes at 6600 F.	Will burn. Depends upon vapor barrier for low temperature service life.

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CHARACTERISTICS

LOOSE AND FILL

GENERIC CLASS NUMBER		115	116	117
INSULATION TRADE NAMES		Micro Cel T-4	Celatom MN-83, Sil-O-Cel Coarse	Celatom MN-35, Sil-O-Cel Fine.
BASIC MATERIAL		Synthetic calcium silicate	Diatomaceous silica	Diatomaceous silica
GENERAL FORM		Loose	Loose	Loose
ALKALINITY, pH			5 to 7	5 to 7
COMBUSTIBILITY	FLASH FLAME MELTING		Incombustible	Incombustible
COMPACTION				
DENSITY, lb / cu ft		5 to 8	19 to 27	10 to 17
HYGROSCOPICITY, % by weight			6	6
RESISTANCE TO ACIDS			Good	Good
RESISTANCE TO CAUSTICS			Soluable in caustic solution	Soluable in caustic solution
RESISTANCE TO SOLVENTS			Good	Good
SPECIFIC GRAVITY	REAL APPARENT	2.45	2.10 0.30 to 0.43	2.10 0.18 to 0.27
SPECIFIC HEAT, btu / lb			0.25 Approximately	0.25 Approximately
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	-459 F Min 1200 F Max -459 F Min 1200 F Max -459 F Min 1200 F Max	Atmos Min 1800 F Max Atmos Min 1800 F Max Atmos Min 1600 F Max	Atmos Min 1600 F Max Atmos Min 1600 F Max Atmos Min
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)		Density 6 0.20 @ -115 F	Density 22 0.70 @ 800 F 0.48 @ 200 F 0.77 @ 1000 F 0.58 @ 400 F 0.84 @ 1200 F 0.63 @ 600 F 0.92 @ 1400 F	Density 12.6 0.64 @ 800 F 0.36 @ 200 F 0.44 @ 400 F 0.53 @ 600 F
		Density 8 0.22 @ -115	Density 25 1.13 @ 800 F 0.63 @ 200 F 0.77 @ 400 F 0.92 @ 600 F	Density 17 0.62 @ 800 F 0.42 @ 200 F 0.69 @ 1000 F 0.48 @ 200 F 0.76 @ 1200 F 0.55 @ 600 F 0.84 @ 1400 F
THERMAL DIFFUSIVITY, sq ft / hour			0.009 @ 500 F	0.01 @ 500 F
THERMAL SHOCK RESISTANCE			Good	Good
VIBRATION RESISTANCE				
WATER ABSORPTION, % by weight		High	High	149
ADVANTAGES		Good for cryogenic service. Non-abrasive.	Used to insulate high temperature cavity walls.	Used to insulate high temperature cavity walls.
LIMITATIONS		Will readily pick up moisture.		

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CHARACTERISTICS

LOOSE AND FILL

GENERIC CLASS NUMBER		118	119	120
INSULATION TRADE NAMES		Celatom MP 87, Sil-O-Cel C-3	Gilsulate A, Gilsulate B, Gilsulate C, Gilsulate Special B.	Gilso-Gard
BASIC MATERIAL		Calcined diatomaceous silica	Gilsonite	Gilsonite
GENERAL FORM		Loose	Granular	Granular
ALKALINITY, pH		5 to 7	7	
COMBUSTIBILITY	FLASH FLAME MELTING	Incombustible	600 F Softening 275 F to 395 F	
COMPACTION				
DENSITY, lb / cu ft		26 to 31	Bulk 40, Packed 44.	Bulk 40, Packed 50
HYGROSCOPICITY, % by weight		1	Approaches zero	
RESISTANCE TO ACIDS		Good	Good except nitric	
RESISTANCE TO CAUSTICS		Soluable in caustics	Good	
RESISTANCE TO SOLVENTS		Good	Little or none in alcohols. Soluable in hydrocarbon solvents.	
SPECIFIC GRAVITY	REAL APPARENT	2.15 0.41 to 0.49	1.04 0.64	
SPECIFIC HEAT, btu / lb		0.25 Approximately	0.35 @ 100 F, 0.50 @ 200 F 0.60 @ 300 F	
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	Atmos Min 2000 F Max Atmos Min 2000 F Max Atmos Min 2000 F Max	300 to 520 F Max 300 to 520 F Max	Atmos Min 260 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)		Density 26 0.69 @ 100 F 0.91 @ 400 F 0.76 @ 200 F 1.00 @ 600 F 0.83 @ 300 F 1.11 @ 800 F 1.35 @ 800 F Density 31 0.92 @ 200 F 1.26 @ 800 F 1.03 @ 400 F 1.37 @ 1000 F 1.14 @ 600 F 1.48 @ 1200 F 1.60 @ 1400 F	Density 40 0.55 @ 100 F 0.55 @ 200 F 0.55 @ 300 F Density 46 0.65 @ 100 F 0.65 @ 200 F 0.65 @ 300 F	Density 50 0.72
THERMAL DIFFUSIVITY, sq ft / hour		0.12 @ 500 F	0.0023 @ 200 F and 40 lbs	
THERMAL SHOCK RESISTANCE		Good	Cooling rate below 150 F should not exceed 3 F per minute	
VIBRATION RESISTANCE				
WATER ABSORPTION, % by weight		High	1	
ADVANTAGES		Used as fill for higher temperatures than uncalcined material. May also be used with cements to form insulating concrete.	Used as fill insulation for underground hot lines. Curing results in plastic layer to pipe which gives corrosion protection.	Special sizing prohibits water penetration when water table 18" above pipe depth. Does not require curing. Gives corrosion protection.
LIMITATIONS			Must be heat cured after installation.	

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CHARACTERISTICS

LOOSE AND FILL

GENERIC CLASS NUMBER		121	122	123
INSULATION TRADE NAMES		TWL Shredded, TW-F Shredded	Sub Zero Insul Wood	Pouring wool, Blowing Wool
BASIC MATERIAL		Fibrous glass	Fibrous glass	Fibrous glass
GENERAL FORM		Bulk	Loose	Bulk
ALKALINITY, pH		8 to 10	8 to 10	8 to 10
COMBUSTIBILITY	FLASH FLAME MELTING	 1400 F	 1400 F	Incombustible 1400 F
COMPACTION				
DENSITY, lb / cu ft		2 to 12	2 to 12	0.5 to 1.5
HYGROSCOPICITY, % by weight		Nil	0	0
RESISTANCE TO ACIDS		Good from pH 5 to 7	Good from pH 5 to 7	Good from pH 5 to 7 except HF and H_3PO_4
RESISTANCE TO CAUSTICS		Good from pH 7 to 10	Good from 7 to 10	Good from pH 7 to 10
RESISTANCE TO SOLVENTS		Good	Good	Good
SPECIFIC GRAVITY	REAL APPARENT	2.5 0.032 to 0.19	2.5	2.5 0.008 to 0.024
SPECIFIC HEAT, btu / lb		0.20	0.20	
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	-300 F Min 250 F Max -300 F Min 250 F Max -300 F Min 250 F Max	-300 F Min 1000 F Max -300 F Min 1000 F Max -300 F Min 1000 F Max	-300 F Min 250 F Max -300 F Min 250 F Max -300 F Min 250 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)		Density 4 0.24 @ 70 F 0.40 @ 300 F 0.25 @ 100 F 0.51 @ 400 F 0.32 @ 200 F Density 6 0.24 @ 70 F 0.36 @ 300 F 0.24 @ 100 F 0.45 @ 400 F 0.31 @ 200 F	Density 4 0.24 @ 70 F 0.40 @ 300 F 0.25 @ 100 F 0.51 @ 400 F 0.32 @ 200 F Density 6 0.24 @ 70 F 0.36 @ 300 F 0.24 @ 100 F 0.45 @ 400 F 0.31 @ 200 F	Density 1 0.34 @ 70 F
THERMAL DIFFUSIVITY, sq ft / hour		0.0167 at 100 F and 8 lbs		
THERMAL SHOCK RESISTANCE		Resistant		Good
VIBRATION RESISTANCE				
WATER ABSORPTION, % by weight		800	800	1000
ADVANTAGES		Can be poured or packed into large or small space.	Resilient. Inorganic. Compatible with liquid oxygen.	Used mainly for building insulation.
LIMITATIONS		Dependent upon vapor barrier for low temperature service life.		Dependent on vapor barrier for low temperature service life.

UCC 022113

CHARACTERISTICS

LOOSE AND FILL

GENERIC CLASS NUMBER		124	125	126
INSULATION TRADE NAMES		Vitron "E" Micro Fiber	Foamglas Pellets	Gypsum
BASIC MATERIAL		Boro silicate glass fibers	Cellular glass pellets	Cellular gypsum
GENERAL FORM		Bulk	Loose	Bulk
ALKALINITY, pH		7.75		
COMBUSTIBILITY	FLASH FLAME MELTING	Incombustible	Incombustible	Incombustible
COMPACTION				
DENSITY, lb / cu ft			6	12 to 30
HYGROSCOPICITY, % by weight			0	
RESISTANCE TO ACIDS		Good except for HF and H_3PO4	Good except for HF and H_3PO_4	
RESISTANCE TO CAUSTICS		Resistant to weaker caustics.	Good	
RESISTANCE TO SOLVENTS				
SPECIFIC GRAVITY	REAL APPARENT	2.5	0.10	0.19 to 0.48
SPECIFIC HEAT, btu / lb				
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	Atmos Min 1500 F Max Atmos Min Atmos Min	-300 F Min 800 F Max 800 F Max 800 F Max	Atmos Min 900 F Max Atmos Min 900 F Max Atmos Min 900 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)		0.24 @ 70 F	0.4 @ 70 F	0.44 @ 90 F to 1.0 @ 90 F
THERMAL DIFFUSIVITY, sq ft / hour				
THERMAL SHOCK RESISTANCE		Good		Good
VIBRATION RESISTANCE				
WATER ABSORPTION, % by weight				High
ADVANTAGES		Used as fill and for protection of other insulating products.	Can be poured into cavity space. Pellets themselves resist vapor and moisture.	
LIMITATIONS			Dependent on vapor barrier for low temperature service life.	Very absorbant.

UCC 022114

CHARACTERISTICS

LOOSE AND FILL

GENERIC CLASS NUMBER		127	128	129
INSULATION TRADE NAMES		Granulated Wool, Type 7 B, Copr-Fibre Gran., Banroc Gran., Palmsul, Pouring Wool.	Loose Wool, Loose Mineral Wool, Type H-2, Type H-4, Copr-Fibre Loose, Banroc Loose, Blowing Wool, Loose Spun Wool. See materials list for more.	Perlox Perlite
BASIC MATERIAL		Mineral Wool	Mineral Wool	Expanded Perlite
GENERAL FORM		Granulated	Loose	Loose powder
ALKALINITY, pH		5 to 9	5 to 9	
COMBUSTIBILITY	FLASH FLAME MELTING	Incombustible 1900 F	Incombustible 1900 F	Incombustible
COMPACTION				
DENSITY, lb / cu ft		3 to 20	3 to 20	3
HYGROSCOPICITY, % by weight		1		
RESISTANCE TO ACIDS		Fair to poor	Fair to poor	
RESISTANCE TO CAUSTICS		Fair	Fair	
RESISTANCE TO SOLVENTS		Excellent	Excellent	
SPECIFIC GRAVITY	REAL APPARENT	2.70 0.048 to 0.32	2.70 0.048 to 0.32	0.048
SPECIFIC HEAT, btu / lb		0.22	0.22	
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	To - 350 F Min 1000 to 1500 F Max To - 350 F Min 1000 to 1500 F Max To - 350 F Min 1000 to 1500 F Max	-300 F Min 1000 to 1500 F Max -300 F Min 1000 to 1500 F Max -300 F Min 1000 to 1500 F Max	-400 F Min 1400 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)		Density 10 0.28 @ 100 F 0.51 @ 400 F 0.34 @ 200 F 0.72 @ 600 F 0.42 @ 300 F 0.94 @ 800 F Density 7 0.29 @ 100 F 0.54 @ 400 F 0.36 @ 200 F 0.76 @ 600 F 0.44 @ 300 F 0.98 @ 800 F	Density 10 0.28 @ 100 F 0.51 @ 400 F 0.34 @ 200 F 0.72 @ 600 F 0.42 @ 300 F 0.94 @ 800 F	Density 3 0.16 @ -200 F 0.31 @ 150 F 0.27 @ 100 F
THERMAL DIFFUSIVITY, sq ft / hour				
THERMAL SHOCK RESISTANCE		Good	Good	
VIBRATION RESISTANCE				
WATER ABSORPTION, % by weight		High	High	
ADVANTAGES		Soft Resilient	Resilient. Type H-4 and Banroc suitable for oxygen service.	Can be used for liquid oxygen service.
LIMITATIONS		Depends on vapor barrier for low temperature service life.	Will pack down. Depends on vapor barrier for low temperature service life.	Depends on vapor barrier for low temperature service life.

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CHARACTERISTICS

LOOSE AND FILL

GENERIC CLASS NUMBER		130	131	132
INSULATION TRADE NAMES		Insul-fil, Armafil.	Micro Quartz Fiber	Refrasil F-100
BASIC MATERIAL		Perlite and asphalt	Quartz fibers	Fibrous silica
GENERAL FORM		Granular	Loose	Loose
ALKALINITY, pH				5 to 7
COMBUSTIBILITY	FLASH FLAME MELTING	590 F 300 F	Incombustible	Incombustible
COMPACTION				Resists compaction to greater than 3 lb density
DENSITY, lb / cu ft		28		3 to 9
HYGROSCOPICITY, % by weight		Nil		2 to 10
RESISTANCE TO ACIDS		Good		Good except HF and H_3PO_4
RESISTANCE TO CAUSTICS		Good		Poor
RESISTANCE TO SOLVENTS		Soluable in hydrocarbon solvents		Resistant to all common organic solvents
SPECIFIC GRAVITY	REAL APPARENT		0.045	2.2 0.05 to 0.14
SPECIFIC HEAT, btu / lb				0.19
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	90 F Min 450 F Max	Atmos Min 2500 F Max Atmos Min 2500 F Max Atmos Min 2500 F Max	-320 F Min 1800 to 2000 F Max -320 F Min 3000 F Max -320 F Min 2500 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)		Density 28 0.47 @ 74 F 0.61 @ 163 F 0.87 @ 322 F	0.28 @ 200 F 0.78 @ 800 F 1.02 @ 1200 F	Density 3 0.66 @ 800 F 1.57 @ 1200 F 0.90 @ 800 F 2.00 @ 1400 F 1.20 @ 1000 F Density 9 0.40 @ 600 F 0.90 @ 1200 F 0.55 @ 800 F 1.12 @ 1400 F 0.75 @ 1000 F
THERMAL DIFFUSIVITY, sq ft / hour				0.054 @ 1000 F and 6 lbs
THERMAL SHOCK RESISTANCE			Resistant	Excellent
VIBRATION RESISTANCE				Good
WATER ABSORPTION, % by weight			High	High
ADVANTAGES		Will not wash away. Will not be disturbed by surface loads. Repeated heating and cooling will not cause cracking.		Soft, resilient, and flexible. No organic binder. Pure SiO_2.
LIMITATIONS		Must use primer on pipe. Must be cured above 220 F. Cannot be used under water. Cannot be installed in extremely wet weather.	Low mechanical strength.	Low mechanical strength.

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CHARACTERISTICS

LOOSE AND FILL

GENERIC CLASS NUMBER		133	134	135
INSULATION TRADE NAMES		Santocel	Zonolite	
BASIC MATERIAL		Silica aerogel	Expanded vermiculite	
GENERAL FORM		Loose	Loose	
ALKALINITY, pH		3.5 to 4	8 to 10	
COMBUSTIBILITY	FLASH FLAME MELTING	Incombustible 400 F	Incombustible 2200 F	
COMPACTION			20 % @ 15 psi, 25 % @ 25 psi	
DENSITY, lb / cu ft		4 to 6.5	4 to 10	
HYGROSCOPICITY, % by weight		10 to 15	2	
RESISTANCE TO ACIDS		Will dissolve in HF, reacts with H_3PO_4	Good, strong acids will leach out combined metallic ions	
RESISTANCE TO CAUSTICS		Will dissolve and react with caustics	Excellent	
RESISTANCE TO SOLVENTS		Does not react but may change structure	Excellent	
SPECIFIC GRAVITY	REAL APPARENT	2.2 0.064 to 0.10	2.2 to 2.7 0.11 to 0.19	
SPECIFIC HEAT, btu / lb		0.205 @ 147 F	0.20 @ 0 F 0.24 @ 300 F	
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	-457 F Min 1300 F Max -457 F Min 1300 F Max -457 F Min 1300 F Max	-350 F Min 2000 F Max -350 F Min 2000 F Max -350 F Min 2000 F Max	
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)		Density 5.3 0.12 @ -100 F 0.16 @ 100 F 0.15 @ 70 F 0.18 @ 200 F 0.21 @ 300 F	Density 4 to 7 0.45 @ 70 F 0.47 @ 100 F 0.58 @ 200 F	
			Density 7 to 10 0.89 @ 600 F 0.46 @ 70 F 1.10 @ 800 F 0.55 @ 200 F 1.32 @ 1000 F 0.71 @ 400 F 1.76 @ 1400 F	
THERMAL DIFFUSIVITY, sq ft / hour		0.02 @ 147 F	0.025 @ 150 F	
THERMAL SHOCK RESISTANCE				
VIBRATION RESISTANCE				
WATER ABSORPTION, % by weight		100	300	
ADVANTAGES		Very low conductivity. Good for cryogenic service.	Used as fill and aggregate for concrete. *Non-abrasive. Can also be used with* various binders in sprayed-on coating.	
LIMITATIONS		Must be fully contained. Depends on vapor barrier for low temperature service life.	Depends on vapor barrier in low temperature service but not actually damaged by water.	

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CHARACTERISTICS

REFLECTIVE

GENERIC CLASS NUMBER		136	137	138
INSULATION TRADE NAMES		Alcoa, Aluminum Foil, Metallation.	Alfol	Alcoa, Alumiseal.
BASIC MATERIAL		Aluminum foil	Aluminum foil	Aluminum
GENERAL FORM		Various thicknesses of foil	Foil fabricated blanket	Sheet
CAPILLARITY, % by weight		0	0	0
COEFFICIENT OF EXPANSION		13 x 10 $^{-6}$	13 x 10 $^{-6}$	13 x 10^{-6}
COMBUSTIBILITY	FLASH FLAME MELTING	1200 F	Depends on material other than foil used to make blanket.	1200 F
CORROSION - RUSTING				
CORROSION - STRESS				
DENSITY, lb / cu ft		169 for aluminum		
EMISSIVITY - HEAT		0.05 (each surface)	0.05 (each surface)	0.05 (each surface)
HYGROSCOPICITY, % by weight				
RESISTANCE TO ACIDS		Good. See disadvantages.	Good. See disadvantages.	Good. See disadvantages.
RESISTANCE TO CAUSTICS		Poor	Poor	Poor
RESISTANCE TO SOLVENTS		Good	Good	Good
REFLECTANCE - HEAT		0.95	0.95	0.95
SPECIFIC GRAVITY	REAL APPARENT			
SPECIFIC HEAT, btu / lb				
SHRINKAGE				
STRENGTH				
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	Atmos Min 600 F Max 600 F Max	Atmos Min 200 F Max Atmos Min 200 F Max Atmos Min 200 F Max	1100 F Max 1100 F Max 1100 F Max
TRANSMITTANCE (U) btu / hr, sq ft outer surface, deg F		Depends upon number of sheets, spacing, and direction of heat flow.	Depends upon number of sheets, spacing, and direction of heat flow.	Depends upon number of sheets, spacing, and direction of heat flow.
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)				
THERMAL SHOCK RESISTANCE		Good	Good	Good
VIBRATION RESISTANCE		Good	Good	Good
WATER ABSORPTION, % by weight		0	0	0
WATER VAPOR TRANSMISSION		0	Low	Very low
ADVANTAGES		Used as heat reflector.	Used as building insulation. Manufactured to fit into joists and stud spaces.	Light weight construction.
LIMITATIONS		Must be properly installed to be effective. Resistance to halogen acids, dilute nitric and dilute sulfuric acid is poor.	Low tear strength for some products. Resistance to halogen acids, dilute nitric and dilute sulfuric acid is poor.	Depends on proper joint seal for vapor resistance. Must be properly installed. Resistance to halogen acids, dilute nitric and dilute sulfuric acid is poor.

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CHARACTERISTICS

REFLECTIVE

GENERIC CLASS NUMBER		139	140	141
INSULATION TRADE NAMES		Alfol-102, Alfol-103, Alfol-101, Foil Laminates.	AL Mirror, AL Mirror AS, AL Mirror DT, JM Metal K.	SC Mirror, SC Mirror AS, SC Mirror R, AS Mirror DT, JM Metal K.
BASIC MATERIAL		Aluminum foil and asbestos paper	Aluminum sheet	Stainless steel and aluminum
GENERAL FORM		Laminated foil and flat or corrugated paper	Factory prefabricated shapes	Factory preformed shapes
CAPILLARITY, % by weight		0	0	0
COEFFICIENT OF EXPANSION			129 x 10^{-7}	129 x 10^{-7}
COMBUSTIBILITY	FLASH	Incombustible		Incombustible
	FLAME			
	MELTING	1200 F	1200 F	1200 F
CORROSION - RUSTING			Will not cause steel to rust	Will not cause steel to rust
CORROSION - STRESS			Will not contribute	Will not contribute
DENSITY, lb / cu ft			6 to 7	6 to 7
EMISSIVITY - HEAT			0.05 (per surface)	0.05 (per surface)
HYGROSCOPICITY, % by weight			0	0
RESISTANCE TO ACIDS		Poor	Good resistance to most acids	Good resistance to most acids
RESISTANCE TO CAUSTICS		Poor	Not resistant to some caustics	Not resistant to some caustics
RESISTANCE TO SOLVENTS		Good	Resistant	Excellent
REFLECTANCE - HEAT			0.95 (per surface)	0.95 (per surface)
SPECIFIC GRAVITY	REAL		2.7	2.7
	APPARENT		0.086 to 0.10	0.086 to 0.10
SPECIFIC HEAT, btu / lb			0.20	0.16
SHRINKAGE			0	0
STRENGTH			Standard structure meets normal service requirements. X-Hvy case available for severe service.	Standard structure meets normal service requirements. X-Hvy case available for severe service.
TEMPERATURE LIMITS	*CONTINUOUS*	Atmos Min 600 F Max	* Min Atmos to 1000 F Max	* Min Atmos to 1000 F Max
	SHORT PERIOD	Atmos Min 600 F Max	* Min Atmos to 1000 F Max	* Min Atmos to 1000 F Max
	CYCLIC	Atmos Min 600 F Max	* Min Atmos to 1000 F Max	* Min Atmos to 1000 F Max
TRANSMITTANCE (U) btu / hr, sq ft outer surface, deg F		Depends on number of sheets, spacing, and direction of heat flow.		
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)			0.25 @ 100 F, 0.44 @ 400 F 0.31 @ 200 F, 0.55 @ 600 F	0.27 @ 100 F, 0.47 @ 400 F 0.33 @ 200 F, 0.60 @ 600 F
THERMAL SHOCK RESISTANCE		Good	Excellent	Excellent
VIBRATION RESISTANCE		Good	Excellent	Excellent
WATER ABSORPTION, % by weight		0	0	0
WATER VAPOR TRANSMISSION			0	0
ADVANTAGES		Used to wrap around pipes or equipment.	Prefabricated for pipe, fittings and equipment. Not moisture absorbant. Can be taken off and replaced easily. AS, R, and DT outer jacket sealed to provide vapor seal. No shrinkage.	Can be taken off and replaced easily. AS, R, and DT outer jacket sealed to provide vapor barrier. Not moisture absorbant. Highly resistant to external fires. Prefabricated for pipes, fittings and equipment.
LIMITATIONS		Low mechanical strength.	Must be prefabricated to fit. * Notes: - 100 to Atmospheric. See particular product.	Must be prefabricated to fit. * Notes: - 100 to Atmospheric. See particular product.

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CHARACTERISTICS

REFLECTIVE

GENERIC CLASS NUMBER		142	143	144
INSULATION TRADE NAMES		SS Mirror HT, SS Mirror AS, SS Mirror R, SS Mirror DT, JM Metal K.		
BASIC MATERIAL		Stainless steel		
GENERAL FORM		Factory preformed shapes		
CAPILLARITY, % by weight		0		
COEFFICIENT OF EXPANSION		99 x 10^{-7}		
COMBUSTIBILITY	FLASH FLAME MELTING	Incombustible 2600 F		
CORROSION - RUSTING		Will not cause steel to rust		
CORROSION - STRESS		Will not contribute		
DENSITY, lb / cu ft		8 to 9		
EMISSIVITY - HEAT		0.1 to 0.96 per stainless steel surface. Depends on conditions.		
HYGROSCOPICITY, % by weight		0		
RESISTANCE TO ACIDS		Good		
RESISTANCE TO CAUSTICS		Good		
RESISTANCE TO SOLVENTS		Excellent		
REFLECTANCE - HEAT		0.9 to 0.04 per stainless steel surface		
SPECIFIC GRAVITY	REAL APPARENT	8.0 0.114 to 0.129		
SPECIFIC HEAT, btu / lb		0.12		
SHRINKAGE		0		
STRENGTH		Standard structure meets normal service requirements. X-Hvy case available for severe service.		
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	* Min Atmos to 1500 F Max * Min Atmos to 1500 F Max * Min Atmos to 1500 F Max		
TRANSMITTANCE (U) btu / hr, sq ft outer surface, deg F		Depends on number of layers and temperature difference across insulation.		
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)				
THERMAL SHOCK RESISTANCE		Excellent		
VIBRATION RESISTANCE		Excellent		
WATER ABSORPTION, % by weight		0		
WATER VAPOR TRANSMISSION		0		
ADVANTAGES		Can be taken off and replaced easily. AS, R, and DT outer jacket sealed to provide vapor barrier. Not moisture absorbent. Highly resistant to external fires. Prefabricated for pipes, fittings and equipment.		
LIMITATIONS		Must be prefabricated to fit. * Notes: - 100 to Atmospheric. See particular product.		

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CHARACTERISTICS

SPRAYED, FOAMED, AND FORMED IN PLACE

GENERIC CLASS NUMBER		145	146	147
INSULATION TRADE NAMES		Sprayed Limpet Asbestos LW-25, Sprayed Limpet Asbestos LB-8, Cafco Asbestos.	Cafco Heat Shield Cafco Blaze Shield	No Drip, Coopers Creek C-4.
BASIC MATERIAL		Asbestos	Asbestos fibers, mineral fibers	Asphalt and granulated cork or mica.
GENERAL FORM		Sprayed	Sprayed	Emulsion mastic
ABRASION RESISTANCE % weight loss	1st RUN 2nd RUN			
ADHESION	WET DRY			
ALKALINITY, pH		10		
CAPILLARITY, % by weight		350		
COEFFICIENT OF EXPANSION		0 Effective		
COMBUSTIBILITY	FLASH FLAME MELTING	Incombustible	Incombustible	Will burn 200 F Softening
CORROSION - RUSTING		Inhibits steel corrosion		
CORROSION - STRESS				
COVERAGE, board ft / 100 lb		87 to 150		12 sq ft / gal - 1/8" thick
DENSITY, lb / cu ft		8 to 14	9 to 15	
HARDNESS, m m penetration		3		
HYGROSCOPICITY, % by weight		5		
RESISTANCE TO ACIDS		Not recommended for liquid exposure		
RESISTANCE TO CAUSTICS		Good		
RESISTANCE TO SOLVENTS		Excellent		
SHRINKAGE - HEAT	LINEAR VOLUMETRIC			
SHRINKAGE - WET TO DRY VOLUMETRIC, %				
SPECIFIC GRAVITY	REAL APPARENT	2.2 0.13 to 0.23	0.14 to 0.24	
SPECIFIC HEAT, btu / lb		0.20		
STRENGTH - COMPRESSIVE, psi			11 @ 5 % deformation	
STRENGTH - FLEXURAL, psi				
STRENGTH - SHEAR, psi				
STRENGTH - TENSILE, psi				
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	-60 F Min 700 to 1350 F Max -60 F Min 700 to 2000 F Max -60 F Min 700 to 1450 F Max	Atmos Min 1600 to 2000 F Max Atmos Min Atmos Min	-20 F Min 180 to 200 F Max
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)		0.32 @ 100 F 0.55 @ 600 F 0.38 @ 200 F 0.60 @ 700 F 0.46 @ 400 F	0.26 @ 70 F 0.47 @ 400 F	0.65
THERMAL DIFFUSIVITY, sq ft / hour		0.010 to 0.017		
THEMAL SHOCK RESISTANCE				
VIBRATION RESISTANCE		Good		
WATER ABSORPTION , % by weight		400		
WATER VAPOR TRANSMISSION		150		
ADVANTAGES		Used as fireproofing	Used as fireproofing	Used for condensation control. Can be sprayed or trowelled.
LIMITATIONS				Will burn.

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CHARACTERISTICS

SPRAYED, FOAMED, AND FORMED IN PLACE

GENERIC CLASS NUMBER		148	149	150
INSULATION TRADE NAMES		Sweatcheck, Ekote 3X, Foster 60-24, Insulkote SGC, No Korode K Kote, Pitt-Chem 553 D, Insulmat 2077, Pioneer 829.	Ercote 3-FR-X, Foster 60-31, Pitt-Chem 553 FR, Coopers Creek C-4.	Plastipork, Rubbercork.
BASIC MATERIAL		Asphalt and granulated cork or mica	Bituminous and cork fillers	Granulated cork and rubber
GENERAL FORM		Solvent mastic	Solvent mastic	Moldable mastic sheet insulation
ABRASION RESISTANCE % weight loss	1st RUN 2nd RUN			
ADHESION	WET DRY			
ALKALINITY, pH				
CAPILLARITY, % by weight				
COEFFICIENT OF EXPANSION				
COMBUSTIBILITY	FLASH FLAME MELTING	Will burn	Self extinguishing	
CORROSION - RUSTING				None
CORROSION - STRESS				
COVERAGE, board ft / 100 lb			25	
DE: :TY, lb / cu ft			40 to 50 dry	
HARDNESS, m m penetration				
HYGROSCOPICITY, % by weight				
RESISTANCE TO ACIDS			Fair	
RESISTANCE TO CAUSTICS			Fair	
RESISTANCE TO SOLVENTS			Fair	
SHRINKAGE - HEAT	LINEAR VOLUMETRIC			
SHRINKAGE - WET TO DRY VOLUMETRIC, %			20 to 30	
SPECIFIC GRAVITY	REAL APPARENT		8.04 to 8.64	
SPECIFIC HEAT, btu / lb				
STRENGTH - COMPRESSIVE, psi				
STRENGTH - FLEXURAL, psi				
STRENGTH - SHEAR, psi				
STRENGTH - TENSILE, psi				
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	To - 50 F Min 150 to 300 F Max 150 to 300 F Max 150 to 300 F Max	-20 F Min 200 F Max -20 F Min 200 F Max -20 F Min 200 F Max	-300 F Min 200 F Max -300 F Min 200 F Max -300 F Min 200 F Max
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)		0.9 @ 70 F		
THERMAL DIFFUSIVITY, sq ft / hour				
THEMAL SHOCK RESISTANCE				
VIBRATION RESISTANCE				
WATER ABSORPTION, % by weight			20 % Max	
WATER VAPOR				
ADVANTAGES		Used for condensation control.	Used for condensation control.	Is reusable.
LIMITATIONS		Will burn.		

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GENERIC CLASS NUMBER		151	152	153
INSULATION TRADE NAMES		Latex Insulmat 3018.	Stafoam, Nopcofoam	Stafoam, Krko-Foam 25 and Foam F, Nopcofoam.
BASIC MATERIAL		Latex resin and cork or mica	Foamed polyurethane	Foamed polyurethane
GENERAL FORM		Emulsion mastic	Sprayed, forms flexible open-cell insulation.	Sprayed, rigid, closed-cell insulation.
ABRASION RESISTANCE % weight loss	1st RUN 2nd RUN			
ADHESION	WET DRY			
ALKALINITY, pH				
CAPILLARITY, % by weight				
COEFFICIENT OF EXPANSION				
COMBUSTIBILITY	FLASH FLAME MELTING			
CORROSION - RUSTING				
CORROSION - STRESS				
COVERAGE, board ft / 100 lb		12 sq ft / gal - 1/8" thick		
DENSITY, lb / cu ft				2 to 2 1/2
HARDNESS, m m penetration				
HYGROSCOPICITY, % by weight				
RESISTANCE TO ACIDS				
RESISTANCE TO CAUSTICS				
RESISTANCE TO SOLVENTS		Excellent		
SHRINKAGE - HEAT	LINEAR VOLUMETRIC			
SHRINKAGE - WET TO DRY VOLUMETRIC, %				
SPECIFIC GRAVITY	REAL APPARENT			
SPECIFIC HEAT, btu / lb				
STRENGTH - COMPRESSIVE, psi				
STRENGTH - FLEXURAL, psi				
STRENGTH - SHEAR, psi				
STRENGTH - TENSILE, psi				
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC		-60 F Min 160 to 250 F Max	To -200 F Min 160 to 275 Max
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)				
THERMAL DIFFUSIVITY, sq ft / hour				
THEMAL SHOCK RESISTANCE				
VIBRATION RESISTANCE				
WATER ABSORPTION , % by weight				
WATER VAPOR TRANSMISSION				
ADVANTAGES		Used for condensation control. Can be sprayed, brushed or trowelled.		
LIMITATIONS		Requires primed surface.	Low maximum temperature limit.	

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GENERIC CLASS NUMBER		154	155	156
INSULATION TRADE NAMES		Stafoam, Nopcofoam	Expandofoam, Stafoam, Gemfil, Erko-Foam 2 P, Nopcofoam.	WC-1 Type C
BASIC MATERIAL		Foamed polyurethane	Foamed polyurethane	Vinyl and cork or mica
GENERAL FORM		Poured-in-place, flexible open-cell insulation.	Poured-in-place, rigid open-cell insulation.	Mastic
ABRASION RESISTANCE % weight loss	1st RUN 2nd RUN			
ADHESION	WET DRY			
ALKALINITY, pH				
CAPILLARITY, % by weight				
COEFFICIENT OF EXPANSION				
COMBUSTIBILITY	FLASH FLAME MELTING			Fire retardant Non-flowing
CORROSION - RUSTING				
CORROSION - STRESS				
COVERAGE, board ft / 100 lb			Does not contribute	20 gal / 100 sq ft, 1/4" thick
DENSITY, lb / cu ft		2	2 to 20 and 75	
HARDNESS, in to penetration				
HYGROSCOPICITY, % by weight				
RESISTANCE TO ACIDS			Good for dilute acids	Good
RESISTANCE TO CAUSTICS			Good for dilute caustics	Good
RESISTANCE TO SOLVENTS				Fair
SHRINKAGE - HEAT	LINEAR VOLUMETRIC			
SHRINKAGE - WET TO DRY VOLUMETRIC, %				
SPECIFIC GRAVITY	REAL APPARENT			
SPECIFIC HEAT, btu / lb				
STRENGTH - COMPRESSIVE, psi			25 to 30 @ 10 % deformation	
STRENGTH - FLEXURAL, psi				
STRENGTH - SHEAR, psi			15	
STRENGTH - TENSILE, psi				1250
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	160 to 250 F Max	To -200 F Min 160 to 275 F Max To -200 F Min 160 to 275 F Max To -200 F Min	-20 F Min 180 F Max -20 F Min 180 to 200 F Max -20 F Min 180 to 200 F Max
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)			0.13 @ 70 F	0.51
THERMAL DIFFUSIVITY, sq ft / hour				
THEMAL SHOCK RESISTANCE				Good
VIBRATION RESISTANCE				Excellent
WATER ABSORPTION, % by weight			35	
WATER VAPOR TRANSMISSION			2 perm-inches	0.62 perm-inch
ADVANTAGES				Variety of colors. Will not drip in a fire. Hazard free in wet and dry state. Used for condensation control.
LIMITATIONS				

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CHARACTERISTICS

CRYOGENIC EVACUATED SYSTEMS AND MATERIALS

GENERIC CLASS NUMBER		157	158	159
INSULATION TRADE NAMES		Linde SI-10, Linde SI-12, Linde SI-44	Linde SI-62, Linde SI-91.	Fiberglas Cryogenic Insulation
BASIC MATERIAL		Aluminum, foil and glass mat system.	Aluminum foil and glass fiber paper system.	Aluminum foil and glass mat.
GENERAL FORM		Multilayer construction under vacuum.	Multilayer construction under vacuum.	Sheet to be used in vacuum.
CAPILLARITY, % by weight				
COEFFICIENT OF EXPANSION				12×10^{-6} for aluminum
COMBUSTIBILITY	FLASH FLAME MELTING			 1100 F
CORROSION - RUSTING				
CORROSION - STRESS				
DENSITY, lb / cu ft		1.2 to 4.7	5 to 8	4 to 8 depending on number of septa
EMISSIVITY - HEAT				0.03
HYGROSCOPICITY, % by weight				
RESISTANCE TO ACIDS				
RESISTANCE TO CAUSTICS				
RESISTANCE TO SOLVENTS				
REFLECTANCE - HEAT				0.97
SPECIFIC GRAVITY	REAL APPARENT			2.8 0.10
SPECIFIC HEAT, btu / lb				0.21
SHRINKAGE				
STRENGTH				
TEMPERATURE LIMITS	CONTINUOUS *SHORT PERIOD* CYCLIC	-459 F Min Atmos Max -459 F Min Atmos Max -459 F Min Atmos Max	-459 F Min Atmos Max -459 F Min Atmos Max -459 F Min Atmos Max	-459 F Min 1000 F Max -459 F Min 1000 F Max -459 F Min 1000 F Max
TRANSMITTANCE (U) btu / hr, sq ft outer surface, deg F		12×10^{-5} for SI-12, 10×10^{-5} for SI-10, 2.5×10^{-5} for SI-44 based on one-foot thickness at 80 F and -320 F surface temperatures.	2.1×10^{-5} for SI-62, 1.8×10^{-5} for SI-91 based on one-foot thickness at 80 F and -320 F surface temperatures.	5×10^{-5} for one-foot thickness at -115 F mean temperature and 1 micron pressure.
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)				
THERMAL SHOCK RESISTANCE				Excellent
VIBRATION RESISTANCE				Excellent
WATER ABSORPTION, % by weight				
WATER VAPOR TRANSMISSION				
ADVANTAGES		Layers per inch: SI-10 10 to 20 SI-12 15 to 30 SI-44 35 to 70 Lower cost for better performance than opacified powder system.	Layers per inch: SI-62 50 to 100 SI-92 75 to 150 Lower cost for better performance than opacified powder system.	Lower cost for better performance than opacified powder systems.
LIMITATIONS		Stringent vacuum requirement.	Stringent vacuum requirement.	Stringent vacuum requirement.

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CHARACTERISTICS

CRYOGENIC EVACUATED SYSTEMS AND MATERIALS

GENERIC CLASS NUMBER		160	161	162
INSULATION TRADE NAMES		Micro-Cel T-4	Heat Felted AA, Heat Felted Fiber Glass (HF)	Perlox Perlite
BASIC MATERIAL		Synthetic calcium silicate	Fine glass fibers	Perlite
GENERAL FORM		Loose, to be used in vacuum.	Sheet to be used in vacuum	Loose, to be used in vacuum.
CAPILLARITY, % by weight				
COEFFICIENT OF EXPANSION			0	
COMBUSTIBILITY	FLASH FLAME MELTING		 1200 F	 Incombustible
CORROSION - RUSTING				
CORROSION - STRESS				
DENSITY, lb / cu ft		5 to 8	4 and 16	3
EMISSIVITY - HEAT			0.9	
HYGROSCOPICITY, % by weight				
RESISTANCE TO ACIDS				
RESISTANCE TO CAUSTICS				
RESISTANCE TO SOLVENTS				
REFLECTANCE - HEAT				
SPECIFIC GRAVITY	REAL APPARENT	2.45	2.5 0.064 and 0.26	0.048
SPECIFIC HEAT, btu / lb			0.20	
SHRINKAGE				
STRENGTH			16 pcf material will support atmospheric loading with minimum compression when thin exterior skin is used.	
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	-459 F Min 1200 F Max -459 F Min 1200 F Max -459 F Min 1200 F Max	-459 F Min 1000 F Max -459 F Min 1000 F Max -459 F Min 1000 F Max	-400 F Min 1400 F Max -400 F Min 1400 F Max -400 F Min 1400 F Max
TRANSMITTANCE (U) btu / hr, sq ft outer surface, deg F		28×10^{-5} @ -171 F mean temperature, high vacuum and one foot thickness.	5×10^{-4} for 4 pcf, 3.3×10^{-4} for 16 pcf. One foot thickness, -115 mean temperature and 11 micron pressure.	72×10^{-5} @ -177 F mean temperature, one foot thickness and high vacuum.
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)			Excellent	
THERMAL SHOCK RESISTANCE			Excellent	
VIBRATION RESISTANCE				
WATER ABSORPTION, % by weight				
WATER VAPOR TRANSMISSION				
ADVANTAGES				
LIMITATIONS		Must avoid contact with atmospheric air.	Less efficient than multilayer.	Less efficient than some other types of cryogenic insulation.

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CHARACTERISTICS

CRYOGENIC EVACUATED SYSTEMS AND MATERIALS

GENERIC CLASS NUMBER		163	164	
INSULATION TRADE NAMES		Santocel A	Linde CS-5	
BASIC MATERIAL		Silica aerogel	Silica aerogel and copper flakes system.	
GENERAL FORM		Loose, to be used in vacuum.	Opacified powder under vacuum.	
CAPILLARITY, % by weight				
COEFFICIENT OF EXPANSION				
COMBUSTIBILITY	FLASH FLAME MELTING	Incombustible 1400 F		
CORROSION - RUSTING				
CORROSION - STRESS				
DENSITY, lb / cu ft		8	11	
EMISSIVITY - HEAT				
HYGROSCOPICITY, % by weight				
RESISTANCE TO ACIDS				
RESISTANCE TO CAUSTICS				
RESISTANCE TO SOLVENTS				
REFLECTANCE - HEAT				
SPECIFIC GRAVITY	REAL APPARENT	2.2 0.10		
SPECIFIC HEAT, btu / lb		0.205 @ 147 F		
SHRINKAGE				
STRENGTH				
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	-457 F Min 1600 F Max -457 F Min 1600 F Max -457 F Min 1600 F Max	-459 F Min Atmos Max -459 F Min Atmos Max -459 F Min Atmos Max	
TRANSMITTANCE (U) btu / hr, sq ft outer surface, deg F		96×10^{-5} @ -177 F mean temperature, one foot thickness, and high vacuum.	22×10^{-5} for one foot thickness and absolute pressure of 50 microns. At 80 F and -320 F surface temperatures.	
THERMAL CONDUCTIVITY, btu / (hr) (sq ft) (deg F / in.)				
THERMAL SHOCK RESISTANCE				
VIBRATION RESISTANCE				
WATER ABSORPTION, % by weight				
WATER VAPOR TRANSMISSION				
ADVANTAGES			Can be poured into irregular shapes.	
LIMITATIONS		Less efficient than other types of cryogenic insulation.	Relatively expensive. Moderate vacuum requirements.	

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MATERIALS

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MANUFACTURERS

Company	Full Name and Address
Acme Steel	Acme Steel Products Division Acme Steel Company 135th Street and Perry Avenue Chicago 27, Illinois
Acro	Acro Metal Stamping Company 332 E. Reservoir Avenue Milwaukee 12, Wisconsin
Adhesive Products	Adhesive Products, Inc. 1660 Boone Avenue New York 60, New York
Alabama Metal	Alabama Metal Industries Corporation P. O. Box 992 Birmingham 1, Alabama
Alcoa	Aluminum Company of America 1501 Alcoa Building Pittsburgh 19, Pennsylvania
Alumiseal Corporation	Alumiseal Corporation 429 East 53rd Street New York 22, New York
American Bitumuls	American Bitumuls & Asphalt Company 320 Market Street San Francisco 20, California
American Cellular Products	American Cellular Products, Inc. Greater Wilmington Airport Box 49 New Castle, Delaware
American Gilsonite	American Gilsonite Company Municipal Airport P. O. Box 15 Salt Lake City, Utah
American Latex	American Latex Products Corporation 3341 West El Segundo Boulevard Hawthorne, California
American Oil	American Oil Company 910 South Michigan Avenue Chicago 80, Illinois
A. P. Green	A. P. Green Fire Brick Company Mexico, Missouri U.S.A.
Arabol	The Arabol Manufacturing Company 110 East 42nd Street New York 17, New York

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Arco	The Arco Company Division of Martin Marietta Corporation 7301 Bessemer Avenue Cleveland 27, Ohio
Armstrong	Armstrong Cork Company West Liberty Street Lancaster, Pennsylvania
Arno	Arno Adhesive Tapes, Inc. Michigan City, Indiana
Aseeco	Associated Engineering & Equipment Company, Inc. 2910 Crawford P. O. Box 66609 Houston, Texas
Babcock & Wilcox	The Babcock & Wilcox Company Refractories Division 161 East 42nd Street New York, New York
Barrett	Barrett Division Allied Chemicals Corporation 40 Rector Street New York 6, New York
B.E.H.	Baldwin-Ehret-Hill, Inc. 500 Breuing Avenue Trenton 2, New Jersey
Better Finishes	Better Finishes and Coatings Company Broad Street & Hepburn Road Clifton, New Jersey
Bigelow-Liptak	Bigelow-Liptak Corporation 13300 Puritan Avenue Detroit 27, Michigan
Bitucote	Bitucote Products Company 1824 Knox Avenue St. Louis 10, Missouri
Bostitch	Bostitch Company Department T 815 Briggs Drive East Greenwich, Rhode Island
Camp Company	Camp Company, Inc. 9300 South Sangamon Street Chicago 20, Illinois
Carboline	Carboline Company 32 Hanley Industrial Court St. Louis 17, Missouri

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Carborundum	The Carborundum Company P. O. Box 337 Niagara Falls, New York
Carey	The Philip Carey Manufacturing Company 320 South Wayne Avenue Cincinnati 15, Ohio
Ceilcote	The Ceilcote Company, Inc. 4832 Ridge Road Cleveland 9, Ohio
Chemax	Chemax Manufacturing Corporation New Castle, Delaware
Chicopee Manufacturing Corporation	Lumite Division Chicopee Manufacturing Corporation Buford, Georgia
Childers	Childers Manufacturing Company 3620 West 11th Street P. O. Box 7467 Houston 8, Texas
Columbia Acoustics	Columbia Acoustics & Fireproofing Company Subsidiary of U.S. Mineral Wool Company Stanhope, New Jersey
Coopers Creek	Coopers Creek Chemical Corporation West Conshohocken, Pennsylvania
Cordo	Cordo Chemical Corporation 34 Smith Street Norwalk, Connecticut
Dampney	The Dampney Company Hyde Park Boston 36, Massachusetts
Detrick	M. H. Detrick Company 111 West Washington Street Chicago 2, Illinois
Dow Chemical	The Dow Chemical Company Midland, Michigan
Dow Corning	Dow Corning Corporation Midland, Michigan
Dyfoam	Dyfoam Corporation New Castle, Pennsylvania
Eagle-Picher	The Eagle-Picher Company 900 American Building Cincinnati 1, Ohio

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Earl Paint	Earl Paint Corporation 240 Genesee Street Utica 2, New York
Esso	Esso Standard Oil Company 15 West 51st New York, New York
Fabric Distributing Company	Fabric Distributing Company 42 White Street New York 13, New York
Fiberglas Engineering	Fiberglas Engineering & Supply Corporation
Fleet Marking	Fleet Marking Company Chagrin Falls, Ohio
Flintkote	The Flintkote Company, Inc. 30 Rockefeller Plaza New York 20, New York
Forty-Eight	Forty-Eight Insulation, Inc. Aurora, Illinois
Foster	Benjamin Foster Company 4635 West Girard Avenue Philadelphia 31, Pennsylvania
France	J. H. France Refractories Company Snow Shoe, Pennsylvania
Fuller	H. B. Fuller Company 1150 Eustis Street St. Paul 8, Minnesota
General Refractories	General Refractories Company 1522 Locust Street Philadelphia 2, Pennsylvania
Gilbert & Bennett	The Gilbert & Bennett Manufacturing Company Georgetown, Connecticut
Glasrock Products	Glasrock Products Inc. 1101 Glidden Street, N.W. Atlanta 18, Georgia
A. J. Gerrard	A. J. Gerrard & Company 400 East Touhy Avenue Des Plaines, Illinois
Goodrich	Sponge Products Division The B. F. Goodrich Company Shelton, Connecticut
Gulf	Gulf States Asphalt Company, Inc. 300 Christy Place Houston, Texas

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Gustin-Bacon	Gustin-Bacon Manufacturing Company 210 West Tenth Street Kansas City 5, Missouri
H. I. Thompson	H. I. Thompson Fiber Glass Company 1733 Cordova Street Los Angeles 7, California
Holmes Foundry	Holmes Foundry Limited Sarniz, Ontario Canada
Insul-Coustic	Insul-Coustic Corporation 42-54th Road Maspeth 78, New York
Johns-Manville	Johns-Manville 22 East 40th Street New York 16, New York
Johnston Foil	Johnston Foil Division Standard Packaging Corporation 6008-6298 South Broadway St. Louis 11, Missouri
Kaiser	Kaiser Aluminum & Chemical Sales, Inc. Kaiser Center 300 Lakeside Drive Oakland 12, California
Keasbey & Mattison	Keasbey & Mattison Company Butler Avenue Ambler, Pennsylvania
Keystone Steel & Wire	Keystone Steel & Wire Company Peoria 7, Illinois
Koppers	Koppers Company, Inc. Tar Products Division Pittsburgh 19, Pennsylvania
KSM Products	K.S.M. Products, Inc. Moorestown, New Jersey
Lexsuco Inc.	Lexsuco Inc. 33095 Bainbridge Road Solon, Ohio
Linde	Linde Company Division of Union Carbide Corporation Tonawanda, New York
Lion Oil	Lion Oil Company A Division of Monsanto Chemicals Company Lion Oil Building El Dorado, Arkansas

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3 M. Company	3 M. Company 900 Bush Avenue St. Paul 6, Minnesota
Miracle Adhesives	Miracle Adhesives Corporation 250 Pettit Avenue Bellmore, Long Island, New York
Mirror Insulation	Mirror Insulation Company, Inc. 201 Main Street Lambertville, New Jersey
Mobil	Mobil Oil Company A Division of Socony Mobil Oil Company, Inc. Asphalt and Coke Department 150 East 42nd Street New York 17, New York
Monsanto	Monsanto Chemical Company 800 North Lindberg Boulevard St..Louis 66, Missouri
Moore	Goodloe E. Moore, Inc. 2811 North Vermilion Street Danville, Illinois
Mortell	J. W. Mortell Company Kankakee, Illinois
Morningstar-Paisley	Morningstar-Paisley, Inc. 1770 Canalport Avenue Chicago 16, Illinois
Mundet	Mundet Cork Corporation 7101 Tonnelle Avenue North Bergen, New Jersey
Mystik	Mystik Adhesive Products 2635 North Kildare Avenue Chicago, Illinois
National Carbon	National Carbon Company Division of Union Carbide Corporation 270 Park Avenue New York 17, New York
National Cork	National Cork Company P. O. Box 329 Englewood, New Jersey
National Gypsum	National Gypsum Company 1650 Military Road Buffalo 17, New York
Nelson Stud Welding	Nelson Stud Welding Division Gregory Industries, Inc. Lorain, Ohio

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Newark Hair Felt	Newark Hair Felt 700 Maple Avenue Landsdale, Pennsylvania
Nicolet	Nicolet Industries, Inc. Nicolet Avenue Florham Park, New Jersey
Nopco Chemical	Nopco Chemical Company 66 Park Place Newark 1, New Jersey
North American Refractories	North American Refractories Company 1012 National City, East 6th Building Cleveland 14, Ohio
O'Neal Floors	E. H. O'Neal Floors Company 2525 South 50th Avenue Cicero 50, Illinois
Owens-Corning	Owens-Corning Fiberglas Corporation 717 Fifth Avenue New York 22, New York
Pabco	Pabco Industrial Products Division Fibreboard Paper Products Corporation P. O. Box 4331 Oakland 23, California
Pac-O-Power	Pac-O-Power Corporation Houston, Texas
Pecora	Pecora, Inc. 300 West Sedgley Avenue Philadelphia 40, Pennsylvania
Pennsalt Pennsalt	Pennsalt Chemicals Corporation Natrona, Pennsylvania
Permacel	Permacel New Brunswick, New Jersey
Perma Glas-Mesh	Perma Glas-Mesh Corporation 180 West Broadway P. O. Box 308 Dover, Ohio
Pittsburgh Chemical	Pittsburgh Chemical Company Grant Building Pittsburgh 19, Pennsylvania
Pittsburgh Corning	Pittsburgh Corning Corporation One Gateway Center Pittsburgh 22, Pennsylvania
Pittsburgh Plate Glass	Pittsburgh 22, Pennsylvania One Gateway Center Pittsburgh 22, Pennsylvania

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Pittsburgh Steel	Pittsburgh Steel Company Pittsburgh, Pennsylvania
Polyken	Polyken Sales Division The Kendall Company 309 West Jackson Boulevard Chicago 6, Illinois
Porter Hayden	Porter Hayden Conduit Company H. W. Porter & Company, Inc. Newark, New Jersey
Precision Insulation	Precision Insulation Company P. O. Box 14398 Houston 21, Texas
Preformed Metal	Preformed Metal Products Company, Inc. 232 Simms Street Shreveport, Louisiana
Presstite	Presstite Division American-Marietta Company St. Louis 10, Missouri
Pure Asphalt	Pure Asphalt Company 3302 West 31st Street Chicago 23, Illinois
Raybestos-Manhattan	Raybestos-Manhattan, Inc. Manheim, Pennsylvania
Reardon	The Reardon Company 7501 Page Avenue St. Louis 33, Missouri
Reflectal Corporation	Reflectal Corporation A Subsidiary of Borg-Warner Corporation 200 South Michigan Avenue Chicago 4, Illinois
Refractory & Insulation	Refractory & Insulation Corporation 120 Wall Street New York 5, New York
Reynolds	Reynolds Metal Company Reynolds Metals Building Richmond 18, Virginia
Ric-Wil	Ric-Wil, Inc. Barberton, Ohio
Rock Wool Manufacturing	Rock Wool Manufacturing Company Leeds, Alabama
Rubatex	Rubatex Division of Great American Industries, Inc. Bedford, Virginia

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Rubber and Asbestos	Rubber and Asbestos Corporation 225 Belleville Avenue Bloomfield, New Jersey
Rubber Corporation of America	Rubber Corporation of America New South Road Hicksville, Long Island, New York
Ruberoid	The Ruberoid Company 733 Third Avenue New York 17, New York
Smith Products	Smith Products, Inc. Novi, Michigan
Spotnails	Spotnails, Inc. 1100 Hicks Road Rolling Meadows 6, Illinois
Stanley	Stanley Steel Strapping Division of The Stanley Works New Britain, Connecticut
St. Clair Rubber	St. Clair Rubber Company Marysville, Michigan
Stic-Klip	Stic-Klip Manufacturing Company, Inc. 50 Regent Street Cambridge 40, Massachusetts
Surface Coatings	Surface Coatings, Inc. 110 Pear Street, S. E. Atlanta, Georgia
Techalloy	Techalloy Company, Inc. Zone 2 Rahns, Pennsylvania
Texaco	Texaco, Inc. P. O. Box 2332 Houston 1, Texas
Thermatomic Carbon	Vanderbilt Company, Sales Agent of Thermatomic Carbon Company 230 Park Avenue New York 17, New York
Thermon	Thermon Manufacturing Company 1017 Rosine Street Houston 19, Texas

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Tufflite Plastics	Tufflite Plastics, Inc. Ballston Spa New York
Twinsburg-Miller	Twinsburgh-Miller Corporation P. O. Box 207 Twinsburgh, Ohio
Union Asbestos	Union Asbestos & Rubber Company 1111 West Perry Street Bloomington, Illinois
United Cork	United Cork Companies 1 Central Avenue Kearny, New Jersey
U. S. Gypsum	United States Gypsum Company 1253 West Diversey Chicago, Illinois
U. S. Mineral Wool	United States Mineral Wool Company Stanhope, New Jersey
U. S. Rubber Company	United States Rubber Company Ensolite Products Department Mishawaka, Indiana
Vimasco	Vimasco Corporation Nitro, West Virginia
Virginia Chemicals	Virginia Chemicals & Smelting Company West Norfolk, Virginia
Visking Company	Visking Company 6733 West 65th Street Chicago 38, Illinois
Witco	Witco Chemicals Company, Inc. 122 East 42nd Street New York 17, New York
Zonolite	Zonolite Company 135 South LaSalle Street Chicago 3, Illinois

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APPENDIX II

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EXPLANATION OF CHARACTERISTICS

1. ABRASION RESISTANCE - Tested per ASTM C 424. Consists of two 10 minute runs. Expressed as per cent loss of weight.

2. ADHESION -

   WET - Tested per ASTM C 383. Expressed as psi.

   DRY - Tested per ASTM C 353. Expressed as psi.

3. ALKALINITY - pH value of the soluble material dissolved from a shredded 10 gram sample that has been boiled for two hours in 150 ml of neutral water using a reflux condenser and 50 ml of neutral water to wash down the condenser.

4. CAPILLARITY - 3" x 3" x 1½" specimen placed on a wet cloth. Cloth is in a tilted pan with water covering one-half of the cloth. Specimen does not touch water surface. Expressed as per cent gain of weight after seven days.

5. COEFFICIENT OF EXPANSION - Length of specimen measured at various temperatures. Expressed by the ratio of change in a unit length, to the unit length, for a temperature change of one degree F.

6. COMBUSTIBILITY -

   FLASH POINT - Minimum temperature in degrees F of the material at which material can be ignited by a flame but will not continue to burn after flame is removed.

   FLAME POINT - Minimum temperature in degrees F of the material at which material can be ignited by a flame and will continue to burn after flame is removed.

   MELTING POINT - Temperature in degrees F at which the material starts to change from a solid to a liquid.

7. CORROSION, RUSTING - Evaluation of the extent to which the inherent properties of the material contribute toward the rusting of steel.

8. CORROSION, STRESS - Evaluation of the extent to which the inherent properties of the material contribute toward stress corrosion of stainless steel.

9. COVERAGE - Dry covering capacity, per ASTM C 166. Expressed as board feet per 100 pounds.

10. CRACKING - HOT SIDE - Tested per ASTM C 411.

11. DENSITY - Tested per ASTM C 303, C 167, and C 302. Expressed as pounds per cubic foot.

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12. DROP RESISTANCE - Tested using Handleability Machine, which shows the resistance to fracture by flexure of commercial sized units of insulation when subjected to repeated shock loading.

13. EMISSIVITY, HEAT - Tested per ASTM C 445. Expressed as a ratio of the rate of radiant emission as a consequence of temperature only, to the corresponding emission of a perfect emitter or black body at the same temperature.

14. HARDNESS - Tested with 1/8" ball point under 1 kg load. Expressed as mm penetration.

15. HYGROSCOPICITY - 2" cubes oven dried at 220 F to constant weight, then exposed to atmosphere at 70 F and 90 per cent relative humidity for 14 days. Expressed as per cent increase in weight.

16. REFLECTANCE, HEAT - Ratio of heat reflected to total available for reflection.

17. RESISTANCE TO ACIDS - Tested with acids in liquid and vapor states.

18. RESISTANCE TO CAUSTICS - Tested with caustics in liquid and vapor states.

19. RESISTANCE TO SOLVENTS - Tested with solvents in liquid and vapor states.

20. SHRINKAGE -

LINEAR - Tested per ASTM C 356. Expressed as per cent change.

VOLUMETRIC - Per cent change in volume after exposure to maximum service temperature.

21. SHRINKAGE, WET TO DRY - Tested per ASTM C 166. Expressed as per cent change in volume.

22. SPECIFIC HEAT - Tested per ASTM C 351. Expressed as btu/lb, degrees F.

23. SPECIFIC GRAVITY -

REAL - Weight of specimen with volume taken as mass of solids only, divided by the weight of an equal volume of water.

APPARENT - Weight of specimen divided by the weight of water of a volume equal to the volume of the specimen including its voids.

24. STRENGTH - General observations. This applied to non-homogeneous materials where compressive strength, tensile strength, flexural strength and shear strength will not apply.

25. STRENGTH, BREAKING (Modulus of rupture) - Tested per ASTM C 203. Expressed in pounds.

26. STRENGTH, COMPRESSIVE - Tested per ASTM C 165 and C 354. Expressed as psi.

27. STRENGTH, FLEXURAL - Tested per ASTM C 203. Expressed as psi.

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28. STRENGTH, SHEAR - Expressed as psi.

29. STRENGTH, TENSILE - Expressed as psi.

30. TEMPERATURE LIMITS - Recommendations, based on test, as to the maximum and minimum temperatures at which the material can be used under CONTINUOUS, SHORT PERIOD, AND CYCLIC service.

31. TEMPERATURE RISE (Self internal heating) - Specimen heated in furnace with means of measuring temperature within and on surface of specimen. Furnace temperature is raised uniformly to 1200 F or until specimen flames. Materials which have self internal heating characteristics will cuase the center temperature to rise and exceed the surface temperature.

32. THERMAL CONDUCTIVITY - Tested per ASTM C 177 and C 335. Expressed as btu,inch/sq ft, hr, degrees F.

33. THERMAL DIFFUSIVITY - Calculated by k/sp heat x density. Expressed as sq ft/hour.

34. THERMAL SHOCK RESISTANCE - Specimens are heated to maximum recommended temperature and held for two hours. One specimen is then cooled by a stream of compressed air. Physical changes are then noted.

35. TRANSMITTANCE - Tested per ASTM C 236. Expressed as btu/sq ft, hr, degrees F.

36. VIBRATION RESISTANCE - Evaluation of the ability of a material to withstand vibration under various frequencies and amplitudes.

37. WARPAGE IN SERVICE - Warpage measured after specimen is heated to maximum recommended temperature on one face only.

38. WATER ABSORPTION - Specimen to be submerged in water for 24 hours and drained for 10 minutes before weighing. Expressed as per cent weight gain.

39. WATER VAPOR TRANSMISSION - Tested per ASTM C 355 and E 96. Expressed as perm inches. Perm inches are expressed as grain; inch/sq ft, hr, inch Hg.

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APPENDIX I

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BLOCK, BOARD, AND PREFORMED PIPE COVERING

BASIC MATERIAL	GENERAL DESCRIPTION	MANUFACTURERS	TRADE NAMES	TEMP LIMITS MIN	TEMP LIMITS MAX	DENSITY LB/CU FT	GEN CL NUM
Alumina-Silica Fiber and Binder (Block)	Alumina-silica fibers combined with inorganic binders. Chemically inert and resistant to thermal shock. Used in furnaces, etc. Skin can be surface hardened. Rigid.	Carborundum	Fiberfrax F-13 Block	Atmos	2000	13	
Alumina-Silica Fiber and Binder (Board)	Alumina-silica fibers combined with inorganic binders. Used for heat shields, seals, baffles, etc. Rigid.	Carborundum	Fiberfrax XB Board	Atmos	2000	25	
Alumina-Silica Fiber and Binders (Tubes)	Alumina-silica fiber paper combined with a small amount of inorganic binder to form tubes. Used as furnace liners, etc. Rigid.	Carborundum	Fiberfrax T-30 Tubes	Atmos	2000	35	
Asbestos Fiber and Diatomaceous Silica (Pipe Covering)	Amosite asbestos fibers combined with diatomaceous silicate and sprayed with a silicate binder. Low shrinkage. Good mechanical strength. Rigid.	Holmes Foundry Pittsburgh Corning	Caposite Unibestos No. 1200	Atmos Atmos	1200 1200	14 16	
Asbestos Fiber and Glass Fiber (Pipe Covering)	Braided asbestos inner tube covered with glass fiber insulation and contained within an outer jacket of braided asbestos tubing. To slide on small lines. Flexible.	Union Asbestos	Unarco Insutube	Atmos	500		
Asbestos Fiber (Sponge Felt) (Block and Pipe Covering)	Built up of asbestos fiber felts laminated and cemented together to form a relatively spongy material. Resilient. Forty layers per inch. Flexible.	Carey Keasbey & Mattison Mundet Nicolet	Asbestos Sponge Felt Best Felt Asbestos Sponge Asbestos Sponge Felt	Atmos Atmos Atmos Atmos	700 700 700 700	29 - 33 26 - 30	
Asbestos Fiber (Block and Pipe Covering)	Built up of alternating layers of plain and indented asbestos paper. Approximately 22 layers per inch. Semi-rigid.	Carey Nicolet	Defentex "U" Dent	Atmos Atmos	550 550		
Asbestos Fiber (Air Cell) (Block, Board and Pipe Covering)	Built up of alternating layers of plain and corrugated asbestos paper cemented together. Semi-rigid.	Carey Johns-Manville Johns-Manville Keasbey & Mattison Keasbey & Mattison Keasbey & Mattison Mundet Mundet Nicolet Nicolet Nicolet Nicolet	Air Cell 1/4" Corrugated Asbestocel 1/4" Corrugated Asbestocel 1/8" Corrugated Air Cell 1/4" Corrugated Air Cell 1/8" Corrugated Air Cell 1/8" Corrugated Air Cell 1/4" Corrugated Air Cell 1/8" Corrugated Air Cell 1/8" Corrugated Air Cell 1/8" Corrugated Air Cell 1/4" Corrugated Air Cell 1/2" Corrugated	Atmos Atmos Atmos Atmos Atmos Atmos Atmos Atmos Atmos Atmos Atmos Atmos	300 300 300 300 300 300 300 300 300 300 300 300	9 11 13 16	
Asbestos Fiber and Cement (Board)	Formed from asbestos and cement using high pressures. Hard smooth finish on one side. Weather resistant. Fireproof. Used as protective facing over insulation. Semi-rigid.	Johns-Manville National Gypsum Ruberoid	Asbestocite Pin-F-Lex Deluxe Stonewall	Atmos -50 Atmos	600 600 600	95 105 95	
Asbestos Fiber and Cement (Board)	Asbestos and cement formed into board. Used as siding in places requiring incombustible boards. Rigid.	Johns-Manville National Gypsum	Transite Permaboard	-50 -50	600 600	124 100	
Asbestos Fiber and Binder (Board)	Asbestos fibers and binder formed into board. Available in various grades and thicknesses. Rigid.	Carey Detrick Johns-Manville Johns-Manville Johns-Manville Johns-Manville Nicolet Ruberoid	Asbestos Millboard "C" Detroc Board Asbestos Millboard 106 Asbestos Millboard 102 Asbestos Millboard 219 Asbestos Millboard "C" Asbestos Millboard Asbestos Millboard	Atmos Atmos Atmos Atmos Atmos Atmos Atmos	1200 1000 800 1000 1100 1200 1000	56 56 56 52 56 56	
Calcium Silicate (Block and Pipe Covering)	Hydrous calcium silicate reinforced with a small amount of asbestos fibers. Good compressive strength. Rigid.	Armstrong B.E.H. Carey Eagle-Picher Johns-Manville Keasbey & Mattison Mundet Owens-Corning Pabco Ruberoid Union Asbestos	L.K. Thermasil Calcium Silicate Hylo Thermobestos Kay-Therm Tri-Calsite Kevlo Caltemp Calsilite Calcium Silicate	Atmos Atmos Atmos Atmos Atmos Atmos Atmos Atmos Atmos Atmos Atmos	1200 1200 1350 1200 1200 1350 1350 1200 1350 1350 1200	11 11 12 12 11 12 12 12 12 12 12	

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MATERIALS

BLOCK, BOARD, AND PREFORMED PIPE COVERING

BASIC MATERIAL	GENERAL DESCRIPTION	MANUFACTURERS	TRADE NAMES	TEMP LIMITS MIN	TEMP LIMITS MAX	DENSITY LB/CU FT	GENERIC CLASS NUMBER
Calcium Silicate (High Temp.) (Block and Pipe Covering)	Hydrous calcium silicate with a small amount of asbestos fibers. Good compressive strength. Useful as fire protection insulation. Rigid.	Armstrong Owens-Corning Ruberoid	LK-20 Kaylo-20 Calsilite Hi	Atmos Atmos Atmos	1800 1800 1800	12 12 12	13
Cork, Vegetable (Board and Pipe Covering)	Granules of vegetable cork compressed and baked in molds to form board and pipe covering. Good structural strength. Water resistant. Not vapor resistant. Rigid.	Armstrong Armstrong Mundet National Cork United Cork	LT Cork Corkboard Jointite Novoid Cork BB Corkboard	-250 -300 -250	200 200 200 200 200	7 7 7 7 7	14
Diatomaceous Silicate (Block and Pipe Covering)	Calcined diatomaceous silicate blended with other insulating materials and bonded with asbestos fiber. Rigid.	B.E.H. Carey Johns-Manville Kensbey & Mattison Mundet Pabco Refractory and Insulation	Enduro Block Hi Temp No. 19 Block Superex Block Hy Temp Type 19 Block Prasco 19-C Block No. 19	Atmos Atmos Atmos Atmos Atmos Atmos Atmos	1900 1900 1900 1900 1900 1900 1900	24 23 24 24 23 23	15
Diatomaceous Silicate (Block and Pipe Covering)	Similar to above except has lower thermal conductivity and temperature limits. Rigid.	Johns-Manville Mundet Pabco	Superex M Type M Prasco 15-C	Atmos Atmos Atmos	1600 1500 1500	21 22 22	16
Diatomaceous Silicate and Asbestos (Board)	Diatomaceous silicate, asbestos fibers and an inorganic binder pressed into board. Will not burn or rot. Rigid.	Johns-Manville Johns-Manville Johns-Manville Union Asbestos	Marinite 23 Marinite 36 Marinite 65 Unarcoboard	Atmos Atmos Atmos Atmos	900 900 800 1200	23 36 65 36	17
Glass, Cellular (Block and Pipe Cover)	Inorganic, pure glass containing millions of seperated hermetically sealed cells, each filled with dead air. High resistance to moisture, vapor, and acid atoms. Incombustible. Good strength. Rigid.	Pittsburgh Corning	Foamglas	-450	800	9	18
Glass, Cellular (Board)	Same description as item above. Rigid.	Pittsburgh Corning	Foamglas Roof Insulation	-450	800	9	19
Glass, Fibrous with Binder (Pipe Covering)	Fine fibrous glass with phenolic resin binder. Density approximately 7 1/4 lbs. Available in a variety of canvas jackets, waterproof felt jackets, dual temperature jackets and fire retardant jackets.	Armstrong Armstrong Eagle-Picher Owens-Corning Owens-Corning Pabco	Armaglas P.F. Armaglas P.F. Dual Temp Superglas Fiberglas Heavy Density Sectional Fiberglas Heavy Density Section Dual Temp Pabco Heavy Density Sectional	Atmos -320 -120 Atmos -320 -120	450 200 200 450 200 450	7 1/4 7 1/4 7 1/4 7 1/4 7 1/4 7 1/4	20
Glass, Fibrous with Binder (Pipe Covering)	Fine fibrous glass with phenolic resin binder. Similar to above except comes only in 1/2" insulation thickness. Available with a variety of jackets. Semi-rigid.	Armstrong Eagle-Picher Owens-Corning	Armaglas Low Pressure Superglas Low Pressure Fiberglas Low Pressure	Atmos Atmos Atmos	250 250 250	7 1/4 7 1/4 7 1/4	21
Glass, Fibrous with Binder (Pipe Covering)	Fine glass fibers with phenolic resin binder molded into one piece pipe covering sections. Soft and resilient. Approximately 4 lb density. Available with a variety of jackets. Semi-rigid.	Armstrong B.E.H. Carey Eagle-Picher Johns-Manville Mundet Owens-Corning Pittsburgh Plate Glass Gustin-Bacon	Armaglas One Piece Mono-Kover Thermoglas Superglas Micro-Lok Superglas Fiberglas One Piece Fiber Glass Pipe Insulation Snap-On	-30 -30 -30 -30 -30 -30 -30 -30 - 30	400 350 350 350 370 350 400 370 350	4 4 3 1/2 3 1/2 4 3	22
Glass, Fibrous with Binder (Board)	Fibrous glass and binders. Used for boilers, ducts and other heated equipment. Resilient. Semi-rigid.	Armstrong Owens-Corning	Armaglas I.S. Board Fiberglas I.S. Board	-120 -120	700 700	3 3	23
Glass, Fibrous (Board)	Fibrous glass board for duct insulation. Available with several facings. Semi-rigid.	Armstrong Eagle-Picher Owens-Corning	Armaglas Duct Insulation Type I Type II Superglas All Purpose Duct Insulation Type I Type II		250 250 250 250 250	1.6 3 1.6 3	24

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BASIC MATERIAL	GENERAL DESCRIPTION	MANUFACTURERS	TRADE NAMES	TEMP LIMITS MIN	TEMP LIMITS MAX	DENSITY LB/CU FT	GE C NU
Glass, Fibrous with Binder (Board)	Glass fibers with phenolic resin binder. Supplied in several densities. For use on equipment, ducts, and cold rooms.	Armstrong	Armaglas PF-611	- 50	250	2	
			Armaglas PF-612	- 50	250	2 1/2	
			Armaglas PF-613	- 50	450	3 1/4	
			Armaglas PF-614	- 50	450	4 1/4	
			Armaglas PF-615	-300	450	6	
			Armaglas PF-616	-300	450	7 3/4	
			Armaglas PF-617	-300	450	9	
			Armaglas PF-618	-300	450	10 1/2	
		Eagle-Picher	EPF-611	- 50	250	2	
			EPF-612	- 50	250	2 1/2	
			EPF-613	- 50	450	3 1/4	
			EPF-614	- 50	450	4 1/4	
			EPF-615	-300	450	6	
			EPF-616	-300	450	7 3/4	
			EPF-617	-300	450	9	
			EPF-618	-300	450	10 1/2	
		Johns-Manville	J-M Microlite	- 50	350	2, 2 1/2, 3	
		Owens-Corning	Fiberglas PF-611	- 50	250	2	
			Fiberglas PF-612	- 50	250	2 1/2	
			Fiberglas PF-613	- 50	450	3 1/4	
			Fiberglas PF-616	-300	450	7 3/4	
			Fiberglas PF-617	-300	450	9	
			Fiberglas PF-616	-300	450	10 1/2	
		Pabco	PF-613			3 1/4	
			PF-615		250	6	
			PF-617		250	9	
			Fiberglas PF-614	- 50	450	4 1/4	
			Fiberglas PF-615	-300	450	6	
Glass, Fibrous with Binder (Board)	Glass fibers with phenolic resin binder. Completely sheathed in asphalt. Used in cold storage rooms. Rigid.	Armstrong	Armaglas AE Board	- 50	90	6	
		Owens-Corning	Fiberglas AE-6 Board	- 50	100	6	
Glass, Fibrous Impregnated Surface (Board)	Glass fibers with phenolic resin binder. Top surface coated with asphalt to which craft paper is adhered and lapped around both ends.	Armstrong	Armaglas Roof Insulation	Atmos	175	12	
		Owens-Corning	Fiberglas Roof Insulation	Atmos	175	12	
Hair and Wool Felts	Layers of hair felt surrounded by layers of wool felt, with inner layer of wool felt. Main use is to retard freezing of water lines. Semi-rigid.	Carey	Protecto	0	90		
		Johns-Manville	Zero	0	90		
		Keasbey & Mattison	Non Frost	0	90	20 - 22	
		Mundet	Built-up Hair Felt	0	90		
		Nicolet	Frost-Proof	0	90		
Magnesium Carbonate and Asbestos (Block and Pipe Covering)	Composed of not less than 85% by volume of hydrated magnesium carbonate and the balance of asbestos fibers. Relatively soft. Absorbant, will soften when wet. Rigid.	Armstrong	85% Magnesium	Atmos	600	11	
		B.E.H.	Thermalite	Atmos	600	11	
		Carey	Super Light	Atmos	600	11	
		Eagle-Picher	85% Magnesium	Atmos	550	11	
		Johns-Manville	85% Magnesium	Atmos	600	11	
		Mundet	Custom Molded Magnesium	Atmos	600	11	
		Pabco	Precision Molded 85 % Magnesium	Atmos	550	11	
Mineral Wool with Binders (Block)	Mineral wool fibers with inorganic binders. Surface will yield to irregularities without fracture of block. Low compressive strength. Requires protection from liquids. Rigid.	A. P. Green	High Temp Block Insul.	Atmos	1700	16 - 22	
		Armstrong	Armatemp M.W. Block	Atmos	1500	15	
		B.E.H.	Mono Block	Atmos	1800	14 - 18	
		Bigelow-Liptak	BL-19 Block Insul.	Atmos	1900	18 - 20	
		Detrick	Grip Tex	Atmos	1900	18 - 22	
		Forty-Eight	Webers HT Block	Atmos	1800	14 - 17	
		General Refractories	Grefco MX-17	Atmos	1900	16 - 20	
		Holmes	Uniblock	Atmos	1700	17 - 19	
		Johns-Manville	HT Banroc	Atmos	1700	18	
		Mundet	Type No. 17	Atmos	1700		
		North American Refrac.	Narco Block Insul.	Atmos	1900	16 - 20	
		Union Asbestos	Unarco Mineral Wool Insulation Block	Atmos	1800	16 - 20	
		Eagle-Picher	PV Super Temp	Atmos	1900	16 - 20	
Mineral Wool with Binder (Board)	Mineral wool combined with a water-resistant asphaltic binder. Rigid.	Johns-Manville	Rock Cork Board	-300	330	15	
Mineral Wool with Binder (Board)	Mineral wool with binder. Used for low temperature applications mainly. Semi-rigid.	Eagle-Picher	LT-4 Felt	-300	450	4	
		Eagle-Picher	LT-6 Felt	-300	450	6	
		Eagle-Picher	LT-8 Felt	-300	450	8	

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BASIC MATERIAL	GENERAL DESCRIPTION	MANUFACTURERS	TRADE NAMES	TEMP LIMITS MIN	TEMP LIMITS MAX	DENSITY LB/CU FT	GENERIC CLASS NUMBER
Mineral Wool with Binder (Block and Board)	Mineral wool fibers bonded with resin binder. Resilient. Semi-rigid.	B.E.H. Detrick Eagle-Picher Johns-Manville	Therma-K Templite MT Board Banroc M	Atmos Atmos Atmos Atmos	700 700 700 1000	10 9 9 8	33
Mineral Wool with Binder (Block, Board and Pipe Covering)	Mineral wool fibers bonded with resin binder.	Forty-Eight U.S. Mineral Wool	N-700 9 lb Felt	-300 -300	700 800	9 9	34
Mineral Wool with Binder (Board)	Fine mineral wool fibers bonded together with thermo-setting resin. Available plain or with vapor barrier facings. Semi-rigid.	Armstrong B.E.H. Gustin Bacon Johns-Manville Mundet U. S. Mineral Wool	Atmatemp Spun Wool Duct Duct Insulation Insulation Board Spintex Board Spun Wool Insulation Board USM Felt	Atmos Atmos Atmos Atmos Atmos Atmos	450 450 450 450 450 450	7 7 7 6, 8, 9 3 - 8 3 - 7	35
Perlite, Asbestos Fibers and Binder (Block)	Molded from expanded perlite, asbestos fibers, amosite asbestos fibers and hydraulic binder. Rigid.	Refractory and Insulation	No. 12 Insulation Block	Atmos	1200	14 - 16	36
Polyethylene, Expanded. (Board)	Closed cell expanded polyethylene. Low water absorption. Flexible.	Tufflite Plastics	Tufflite Expanded Polyethylene.	-50	160	2	37
Polystyrene, Expanded (Bead) (Block Board and Pipe Covering)	Expanded beads of polystyrene molded into shape. Lightweight. Moisture resistant. Resilient. Available in standard or self-snuffing grades. Rigid.	Alumiseal Corporation Armstrong Dyfoam Corporation Johns-Manville Mundet U.S. Mineral Wool United Cork	Alumifoam Armalite (Block and board only) Dyfoam J Foam (Block only) Expanded Polystyrene U.S. Cellofoam Uni-Crest	-400 -400 -400 -400 -400 -400	175 175 175 180 175 175	1 1 1 1 1	38
Polystyrene, Expanded. (Board)	Expanded polystyrene. Higher density than items above. Has higher compressive strength.	Tufflite Plastics	Tufflite High Density Board	-400	175	4 1/2	39
Polystyrene, Expanded. (Block, Board and Pipe Covering)	Polystyrene expanded into rigid insulation. Low water vapor transmission. Self-snuffing. Rigid.	Dow Chemical Tufflite Plastics Tufflite Plastics	Styrofoam Tufflite Tufflite Fitting Covers	-400 -400 -400	170 175 175	2 2 2	40
Polyurethane, Expanded. (Block and Board)	Foamed polyurethane. Closed-cell structure. Will not rot or contaminate. Good vapor resistance. Rigid.	American Latex National Gypsum Barrett	Stayfoam Gold Bond Therma Thane Urethane Insulation	-350	200 190	1.5 - 2 1.5 - 1.9 1.5 - 2	41
Polyurethane, Expanded. (Block, Board and Pipe Covering)	Foamed polyurethane. Same as above except is self-extinguishing. Rigid.	American Latex Johns-Manville National Gypsum Precision Insulation Pittsburgh Corning Tufflite Plastics Union Asbestos	Stayfoam (Block and board only) M-Thane Gold Bond Therma Thane (Block and board only) One 7 Cel Foamthane Tufflite Urethane Unarco U-200	-280 -350 -330 -300 -400	250 200 175 250 200	1.5 - 2 2 1.5 - 1.9 1.6 - 2 2.2 2 - 3	42
Polyurethane, Expanded. (Board)	Foamed polyurethane sandwiched between two layers of roofing membrane. Closed cell. Used as roof insulation. Rigid.	Barrett	Urethane Roof Insulation	Atmos		1.9	43
Polyurethane, Expanded. (Board and Pipe Covering)	Foamed polyurethane. Comes in grades from soft to extra firm. Open-celled. Flexible.	American Latex American Cellular Prod.	Stayfoam Thermax	-300	275	1.3 - 3.8 3 - 3 1/4	44
Rubber, Expanded. (Pipe Covering)	Foamed synthetic rubber material. Closed cell. Self extinguishing. Used underground and under pipe hangers. Rigid.	Armstrong Johns-Manville	Rigid Armaflex JM Rigid Aerotube	-400 -400	220 220	8 8	45

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MATERIALS

BLOCK, BOARD, AND PREFORMED PIPE COVERING

BASIC MATERIAL	GENERAL DESCRIPTION	MANUFACTURERS	TRADE NAMES	TEMP LIMITS MIN	TEMP LIMITS MAX	DENSITY LB/CU FT
Rubber, Expanded. (Board)	Foamed synthetic rubber. Will burn. Good structural strength. Rigid.	Rubatex	Rubatex R-103-B	-300	140	4 - 6
Rubber, Expanded. (Board and Pipe Covering)	Foamed synthetic or natural rubber. Closed cells. Used also on tubing. Flexible.	Armstrong	Armaflex 22 (Pipe covering)	-400	180	7
		Armstrong	Sheet Armaflex	-400	180	8
		Carey	Flexible Tubing Insulation	0	200	8
		Goodrich	Cell-Tite Tubing	- 20	200	6 - 12
		Gustin-Bacon	Ultra Foam	0	220	
		Johns-Manville	Aerotube	32	200	
		Mundet	Foamed Plastic Tubing	- 20	180	7 - 11
		Owens-Corning	O-C Flexible Sheet	0	220	7
		Owens-Corning	O-C Flexible Tubing	0	220	7
		Pressite	Prest-O-Cel	- 40	220	7 - 8 1/2
		Rubatex	Rubatex Pipe Insulation	0	220	7 - 11
		Virginia Chemicals	Vascocel	-300	220	6 - 11
Silica, Expanded Fibers and Binder (Block and Pipe Covering)	Expanded silica with a special binder and reinforced with inorganic fibers. Has low water absorption. Low shrinkage. Acid resistance. Rigid.	Carey	Carey Temp	Atmos	1600	9 - 10
Silica, Bonded, Inert. (Pipe Covering)	Inert silica molded to form pipe covering. For use on hot water and low pressure steam lines. Will not disintegrate in water. Rigid.	Johns-Manville	JM Fibrocel	Atmos	300	9
Silica, Cellular. (Block)	Pure cellular silica. Rigid.	Glasrock Products	Quartz Foam		2000	10 - 50
Silica, Fused. (Block)	Fused silica block. Chemically inert. Rigid.	Glasrock Products	Glasrock No. 25 Foam		1500	25
Silica, Fused. (Block)	Foamed, fused silica block. Chemically inert. Excellent thermal shock resistance. Rigid.	Glasrock Products	Glasrock No. 50 Foam	Atmos	2000	50
Silica, Fused. (Board and Shapes)	Foamed, fused silica material. Chemically inert. Excellent thermal shock resistance. Rigid.	Glasrock Products	Masrock	Atmos	2000	115
Wood Fibers, Roof Insulation. (Board)	Shredded wood fibers bonded into rigid, moisture resistant insulating board. Rigid.	Johns-Manville	JM Roof Insulation	Atmos	Atmos	15 - 18
		National Gypsum	Gold Bond Fiberboard Roof Insulation	Atmos	Atmos	15 - 18
Wool Felt with Vapor Barrier (Pipe Covering)	Wool felt sheets formed into pipe insulation. Saturated asbestos jacket to increase the insulation's resistance to moisture. For use on cold water lines. Semi-rigid.	Carey	Impervo	40	90	23
		Johns-Manville	Anti-Sweat	40	90	
		Keasbey & Mattison	Non-Sweat	40	90	
		Mundet	Anti-Sweat	40	90	
		Nicolet	Anti-Sweat	40	90	
Wool Felt (Pipe Covering)	Wool felt sheets formed into pipe insulation. Low resistance to moisture. For use on cold and hot water lines. Semi-rigid.	Carey	Perfecto	Atmos	225	18 - 20
		Johns-Manville	Pre-Shrunk	Atmos	225	
		Keasbey & Mattison	Duplex	Atmos	212	
		Mundet	Wool Felt	Atmos	212	

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MATERIALS

BLANKET, FELT, TAPE, AND ROPE

BASIC MATERIAL	GENERAL DESCRIPTION	MANUFACTURERS	TRADE NAMES	TEMP LIMITS MIN	TEMP LIMITS MAX	DENSITY LB/CU FT	GENERIC CLASS NUMBER
Alumina-Silica Fiber (Blanket and Felt)	Alumina-silica fibers combined with inorganic binders. Flexible.	Babcock and Wilcox Carborundum Carborundum Carborundum Carborundum Carborundum Johns-Manville	Kaowool Fiberfrax XV-Felt Fiberfrax XSW Blanket Fiberfrax XLF Blanket Fiberfrax XLM Blanket Fiberfrax XSWF Faced Blanket Cerafelt	Atmos Atmos Atmos Atmos Atmos Atmos Atmos	2000 2000 2000 2000 2000 2000 2000	 4.3 - 8 5 - 8 5 - 8 3 - 24	58
Alumina-Silica Fiber (Paper)	Alumina-silica fiber paper. Available in several widths and thicknesses. Available with or without inorganic binder.	Carborundum	Fiberfrax 970 Series Paper	Atmos	2000	25	59
Alumina-Silica Fiber (Rope and Cord)	Long staple fiber, three-strand rope. Available in several diameters. Also available in cord and yarn.	Carborundum Carborundum	Fiberfrax Rope Fiberfrax Cord and Yarn	Atmos Atmos	2000 2000	25	60
Alumina-Silica Fiber (Cloth and Tape)	Woven cloth and tape. Reinforced with wire or glass filament to give more strength.	Carborundum	Fiberfrax Cloth and Tape	Atmos	2000		61
Asbestos, Woven. (Felt)	Lightweight, flexible blanket woven from Amosite Fibers and bound together by brass wire inserted asbestos yarn.	Union Asbestos	Insubestos Felt Type A	Atmos	750	10	62
Asbestos, Woven. (Felt)	Identical to item above except that blanket is treated to repel water. For cold water. Can be enclosed in cotton muslin.	Union Asbestos	Insubestos Felt Type B	40	90	10	63
Asbestos, Wrap. (Tape)	Long-fibered asbestos rovings enclosed within a tubular, woven asbestos jacket. Outer surface coated. For spiral wrapping of lines.	Keasbey & Mattison Johns-Manville Union Asbestos	Kay KM Tape Thermotape Unarco Insutape	Atmos Atmos Atmos	400 400 500		64
Asbestos Wrap (Tape)	Identical to item above except is wider and is wrapped and laced instead of being spirally wound.	Johns-Manville	Thermowrap	Atmos	450		65
Asbestos Fiber in Envelope (Blanket)	Asbestos cloth in envelope form filled with asbestos fibers.	Johns-Manville Union Asbestos	Asbestos Blanket Unarco Asbestos Blanket	Atmos Atmos	850 750	9 - 12	66
Asbestos Fiber Felted (Felt)	Soft flexible asbestos felt.	Johns-Manville Nicolet	Asbestos Roll Fire Felt Roll Felt	Atmos Atmos	1000 1000		67
Asbestos Fiber (Paper)	Asbestos fiber and binder.	Johns-Manville Nicolet Ruberoid	J.M. Commerical Paper Commercial Paper Commercial Paper	Atmos Atmos Atmos	400 400 400		68
Asbestos Fiber in Asbestos Jacket (Pipe Covering Blanket)	Asbestos fibers enclosed in a neoprene-coated, water-proofed asbestos jacket. Has lacing hooks for fast installation.	Union Asbestos	Unarco Wovenstone	Atmos	750	10	69
Carbon (Felt)	Felt made from 0.0003" carbon fibers. Approximately 6% volatile material. Inert gas or vacuum required above 600 F. 1/4" thick. Reinforced grades available.	National Carbon	Grade VDF Carbon Felt	-455	4500	5.2	70
Glass, Fibrous, Without Binder. (Blanket)	Fibrous glass without binder but with mineral oil lubricant.	Armstrong Owens-Corning Pabco	Armaglas TWL Armaglas TW-F Fiberglas TWL Fiberglas TW-F Pabco TW-F	-300 -300 -300 -300	1000 1000 1000 1000	4 1/2 4 1/2 4 1/2 4 1/2	71
Glass, Fibrous, Without Binder, Metal Enclosed (Blanket)	Same as above except is faced on one or both sides with metal fabric.	Armstrong Owens-Corning Pabco	Armaglas TWL Metal Mesh Armaglas TW-F Metal Mesh Fiberglas TWL Metal Mesh Fiberglas TW-F Metal Mesh Pabco Metal Mesh	Atmos Atmos Atmos Atmos	1000 1000 1000 1000 1000	4 1/2 4 1/2 4 1/4 4 1/4 4 1/4	72

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BASIC MATERIAL	GENERAL DESCRIPTION	MANUFACTURERS	TRADE NAMES	TEMP LIMITS MIN	TEMP LIMITS MAX	DENSITY LB/CU FT	GE
Glass, Fibrous, Needled Felt. (Blanket)	Needled glass fiber felt made into blanket. *Prefabricated.*	Union Asbestos	*Unimat Glass Blanket*	Atmos	1200	8	
Glass, Fibrous. (Felt)	Woven glass rovings frequently enclosed with stainless or (some) wire mesh.	Union Asbestos	Unarco Woven Glass Felt	Atmos	1200	9	
Glass, Fibrous, Textile Type. (Blanket)	Long textile-type glass fibers and phenolic binder. Very resilient. Available in a variety of densities and facings.	Gustin-Bacon	Ultralite	Atmos	375	1/2, 3/4, 1, 1 1/2, 2, and 3.	
Glass, Fibrous. (Blanket)	Long textile-type glass fibers with extremely fine glass fibers added, and phenolic binder. Available in a variety of densities and facings.	Johns-Manville Mundet Pittsburgh Plate Glass	Microtex Supertex Textrafine	Atmos Atmos Atmos	350 350 350	3/4, 1, 1 1/2, 2, 2 1/2 and 3. 3/4, 1, 1 1/2 and 2 1/2, 3/4, 1, 1 1/2, 2 and 3.	
Glass, Fibrous. (Blanket)	Made from extremely fine glass fibers *and bonded* with a phenolic binder. Available in variety of densities and facings.	Armstrong B.E.H. Carey Gustin-Bacon Johns-Manville Mundet *Owens-Corning* Owens-Corning Pabco Pittsburgh Plate Glass	Armaglas Flexible Duct Fine Fyber Thermoglas Ultrafine Microlite Superfine Fiberglas Aercore (PF 300 Series) Fiberglas Flexible Duct (GL-310 Series) Pabco Flexible Duct (PF-300 Series) Superfine		370 370 370 370 370 370 370 370 370 370	1/2 - 1 1/2 - 3 1/2 - 3 1/2 - 3 1/2 - 3 1/2 - 3 1/2 - 20 1/2 - 1 1/2 - 1 1/2 - 3	
Glass, Fibrous (Blanket)	Fibrous glass blanket consisting of 1 lb density core and a 4 lb density skin. Used as a duct liner.	Johns-Manville Pittsburgh Plate Glass	Micro-Bar Superface		200 200		
Glass, Fibrous. (Blanket)	Fibrous glass blanket with a glass mat surface. Used as a duct liner.	*Armstrong* Owens-Corning	Armaglas Mat-Faced Duct Liner Fiberglas Mat-Faced Duct Liner	-300 -300	180 180	1.5 - 2.5 1.5 - 2.5	
Glass, Fibrous. *(Blanket)*	Fibrous glass building insulation. Foil-Kraft laminated to fine fibrous glass. Comes in rolls or batts *and with or without* vapor barrier.	Owens-Corning	Fiberglas Foil-Faced Building Insulation	Atmos	150	3/4	
Graphite (Felt)	Felt made from 0.003" carbon fibers. No volatile. Inert gas or vacuum required above 600 F. 1/4" thick. *Reinforced* grades available.	National Carbon	Grade WDF Graphite Felt	-455	4500	4.6	
Hair Felt (Std Wt) (Felt)	Select, clean cattle hair processed into felt. Soft. Compresses approximately 30% when secured in place with twine wrapping. Not vapor resistant.	Johns-Manville Newark Hair Felt	Hair Felt Hair Felt	-150 -150	200 200	8 8	
Hair Felt (Heavy Density) (Felt)	Same as above but approximately twice the density. Will not compress greatly on application.	Johns-Manville Newark Hair Felt	H.D. Hair Felt H.D. Hair Felt	-150 -150	200 200	15 15	

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BASIC MATERIAL	GENERAL DESCRIPTION	MANUFACTURERS	TRADE NAMES	TEMP LIMITS MIN	TEMP LIMITS MAX	DENSITY LB/CU FT	GENERIC CLASS NUMBER
Mineral Wool Blanket. Metal Backing. (Blanket)	Felted mineral wool secured between various types of metal fabrics. Furnished as desired with metal mesh, metal lath, stucco lath or rib lath. Compressible. Flexible.	A.P. Green Armstrong B.E.H. Bigelow-Liptak Carey Detrick Eagle-Picher Forty-Eight General Refractories Holmes Johns-Manville Mundet Refractory and Insulation Rock Wool Manufacturing	Blanket Insulation Armatemp Spun Wool Blanket Metal Mesh Blanket BN-12 Industrial Mineral Wool Blanket Spun Wool Blanket EP Blanket Copr-Fibre Grefco Mineral Wool Blanket Metal Mesh Blanket Banroc Blanket Mineral Wool Blanket Mineral Fiber Blanket Delta Maid Blanket	 -300 	1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1000 1200 8 1200	10 10 9 10 8 8 10 10 10 8 8 9 8 8	84
Mineral Wool and Binders (Felt)	Mineral wool fibers felted and bonded together. Soft, resilient. Low compressive strength. Used for duct insulation. Comes with various enclosures.	Armstrong B.E.H. Eagle-Picher Forty-Eight Holmes Johns-Manville National Gypsum U.S. Mineral Wool Detrick	Armatemp Spun Wool Blanket BEH Spun Felt Mineral Wool Felt Copr Fibre LT Felt H.F. Felts Spintex Gold Bond Handi-Batts USM 3 lb Felt Spun Wool Felt	-150 -150 -150 -150 	450 450 450 450 450 450 1500 600 450	3 - 8 3 - 8 2 1/2 - 4 3 - 8 3 - 9 2 - 4 3 - 7 3 - 8	85
Mineral Wool, Binders and Metal Backing (Blanket)	Mineral wool fibers felted and bonded together and enclosed by metal fabric.	Eagle-Picher	Bonded Blanket	Atmos	450	6 - 8	86
Mineral Wool with Metal Fabric (Blanket Pipe Covering)	Mineral wool fibers secured between expanded metal lath or wire mesh. Precut for pipe size. Installed by wrapping around pipe and lacing or hooking.	Armstrong B.E.H. Detrick Eagle-Picher Forty-Eight Mundet	Armatemp 100 and 101 No. 100 and 101 Mineral Wool Tab-Lok Copr Fibre No. 48, Lace-On Type 1200	Atmos Atmos Atmos Atmos Atmos	1200 1200 1200 1200 1200 1200	6 - 10 6 - 10 9 - 12 8 6 - 10	87
Quartz Fibers (Felt)	Fine quartz fibers felted. Fiber size approximately 0.75 microns.	Johns-Manville	Micro-Quartz	Atmos	2500	3, 3 1/2 and 6	88
Silica, Fibrous. (Felt and Blanket)	Long fiber, organic free, flexible, corrosion resistant. Lightweight. Also available in tape, fabric, sleeving, yarn, cordage and rope.	H.I. Thompson H.I. Thompson	Refrasil A-100 Refrasil B-100	-320 -320	2000 2000	4 1/2 - 6 4 1/2 - 6	89

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BASIC MATERIAL	GENERAL DESCRIPTION	MANUFACTURERS	TRADE NAMES	TEMP LIMITS MIN	TEMP LIMITS MAX	DENSITY LB/CU FT	GENERIC CLASS NUMBER
Alumina-Silica Fiber (Cement)	Alumina-silica fibers bonded with inorganic air setting binder. Available in paste or liquid. Limited shelf life.	Carborundum	Fiberfrax Coating Cement	Atmos	2000	120	91
Alumina-Silica Fiber (Hydraulic Setting Fireproofing Cement)	Hydraulic setting, semi-refractory cement. Water mixed. Can be troweled or gunned.	Babcock and Wilcox Babcock and Wilcox Johns-Manville	Kaolite 20 Kaolite 22 L.W. Blasecrete	Atmos Atmos Atmos	2000 2200 2000	48 52 70	92
Alumina-Silica and Asbestos Fibers (Semi-refractory Hydraulic Setting Cement)	Asbestos fibers and alumina-silica materials. Water mixed.	Carey Eagle-Picher	Vitricel No. 106	Atmos Atmos	1900 2000	55	93
Alumina-Silica and Asbestos Fibers (Insulating Cement)	Alumina-silica fibers, asbestos and high temperature bonding materials.	Detrick	Hi Therm	Atmos	2300	20	94
Asbestos Fiber (Mine-run Finishing Cement)	Made from mine-run asbestos fibers. Can be used straight or with Portland Cement to get harder, whiter surface. Water-mixed.	Carey Eagle-Picher Mundet National Gypsum Nicolet Ruberoid	7M Short No. 20 7M Short Fiber 7M Short 7M Short 7M Short Fiber	Atmos Atmos Atmos Atmos Atmos	1000 1000 1000 1000 1000		95
Asbestos Fiber (General Utility Finishing Cement)	May also be used as an insulating cement. Finish medium-hard to hard. Composed of asbestos fibers and bonding clays. Water-mixed.	Carey B.E.H. Eagle-Picher Johns-Manville Keasbey & Mattison Mundet Ruberoid U.S. Mineral Wool	No. 303 No. 200 No. 99 No. 352 No. 152 7M No. 115 Commco Finishing	Atmos Atmos Atmos Atmos Atmos Atmos Atmos Atmos	1000 1000 1000 1000 1000 1000 1000 1000	40 - 70 50 - 60 57 - 63	96
Asbestos Fiber, Long. (High Grade Finishing Cement)	Long fiber asbestos and binder made into a high-grade cement. Makes a medium-hard finish.	A.P. Green Bigelow-Liptak Carey Eagle-Picher Johns-Manville Ruberoid	SS-11 C-10 LF-20 No. 43 No. 302 No. 214	Atmos Atmos Atmos Atmos Atmos Atmos	1000 1000 1000 1000 1000 1000	42 - 45 42 - 45 35 - 60 42 - 45 45	97
Asbestos Fiber (Hard Finish Cement)	Asbestos fibers and bonding clay. Makes a smooth, hard finish.	Carey Detrick Forty-Eight	No. 100 MHD Finish Hi Glos	Atmos Atmos Atmos	1000 1000 1000	50 - 60 42 - 45 55	98
Asbestos Fiber (Insulating Cement)	Used chiefly as an asbestos insulating cement.	Carey Keasbey & Mattison	No. 707 Amblerex No. 2	Atmos Atmos	750 1000	50 - 60 48 - 52	99
Asbestos Fiber (Careytemp Finishing Cement)	Made for use over Caretemp insulation. Dries to a smooth hard white finish.	Carey	Careytemp Asbestos Cement	Atmos	1000	50 - 60	100
Calcium Silicate Cement	Composed of same material as calcium silicate block insulation. Not recommended for hard finishes.	Pabco	Caltemp Cement	Atmos	1200	19 -22	101
Diatomaceous Silica (Insulating Cement)	Diatomaceous silica in powdered form and binders. Soft when dried. Little strength. Not moisture resistant. Used where cement is exposed to extreme high temperatures.	Carey Johns-Manville Keasbey & Mattison Pabco	Hy Temp No. 19 Superex Cement Hy Temp Cement Pasco H.T. Cement	Atmos Atmos Atmos Atmos	1900 1900 1900 1900	27 23 - 32 28 - 31	102

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BASIC MATERIAL	GENERAL DESCRIPTION	MANUFACTURERS	TRADE NAMES	TEMP LIMITS MIN	TEMP LIMITS MAX	DENSITY LB/CU FT	GENERIC CLASS NUMBER
Magnesia and Asbestos (Insulating Cement)	Magnesium carbonate and asbestos fibers. To be mixed with water. Soft. Little mechanical strength. Not water resistant.	B.E.H. Johns-Manville Mundet Pabco	Thermalite 85% Magnesium Cement Magnesium Cement 85% Magnesium Cement	Atmos Atmos Atmos Atmos	800 800 800 550	 18 - 20	103
Mineral Wool (Insulating Cement)	Mineral wool with clay binders. Relatively low k values. Good adhesion. Good adhesion to hot and cold surfaces.	A. P. Green Armstrong B.E.H. Bigelow-Liptak Carey Detrick Eagle-Picher Fiberglas Engineering Forty-Eight General Refractories Holmes Johns-Manville Mundet North American Refractories Owens-Corning Refractory and Insulation Rockwool Manufacturing Ruberoid Union Asbestos U.S. Mineral Wool	Insulating Cement Armstemp No. 168 BEH No. 1 Plus C-18 MW-50 Super 711 Super 66 Fenco Mineral Wool Cement Webers Super 48 Greico Insulating Cement No. 1 No. 450 A-1 Narco Staz-On OC-660 Stic-Tite High Temp-Master No. 313 Unarco No. 330 Cominco No. 2	Atmos Atmos Atmos Atmos Atmos Atmos Atmos Atmos Atmos Atmos Atmos Atmos Atmos Atmos Atmos Atmos Atmos Atmos Atmos Atmos	1800 1800 2100 1800 1800 1800 1800 1800 1900 1800 1700 1800 1800 1800 1800 1800 1800 1800 1800 1800	22 - 24 24 22 - 24 24 22 - 24 22 - 24 25 22 - 24 30 24 - 27 22 - 24 24 - 26 22 - 24 	104
Mineral Wool (Hydraulic Setting Cement)	Mineral wool with binders and hydraulic setting cement. Little shrinkage. Fair adhesion to insulation. Poor adhesion to hot surfaces. Will not go back to plastic condition when wetted after complete setting. Limited shelf life.	A. P. Green Armstrong B. E. H. Bigelow-Liptak Carey Detrick Detrick Eagle-Picher Fiberglas Engineering Forty-Eight Forty-Eight General Refractories Holmes Johns-Manville Mundet Owens-Corning Pabco Refractory and Insulation Rockwool Manufacturing Ruberoid Union Asbestos U.S. Mineral Wool	SS-10 Armatemp No. 10 Superpowerhouse FC-13 MW-One Utility Thermal Finish Hillite One Coat Fenco All-Purpose White Quick-Set Quick-Set Fitting Greico Insul-Finishing Cement Superpowerhouse No. 301 NE Plus Ultra OC-110 Hydraulic Setting Super Finish Stic-Tite One Shot No. 412 Single Coat Unarco No. 10 Cominco No. 4	Atmos Atmos	1000 1000 1200 1000 1000 1200 1400 1000 1000 1400 1800 1000 1200 1400 1200 1000 1200 1700 1000 1200 1000 1800	30 - 34 30 - 33 34 - 38 30 - 34 32 - 44 36 - 40 27 - 29 30 - 34 30 - 34 35 40 30 - 34 34 - 38 32 - 38 34 30 - 34 27 - 35 30 - 35 35 - 40 34 - 38 30 - 33 30 - 40	105
Mineral Wool and Asbestos (Hydraulic Setting Fireproofing Cement)	Mineral wool, asbestos fibers and a hydraulic binder. Provides lightweight, fire-retardent protection for structural steel. To be mixed with water.	Detrick Eagle-Picher	Pyro-Seal Fireproofing Cement	Atmos Atmos	2000 2000	53 - 55 38 - 42	106
Silica, Fused. (Facing Cement)	Facing and bonding cement having excellent thermal shock resistance and dimensional stability.	Glasrock Products	Glasrock Cement	Atmos	2000	115	107
Vermiculite (Insulating Cement)	Expanded vermiculite and binders. To be mixed with water. Good coverage. Higher k values than mineral wool insulating cement. Lightweight. Soft. Little mechanical strength.	Eagle-Picher Johns-Manville U. S. Mineral Wool Zonolite	No. 33 No. 500 Cominco No. 3 High Temp Insulating Cement	Atmos Atmos Atmos Atmos	1800 1800 1800 1800	16 1/2	108

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MATERIALS

LOOSE AND FILL

BASIC MATERIAL	GENERAL DESCRIPTION	MANUFACTURERS	TRADE NAMES	TEMP LIMITS MIN	TEMP LIMITS MAX	DENSITY LB/CU FT	GEN CL NU
Alumina-Silica Fiber (Loose Fibers)	Fibrous alumina-silica designed for fill applications. Used for packing in furnace joints, etc.	Babcock and Wilcox Carborundum Johns-Manville	B and W Kaowool Fiberfrax Bulk Short Staple Fibers JM Cerafiber	Atmos Atmos Atmos	2500 2300 2000	4 as shipped	10
Alumina Silicate (Loose Aggregate)	Lightweight aluminum silicate aggregate used for fills.	Babcock and Wilcox Johns-Manville	Kaolite L.W. Fill JM 2400 L.W. Aggregate JM Zelis L.W. Aggregate	Atmos Atmos Atmos	2000 2400 2400	30 31	11
Asbestos Fibers	Loose asbestos fibers. Comes in various grades and densities.	Carey Johns-Manville National Gypsum Nicolet Pabco Ruberoid Union Asbestos U.S. Mineral Wool	Asbestos Fibers Asbestos Fibers Gold Bond Asbestos Fibers Asbestos Fibers Asbestos Fibers Asbestos Fibers Carded Crysotile USM Asbestos Fibers	Atmos Atmos Atmos Atmos Atmos Atmos Atmos Atmos	1200 1000 900 1200 1200 1200 1200 1200	20 - 50	
Bituminous	Fill type bituminous insulation for pouring in trench to insulate underground pipes. Must be heat cured.	Witco Chemicals Witco Chemicals Witco Chemicals	Witcolite Grade A Witcolite Grade B-1 Witcolite Grade B-2	40 213 300	212 300 360		
Carbon (Loose Powder)	MT Carbon Black.	Thermatomic Carbon	Thermax	-455	5000	30	
Cork, Vegetable Granulated.	Vegetable Cork, granulated (raw) or regranulated (baked). Available in numerous grades.	Armstrong Mundet National	Granulated Cork Granulated Cork Novoid Granulated	-200 -200 -200	200 200 200	15	
Calcium Silicate	Synthetic calcium silicate. Good handling properties. Must be fully enclosed for low temperature service.	Johns-Manville	Micro Cel T-4	-459	1200	5 - 8	11
Diatomaceous Silica, Coarse.	Pure mineral diatomaceous silica milled to a coarse powder.	Eagle-Picher Johns-Manville	Celatom MN-83 Sil-O-Cel Coarse	Atmos Atmos	1600 1600	25 - 27 19 - 22	11
Diatomaceous Silica, Fine.	Pure mineral diatomaceous silica milled to fine powder.	Eagle-Picher Johns-Manville	Celatom MN-35 Sil-O-Cel Fine	Atmos Atmos	1600 1600	10 - 13 10 - 17	
Diatomaceous Silica, Calcined.	Calcined diatomaceous silica to withstand higher temperatures. Used as fill. Can be mixed with cement to form insulating concrete.	Eagle-Picher Johns-Manville	Celatom MP-87 Sil-O-Cel C-3	Atmos Atmos	2000 2000	26 26 - 31	13
Gilsonite Granules	Specially selected, sized, and blended gilsonites mined from the ground. Must be heat cured to obtain maximum efficiency. Used for underground lines.	American Gilsonite American Gilsonite American Gilsonite American Gilsonite	Gilsulate Type A Gilsulate Type B Gilsulate Type C Gilsulate Type Special B	220 300 420 365	300 365 520 [illegible]0	44 44 44 44	
Gilsonite Granules	Similar to above. Does not need curing.	American Gilsonite	Gilso-Gard	Atmos	260	50	12
Glass, Fibrous, Shredded.	Fibrous glass with mineral oil lubricant. Low "k" value.	Armstrong Owens-Corning	Armaglas TWL and TW-F Shredded Fiberglas TWL and TW-F Shredded	-300 -300	1000 1000	2 - 12 2 - 12	1
Glass, Fibrous.	Unbonded, unlubricated fibrous glass. Can be used for cryogenic service. Can be used in liquid oxygen service.	Owens-Corning	Sub Zero Insulation Wool	-300	1000	2 - 12	1
Glass, Fibrous.	Fibrous glass wool for pouring and blowing into cavity space.	Owens-Corning Owens-Corning	Fiberglas Pouring Wool Fiberglas Blowing Wool	-300 -300	250 250	1 1	1
Glass, Fibrous.	Boro silicate-type glass of various diameters available. Good electrical properties.	Johns-Manville	Vitron "E" Micro Fiber	Atmos	1500		12
Glass, Cellular Pellets.	Foamed glass pellets. Used for pouring. Each pellet foamed with hermetically sealed cells.	Pittsburgh Corning	Foamglas Pellets	-300	800		12
Gypsum, Cellular.	Gypsum in cellular form to be poured in cavity spaces. Not moisture resistant. Relatively high "k" value even when dry.	National Gypsum	Gypsum	Atmos	900		126

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BASIC MATERIAL	GENERAL DESCRIPTION	MANUFACTURERS	TRADE NAMES	TEMP LIMITS MIN	TEMP LIMITS MAX	DENSITY LB/CU FT	GENERIC CLASS NUMBER
Mineral Wool, Granulated.	Mineral wool fibers in granulated form for filling cavity spaces. Soft. Low "k" value.	Armstrong	Armatemp Granulated Spun Wool	-350	1200	3 - 10	127
		B.E.H.	Granulated Wool	-350	1200	3 - 10	
		Eagle-Picher	Type 7B	-300	1200		
		Forty-Eight	Copr Fibre Granulated	-300	1200	3 - 20	
		Holmes Foundry	Granulated Wool		1200		
		Johns-Manville	Banroc Granulated		1000		
		Mundet	Granulated Wool	-350	1200		
		National Gypsum	Gold Bond Pouring Wool		1500		
		Refractory and Insulation	Pakinsul		1000	7 - 12	
		U.S. Gypsum	Thermafiber Pouring Wool		1500		
		U.S. Mineral Wool	USM Granulated Wool	-300	1500		
Mineral Wool, Loose.	Mineral wool fibers in loose form. For filling cavity spaces. Soft. Low "k" value.	A.P. Green	Loose Wool	-300	1200		128
		Armstrong	Armatemp Loose Spun Wool	-350	1200		
		B.E.H.	Loose Wool	-350	1200	7 - 10	
		Bigelow-Liptak	W-12	-300	1200		
		Carey	Loose Mineral Wool		1000	6 - 8	
		Eagle-Picher	Type H-2	-300	1200		
		Eagle-Picher	Type H-4	-300	1200		
		Forty-Eight	Copr Fibre Loose	-300	1200	3 - 20	
		General Refractories	Grefco Loose Mineral Wool	-300	1200		
		Holmes Foundy	Loose Wool		1200		
		Johns-Manville	Banroc Loose	-300	1000		
		Mundet	Loose Wool		1200		
		National Gypsum	Loose Wool		1500		
		National Gypsum	Blowing Wool		1500		
		Refractory and Insulation	Loose Wool		1000	8 - 12	
		U.S. Gypsum	Thermafiber Blowing Wool		1500	3 - 20	
		U.S. Mineral Wool	U.S.M. Loose Wool	100	1200		
Perlite	Expanded perlite.	Johns-Manville	Perlox	-400	1400	3	129
		Zonolite	Perlite	-400	1400	3	
Perlite and Asphalt (Granular Underground Fill)	Beads of perlite sealed with an asphalt coating and mixed with a granular high softening point asphaltic resin. Pipes must be coated with asphaltic primer before application	Armstrong	Armafil	90	450	28	130
		Miracle Adhesives	Insul-fil	90	450	28	
Quartz, Fine Fibers.	Quartz fibers, more than 98% pure silica. Available in several fiber diameters.	Johns-Manville	Micro Quartz Fiber	Atmos	2500		131
Silica, Fibrous.	Long silica fibers, free of organic material. Corrosion resistant. Soft. Various fiber lengths.	H.I. Thompson	Refrasil F-100	-300	2500	3 - 9	132
Silica Aerogel	Small hollow spheres of silica. Must be well contained as it will flow through a small opening.	Monsanto	Santocel	-457	1300	4 - 5.5	133
Vermiculite, Expanded.	Expanded vermiculite ore. (magnesium - aluminum silicate) Flaked aggregate graded into various sizes as required.	Zonolite	Zonolite	-350	2000	4 - 10	134

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BASIC MATERIAL	GENERAL DESCRIPTION	MANUFACTURERS	TRADE NAMES	TEMP LIMITS MIN	TEMP LIMITS MAX	DENSITY LB/CU FT	GENERIC CLASS NUMBER
Aluminum (Foil)	Reflective aluminum foil. Various thicknesses. Some foils reinforced by attachment to membrane materials.	Alcoa Gustin-Bacon Johnston Foil Kaiser Reynolds U.S. Mineral Wool	Alcoa Foil Aluminum Foil Aluminum Foil Insul Foil Metallation Aluminum Foil	Atmos Atmos Atmos Atmos Atmos Atmos	600 600 600 600 600 600		136
Aluminum Foil (Blanket)	Reflective foils fabricated into rolls or folded strips. Designed for building insulation.	Reflectal Corporation	Alfol	Atmos	200		137
Aluminum (Sheet or Roll)	Reflective sheets of various thicknesses. In rolls or sheets.	Alcoa Aluminseal Corporation Kaiser Reynolds	Alcoa Aluminseal		1100 1100 1100 1100		138
Aluminum and Asbestos (Blanket)	Aluminum foil bonded to flat or corrugated asbestos paper.	Nicolet Reflectal Corporation Reflectal Corporation Reflectal Corporation	Foil Laminates Alfol No. 101 (Corrugated) Alfol No. 102 (Flat) Alfol No. 103 (Flat)	Atmos Atmos Atmos	600 600 600	12 - 14 lbs per 100 sq ft 9 - 10 lbs per 100 sq ft	139
Aluminum (Preformed)	Preformed aluminum reflective pipe and equipment insulation. Easy to remove and install. No fibers to absorb liquid.	Johns-Manville Mirror Insulation Mirror Insulation Mirror Insulation Mirror Insulation	J.M. Metal K AL Mirror AL Mirror AS AL Mirror R AL Mirror DT	Atmos 32 -100 -100	600 1000 Atmos Atmos 1000	40	140
Stainless Steel Jacketed Aluminum Reflective (Preformed)	Preformed stainless steel jacketed aluminum reflective pipe and equipment insulation. Easy to remove and install.	Johns-Manville Mirror Insulation Mirror Insulation Mirror Insulation Mirror Insulation	J.M. Metal K SC Mirror SC Mirror AS SC Mirror R SC Mirror DT	Atmos 32 -100 -100	600 1000 Atmos Atmos 1000		141
Stainless Steel (Preformed Reflective Insulation)	Preformed stainless steel jacket and reflective pipe and equipment insulation.	Johns-Manville Mirror Insulation Mirror Insulation Mirror Insulation Mirror Insulation	J.M. Metal K SS Mirror HT SS Mirror AS SS Mirror R SS Mirror DT	Atmos 32 -100 -100	1800 1500 Atmos Atmos 1000		142

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BASIC MATERIAL	GENERAL DESCRIPTION	MANUFACTURERS	TRADE NAMES	TEMP LIMITS MIN	TEMP LIMITS MAX	DENSITY LB/CU FT	GENERIC CLASS NUMBER
Asbestos (Sprayed)	Asbestos fibers applied by spraying to form a continuous, seamless blanket on any surface contour.	Columbia Acoustics Armstrong Armstrong Keasbey & Mattison Keasbey & Mattison	Cafco-Asbestos Sprayed "Limpet" Asbestos LW-25 Sprayed "Limpet" Asbestos LB-8 Sprayed "Limpet" Asbestos LW-25 Sprayed "Limpet" Asbestos LB-8	Atmos -60 -60 -60 -60	1350 700 1350 700 1350	8 - 14 8 - 14 8 - 14 8 - 14 8 - 14	145
Asbestos and Mineral Fibers (Sprayed)	Asbestos fibers and small pellet mineral fibers with inorganic binders. Latex-type water emulsion bonding adhesive.	Columbia Acoustics Columbia Acoustics	Cafco - Heat Shield Cafco - Blaze Shield	Atmos Atmos	1600 2000	9 - 12 11 - 15	146
Asphalt and Cork or Mica (Sprayed and Formed-in-Place)	Emulsion asphaltic compounds filled with granulated cork or mica. Used for condensation control. Available in brush, trowel, or spray consistencies.	Coopers Creek Mortell	C-4 Emulsion Compound No Drip	-20 -20	200 180		147
Asphalt and Cork or Mica (Sprayed and Formed-in-Place)	Solvent asphaltic compound filled with granulated cork or mica. Used for condensation control.	Coopers Creek Eagle-Picher Earl Paint Foster Johns-Manville Lion Oil Mortell Pittsburgh Chemicals Witco Chemicals	C-4 Solvent Mastic Sweatcheck Ekote 3X 60 - 24 Insulkote SGC Nokorode K Kote Insulmat 2077 553 Type D Pioneer 620	-40 Atmos -40 -20 -40 -50 -50 -50	250 150 300 180 250 275 300 300		148
Bituminous and Cork Fillers	Bituminous solvent type filled coating. Will disintegrate but will not support combustion after curing time. Self-extinguishing.	Coopers Creek Earl Paint Foster Pittsburgh Chemicals	C-4 Bituminous Erkote 3-FR-X 60 - 31 553 FR	-20 -20 -20	200 200 200		149
Cork and Rubber (Sheet - Formed-in-Place)	Moldable granulated cork and rubber. Used to hand-mold over fittings on cold lines.	Armstrong National Cork	Plasticork Rubbercork	-300	200 200	17	150
Latex Resin and Cork or Mica (Sprayed and Formed-in-Place)	Water emulsion latex base with cork or mica.	Mortel	Latex Insulmat 3018				151
Polyurethane, Foamed, (Sprayed, Flexible)	Polyurethane sprayed and allowed to foam in place to a flexible, open-cell insulation.	American Latex Nopco Chemical	Stafoam Nopcofoam	-60	160		152
Polyurethane, Foamed, (Sprayed, Rigid)	Polyurethane sprayed and allowed to foam in place to a rigid closed-cell insulation. Carbon dioxide blown or freon blown.	American Latex Earl Paint Earl Paint Nopco Chemical	Stafoam Erko-Foam 25 Erko-Foam F Nopcofoam	-60 -200 -200	160 275 210	2 1/2 2	153
Polyurethane, Foamed, (Poured, Flexible)	Polyurethane poured and foamed in previously prepared mold or cavity. Makes a flexible open-cell insulation.	American Latex Nopco Chemical	Stafoam Nopcofoam	-60	160	2	154
Polyurethane, Foamed, (Poured, Rigir	Polyurethane poured and foamed in previously prepared mold or cavity. Makes a rigid closed-cell insulation.	American Latex Armstrong Earl Paint Nopco Chemical	Stafoam Expandofoam Erko-Foam 2 P Nopcofoam	-60 -50 -200	160 160 275 250	2 1/2 - 20 2, 8 and 7e	155
Vinyl and Cor[illegible] Mica (Sprayed and Form in-Place)	Vinyl base filled with cork or mica. Will resist fire.	Vimasco	WC-1 Type C	-20	160		156

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BASIC MATERIAL	GENERAL DESCRIPTION	MANUFACTURERS	TRADE NAMES	TEMP LIMITS MIN	TEMP LIMITS MAX	DENSITY LB/CU FT	GEN CL NUM
Aluminum Foil and Glass Mat Under Vacuum (System)	Multilayers of aluminum reflective foil spaced by glass mat in a high vacuum space.	Linde Company Linde Company Linde Company	Linde S1-10 Linde S1-12 Linde S1-44	-459 -459 -459	Atmos Atmos Atmos		1
Aluminum Foil and Glass Fiber Paper Under Vacuum (System)	Multilayers of aluminum reflective foil spaced by glass fiber paper in a high vacuum space.	Linde Company Linde Company	Linde S1-62 Linde S1-91	-459 -459	Atmos Atmos		1
Aluminum Foil and Glass Mat (Sheets)	Multilayers of aluminum reflective foil spaced by glass fiber mat to be used in a vacuum application.	Owens-Corning	Fiberglas Cryogenic Insulation	-459	1000		1
Calcium Silicate (Loose)	Synthetic calcium silicate. Good handling properties.	Johns-Manville	Micro-Cel T-4	-459	1200	5 - 8	1
Glass Fiber (Sheets)	Very fine diameter glass fiber, heat felted to specified thickness and density without organic binders. Available with and without interleaving aluminum foils. For use in high vacuum.	H.I. Thompson Owens-Corning	Heat Felted Fiber Glass (HF) Heat Felted AA	-459 -459	1000 1000	4 - 16 4 - 16	1
Perlite (Loose)	Expanded perlite. Used under high vacuum.	Johns-Manville Zonolite	Perlox Perlite	-400 -400	1400 1400	3 3	1
Silica Aerogel (Loose)	Small hollow spheres of silica. Used under high vacuum.	Monsanto	Santocel A	-457	1300	6	1
Silica Aerogel and Copper Flakes Under Vacuum (System)	Equal parts by weight of copper flakes and silica aerogel powder under absolute pressure of 50 microns of mercury in the insulating space.	Linde Company	Linde CS-5	-459	Atmos	11	1

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GENERAL DESCRIPTION	ASBESTOS PAPER (Commercial Grade)	MIN	MAX	ASBESTOS PAPER (Long Fiber)	MIN	MAX	ASBESTOS PAPER (Special Long Fiber)	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Carey Asbestos Paper	0	600	Johns-Manville Special J-M Long Fiber	0	1000	Johns-Manville Special Long Fiber	0	1200
	Johns-Manville Commercial Grade	0	600	Ruberoid E-511	0	1000	Keasbey & Mattison K & M 201	0	1200
	Keasbey & Mattison K & M 101	0	600				Ruberoid E-515	0	1200
	Ruberoid Commercial Grade	0	600						
BASIC MATERIALS AND AVAILABLE FORMS	Short fiber paper with high fiber content (95% minimum). Maximum of 5% binder content. Weighs from 4 pounds to 32 pounds/100 square feet. Thicknesses vary from .012 in. to .062 in. Widths of rolls range from 18 in. to 72 in.			Made with high grade long asbestos fiber. Minimum fiber content of 88% and maximum binder content of 5%. Thicknesses from .006 in. to .065 in., 36 in. roll widths.			High quality paper uniform throughout. Minimum fiber content of 88% and maximum binder content of 5%. Thicknesses from .006 in. to .065 in., 36 in. roll widths.		
USES	Fire protection and safety coverings for heating ducts.			Fire protection, gasketing and base sheet for saturating.			Diaphragm material in electrolytic cells in the manufacture of chlorine and caustic soda.		
APPLICATION									
OTHER DATA	Fire retardant, acid and alkali resistant. Maximum recommended continuous exposure temperature usually 400 F.			Fire retardant, acid and alkali resistant. Maximum recommended continuous exposure temperature usually 400 F.			Fire retardant, acid and alkali resistant. Maximum recommended continuous exposure temperature usually 400 F.		
ADVANTAGES	Fast and easy to apply, safe to handle, strong enough for most uses, and is vermin proof.			Not subject to rapid deterioration.			High dielectric strength.		
LIMITATIONS	Very little insulating value.								

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GENERAL DESCRIPTION	ASBESTOS PAPER (Welder's Grade)			ASBESTOS PAPER (Reinforced With Glass Thread)			ASBESTOS PAPER TAPE		
		MIN	MAX		MIN	MAX		MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Johns-Manville Welding Paper	0	1000	Johns-Manville Type GT	0	1000	Carey	0	800
	Keasbey & Mattison K & M 104	0	1000				Johns-Manville	0	800
							Keasbey & Mattison	0	800
							Ruberoid	0	800
BASIC MATERIALS AND AVAILABLE FORMS	Long fiber asbestos with binder. 32 pounds per cubic foot			Asbestos paper reinforced with glass threads. Almost 100% inorganic. Maximum asbestos fiber content of 84% with 8% maximum Fe_2O_3 content.			Asbestos paper tape. Approximate weight 12 pounds/100 square feet. Cut from commercial grade paper. 2 in. and 3 in. wide rolls approximately 85 in. in length.		
USES	Protecting adjacent parts from heat, smoke and sparks during welding.			Wherever strong heat resistant sheet is needed.			Sealing joints in air cell coverings when applied to furnaces, pipes, ducts and flues.		
APPLICATION							Applied with cold water paste or silicate of soda cement.		
OTHER DATA	Fire retardant. Maximum recommended continuous exposure temperature limit usually 400 F.			Fire retardant. Maximum recommended continuous exposure temperature limit usually 400 F.			Fire retardant. Maximum recommended continuous exposure temperature limit usually 400 F.		
ADVANTAGES									
LIMITATIONS									

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GENERAL DESCRIPTION	ASBESTOS ROLL BOARD	MIN	MAX	ASBESTOS MILL BOARD (Commercial Grade)	MIN	MAX	ASBESTOS MILL BOARD (Gasket Grade)	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Carey Roll Board	0	600	Carey	0	1000	Johns-Manville J-M "C" Grade	0	1000
	Johns-Manville Roll Board	0	600	Johns-Manville J-M 106	0	1000	Keasbey & Mattison K & M 801	0	1000
	Keasbey & Mattison K & M 103	0	800	Keasbey & Mattison K & M 801	0	1000	Ruberoid Gasket Quality	0	1000
	Ruberoid Roll Board	0	600	Ruberoid Mill Board	0	1000			
BASIC MATERIALS AND AVAILABLE FORMS	Asbestos fibers with a small quantity of strong binding materials. Two thicknesses only, 3/32 in. and 1/8 in. Rolls 18 in. and 36 in. wide.			Asbestos fibers mixed with inorganic binding materials formed under pressure into dense hard sheets. Sheets from 1/32 in. to 1/2 in. thick, 42 in x 46 in.			Extra long asbestos fibers mixed with a strong binding material and formed under pressure. 42 in. x 48 in. sheets, and thicknesses of 3/32 in., 1/8 in., 3/16 in., and 1/4 in.		
USES	Gaskets. Fire retardant material for use between walls and wrapping exhaust manifolds.			Board for protection against fire, heat and acid fumes.			Gasket material for hot oil, gas and tar lines. Also for clutch and brake linings.		
APPLICATION									
OTHER DATA	Fire retardant. Maximum recommended continuous exposure temperature is usually 400 F.			Fire retardant. Maximum recommended continuous exposure temperature is usually 400 F.			Fire retardant.		
ADVANTAGES	Flexible, tough, strong, durable sheet that is easy to apply to curved surfaces.			Will not disintegrate or separate when exposed to moisture.			Highly fire resistant. Will not mold decay or disintegrate. Water and vermin-proof. Will not shrink.		
LIMITATIONS									

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ACCESSORIES

MISCELLANEOUS ASBESTOS PRODUCTS

GENERAL DESCRIPTION	ASBESTOS MILL BOARD (Welder's Grade)	MIN	MAX	ASBESTOS MILL BOARD (Heavy Density)	MIN	MAX	ASBESTOS YARN	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Carey No. 1 Hard	0	1000	Johns-Manville No. 219	0	1500	Johns-Manville		
	Johns-Manville Grade "C"	0	1200	Keasbey & Mattison No. 701	0	1500	Keasbey & Mattison		
	Keasbey & Mattison No. 801	0	1200				Raybestos-Manhattan		
							Union Asbestos Unarco		
BASIC MATERIALS AND AVAILABLE FORMS	Extra long asbestos fibers mixed with a special binder and formed under pressure. Sheets are 42 in. x 48 in. with thicknesses of 3/16 in. and 1/4 in.			Long asbestos fibers usually mixed with a portland cement binder. Sheets are 36 in. x 48 in. 42 in. x 48 in. and 42 in. x 96 in. with thicknesses ranging from 1/8 in. to 7/8 in.			Made from long fiber asbestos rovings mechanically twisted. Grades are available that are reinforced with wire or with fibers. Grades, cuts and plys furnished as specified.		
USES	By welders and glass sign manufacturers.			In kilns, ovens, air-cooled boiler walls and laboratory table tops.			Components in all asbestos textiles.		
APPLICATION	Can be nailed, drilled and sawed.								
OTHER DATA	Fire retardant.			Fire retardant.			Fire retardant.		
ADVANTAGES	Will retain its strength at high temperatures, will not smoke, char or give off fumes.			Extra strong with exceptional fire resistance.					
LIMITATIONS									

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GENERAL DESCRIPTION	ASBESTOS ROPE	MIN	MAX	ASBESTOS CLOTH	MIN	MAX	ASBESTOS CLOTH (Clad In Aluminum Foil)	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Detrick Johns-Manville Keasbey & Mattison Raybestos-Manhattan Union Asbestos Unarco Brand			Johns-Manville Keasbey & Mattison Raybestos-Manhattan Union Asbestos Unarco Brand			Keasbey & Mattison Kamklad		
BASIC MATERIALS AND AVAILABLE FORMS	Long fiber asbestos yarn, twisted or braided to obtain rope. Grade, size and plys as specified for desired application.			Long fiber asbestos roving yarn, woven into asbestos cloth. Furnished in grade, weight and weave as specified.			Combination of high heat reflective aluminum foil and fire resistant asbestos cloth welded together by a special process.		
USES	Seals between furnace doors and brick work, expansion joints in boiler settings, caulking and gaskets, and seals around manhole covers.			Asbestos curtains, fire smothering blankets, fire fighting suits and insulation jacketing material.			Fire entry suits, fire curtains, blankets and partitions. Jacketing material where heat and flame resistance is necessary.		
APPLICATION							Fabricate cloth to meet desired needs.		
OTHER DATA	Normally furnished in commercial grades but other grades can be supplied.			Manufactured according to ASTM Standards			Will pass U.S. Air Force Glo Bar Test at 2500 F. Low vapor permeability.		
ADVANTAGES				Will not deteriorate, decay, or heat.			Will not crack or peel while being stitched or sewed.		
LIMITATIONS									

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GENERAL DESCRIPTION	ASBESTOS FELT	MIN	MAX	ASBESTOS FELT (Asphalt Saturated)	MIN	MAX	ASBESTOS FELT (Heavy Asphalt Felt and Asbestos Paper)	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Johns-Manville Fire-Felt Raybestos-Manhattan Pyrotex		1000	Carey Johns-Manville Weatherproofing Felt Double-Coated Flexatone Paboo			Carey Fireclad Johns-Manville Firetard Jacket		
BASIC MATERIALS AND AVAILABLE FORMS	Soft flexible asbestos felt in roll form.			Asphalt saturated asbestos felt.			Laminate of heavy asphalt saturated felt and plain asbestos paper.		
USES	Wrapping for pipe in furnace expansion joints. Also in the laminating field.			Weatherproofing outdoor pipe insulation.			Weatherproofing pipe insulation where resistance to the spread of fire is important.		
APPLICATION				Wired or banded in place.			Wired or banded in place.		
OTHER DATA									
ADVANTAGES				A heavy duty insulation jacketing material. Highly weather-resistant. Long service life.			Unsaturated felt outward provides fire retardant surface.		
LIMITATIONS									

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ACCESSORIES
MISCELLANEOUS ASBESTOS PRODUCTS

GENERAL DESCRIPTION	ASBESTOS FELT (Reinforced With Asbestos Cloth)			ASBESTOS TAPE			ASBESTOS TUBING OR SLEEVING		
		MIN	MAX		MIN	MAX		MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Johns-Manville J-M Ceilinite		1000	Johns-Manville Styles 119, 120, 121 and 122 Keasbey & Mattison Raybestos-Manhattan Union Asbestos Unarco			Keasbey & Mattison Raybestos-Manhattan Union Asbestos Unarco		
BASIC MATERIALS AND AVAILABLE FORMS	Soft, flexible asbestos felt reinforced on one side with asbestos cloth.			Woven asbestos fibers, low in iron content, furnished plain or coated with oil and water resistant compound. A wire-inserted type can be furnished for additional strength. Thicknesses 0.010 in. to 5/16 in.			Asbestos fibers braided and woven into tubing of a variety of sizes and wall thicknesses.		
USES	Interlining steel cars, fireproofing electrical apparatus, etc.			Wrapping of electrical cables, safety protection on hot piping where abrasive conditions exist. Also used for general gasketing service.			Heat protective and insulating sleeving over electrical wiring, piping, and laboratory equipment. Also as protection against shock and abrasion.		
APPLICATION									
OTHER DATA									
ADVANTAGES									
LIMITATIONS									

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GENERAL DESCRIPTION	ASPHALT, HOT			ASPHALT EMULSION			ASPHALT CUT-BACK		
		MIN	MAX		MIN	MAX		MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	American Oil	-100	150	American Bitumuls			Armstrong		
	Carey			Laykold Insul Adhesive	-20	100	Cold Erection Plastic	-25	150
	Hydro-Gard	-100	150	Bitucote Products			Carey		
	Esso	-100	150	Lap Cement	-20	200	Insulation Seal	-40	200
	Gulf	-100	150	Insulation Mastic	-20	200	Coopers Creek		
	Lion Oil	-100	150	Emulsion No. 114	-20	200	C-4	-40	250
	Mobil Oil	-100	150	Carey, Ebontex	-30	150	Flintkote		
	Pure Asphalt	-100	150	Coopers Creek, C-4	-20	150	GC 101	-50	125
	Texaco			Flintkote			GC 102	-20	200
	No. 30	0	200	N-13-HPC	-20	200	C 19	-20	225
	No. 35	0	200	Emulsion Type No. 2	-20	100	Trowel Mastic	-20	225
	No. 10	0	200	Forty-Eight, Stickfast	-30	125	Foster		
	Witco			Insul-Coustic			60-25	-20	200
	No. 180 and No. 3126	-100	150	1-C 330, 1-C 331	-20	200	81-02	-10	100
	No. 3230	+ 25	200	Johns-Manville			Insul-Coustic		
	Hot Asphalt (FR)	- 50	175	Laptite	-40	150	Vapo-Sure IC-320	-40	300
				S.A. Adhesive	-20	180	IC-321	-40	300
				Morningstar-Paisley			Johns-Manville		
				66-784	-60	200	Laptite	-40	250
				Pittsburgh Chemical			Lion Oil		
				Insul-Mastic 507 SF	-50	175	Nokorode Sealcote	-40	325
				Pittsburgh-Corning			Morningstar-Paisley		
				PC Emulsion	-25	100	Vapor-Speed No. 43 - 785	-20	200
				Pure Asphalt			National Cork		
				No. 20 and No. 21	-20	150	CBH Cement		150
				Ruberoid			Pabco	-20	150
				Lap Cement	-40	150	Pittsburgh-Corning		
				Texaco			Pittcote 300	-50	300
				Emulsified No. 24 and No. 30	0	150	Witco		
				Witco			Pioneer No. 311 and No. 211	-40	200
				Pioneer W-35	-20	150			
BASIC MATERIALS AND AVAILABLE FORMS	Blended from a variety of basic asphalts having different melting and hardening characteristics. Supplied in solid cake form and must be melted and applied hot. A chlorinated type can be supplied for added fire retardant qualities.			Refined asphalts emulsified in water, usually with clay or similar materials as emulsifying agents. These compounds differ mostly in the degree of hardness of the basic asphalts. Asbestos fibrated emulsions are also available.			Blend of different basic asphalts with various degrees of hardness. Can contain inert mineral fillers. The solvent is usually a hydrocarbon base that is best suited for use and grade desired.		
USES	Good low cost, general purpose adhesive for light materials. Will bond to all construction surfaces.			Suitable for bonding rigid type, porous, insulation materials, provided the water vehicle can escape from the film. Can also be used as a spot or gob adhesive depending on the classification and grade of material.			Lap and joint adhesive and sealer. Vapor barrier or sealer on the edges of cellular glass type insulation materials.		
APPLICATION	Melted and applied by brush, mop or dip. Working temperature range from 350 to 450 F. Surface should be primed first.			Trowel, brush or spray. Do not apply at temperature less than 40 F or outside during rain.			Trowel or spray. Drying time is 12 to 24 hours at 60 F.		
OTHER DATA	Vermin proof. Will not mold or mildew. Resistant to acids, alkalies and water but not to most solvents.			Cannot be treated to protect from freezing while being shipped or stored. Resistant to acids, alkalies and water but not to most solvents.			Resistant to acids, alkalies and water but not to most solvents.		
ADVANTAGES	Contains no flammable or toxic solvents. Odorless except when being melted.			May be used on dry or damp surfaces. Odorless and non-toxic. Applied without being heated.			Wider temperature range than the asphalt emulsions.		
LIMITATIONS	Thermoplastic material which loses its adhesive strength at high temperatures and becomes brittle at low temperatures.			Not recommended for surfaces which do not permit evaporation of water such as plastics, laminated vinyls and metals.			Must be used with adequate ventilation to eliminate fire hazards and prolonged breathing of toxic vapors.		

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GENERAL DESCRIPTION	ASPHALT, RUBBER FILLED (Emulsion)	MIN	MAX	ASPHALT, RUBBER FILLED (Solvent Type)	MIN	MAX	ASPHALT, SILICATE AND ASBESTOS FILLED	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Armstrong Armstrong 536		200	Pure Asphalt I-101 Adhesive	-20	150	Pittsburgh Chemical Pitt Chem X-201 Hi-Temp Mastic	-50	
	Flintkote No. 746		180	St. Clair Rubber SC-15-220	-20	190			
	Foster 82 x 08	-50	170						
BASIC MATERIALS AND AVAILABLE FORMS	Heavy-bodied, short, water-dispersed rubber asphalt adhesive, containing no solvent.			Asphalt, rubber fillers and proper solvents.			Special blend of soft asphalts, asbestos, silicas, fire retardant resins and pigme No volatile solvents.		
USES	On flexible duct insulation and other applications where a vapor seal is required.			Erection adhesive for cork, glass fibers, foamglas, and concrete walls.			For chimney, stack and boiler areas where temperatures up to 400 F are encountered.		
APPLICATION	Brush			Spot or gob, trowel.			Trowel. Warm from 100 to 150 F temperature range for ease of application.		
OTHER DATA	Some resistance to solvents. Fair alkali resistance. Some fire retardance.			Not fire retardant. Resistant to acids and alkalies. Not resistant to solvents.			Resistant to alkalies. Some solvent resistance. Fire retardant.		
ADVANTAGES	Resilient. Good strength and aging properties.			Quick setting, strong adhesive.			Suitable for higher surface temperatures than most asphalt base materials.		
LIMITATIONS	Poor resistance to oil and grease.			Must be used with adequate ventilation to eliminate fire hazards and prolonged breathing of toxic vapors.					

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GENERAL DESCRIPTION	COAL TAR (Hot Pitch)	MIN	MAX	COAL TAR (Steep Pitch)	MIN	MAX	COAL TAR (Emulsion)	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Barrett	-25	120	Barrett	-25	150	Coopers Creek Pitchmastic No. 61	-20	200
	Coopers Creek C-4 Adhesive	-25	120	Pittsburgh Chemical	-25	150	Koppers Bituplastic No. 44	-20	200
	Koppers	-25	120						
	Pittsburgh Chemical	-25	120						
BASIC MATERIALS AND AVAILABLE FORMS	Black coal tar, hot melt. Softening temperature range from 180 F to 200 F.			Black coal tar with mineral fillers added. Softening temperature range from 180 to 200 F.			Polymer modified coal tar emulsion usually containing clays or mineral fillers.		
USES	Bonding cellular glass to masonry surfaces.			Adhesive for tarred glass cloths and cellular glass pipe insulation. Also for steep roofs where higher temperatures are encountered.			Durable bonding material for adhering cellular glass insulation to steel tanks and piping.		
APPLICATION	Brush, spray or trowel at temperatures above 40 F. Requires heating to liquify. Masonry, metal and wood should first be primed.			Brush, spray or trowel at temperatures above 40 F. Requires heating to liquify.			Trowel, brush or spray at temperatures above 40 F in dry weather. All surfaces must be clean and dry. Does not have to be heated to apply.		
OTHER DATA	Commonly referred to as "Narrow Range Enamel". Poor solvent resistance. Will burn when dry.			Commonly referred to as "Wide Range Enamel". Poor solvent resistance. Will burn when dry.			Serves as a moisture barrier and galvanic insulator in cracks between ends of insulation. Poor solvent resistance.		
ADVANTAGES	Resistant to dilute acids and alkalies. More resistant to water than asphalt.			Will withstand higher temperatures than hot pitch and can be used on steep or vertical surfaces.			Forms a tough elastic bond to both steel and insulation. Low water absorption rate.		
LIMITATIONS	Becomes brittle in moderate cold and tends to creep or sag when warm. Must not be used in cold rooms.			Poor melting technique in the field can increase the softening point or produce a brittle film.			Must be applied at temperatures above 40 F.		

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GENERAL DESCRIPTION	COAL TAR (Cut Back)			SODIUM SILICATE (With Fibrous Asbestos)			SODIUM SILICATE (With Clay and Water)		
		MIN	MAX		MIN	MAX		MIN	M
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Coopers Creek Black No. 750	-20	160	Arabol M-6B	40	200	Forty-Eight Blockatik	32	1
				Carey	60	800			
				Detrick	60	800			
				Eagle-Picher Insulatic	60	800			
				Foster 81-27 and 81-93	50	800			
				Insul-Coustic Temp-Sure I-C 250	60	800			
				Johns-Manville	60	500			
				Kaasbey & Mattison	60	800			
				North American Refractories Narco Block-Stick	60	500			
				Pabco	60	800			
				Refractory & Insulation Block Stick	60	800			
				Ruberoid	60	500			
BASIC MATERIALS AND AVAILABLE FORMS	Black coal tar pitch dissolved in organic solvents. Contain mineral fillers.			Sodium silicate with fibrous asbestos fillers.			Sodium silicate, clay and water.		
USES	Bonding cellular glass and glass cloth to steel tanks and piping.			Cementing laminations of magnesia or asbestos products.			Hi-temperature adhesive for all insulations.		
APPLICATION	Trowel, brush or spray. Can be applied cold.			Spot or gob, trowel or brush.			Brush or dab.		
OTHER DATA	Good galvanic insulator. Some fire retardance after curing.			Not to be used on glass or mineral wool insulations. Good fire retardance.			Good fire retardance.		
ADVANTAGES	Resistant to most acids and alkalies. Not as water absorbant as most coal tar emulsions.			High temperature limits.			Excellent resistance to acids, good to solvents and fair to caustics.		
LIMITATIONS	Not solvent resistant. Must be used with adequate ventilation to eliminate fire hazards and prolonged breathing of toxic vapors.			Dry film is soluble in water. Will check-crack after extended exposure to high temperature.			Dry film is soluble in water. Will check-crack after extended exposure to high temperature.		

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GENERAL DESCRIPTION	SODIUM SILICATE (With Fibrous Asbestos)	MIN	MAX	RESIN EMULSION (LAGGING ADHESIVE)	MIN	MAX	RESIN BASE (ACOUSTICAL ADHESIVE)	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Carey Careytemp Adhesive			Arabol No. 60-69-05, E-710-B	0	200	Armstrong Acoustic Cement	-25	100
				V-700 Series	40	100	340 Cement	-25	150
				E-1658-B	0	200	Flintkote		
				Flintkote			Acoustic (B)	-25	100
				F-101	0	180	No. 75	0	140
				F-102	0	180	3 M Company		
				Lagging Adhesive - Types I and II	-50	175	EC 461	-25	100
				Foster			Vimasco		
				81-59, 81-92W, 81-42W	-50	180	Lag 704	-50	180
				Insul-Coustic					
				I-C 140	-20	180			
				I-C 130	-20	180			
				Morningstar-Paisley					
				Lag-Spred No. 72-778	-50	150			
				Pittsburgh-Corning					
				CS White Paint	-25	125			
				St. Clair Rubber					
				Claircoat	-50	180			
				Fuller					
				Fuller's No. 1562	-20	200			
				Surface Coatings					
				CS Paint	-25	125			
				Vimasco					
				Vimasco-Lag 705	-50	180			
				Vimasco-Lag 704 (FR)	-50	160			
BASIC MATERIALS AND AVAILABLE FORMS	Sodium silicate with fibrous asbestos. Five gallon and one gallon containers.			Resin emulsion. Resin is usually a polyvinyl acetate.			Solvent type, resin base, smooth spreading adhesive.		
USES	Cementing together of highly moisture resistant Careytemp insulation and other insulations.			Bonding canvas, asbestos or glass lagging cloths to all types insulation. Also as a laminating bond for polyvinyl film aluminum foil to glass, asbestos, wood and other fibrous materials.			Economical adhesive, for installing thermal and acoustical insulations of medium density on iron, steel, aluminum and wood.		
APPLICATION				Brush, spray or dip. To saturate lagging thin first coat with (1) pint water per gallon. Do not apply below 45 F.			Spread with a "V" notched trowel on one surface. Press insulation in place with sliding motion any time within twenty minutes of application.		
OTHER DATA				Color can be added by using latex type tube colors. Used as finish coat over fabric.			Setting time is 48 hours under warm conditions.		
ADVANTAGES				Forms fire retardant (or slow burning) coating. Resistant to water, mild acids, alkalies and solvents. Vermin and fungi proof.			Good water resistance.		
LIMITATIONS				Will freeze in containers at temperatures below 32 F. Some are flame resistant, others are not.			Contains flammable volatile solvents. Keep away from heat and open flame. Use with adequate ventilation.		

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GENERAL DESCRIPTION	RESIN BASED (Vinyl Adhesive)	MIN	MAX	SYNTHETIC RUBBER (Emulsion)	MIN	MAX	SYNTHETIC RUBBER (Solvent Type)	MIN	M
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Adhesive Products Vinylgrip	-20	250	Flintkote T-322	-20	190	Ahmiseal Corporation No. 101	-30	2
	Foster 82-16	0	200	Miracle Adhesive PF 232	-20	250	Arabol, L-1-B, L-3-B, L-4-B	-20	2
	3 M Company EC 776	-45	250	Moore Tuff-Bond Fabricating Adhesive	-10	250	Flintkote, F-201 and F-202	-20	2
	Rubber and Asbestos Bondmaster G 414-22	-40	250	St. Clair Rubber SC-3148	-40	320	Foster, No. 716	-20	2
	St. Clair Rubber SC-3821 (Non-stain)	-40	190				Fuller, No. 906 and No. 911	-20	2
	SC-3807	-40	300				Insul-Coustic I-C 201	-30	2
	U.S. Rubber Company M 6310	-40	250				I-C 210	-30	2
							3 M Company EC-105, EC-833	-20	2
							Miracle Adhesive PF 78	-30	2
							Moore Tuff-Bond No. 21-C	-20	2
							Tuff-Bond No. 21-W	-20	2
							Mortingstar-Paisley Tac-Spread 72-780	-20	2
							Tac-Spread 72-781	-30	2
							Tac-Spread 72-782	-20	2
							Permacel, PA 300	-20	2
							Pittsburgh-Corning PC Pittseal 222	-30	2
							Rubber & Asbestos Bondmaster K218	-20	3
							St. Clair Rubber SC-4815 Clear	-20	3
							SC-4851 White	-20	3
							U.S. Rubber Company M-6318	-20	2
							Vimasco Lax-Seal	-20	2
BASIC MATERIALS AND AVAILABLE FORMS	Nitrile rubber (Buna N) Resin with aliphatic solvents. Is an oil resistant elastomer.			Synthetic rubber-water base.			Synthetic rubber and petroleum solvent.		
USES	Especially good for bonding vinyl and nitrile rubber. Very versatile and will adhere to nearly any surface.			Bonding rough textured fabrics, wool batts, glass fiber and sheet cork. Bonding insulation to backing.			Adhering low density insulation material and laps of vapor barrier foils and facings		
APPLICATION	Brush, pressure gun, or squeeze bottle. Bonding time five to six minutes.			Apply adhesive to both surfaces with brush, roller or spray. Press together and allow (1) to (2) hours bonding time.			Brush, spray or roller, applied to less porous surface. When tacky press surfaces together.		
OTHER DATA	Forms a transparent film that varies from clear to amber color.			Bonding surface must be clean, dry, and free of dust, dirt and grease. Formulation varied by different manufacturers to obtain desired qualities.			Formulation is varied by different manufacturers to obtain desired characteristics		
ADVANTAGES	Forms a vapor barrier, shock resistant film. Oil and heat resistant.			Easy to apply, quick setting, good bonding strength, waterproof and will remain flexible.			Will not freeze. Water resistant.		
LIMITATIONS	Generally more costly than oil solvent adhesives.			Must be protected from freezing while in container.			Material is flammable and should be applied in well ventilated area.		

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GENERAL DESCRIPTION	SYNTHETIC RUBBER (Fire Retardant - Solvent Type)	MIN	MAX	SYNTHETIC RUBBER (Resin-Solvent Type)	MIN	MAX	SYNTHETIC RUBBER (Rosin-Solvent Type)	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Arabol, L-5-B	-20	250	Armstrong			St. Clair Rubber		
	Flintkote			No. 520	-40	200	SC-4815 (Clear)	-20	300
	No. 718	-20	200	Carboline			SC-4847 (Cream)	-20	300
	Foster			F1	-30	250	SC-4851 (White)	-20	300
	Safetee Duct-Fas 81-99	-20	200	Flintkote Company					
	Insul-Coustic			F-203	-20	200			
	I-C 225 and 215	-30	250	No. 974		250			
	3 M Company, EC-890	-20	250	Insul-Coustic					
	Moore			I-C 230	-50	300			
	Tuff-Bond No. 7	-20	300	Morningstar-Paisley					
	Tuff-Bond No. 6	-20	250	86-798	-30	300			
	Morningstar-Paisley			National Cork					
	Tac-Spread 72-753 (FR)	-20	225	WOC Cement		160			
	66-538	-20	225	St. Clair Rubber					
	Pittsburgh-Corning			SC-4570 (Tan)	-40	325			
	P.C. Pittseal 222 (FR)	-30	250	SC-45007 (White)	-40	325			
	Rubber & Asbestos			U.S. Rubber Company					
	Bondmaster 2743	-40	225	M 6463	-40	200			
	St. Clair Rubber								
	SC-4647	-20	300						
	SC-2542 (Non-burning solvent)	-20	300						
	U.S. Rubber Company								
	M 6139	-20	200						
	Vimasco								
	Lax-Seal F	-20	200						
BASIC MATERIALS AND AVAILABLE FORMS	Synthetic rubber with a non-flammable solvent or chlorinated rubber with a fast evaporating solvent.			Oil resistant synthetic rubber, resin reinforced and aromatic hydrocarbon or ketone solvents.			Synthetic rubber, natural rosins and naphtha solvent.		
USES	Adhering low density insulations and laps of vapor barrier foils and facings on metal ducts, in hazardous areas.			Lap seam adhesive for pipe and duct insulation materials, vapor barrier papers, films, foil and fabric. Also for adhering polyurethane and rubber foams to themselves and to wood or metal.			Quick grab, long tack adhesive for insulation and flexible materials to be bonded to metal or other surfaces.		
APPLICATION	Brush or spray liberal coat on base surface. Press insulation securely in place.			Brush, spray or roller, on both surfaces. Mineral spirits may be used for clean up. Thinning is not recommended.			Paint roller or brush.		
OTHER DATA	Formulation is varied by different manufacturers to obtain desired characteristics.			Formulation is varied by different manufacturers to obtain desired characteristics such as fire retardance and temperature limitations.			Adhesives based on natural rosins and oils are usually somewhat limited in use.		
ADVANTAGES	Fire hazard is decreased by having a fire retardant dry film.			Contains thermosetting resins which allows heat curing which improves bond strength and heat resistance.			Provides a water resistant flexible film.		
LIMITATIONS	Solvent is usually flammable and should be used only in well ventilated areas.			Storage life limited for some materials.			Poor resistance to solvents and oils.		

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GENERAL DESCRIPTION	RECLAIMED RUBBER (Water Dispersed)	MIN	MAX	RECLAIMED RUBBER (Solvent Type)	MIN	MAX	RECLAIMED RUBBER-RESIN (Solvent Type)	MIN
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Flintkote No. 749		300	Aluminseal Corporation No. 102	-120	110	Flintkote No. 717	-20
	Insul-Coustic Sure Stick 1-C 220	-50	200	Insul-Coustic 1-C 240	+ 20	175	Miracle Adhesive MF 22	-30
	Johns-Manville SA Adhesive	-30	200	3 M Company EC 104	- 20	180	PF 42	-30
	3 M Company EC 321	-35	300	EC-194	- 10	140	PF 82	-30
	Moore Tuff-Bond No. 3-A	-30	300	EC-226	- 20	175	PS 82	-30
	Permacel PA 310	-30	250	EC-232	- 20	175	PF 122	-30
				EC 896	- 20	180	No. 5144	-40
				Moore Tuff-Bond - Gen. Purpose	- 30	185	Moore Tuff-Bond M-102-H	-20
				Tuff-Bond No. 9A	- 30	160	Rubber & Asbestos Bondmaster K 361	-20
				Tuff-Bond No. 9	- 30	160	Bondmaster K 455	-20
				Morningstar-Paisley 66-761			St. Clair Rubber SC-15-160A	-20
				St. Clair Rubber SC-15-160A	- 20	212	SC-15-277	-20
				SC-1504	- 20	250		
				U.S. Rubber Company M6218	- 10	150		
				M5038	- 10	150		
BASIC MATERIALS AND AVAILABLE FORMS	Reclaimed rubber, water.			Reclaimed rubber and petroleum naptha solvent.			Reclaimed rubber and resins with aliph hydrocarbon solvent.	
USES	Bonding sound deadener pads, flexible insulating materials, rubber and linoleum to metal, concrete and wood. Also used with high and low density glass fibers.			General purpose adhesive for rigid block and board type insulations to metal, wood and concrete.			Bonding rigid board type insulation to metal and concrete.	
APPLICATION	Brush, spray or flow. Can tolerate some oil on metal surface without impairing adhesion.			Trowel, brush or spray.			Trowel, brush or spray with medium th coat on less porous surface. Bonds ca be made almost immediately.	
OTHER DATA	Formulation varied by different manufacturers to obtain desired characteristics such as increased fire retardance and temperature limitations. Non-flammable.			Formulation varied by different manufacturers to obtain desired characteristics such as consistency, temperature limits, and bonding strength.			Formulation varied by different manufacturers to obtain desired characterist such as consistency, temperature limit and bonding strength.	
ADVANTAGES	Has good water resistance and dries to a tough flexible film.			Good water resistance. Dries to a tough flexible film.			Has high strength characteristics.	
LIMITATIONS	Thermoplastic adhesive. Strength decreases as temperature increases.			Will not withstand oil, gasoline or other solvents.			Must keep material away from sparks a provide adequate ventilation while apply and during drying period.	

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ACCESSORIES
ADHESIVES

GENERAL DESCRIPTION	RECLAIMED RUBBER-ROSIN (Solvent Type)	MIN	MAX	NEOPRENE (Water Dispersed)	MIN	MAX	NEOPRENE (Solvent Type)	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Morningstar-Paisley 66-781 St. Clair Rubber SC-15-148	-30	200	Fuller 16K2 630 2706 St. Clair Rubber SC-2552 SC-2544	-50 -50 -30 -40 -30	150 150 250 250 200	Adhesive Products Gripweld Carboline No. F-1 Flintkote No. 974 Insul-Coustic Quick-Dry 1-C 207 Moore Tuff-Bond Quik-Set Pennsalt Neocoat Stic-Klip Type "S" U.S. Rubber Company M-6124	-40 -30 -20 -30 -30 -40 -50 -40	300 250 250 250 250 225 250 350
BASIC MATERIALS AND AVAILABLE FORMS	*Reclaimed rubber*, wood-rosin and naptha solvent.			Synthetic rubber and water.			Synthetic rubber with toluol solvent or petroleum naptha blend.		
USES	Bonding rigid board and flexible sheet insulation to wood, metal or concrete.			Bonding and laminating asbestos, glass wool, wood and *other fibrous insulations* to vinyl film or paper.			Bonding all types insulation materials to steel, aluminum, masonry, wood and painted or unpainted surfaces. Also for bonding "Stic-Klip" Type insulation fasteners to walls ducts and ceilings.		
APPLICATION	Brush, spray or roller on clean, oil-free surface.			Spray, brush or roller.			Apply (1) coat on each surface, let dry and join with light contact pressure.		
OTHER DATA	Formulation varied by different manufacturers to obtain desired characteristics such as consistency, temperature limits, and bonding strength.			Resists the corrosive action of chemicals better than most of the synthetics.			Maximum storage life from (6) to (12) months at temperature below 80 F.		
ADVANTAGES	Quick bond strength. Highly water resistant.			Good heat resistant qualities. Also *resistant to oil and gasoline*.			Long tack, quick grab adhesive with resistance to heat, water, oil and gasoline.		
LIMITATIONS	Poor resistance to gasoline and oil.			Poor resistance to aromatic solvents, which cause swelling action. Will freeze in containers below 32 F.			Non-vulcanizing adhesive that is volatile and flammable. Health and fire protection should be noted during storage and application.		

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ACCESSORIES
ADHESIVES

GENERAL DESCRIPTION	SILICONE RUBBER			CATALYST TYPE (Chemical Set)			MODIFIED EPOXY		
		MIN	MAX		MIN	MAX		MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Dow Corning Silastic RTV 731 Armstrong No. 520	-100	500	Carboline Carbo Fix S Moore Tuff-Bond No. 500	0 -80	225 300	Carboline XA 2EA XA 4EP Surface Coatings Surco 2501	-20 -20 -75	25 25 200
BASIC MATERIALS AND AVAILABLE FORMS	Silicone rubber.			Especially formulated paste or powder and liquid for mixing when ready for use.			Epoxy resin, solvent dispersed.		
USES	High-temperature, high-strength bond for adhering glass to metal, metal to metal and rubber to metal.			Producing high strength bonds between porous and non-porous materials, securing metal and nylon insulation hangers and fasteners to concrete and masonry.			Adhering any type insulation material to any surface. Expecially recommended for polyurathene.		
APPLICATION	Brush, roller or trowel for No. 520. Caulking gun, collapsible gun or trowel for RTV 731.			Mix as directed and apply immediately.			Brush or trowel.		
OTHER DATA	Possesses low temperature flexibility, as low as -120 F.			Approximately 48 hours drying time.			No open time, apply at room temperature.		
ADVANTAGES	Outstanding high temperature range.			Good immediate bond.			Good vapor barrier. No water absorption. Very high strength and high temperature limits.		
LIMITATIONS	High cost. Sensitive to aliphatic and aromatic fuels.			Do not allow to freeze during storage or drying time.			A factory representative should be consulted in selecting the particular formulation best suited for special applications.		

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GENERAL DESCRIPTION	PURE EPOXY								
		MIN	MAX		MIN	MAX		MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Foster 82-01	0	250						
BASIC MATERIALS AND AVAILABLE FORMS	Pure epoxy resin. 100% total solids.								
USES									
APPLICATION									
OTHER DATA									
ADVANTAGES	A strong bonding material suitable for attaching dissimilar materials, such as plastic to metal.								
LIMITATIONS									

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ACCESSORIES
FABRICATION CEMENTS

GENERAL DESCRIPTION	RUBBER LATEX MORTAR (Two-Part)			RESIN CEMENT (Two-Part)			KEENE'S CEMENT		
		MIN	MAX		MIN	MAX		MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Camp Company Latex Mortar	-40	200	Cellcote Resin Cement B6400	0	250	U.S. Gypsum Keene's Cement	-25	1100
	Carboline Hardtop No. 3	-40	200						
	Flintkote Latex Concrete Patch		200						
	Foster 82-10 Flexfas	-100	200						
	Miracle Adhesive RT 1000	-40	250						
	Rubber Corporation of America Latex BN-57	-40	200						
BASIC MATERIALS AND AVAILABLE FORMS	Coagulated rubber latex, water and powdered cement type aggregate.			Polyester resin, silica or carbon filler and special solvent.			White cement with plaster additives.		
USES	Bonding cellular and porous type insulations to themselves, metal, and masonry. Also to back-plaster uneven walls.			Miscellaneous cementing.			Cementing cellular glass together when used at high temperatures. Can be used as anti-abrasive coating on cellular glass for high temperatures.		
APPLICATION	Must be mixed and applied at temperatures above 40 F. Apply with trowel. Bonding time approximately 48 hours.			Mix according to directions. Pot-life approximately 45 minutes at 70 F. Apply with trowel.			Mix and apply with trowel at temperatures above freezing.		
OTHER DATA	Shelf-life of liquid latex approximately 6 to 9 months. Must be protected from freezing.			Shelf life of liquid is approximately (3) months and (1) year for the powder.			Low initial bond strength.		
ADVANTAGES	Waterproof, odorless, fire-resistant and non-toxic.			Bond strength exceeds strength of brick.			Fast setting. Hydraulic setting. Will not fracture cellular glass on drying.		
LIMITATIONS	Pot life from 40 - 45 minutes. Material mixed longer cannot be remixed.			Surfaces must be at room temperature before applying. Not resistant to caustics.			Will not resist prolonged moisture exposure.		

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GENERAL DESCRIPTION	REFRACTORY CEMENT	MIN	MAX	SODIUM SILICATE STARCH	MIN	MAX	SODIUM SILICATE (With Fibrous Asbestos)	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	France Franset	100	2300	Local Suppliers Sodium Silicate Starch	60	800	Carey Fibrous Adhesive	60	800
	North American Refractories Narcoset	100	3000				Detrick Fibrous Adhesive	60	800
	Pensalt Penchlor FCC	80	2100				Eagle-Picher Insulstic	60	500
	Refractory & Insulation Super 3000	100	3000				Foster 81-27 and 81-83	60 50	800 800
	3000 Cement	100	2500				Insul-Coustic Temp-Sure No. 250	60	800
							Johns-Manville Fibrous Adhesive	60	500
							Keasbey & Mattison Fibrous Adhesive	60	800
							North American Refractories Narco Bloc-Stik	60	500
							Pabco Fibrous Adhesive	60	800
							Refractory & Insulation Block Stick	60	800
							Rubberoid Fibrous Adhesive	60	500
BASIC MATERIALS AND AVAILABLE FORMS	Wet, air-setting, refractory type cement.			Powered sodium silicate mixed with sodium silicate solution.			Sodium silicate with fibrous asbestos fillers.		
USES	Bonding calcium silicate and amosite fiber insulation to themselves. Used to prefabricate high temperature valve and fitting covers.			Bonding calcium silicate and amosite fiber insulation.			Cementing laminations of magnesia, mineral wool and asbestos products in high temperature usage.		
APPLICATION	Trowel or brush.			Trowel or brush.			Spot or gob, trowel or brush.		
OTHER DATA	Chemical hardening, quick-setting.			Can be mixed to various consistencies as required.			Should not be used on alkaline sensitive glass fiber.		
ADVANTAGES	High strength at high temperature. Low expansion or contraction with temperature changes.			Forms a strong heat-resistant bond between porous or dusty insulation surfaces.			High temperature limits.		
LIMITATIONS	Soluble in water at high temperatures.			Dry film is partially soluble in water. Will check-crack after extended exposure to high temperature.			Dry film is partially soluble in water. Will check-crack after extended exposure to high temperature.		

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ACCESSORIES
JOINT SEALERS

GENERAL DESCRIPTION	ASPHALT (Solvent Type)	MIN	MAX	FIBRATED ASPHALT	MIN	MAX	ASPHALT WITH WAXES	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Lion Oil			Arco			Pittsburgh-Corning		
	Nokorode Seam and Backing Cement	- 50	300	Hi-Heat 75-147	50	350	Mastic 100	-50	125
	Nokorode Seal Kote (FR)	- 40	325	Coopers Creek					
	Nokorode Low Temp	-100	200	C-4	-40	250			
	Texaco			C-4 Heavy	-50	150			
	1405 Plastic Material	0	150	Detrick					
	1407 Plastic Material H	0	180	Duraseal	-50	350			
	Witco			Flintkote					
	Pioneer 311 and 301	- 50	150	C-33 LT	-50	125			
				Trowel Mastic	-20	250			
				Foster					
				60-25	-20	200			
				60-46	-10	350			
				Johns-Manville					
				Zeroseal	0	250			
				Lion Oil					
				Seal Kote	-40	325			
				Seam and Backing Cement	-50	300			
				Low Temp	-100	200			
				Pittsburgh Chemical					
				507	-50	200			
				507 SF	-50	175			
				X-201 Hi Temp	-50	400			
BASIC MATERIALS AND AVAILABLE FORMS	Heavy consistency asphaltic sealer, solvent type.			Asphalt-solvent type with asbestos fibers and inorganic fillers.			Asphalts and special waxes.		
USES	*Cold applied caulking, joint sealing and* bedding compound. Classification and grade of material varies when used as a *surface sealer.*			*Caulking and sealing* insulation joints, corners and junction points. Closes pores in sealing membranes.			Low temperature insulation joint sealer.		
APPLICATION	Trowel			Trowel or caulking gun. Use mineral spirits for clean up.			Trowel and caulking gun.		
OTHER DATA	*Check manufacturer's specifications for* variation in fire resistant properties.			*Check manufacturer's* specifications for variation in temperature limits.			Non-setting type sealer, suitable for slip joints.		
ADVANTAGES	Low cost versatile material that can be used as a coating, adhesive or sealer, depending on the classification and grade of material.			Stays flexible underneath and is non-shrinking.			Good resistant to acids, alkaline materia and solvents.		
LIMITATIONS	Solvent fumes are usually flammable and toxic during application.			Must be sealed before painting.			Maximum temperature limit is only 125		

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ACCESSORIES
JOINT SEALERS

GENERAL DESCRIPTION	VINYL-ASPHALT	MIN	MAX	NON-ASPHALTIC (Fire Resistive)	MIN	MAX	MINERAL OIL BASE	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Vimasco Vicarlon No. 49	- 20	180	Foster 90-30 (FR) 95-10 (FR) Insul-Coustic I-C 233 I-C 405	- 20 - 10 - 50 -100	200 160 300 300	Foster 30 - 45 (Cartridges) Johns-Manville Unseal Standard Nodraal Navaseal Type H Nodraal Type T Pecora Caulking	-100 - 35 - 35 - 35 - 35 - 35	300 250 250 220 250 250
BASIC MATERIALS AND AVAILABLE FORMS	Vinyl asphalt.			Resin base with solvents that vary according to manufacturers' specifications.			Mineral oil vehicle with fillers.		
USES	Vapor sealing of cellular glass insulation joints.			Heat resistant sealing and caulking compound.			General purpose sealer and caulking compound to prevent the passage of air, dust or moisture.		
APPLICATION	Trowel or brush.			Trowel or caulking gun.			Furnished in beads, ribbons and pugs and applied by hand. Can also be applied by gun.		
OTHER DATA	Excellent for low temperature applications.			Refer to manufacturers' specifications for variation in temperature limits.					
ADVANTAGES	Good acid and alkali resistance. Fire retardant when dry. Low rate of water vapor migration.			Good resistance to acids and alkalies.			Permanently plastic.		
LIMITATIONS	Should not be used on inner layers of cellular glass where temperature is lower than -50 F.			Very little resistance to most solvents.					

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GENERAL DESCRIPTION	SYNTHETIC RESIN BASE	MIN	MAX	SYNTHETIC RUBBER	MIN	MAX	SYNTHETIC RUBBER (Polybutene Tape)	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Adhesive Products Insul-Seal	- 80	250	Carboline 1303-23	- 30	200	Pecora Extru-Seal Tape	-30	300
	Flintkote Sealing Compound C-222	- 50	200	Insul-Coustic Armor-Cote I-C 401	-100	300	St. Clair Rubber SC-3395	-20	190
	Foster 60-30N	- 20	200	Johns-Manville Volseal	- 35	250			
	Insul-Coustic Sure Joint I-C 405	- 40	300	Type HF Navaseal	- 35	220			
	Johns-Manville Albaseal	- 35	250	Moore Tuff-Bond No. 12	- 30	200			
	Miracle Adhesive FD 400	- 50	350	Permacel EZ-4719	- 30	250			
	Pittsburgh-Corning Pittseal III	-100	300	Pittsburgh-Corning Pittseal 222 (FR)	- 30	250			
	Presstite 578.2 Permagum	- 30	400	Pittseal 222	- 30	250			
	Vimasco "J" Seal 702	0	200						
BASIC MATERIALS AND AVAILABLE FORMS	Synthetic resin with inert fillers.			Synthetic rubber with fillers and solvents.			Polybutene and butyl rubber base non-drying synthetic resin. Volatile solvent with inert fillers.		
USES	Seam filler for cellular insulation. Also as a bedding compound.			Joint and seam filler for metal ducts and insulation.			Effective weather-tight seal between most surfaces held together under pressure.		
APPLICATION	Trowel, caulking gun or by hand.			Surface must be clean and free of grease and oil. Apply by hand or with extruding gun.			Unroll tape and tap it gently in place.		
OTHER DATA	Good resistance to water and water vapor.			Formulations are varied by manufacturers to furnish different grades and classifications.			Dries to hardness of 24 Durometer - stays pliable.		
ADVANTAGES	Will stay pliable under extreme temperature changes. Will not shrink.			Tough, permanently flexible sealer that absorbs movement and shock.			Can withstand intermittant temperature extremes from -65 to 450 F.		
LIMITATIONS	Must be stored in cool place.						Little resistance to some solvents.		

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ACCESSORIES
JOINT SEALERS

GENERAL DESCRIPTION	SILICONE RUBBER	MIN	MAX	SILICONE (Heat Resistant Sealer)	MIN	MAX	POLYVINYL ACETATE (Caulking Compound)	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Dow Corning Silastic RTV 731	-100	500	Foster 30-43	-20	400	Vimasco No. 702		
BASIC MATERIALS AND AVAILABLE FORMS	Silicone rubber.						Polyvinyl Acetate with asbestos fibers.		
USES	High and low temperature insulation joint sealer.			Flashing compound and gasket adhesive.			Caulking compound. Fillets on inside corners of outer surface of insulation.		
APPLICATION	Trowel, caulking gun or collapsible tube.			Trowel or putty knife.			Trowel or putty knife.		
OTHER DATA	Room temperature curing.			10 to 15 sq ft per gal.					
ADVANTAGES	Excellent high and low temperature stability.								
LIMITATIONS	High cost.								

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ACCESSORIES
JOINT SEALERS

GENERAL DESCRIPTION	POLYSULFIDE RUBBER	MIN	MAX	EPOXY BASE	MIN	MAX	FITTING PUTTY	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Better Finishes Flexible Sealant No. 44169 Carboline Caulking Compound 702 703 706 Fuller Resiweld Sealant - 400 Pecora Synthacalk GC-2, GC-5	-60 -60 -60 -60 -65 -65	250 225 225 225 250 225	Adhesive Products Isopox Better Finishes No. 44-188 Carboline 225 Foster 60-37 Fuller 600 Series Pennsalt Flexjoint	- 80 - 20 - 20 - 30 -104 - 20	250 150 200 200 250 150	Foster 95-15 Mundet Brine Putty	-50 -50	150 150
BASIC MATERIALS AND AVAILABLE FORMS	Polysulfide liquid polymer rubber base. Can be furnished in a variety of colors.			These sealers have a wide variety of formulations to meet specific applications and conditions.			Non-drying, non-shrinking compound. Soft and permanently plastic.		
USES	Sealing rigid and semi-rigid joints of metal, wood, plastic, glass and masonry.			On all types of surfaces. For best results consult manufacturer for recommendations.			Filler in cavities of low temperature insulation fittings.		
APPLICATION	Pressure caulking gun, spatula or trowel.			Brush, knife or caulking gun.			Palm and knife.		
OTHER DATA				Provides a tough flexible permanent seal.					
ADVANTAGES	Provides a permanent water-tight seal under extreme temperature changes and vibration conditions. Resists severe ravages of weather.			Resistant to fuel oil gasoline and kerosene.			Not affected by low temperature or age.		
LIMITATIONS	Some formulations of this material may impart a slight pink stain when used in joints of light colored materials.			Due to many types and formulations of epoxies, care must be taken to select the best suited.			Was formulated to use with cork.		

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ACCESSORIES
PRIMERS AND SURFACE SEALERS

GENERAL DESCRIPTION	ASPHALT EMULSION			ASPHALT CUT-BACK			COAL TAR		
		MIN	MAX		MIN	MAX		MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	American Bitumuls			Armstrong			American Bitumuls		
	Bonding Primer	-20	150	No. 3 Asphalt Paint	0	180	Colflx Jet Seal	-30	200
	Bitucote, Primer	-20	160	Bitucote			Bitucote		
	Flintkote, C-13-HPC	-30	150	Black Asphalt Paint	- 50	350	Tarcote	-20	200
	Foster, 10-16	0	200	Coopers Creek			Pure Asphalt		
	Insul-Coustic			Primer (Black)	- 50	150	L70 Sealkote	-20	200
	IC 330 and 331	-20	200	C-4 Primer	0	200			
	Johns-Manville			C-4 Primer (FR)	0	200			
	Insulkote Primer E & S	-20	250	Primer No. 33	- 40	250			
	Lion Oil			Flintkote					
	Nokorode Brush Cement	-50	150	Asphalt Primer	- 40	150			
	Morningstar-Paisley			Asphalt Primer C-11	- 20	200			
	66-784 Hi Spred	-60	200	Gilsonite Primer C-12	- 40	150			
	National Cork			No. 267	- 20	180			
	Plain Emulsion	-	-	Foster					
	Pittsburgh Corning			51-03	0	200			
	PC Asphalt Emulsion	-25	100	Insul-Coustic					
	Pure Asphalt			Primer IC 380	- 50	250			
	No. 20 Protective Coating	-20	150	Lion Oil					
	Texaco			Nokorode S.P. Asphalt	- 50	150			
	No. 20	0	150	Nokorode Brush Cement	- 50	150			
	No. 23	0	150	Pittsburgh Chemical					
	No. 24	0	150	Insul-Mastic 4132 Primer	- 40	250			
	No. 30	0	150	Pittsburgh-Corning					
	No. 1044	0	180	Primer Sealer 3A	- 50	150			
	Witco			Pure Asphalt, No. 7 Primer	- 50	150			
	Pioneer W-35	-20	150	Texaco, No. 1405	0	180			
				Pipe Primer	0	180			
				No. 1044	0	180			
				Witco					
				Pioneer No. 630	- 50	150			
BASIC MATERIALS AND AVAILABLE FORMS	Liquid asphalt emulsion, light consistencies.			Asphalts and petroleum solvents.			Coal tar, water dispersed, especially formulated to be used with asphalts since coal tars and asphalts are normally non-compatible.		
USES	Primer and surface sealer for metal, wood, masonry and insulation especially on damp surfaces. Increases bonding of subsequent asphalt mastics.			Primer and surface sealer for metal, masonry, wood and porous insulation surfaces before application of asphalt coatings and adhesives.			Sealer on asphalt surfaces preventing damage caused by petroleum solvents.		
APPLICATION	Brush or spray.			Brush or spray on clean and dry surfaces free from rust, oil, grease and dirt.			Brush or spray.		
OTHER DATA	Also serves as a non-corrosive coating.			Use mineral spirits for clean up.			Good weather and corrosion resistant characteristics.		
ADVANTAGES	Good resistance to acids, alkalies and water.			Can be used to rehabilitate old asphalt weather coatings.			Can be applied cold without toxic fume or fire hazard.		
LIMITATIONS	Must be protected from freezing while in liquid state and during application.			Most brands are usually toxic and flammable and must be used in well ventilated areas.			Must be applied at temperatures in excess of 40 F.		

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GENERAL DESCRIPTION	SYNTHETIC RESIN (Solvent Type)	MIN	MAX	ASPHALT SEALER (Anti-Bleed)	MIN	MAX	FRICTION TAPE SEALER (Asphalt Cutback)	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Foster 51-12 (FR) Insul-Coustic Sure-Kote No. 110 Morningstar-Paisley 66-858 Pittsburgh Chemical) Insul-Mastic 5402P	-20 -20 -50 -40	200 200 180 250	Insul-Coustic No. 526 (Alcohol-Resin Base) Rubber Corporation of America E-7729 (Rubber Base)	-20 -50	250 125	Johns-Manville Zerogloss	-25	250
BASIC MATERIALS AND AVAILABLE FORMS	Synthetic resin and solvent.			Synthetic resin and solvent.			Smooth bodied solvent type asphalt compound.		
USES	Primer or sealer for porous and dusty type insulations. Provides increased adhesion for application of mastic type coatings.			Anti-bleed sealed to be used over asphaltic surfaces as a base for oil paints.			Black protective finish and sealer for insulation and friction tape over low temperature insulations.		
APPLICATION	Brush or spray.			Brush or spray.			Brush.		
OTHER DATA	Specific information concerning basic materials has not been furnished by manufacturers.			Basic characteristics of these products differ, however, they have the same end use.			Primarily designed as a fabric tape sealer used over fibrous insulation.		
ADVANTAGES	Foster product is fire resistant.			Provides additional solvent resistance to asphalt surfaces.			Moisture resistant.		
LIMITATIONS	Must be applied in well ventilated areas.			Must be applied in well ventilated areas.			Must be applied in well ventilated areas.		

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ACCESSORIES
FINISH COATINGS

GENERAL DESCRIPTION	COAL TAR PITCH (Emulsion)			ASPHALT BASE (Aluminum Paint)			ASPHALT EMULSION (Cold Room Finish)		
		MIN	MAX		MIN	MAX		MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	American Bitumuls Colfix Jet Seal	-300	200	Armstrong Alum. Cold Storage Paint	-25	200	American Bitumuls Weathercoat	-10	200
	Bitucote Tarcote	- 20	200	Bitucote, Alum. Paint	-28	175	Mastic Undercoat	-10	200
	Flintkote Oil Resistant Sealer	- 20	200	Coopers Creek Asphalt Aluminum Paint	-30	200	Armstrong Cork SP Emulsion	-25	200
	Pure Asphalt L 70 Sealkote	- 20	200	Earl Paint Erkote Gilsonite	-30	200	Plastic Emulsion	-25	200
				Flintkote Asphalt Alum. Paint	-50	200	Bitucote Black Plaster Finish	-10	100
				Asphalt Alum. Paint C-17	-20	175	No. 12A-14	-10	100
				Foster 50-08	0	400	Coopers Creek Asphalt Emulsion	-10	100
				Insul-Coustic 1-C 516	-20	250	Flintkote Sanded Premix	-20	150
				Lion Oil Nokorde Vehicle	-40	180	C-13A	-20	150
				National Cork Aluminum Paint	-	-	National Cork Fibre Emulsion	-25	200
				Pabco, Coolite	-20	200	Pure Asphalt Insul Mastic	-20	200
				Pittsburgh Chemical Insul Mastic 4604E	-40	300			
				Pure Asphalt No. 62	-20	200			
BASIC MATERIALS AND AVAILABLE FORMS	Coal tar pitch emulsion.			Selected asphalts and aluminum powder blended with proper solvents.			Asphalt with asbestos fibers, can also contain clay and silica sand.		
USES	Finish coatings over asphaltic surfaces for oil and solvent resistance. Also a protective coating for insulation, masonry and metal.			On all types of surfaces including asphalt mastic as a protective light reflective finish coating for both exterior and interior use.			Interior finish coating over insulation in coolers and cold storage rooms.		
APPLICATION	Brush or spray.			Brush or spray.			Brush spray or trowel.		
OTHER DATA	Meets Federal Specification R-P-00355.			Can be used as anti-corrosion protective coating on steel.			Free from odor bearing solvents. Can be used without danger of contamination to foods or furs.		
ADVANTAGES	Good acid and alkali resistance.			Resistant to most acids and alkalies.			Excellent abrasive resistance. Finished surface has moisture resistant properties.		
LIMITATIONS	Manufacturers' specifications should be checked since some coal tars are not compatible with asphalts.			Poor resistance to most solvents.			Must be protected from freezing during shipping, storing, and application.		

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ACCESSORIES
FINISH COATINGS

GENERAL DESCRIPTION	VINYL EMULSION			VINYL SOLVENT			ACRYLIC EMULSION		
		MIN	MAX		MIN	MAX		MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Armstrong Insulcolor	0	160	Arabol L-2-B	-20	180	Flintkote Decoralt	-20	150
	Earl Paint Erkote 1330	-25	125	Armstrong Armaflex Finish	-20	160	Pittsburgh Chemical Colorcoat 261	-40	250
	Foster Lagiona	-60	180	Carboline Polyclad 933-3	-20	180			
	Fuller Insco	-20	200	Foster Vitect Vinyl	-20	180			
	Insul-Coustic Sure-Kote No. 110			Insul-Coustic IC 520	-50	100			
	Sure-Kote No. 110 (FR)			IC 503 (FR)	-20	225			
	Perm Sure No. 102 (FR)			U.S. Rubber Cold Vinyl Dip 4906	-40	160			
	Morningstar-Paisley Lag Spread No. 72-778	-50	180						
	Pittsburgh-Corning CS White Paint (LT)	-25	125						
	Surface Coatings CS Paint	-25	125						
	Vimasco Vimasco-Lag 704 (FR)	-50	180						
BASIC MATERIALS AND AVAILABLE FORMS	Vinyl resin emulsion.			Vinyl resins with special solvents.			Acrylic resin latex, pigments and fillers.		
USES	Finish coating for fabric jacketing. Heavy bodied mixtures can be applied directly over insulation or asphalt weathercoats. Can be tinted to a variety of colors.			Over insulations to provide a tough, weather-resistant film.			Coating fresh and old concrete and asphaltic mastics. Gives protection against oil and normal chemicals.		
APPLICATION	Used to adhere jacket to insulation. Final coating is then applied on the exterior surface of the fabric for finish.			Brush, trowel or spray.			Brush or spray. Should not be applied at temperatures below 60 F.		
OTHER DATA	Letters (FR) after trade names indicate products with fire-retardant properties. Letters (LT) indicate those formulated for low temperature application.			Low MVT			Good low temperature flexibility.		
ADVANTAGES	Neat washable coating, resistant to oil, dirt, water and abrasion.			Dried film will not support combustion. Good resistance to dilute acids and alkalies.			Decorative weather-resistant coating.		
LIMITATIONS	Must be protected from temperatures under 40 F during shipping, storing and application. Some are flame-resistant, others are not.			Must be applied in well ventilated area as protection against toxic and flammable fumes.			Nonflammable when wet, burns slowly when dry giving off toxic fumes.		

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GENERAL DESCRIPTION	LATEX AND CEMENT (Plaster Finish)			FIBRATED PLASTER (Scratch Coat)			PERLITE PLASTER (Scratch Coat)		
		MIN	MAX		MIN	MAX		MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Armstrong Monoplast	-80	200	National Gypsum Gold Bond Fiber	0	100	National Gypsum Gypsolite	0	100
	Carboline 3340	-50	200	Pabco Fibered	0	100	U. S. Gypsum Structolite	0	100
	Camp Company Suremastic	-50	150	U.S. Gypsum Bondcrete	0	100			
	Flintkote White Insulation Coating	-50	200	Red Top Fibrated	0	100			
	Pennsalt Penntrowel Latex (Fine)	-50	150						
	Pittsburgh-Corning P.C. Type 5	-75	150						
	Surface Coatings PC Type "S"	-75	160						
BASIC MATERIALS AND AVAILABLE FORMS	Synthetic resin latex and dry cement.								
USES	Plaster finish for coolers and cold storage rooms. Also as finish coating on cellular glass, styrofoam and board type insulation materials.			As standard plaster base coat.			As plaster base coat.		
APPLICATION	Trowel on in coats not exceeding 1/8 in. thick per coat.			Trowel			Trowel		
OTHER DATA	Non-toxic and odorless.								
ADVANTAGES	Anti-abrasive, breathing type coating.						Lower thermal conductivity than standard plaster.		
LIMITATIONS				Not vapor resistant.			Not vapor resistant.		

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GENERAL DESCRIPTION	GYPSUM PLASTER (Finish Coat)							
		MIN	MAX		MIN	MAX		MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	National Gypsum Trowel Finish Plaster	0	100						
	Pabco Trowel Finish Plaster	0	100						
	U. S. Gypsum Trowel Finish Plaster	0	100						
BASIC MATERIALS AND AVAILABLE FORMS									
USES	As plaster finish coat.								
APPLICATION	Trowel								
OTHER DATA									
ADVANTAGES									
LIMITATIONS	Not vapor resistant.								

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GENERAL DESCRIPTION	COAL TAR EMULSIONS			COAL TAR CUTBACK			ASPHALT-CLAY EMULSION		
		MIN	MAX		MIN	MAX		MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	American Bitumuls Colflx Jet Seal	-20	200	Coopers Creek Black No. 750	-20	160	American Bitumuls Laykold Clay Emulsion	-20	100
	Bitucote Tarcote	-20	200	Koppers Bitumastic 50	-20	160	Bitucote Insulation Mastic	-20	160
	Koppers Bituplastic No. 28	-50	200	Pittsburgh Chemical Tarmastic 101	-	-	Flintkote N-13-HPC	-20	200
	Pittsburgh-Chemical Tarmastic 105	-	-	Pittsburgh-Corning Pittcote 50	-20	160	C-13-HPC	-30	150
							Waterproofing WAE Type 1	-20	125
	Pure Asphalt L 70 Sealkote	-20	200				Insul-Coustic IC-330	-20	200
							IC-331	-20	200
							Pure Asphalt No. 20 F Emulsion	-20	200
BASIC MATERIALS AND AVAILABLE FORMS	Coal tar base, water dispersion.			Tar base pitch blended with selected solvents.			Asphalt base clay emulsion containing no fillers or fibers. Has a semi-paste consistency.		
USES	Protection of insulation surfaces exposed to weather, gasoline, chemical fumes, heat, cold and abrasion.			Over most aboveground insulations, except those containing asphalts. Especially recommended in areas subject to acid smokes and acid fumes.			Provides a tough, resilient film or coating with high resistance to oxidation and destructive weather deterioration, when used over insulations, metal or masonry.		
APPLICATION	Brush, spray or trowel with drying time approximately (2) hours.			Brush, trowel or heavy duty spray.			Brush spray or trowel.		
OTHER DATA	Not a vapor barrier.			Basically an underground pipe line protective coating.			Stable, non-toxic and nonflammable coating.		
ADVANTAGES	Forms a tough weather-barrier film that will not crack or sag between temperature limits of -20 to 200 F.			Highly resistant to dilute acids and alkalies.			Breathing type coating.		
LIMITATIONS	Manufacturer should be consulted before using as an asphalt coating. Some coal tars are not compatible with asphalts.			Drying time from 24 to 48 hours. Cannot be used over asphalt coatings or primers.			Must be protected from freezing during shipping, storage and application.		

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GENERAL DESCRIPTION	ASPHALT EMULSION (Fibrated)			ASPHALT EMULSION MASTIC (Used with Glass Mesh)			ASPHALT CUTBACK		
		MIN	MAX		MIN	MAX		MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	American Bitumuls Laykold Mastic	-20	200	Bitucote No. 12	-20	150	Baldwin-Ehret-Hill Asphalt Cutback	-40	400
	Armstroog, Insulmastic	-20	200	Carey No. 51 Emulsion	-20	100	Coopers Creek Weather Barrier	-40	250
	Baldwin-Ehret-Hill, Fiberoeat	-20	200	Ebonex	-30	150	Weather Barrier (FR)	-40	250
	Bitucote, Protektite	-20	200	Coopers Creek Black Asphalt Emulsion	-20	150	Detrick, Durimeal	-50	350
	Coopers Creek Emulsified Asphalt	-30	125	Foster 60-99 Hilastic	-20	250	Eagle-Picher Stalastic	0	250
	Emulsified Asphalt (FR)	-20	250	Pure Asphalt No. 20	-20	150	Stamastic	0	250
	Detrick, Thermalcoat	0	450				Earl Paint Erkote 6X	-40	250
	Eagle-Picher, Insulseal	-20	450				Foster 60-25 Trowel	-20	200
	Flintkote, C-13-A, Thermalkote	-20	200				60-26 Spray	-20	200
	Type 7	-20	300				Lion Oil Nokorode Seal Perm	-20	275
	Forty-Eight, Weberseal	-32	400				Nokorode Seal Perm (FR)	-20	275
	Foster, 90-07 H.I. Mastic	0	200				Morningstar-Paisley 66-785	-20	200
	Insul-Coustic Weather-Sure 301	-20	300				Pabco	-20	250
	Emulsion 330, Emulsion 331	-20	200				Pittsburgh-Corning Pittcote 300	-50	300
	Johns-Manville Insulkote ET and EG	-20	250				Pure Asphalt 811 Weatherproof Coating	-20	200
	Morningstar-Paisley Hi-Spred No. 43-784	-60	200						
	National Cork Weather Mastic (HT)	-	-						
	North American Refractories Narco Surfa-Seal	-20	450						
	Pittsburgh Chemical Asphalt Emulsion	-20	200						
	Pittsburgh-Corning P.C. Pittcote 600 B	-20	275						
	Pure Asphalt, Insul. Mastic	-10	250						
	Ref. & Insul., Weather Kote	-10	250						
BASIC MATERIALS AND AVAILABLE FORMS	Asphalt base clay emulsion and asbestos fibers. Filler content is varied to get desired temperature limits.			Asphalt liquid emulsion with approximately 55% solids.			Basic asphalt and petroleum solvent. Some of these products contain asbestos fibers and mineral fillers.		
USES	Provides weather proofing for insulations on hot surfaces.			Weatherproofing high temperature insulations.			Weather-barrier coating used on high temperature thermal insulation.		
APPLICATION	Trowel or spray. Galvanized mesh reinforcement is applied when used on spherical and cylindrical vessels.			Brush, spray and trowel grades are available. Used with glass fabric membrane reinforcing.			Brush, spray, trowel or by palming.		
OTHER DATA	Breather-type insulation coating.			Also used as a surface primer and adhesive on porous surfaces.			Products marked (FR) have fire retardant properties.		
ADVANTAGES	Forms a flexible coating that will protect insulation and equipment during expansion and contraction.			Durable under extreme temperature and weather conditions.					
LIMITATIONS	Do not apply below 40 F. Must be kept from freezing. (Winter grades are available).			Do not apply below 40 F. Must be kept from freezing.			Precautions must be taken during application to avoid toxic and flammable vapors.		

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GENERAL DESCRIPTION	ASPHALT EMULSION (Chemical Dispersion Type)	MIN	MAX	VINYL EMULSION (Film Coating)	MIN	MAX	VINYL EMULSION (Heavy Bodied)	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Detrick Permiseal Eagle-Picher	 -20	 400 250	Flintkote (FR) F-100 Foster Lagtone (FR) Insul-Coustic Sure-Kote 110 (FR) Sure-Kote 111 (FR) Perm-Kote 102 (FR) Morningstar-Paisley Lag-Seal No. 72-779 (FR) 66-858 Pittsburgh Chemical Tarmastic 105	 -30 -60 -20 -20 -20 0 -30	 180 180 200 200 220 180 180	Foster Sealfas Mastic Insul-Coustic VI AC Mastic 551 Pittsburgh-Corning Pittcote 400 Vimasco Vimasco WC-1	 0 -40 20 20	 180 220 180 180
BASIC MATERIALS AND AVAILABLE FORMS	Emulsified asphalt, asbestos fibers, fillers and water with chemical dispersion system.			Synthetic resin emulsion. Usually basic material is polyvinyl acetate. Can be furnished in a variety of colors.			Synthetic resin emulsion, heavy bodied. Usually the basic material is polyvinyl acetate. Available in a wide selection of colors, homogeneous through the entire thickness of the dried film.		
USES	With glass mesh or galvanized netting to provide weatherproofing for insulation on hot surfaces.			Weather-resistive coating for insulation where a tough, white abrasive-resistant finish is required.			Over preformed high or low temperature insulation, interior or exterior.		
APPLICATION	Brush, spray or trowel.			Brush, spray or roller			Applied by palm, spray or hand trowel. Thickness of dry film ranges from 1/16 in. to 1/8 in. depending on amount of protection needed.		
OTHER DATA	Breather type of coating when first applied and approaches low vapor transmission properties of cutbacks when dry.			Products marked (FR) have fire retardant properties.					
ADVANTAGES	Nonflammable solvents. Inhibits rusting.						Free from fire hazard during and after application. Will not melt or drip when exposed to fire.		
LIMITATIONS	Soluble in water until dry.			Must be protected from from freezing during shipping, storage and application.			Must be protected from freezing during shipping, storing, and application.		

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GENERAL DESCRIPTION	VINYL WEBBING			ACRYLIC EMULSION			SILICONE RESIN		
		MIN	MAX		MIN	MAX		MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Carboline Polyclad Web Spray Vimasco Vinyl Webbing	-20 -40	160 160	Flintkote Decorait	-30	200	Carboline 2109 Dow-Corning 770 Pecora Water Repellent P-37, 46	- 50 -100 -100	200 500 500
BASIC MATERIALS AND AVAILABLE FORMS	High molecular weight vinyl resins and special solvents.			Heavy bodied acrylic resin emulsion pigmented and reinforced with mineral fillers and asbestos fibers. Available in a wide color range.			Silicone resin water thin liquid.		
USES	Weather coating for glass fiber insulation, masonry and equipment parts. Web type film will bridge up to 20 in.			Colored weather coatings for use over asphalt coated surfaces such as insulated vessels and lines. Also as a color finish on asphaltic and concrete pavements.			Water repellent coating for heavy density insulations and coatings.		
APPLICATION	Spray			Spray or brush over dampened surfaces. Supplied as a soft paste. To be thinned with half volume of water.			Brush or spray. Two coats are recommended, flooded on surface.		
OTHER DATA	Forms a web base for vinyl film coating.						Causes exterior moisture to run off without penetration, while interior moisture can pass to the outside without harm to the film.		
ADVANTAGES	Dried coating is water repellent and abrasion resistant.			Resistant to cracking and peeling and is not damaged by oil, grease or water.			Will withstand extreme temperature variations.		
LIMITATIONS	Not recommended for areas exposed to temperatures over 180 or having solvent spillage.			Do not apply at temperatures less than 50 F or over surfaces with free standing water. Protect from freezing in containers.			Should not be exposed to rain for 24 to 48 hours after application.		

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GENERAL DESCRIPTION	LATEX MASTIC (Two-Part)								
		MIN	MAX		MIN	MAX		MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Flintkote Mastic White (I.M.W.) White Insulation Coating	 -30 -30	 150 150						
BASIC MATERIALS AND AVAILABLE FORMS	Stabilized rubber-latex and special cementitious powder.								
USES	Over cellular glass, foamed polystyrene and cork. Forms a hard durable white finish. For refrigerated areas.								
APPLICATION	Mix on job and trowel on two coats. Recommended to embed a layer of glass mesh in first coat to minimize cracking.								
OTHER DATA	Breather type weather coating.								
ADVANTAGES	Excellent resistance to spalling under freeze and thaw conditions.								
LIMITATIONS	Liquid must be protected against freezing in containers. Preferred working temperatures are 60 F to 80 F.								

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GENERAL DESCRIPTION	COAL TAR EMULSION (Coating)	MIN	MAX	HOT MELT ASPHALT (Coating)	MIN	MAX	ASPHALT CUTBACK-FIBRATED (Boiler Wall Coating)	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	*Coopers Creek* Pitchumastic-No. 61 Koppers Bituplastic 28 Bituplastic 33	 -20 -50 -20	 200 200 400	*Mobil Oil* Hot Melt Pabco Hot Melt	 -50 -50	 150 150	Baldwin-Ehret-Hill Trowel and Spray Grade Carey BTU Cement Detrick Durimeal - Hi Temp Durimeal - Regular Permineal *Eagle-Picher* Stalastic Johns-Manville Insulkote ST	 -40 - -32 -20 -20 0 0	 400 - 700 400 400 400 250
BASIC MATERIALS AND AVAILABLE FORMS	Polymer modified coal tar pitch emulsion.			Hot melt asphalt.			Asphalt, asbestos and solvents		
USES	Aboveground vapor barrier for cellular glass type insulation and plaster.			Brush applied vapor seal for covering insulation. Basic use is for built-up roof application, not primarily a vapor barrier.			Vapor barrier for high temperature boiler wall coating.		
APPLICATION	Brush, roller or spray at temperatures in excess of 40 F and in dry weather.			Hot mopping or hot dip at temperatures from 350 F - 400 F.			Trowel, spray or brush.		
OTHER DATA	*Resistant to dilute acids and strong salts, naptha and gasoline.*			Resistant to diluted alkalies and acids. Solvent resistance is poor.			Nonbreathing type mastic.		
ADVANTAGES	Excellent adhesive and flexibility properties.			Also used as a protective coating.			Stays flexible and pliable when used as recommended.		
LIMITATIONS	Not recommended for contact with potable water.			Not fire resistant in wet or dry state.			Must be applied in well ventilated area as protection from toxic and flammable fumes.		

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GENERAL DESCRIPTION	ASPHALT CUTBACK (Refrigerant Type Coating)	MIN	MAX	SYNTHETIC LATEX (Coating)	MIN	MAX	ALUMINUM FOIL (Pressure Sensitive)	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Flintkote No. C-1 Lion Oil Kokorode Seal Kote Nokorode Seal Kote (FR)	-20 -40 -40	250 325 325	Foster Sealfas 30-36 Morningstar-Paisley Lag-Seal No. 72-779	0 0	180 180	Alumiseal Zero Perm Cordo Cordoglas (FR) 3 M Company No. 425 (0.003 in.) No. 438 (0.0055 in.)	-76 0	302 250
BASIC MATERIALS AND AVAILABLE FORMS	Blend of special asphalts, asbestos fibers, pigments and mineral spirits.			Synthetic latex (water emulsion).			Aluminum foil clad pressure sensitive tape with special cloth or film backing.		
USES	Insulation coating when surface temperatures are below ambient.			Vapor coating over air conditioning ducts and chilled water piping.			Vapor barrier on air conditioning ducts and as seam sealer for panel type construction.		
APPLICATION	Brush, trowel or spray.			Brush, spray or roller at temperatures above 40 F.			Wrap or press in place.		
OTHER DATA	Fire retardant qualities when dry.			Also used as lag-type adhesive.			Products vary in the type backing, mastic and thickness of aluminum foil used.		
ADVANTAGES	Tough flexible coating that will withstand shock, vibration and thermal expansion.			Has white finish that is resistant to dirt and grease and can be washed.			High strength material that can be used on most any type surface.		
LIMITATIONS	Toxic and flammable. Adequate ventilation during application must be provided.			Must be applied at temperature above 40 F and material must be protected from freezing.					

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GENERAL DESCRIPTION	MODIFIED EPOXY COATING	MIN	MAX	POLYETHYLENE FILM	MIN	MAX	MYLAR AND ALUMINUM FILM	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Carboline Epoxy 194 Surface Coatings Surco No. 2501	-30 -75	200 200	Visking Company Vis Queen Film	-70	350	Alumiseal Zero Perm	-	-
BASIC MATERIALS AND AVAILABLE FORMS	Modified epoxy resin.			Virgin polyethylene film. Available in thicknesses of 2, 4 and 6 mils.			One mil thickness of aluminum between two one-half mil thicknesses of Mylar.		
USES	Adhesive which also serves as a vapor barrier.			Vapor seal in building walls and floors and under foundations.			Permanent vapor barrier.		
APPLICATION	Brush or trowel. Apply at room temperature. No open time.			Stapled, glued or laid in place.			Joints are sealed with Zero Perm tape.		
OTHER DATA	Especially recommended for polystyrene, polyurethane and cellular glass.						Used in construction of reflective cold storage rooms.		
ADVANTAGES	Resistant to acids and caustics. Water absorption is nil.			Easy to handle, low cost vapor seal.			Strong. Excellent vapor barrier.		
LIMITATIONS	When this material is used for its vapor sealing qualities it should be considered an adhesive rather than a coating.			Low strength, will tear or puncture under excess weight or abrasive action.					

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ACCESSORIES
VAPOR BARRIERS

GENERAL DESCRIPTION	POLYVINYL CHLORIDE FILM								
		MIN	MAX		MIN	MAX		MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Carey Fire-Chex Vapor Barrier Sheet								
BASIC MATERIALS AND AVAILABLE FORMS	Polyvinyl chloride film. 32 inches wide x 405 feet long in roll weighing 33 pounds.								
USES	Vapor barrier in built-up roof.								
APPLICATION	Laid with Fire-Chex Adhesive No. 400.								
OTHER DATA	Weight per square - 3.3 pounds.								
ADVANTAGES	Will not burn.								
LIMITATIONS									

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GENERAL DESCRIPTION	ASPHALT CUTBACK (Fibrated Mastic) (Continued)	MIN	MAX	ASPHALT CUTBACK (Fibrated Mastic)	MIN	MAX	ASPHALT CUTBACK (Fibrated Mastic) (Continued)	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Lion Oil			Armstrong			Lion Oil		
	Nokorode Seal Kote	-40	325	Weatherproof Plastic	-20	250	No Flash Nokorode	-40	325
	Nokorode Seal Kote (FR)	-40	325	Baldwin-Ehret-Hill			Regular Nokorode	-40	325
	Nokorode Seal Kote (No Flash) (FR)	-40	325	Trowel Spray Grade	-	-	Nokorode Seal Kote	-40	325
	National Cork			Bitucote			Nokorode Seal Kote (FR)	-40	325
	Weather Mastic (LT)	-	-	No. 3	-40	200	Nokorode Seal Kote (No Flash) (FR)	-40	325
	Pittsburgh Chemical			Coopers Creek			National Cork		
	Insul-Mastic 4010 (FR)	0	250	Regular	-40	250	Weather Mastic (LT)	-	-
	Insul-Mastic 4010	-40	250	Fire Retardant	-20	400	Pittsburgh Chemical		
	Pure Asphalt			Eagle-Picher			Insul-Mastic 4010 (FR)	0	250
	No. 811	-20	200	Stalastic	-	-	Insul-Mastic 4010	-40	250
	No. 811 (FR)	-20	200	Stamastic	-	-	Pure Asphalt		
	Witco			Flintkote			No. 811	-20	200
	Pioneer 1008	-50	300	Trowel Mastic	-20	250	No. 811 (FR)	-20	200
				C-29	-20	200	Witco		
				C-19	-20	225	Pioneer 1008	-50	300
				Forty-Eight					
				Weatherproof	32	300			
				Foster					
				60-25 Cl Mastic	-20	200			
				60-26 Cl Mastic	-20	200			
				Insul-Coustic					
				Vapo-Sure 320 and 321	-40	300			
				Johns-Manville					
				Insulkote ST and SG	-20	250			
				Continued in next column					
BASIC MATERIALS AND AVAILABLE FORMS	Asphalt and mineral spirits (high solids content).			Special asphalts, asbestos fibers, inert fillers and mineral spirit solvents.					
USES	Outdoor weather-vapor coating over most thermal insulation materials.			Exterior weather-vapor coating to protect all types of thermal insulations.					
APPLICATION	Brush, spray or trowel with reinforcing glass fiber membrane embedded.			Brush, spray or trowel with reinforcing glass fiber membrane embedded.					
OTHER DATA	Fire retardant when dry. Also used as a lap joint adhesive and an anti-corrosive coating over metal.			Requires approximately 10 gallons per 100 square feet of coverage.					
ADVANTAGES	Economical, low MVT, cold applied coating.			Flexible and cold applied. High heat resistant properties.					
LIMITATIONS	Flammable when wet. Adequate ventilation must be provided during application.			Flammable when wet. Adequate ventilation must be provided during application. (Except for No Flash)					

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GENERAL DESCRIPTION	ASPHALT CUTBACK (Pigmented)	MIN	MAX	RESIN BASE	MIN	MAX	Polyvinyl Acetate	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Flintkote C-335	-20	175	Foster 60-65 Aluminum	-20	200	Better Finishes No. 65-24	-40	180
	Foster 60-42	-20	200	60-30	-20	200	Insul-Coustic No. 520	-50	180
	60-32	-20	200	60-60N	-20	200	No. 521	-50	180
	Insul-Coustic No. 380, 361	-40	175	60-80	-20	200	No. 551 (Modified)	-20	220
	Pittsburgh Chemical 4010 R	0	250	Insul-Coustic No. 503	-20	225	Pittsburgh-Corning PC Pittcote 400	-50	180
	4010 AL								
	Wilco Pioneer No. 507	-50	250						
BASIC MATERIALS AND AVAILABLE FORMS	Asphalts, pigments and mineral spirits. High solids content.			Resin base with solvent and pigments. Colors available are gray, white, aluminum and dark brown.			Polyvinyl acetate resin emulsion. Furnished in a variety of colors.		
USES	Outdoor weather-vapor coating applied over insulation where color is desired. Also as a protective coating over metal surfaces.			Weather-vapor barrier for insulation when extra flexiblity and chemical resistant is needed.			Weather-vapor barrier finish coat.		
APPLICATION	Brush, spray or trowel. Can be reinforced with embedded glass fiber membrane.			Spray, brush or trowel.			Brush or spray.		
OTHER DATA	Longer drying time is required at low temperature or high humidities.						Also used as an anti-corrosion coating.		
ADVANTAGES	Flexible, cold applied, decorative weather-vapor coating.			Better chemical resistance and flexibility than asphalt mastics.			Flexible, fire retardant and decorative.		
LIMITATIONS	Contains flammable solvents. Protect from heat and open flame during application.			Poor resistance to most solvents.			Must be protected from freezing while in container or during application.		

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GENERAL DESCRIPTION	CHLORINATED RESINS (Solvent Type)	MIN	MAX	RUBBER BASE	MIN	MAX		MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Armstrong LT Sealer CC Navy Sealer National Cork Navy Sealer	 -20 -20 -	 200 200 -	Carboline Neoprene W Pennsalt Neocoat Moore Tuff-Bond Coating	 -30 -40 -30	 200 225 185			
BASIC MATERIALS AND AVAILABLE FORMS	Chlorinated resins, drying oils, fillers and solvent.			Synthetic rubber resin and solvent.					
USES	Wherever a white, weather-vapor seal, fire retardant finish is required.			Weather-vapor barrier and anti-corrosive coating for steel, concrete, wood, canvas and insulation.					
APPLICATION	Trowel or brush on a two-coat application. When used outdoors reinforce first coat with glass mesh membrane.			Spray or brush, two coats required. Allow (2) hours drying time.					
OTHER DATA	Meets special Mil. P-876 A (2)			Do not use synthetic enamels or lacquers over finished surface.					
ADVANTAGES	Good flexibility and abrasion resistance.			Also used as an insulation against electrolytic action.					
LIMITATIONS	Adequate ventilation should be provided during application.			If exposed to strong sunlight protect surface from ultra-violet rays with a finish coat of ordinary paint.					

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ACCESSORIES
HEAT RESISTANT COATINGS

GENERAL DESCRIPTION	MINERAL CEMENT			ASPHALT CUTBACK *(Fibrated Mastic)*			INTUMESCENT TYPE		
		MIN	MAX		MIN	MAX		MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	O'Neal Floors Fire-Ban No. 40	-100	350	Pittsburgh Chemical X-201 Hi-Temp Mastic	-50	400	Vimasco F.R.P. 52-5	-20	200
							Foster 80 x 41	-20	200
BASIC MATERIALS AND AVAILABLE FORMS	High temperature cement with silica aggregates.			Special blend of soft asphalts, asbestos, silica, fire retardant resins and pigments. No volatile solvents.			Butylated melamine formaldahyde intumescing agents and inert fillers.		
USES	Finish coat over all types insulation both hot and cold.			For chimney, stack and boiler areas where temperatures up to 400 F are encountered.			To retard heat input and flame spread on combustible and noncombustible surfaces. Used on equipment and structural steel to increase their resistance to fire.		
APPLICATION	Trowel.			Trowel. Should be warmed to between 100 F to 150 F for ease of application.			Brush or spray.		
OTHER DATA	Listed by Underwriters' Laboratory, Inc.			Also used as high temperature joint sealer and as anti-corrosive coating over metals.			Intumescent action begins at 428 F. Intumescent action forms efficient cellular insulation.		
ADVANTAGES	Highly resistant to fire and solvents.			Stays flexible and waterproof through a wide range of temperature changes.			Protects insulation coatings, metal, and wood from fire and thermal shock.		
LIMITATIONS	Only fair resistance to acids and alkalies.			Must have solvent free use area.			After fire exposure resultant foam must be washed off and coating renewed.		

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GENERAL DESCRIPTION	GLASS FIBER FABRIC (Uncoated)	MIN	MAX	GLASS FIBER FABRIC (Asphalt Coated)	MIN	MAX	GLASS FIBER FABRIC (Coal Tar Coated)	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Chicopee Manufacturing Co. Johns-Manville Duramesh Twinsburg-Miller Glasfab Brand C178R	-	- 1000	Johns-Manville Duramesh (Asphalt Coated) Permaglas-Mesh Type 201 20 x 20 Type 202 20 x 10 Type 208 24 x 24 Type 210 10 x 10 Twinsburgh-Miller Glasfab Brand Style 2020 Style 1020 Style 1010			Johns-Manville Duramesh (Coal Tar Coated) Permaglas-Mesh Type 203 20 x 20 Type 204 20 x 10 Twinsburgh-Miller Glasfab Brand Style 2020 T Style 1020 T Style 1010 T		
BASIC MATERIALS AND AVAILABLE FORMS	Glass fiber open weave fabric. Can be furnished in either rolled sheet or tape form. 2 in to 45 in. widths.			Glass fiber open weave fabric coated with special asphalts. Can be furnished in either rolled sheet or tape form. Basic widths 44 in. to 48 in. Cut widths from 2 in. thru basic widths. Available in a variety of mesh sizes.			Glass fiber open weave fabric coated with coal tar. Can be furnished in either rolled sheet or tape form. Basic widths 44 in. to 48 in. Cut widths from 2 in. thru basic widths.		
USES	Cold wrapping of pipe line insulation. Wrapped around or embedded in mastic coating.			Embedded in mastic insulation coatings as reinforcing membrane.			Embedded in mastic insulation coating by wrapping or pulling over coated surface.		
APPLICATION	Wrapped under tension so as to force mastic through membrane. Apply second coat of mastic or sealer.			Embedded in mastic by wrapping under tension or pulling over coated surface.			Wrapped under tension to force mastic through membrane.		
OTHER DATA	Also used as reinforcement in commercial roofing and insulated walls and floors.			Federal Specification HHC-00466A.			Also used as reinforcing membrane in commercial roofs, walls and floors. Federal Specification HHC-00466A.		
ADVANTAGES	Serves as good reinforcement against mechanical damage.			Serves as reinforcement against mechanical damage.			Serves as reinforcement against mechanical damage.		
LIMITATIONS	Additional coat of mastic or sealer is required after fabric is embedded.			Additional coat of mastic or sealer is required after fabric is embedded.			Additional coat of mastic or sealer is required after fabric is embedded.		

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ACCESSORIES
REINFORCING MEMBRANES

GENERAL DESCRIPTION	GLASS FIBER FABRIC (Starch Coated)	MIN	MAX	GLASS FIBER FABRIC (Resin Coated)	MIN	MAX	GLASS FIBER FABRIC (Aluminum Treated)	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	*Foster* Open Weave Glass-Mesh			Chicopee Manufacturing Co. Type 1 (10 x 8) mesh Type 2 (8 x 8) mesh Type 3 (18 x 14) mesh Type 4 (20 x 20) mesh Type 5 (24 x 24) mesh Flintkote Yellow Jacket *Foster* Hilastic Matt Sealfas No. 10 Sealfas No. 20 *3 M Company* No. 360 No. 361 Permaglas-Mesh *Type 212 (Base Sheet)* Type 205-20 x 20 Mesh Type 206-20 x 10 Mesh Type 209-10 x 10 Mesh Twinsburgh-Miller Glasfab Brand White Weave (1020 mesh) Vimasco Vi Cloth No. 10 (10 x 10) Vi Cloth No. 20 (20 x 20)	 -20 -50 -50	 350 400 400	Permaglas-Mesh Type 207 20 x 20 mesh Twinsburgh-Miller Glasfab Brand Style 2020 AL Style 1020 AL		
BASIC MATERIALS AND AVAILABLE FORMS	Glass fiber fabric, starch coated. Open weave.			Glass fiber fabric, resin coated. Available either in mat form or open weave fabric, in roll or tape form. Basic width 45 in. Cut widths from 2 in. thru 45 in.			Glass fiber membrane, open weave, aluminum treated. Available in either rolled sheet or tape form. Basic width from 45 in. to 48 in. Cut widths from 2 in. thru basic width.		
USES	Reinforcing membrane for mastic type insulation coatings.			Reinforcing membrane or protective cover for mastic type insulation coatings.			Reinforcing membrane or protective cover over aluminum pigmented mastics.		
APPLICATION	Embedded in mastic by wrapping or pulling over coated surface.			Embedded in mastic by wrapping or pulling over coated surface.			Embedded in mastic by wrapping or pulling over coated surface.		
OTHER DATA	Used with resin mastics which are not compatible with the asphalt or tar coated fabrics.			Can be used with nonasphaltic mastics requiring fire resistive materials.			Minimum breaking strength is 75 lbs/1 in. wide strip.		
ADVANTAGES				Easy to handle, high heat resistance. Lightweight, strong material. Will not rot and has no wicking action.			Serves as reinforcement against mechanical damage.		
LIMITATIONS				Additional coat of mastic or sealer is usually required after fabric is embedded.			Additional coat of mastic or sealer is required after fabric is embedded.		

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GENERAL DESCRIPTION	GLASS FIBER MAT	MIN	MAX	COTTON FIBER FABRIC (Asphalt Coated)	MIN	MAX	COTTON FIBER FABRIC (Tar Coated)	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Johns-Manville Duramat Owens-Corning Fiberglas Reinforcing Mat		1000	Permaglas-Mesh Type 213 Type 214 Type 215 Type 216			Permaglas-Mesh Type 214 Type 216		
BASIC MATERIALS AND AVAILABLE FORMS	Nonwoven glass fiber mat with fibers bonded with resinous binders, stitching or needling. Various forms available.			Cotton fabric membrane, open weave, saturated with tar. Available in either rolled sheet or tape form.			Cotton fiber fabric membrane, open weave, saturated with coal tar. Available in either rolled sheet or tape form.		
USES	Reinforcement of materials.			Reinforce insulation on pipe lines and equipment.			To reinforce insulation on pipe lines, equipment and roofing.		
APPLICATION	Embedded in mastic.			Wrapped over or embedded in mastic type coatings.			Wrapped or embedded in mastic coatings.		
OTHER DATA				Meets Government Specification ASTM D 173-44.			Meets Government Specification ASTM D 173-44.		
ADVANTAGES				Economical, easy to handle and is compatible with all waterproofing treatments.			Economical and easy to handle.		
LIMITATIONS				Does not have the strength or permanency equal to glass fibers fabric.			Should not be used with asphalts since certain coal tars and asphalts are non-compatible.		

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ACCESSORIES
REINFORCING MEMBRANES

GENERAL DESCRIPTION	HEX WIRE NETTING (Galvanized)	MIN	MAX	HEX WIRE NETTING (Stainless Steel)	MIN	MAX	HEX WIRE NETTING (Monel)	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Gilbert & Bennett Keystone Steel & Wire Local Suppliers			A. J. Gerrard Gilbert & Bennett Keystone Steel & Wire Techalloy Local Suppliers			A. J. Gerrard Gilbert & Bennett Techalloy Local Suppliers		
BASIC MATERIALS AND AVAILABLE FORMS	Gauge and openings can be furnished as specified. Is available in either poultry or heavy grades. Standard roll is 150 linear feet. Standard openings are 1 in., 1 1/2 in. and 2 in. Multiple width rolls vary from 24 in. to 72 in.			Gauge and openings as specified. Standard openings are 1 1/2 in. and 2 in. hex with three-twist 0.047 diameter wire. Standard rolls are 24 in. wide by 300 linear feet. Available in stainless steel Types 304, 316, and 321.			Gauge and openings as specified. Standard opening size is 1 in. with .026 diameter, three-twist wire. Standard stock width is 48 in., but 24 in. is available on special order.		
USES	Base for insulation and reinforcement for cement, emulsion asphalts or back-up blankets.			High strength, anti-corrosive, and heat resistant netting.			Base for attaching insulation and as a reinforcement for insulation cement, emulsion asphalt and back-up blanket.		
APPLICATION	Fastened to special clips, studs or wires.						By special clips, studs or wire. Tie wire or banding of either monel or stainless steel can be used.		
OTHER DATA	Economical, lightweight, and flexible backing and reinforcing netting.						Has approximately 2 1/2 to 4 times longer life than galvanized netting.		
ADVANTAGES							Monel netting is tough but pliable. Rustless with resistance to atmospheric salt and industrial fumes.		
LIMITATIONS							Higher cost can be justified by using only in corrosive areas.		

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GENERAL DESCRIPTION	WELDED STEEL WIRE FABRIC			EXPANDED METAL LATH			CLOTH ADHESIVE TAPE		
		MIN	MAX		MIN	MAX		MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Keystone Steel & Wire Pittsburgh-Steel Local Suppliers			Alabama Metal (With vapor-barrier backing) Pittsburgh Steel Local Suppliers			Arno C507 Johns-Manville No. 355 No. 360 Permacel No. 672 Polyken No. 200 No. 133	-40 0	200 180
BASIC MATERIALS AND AVAILABLE FORMS	Available in cold drawn steel wire in diameters from 0000 to 16 gauge. Square openings vary from 1 in. x 1 in. to 12 in. x 12 in.			Expanded metal lath, diamond mesh. Available in a variety of openings and thicknesses as specified. Can be furnished with felt, aluminum foil, or kraft paper backing. Fabricated from galvanized, black primed or aluminum metal.			Cotton fabric, impregnated tape, with pressure sensitive adhesive.		
USES	Base support and to reinforce insulation, where it must bridge across ribs.			Reinforcement of insulating cement or as base for attaching thermal insulation.			Wrapping fibrous insulation.		
APPLICATION	Lay in place or fasten with clips, wire, or studs. Can also be spot-welded to steel surfaces.			Nail, staple, wire or weld.			Spiral wrap on pipe directly from roll.		
OTHER DATA	Various sizes and grades are known as stucco mesh, floor mesh and road mesh.						Known to the trade as "General Insulators Tape".		
ADVANTAGES	Can be spot-welded to steel surfaces, eliminating special fasteners.			Serves as a strong fire resistant backing and lath for insulation and insulating cement.			Inexpensive and easy to apply.		
LIMITATIONS				Does not have enough flexibility to be used on spherical insulated surfaces or certain other sharply curved surfaces.			Not a vapor seal.		

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ACCESSORIES
REINFORCING MEMBRANES

GENERAL DESCRIPTION	WATERPROOF FABRIC TAPE			POLYETHYLENE FILM TAPE			VINYL COATED CLOTH TAPE		
		MIN	MAX		MIN	MAX		MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Arno C 505 Johns-Manville No. 353 No. 354 3 M Company No. 390 Permacel No. 691 Polyken No. 214 No. 215	-10	160	Arno C-350 (10 mil) C-355 (16 mil) Johns-Manville Trantex E-12 3 M Company No. 840 No. 822	-60 -60 -30 -32	180 180 140 176	Arno No. C-504 No. C-511 No. C-506 (FR) Permacel P-676 Polyken No. 210 No. 216	-40 -40 -40 -10 -10	200 200 225 160 160
BASIC MATERIALS AND AVAILABLE FORMS	Cotton cloth, waterproof coating on one side with pressure sensitive adhesive on reverse side.			Polyethylene film with rubber base pressure sensitive adhesive.			Vinyl treated cloth with rubber base, pressure sensitive adhesive. Available in a variety of colors.		
USES	Sealing joints of weather barrier jackets.			Sealing pipe and insulation above and below ground from moisture, acids, alkalies, weathering, and abrasion.			General weather resistant tape for sealing joints of weather barrier jackets and sheet metal duct.		
APPLICATION	Spiral wrap by hand or machine.			Spiral wrap by hand or machine, with 1/4 in. to 1/2 in. overlap.			Spiral wrap.		
OTHER DATA	40 lb to 50 lb tensile strength per inch of width.			High dielectric strength.					
ADVANTAGES	Inexpensive and easy to apply.			Excellent flexible moisture barrier.			Strong, waterproof tape with fire retardant properties.		
LIMITATIONS	Lacks resistance to some solvents.			Basically an anti-corrosive barrier. Applications to thermal insulations are limited.			Poor resistance to ketone type solvents.		

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GENERAL DESCRIPTION	VINYL FILM TAPE	MIN	MAX	ALUMINUM FOIL TAPE	MIN	MAX	LEAD FOIL TAPE	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Arno No. C-300 (Elec) No. C-320 Johns-Manville Trantex V-10 Trantex V-20 Vinyl Color Tape No. 128 3 M Company No. 21 No. 22 No. 30 No. 50 No. 51 No. 472 No. 473 No. 474 Mystic No. 6405 No. 6407 No. 6410 No. 6420 Permacel P 32 (4.5 mil) Polyken No. 852 (0.007 in.) No. 872 (0.010 in.)	-20 32 32 - - 0 0	200 175 175 - - 178 176	Alumiseal Zero Perm Johns-Manville No. 330 3 M Company No. 425 (0.003 in.) No. 428 (0.0055 in.) Permacel P-112	-76	175	3 M Company No. 420 Permacel P-141		
BASIC MATERIALS AND AVAILABLE FORMS	Vinyl plastic tape with transparent, pressure sensitive, synthetic rubber adhesive. Available in a variety of colors.			Aluminum foil with special plastic backing and pressure sensitive synthetic rubber adhesive. (No. 425 and No. 428 do not have plastic backing)			Lead foil with plastic liner and synthetic rubber base adhesive.		
USES	Vapor seal on both rigid and flexible insulation materials with plastic, foil or paper backing. Also for pipe coding and marking, electrical insulation, and floor marking. Furnished according to grade and specification.			Vapor sealing joints in aluminum foil backed insulation and metal duct joints.			Moisture and radiation barrier for joints in aluminum sheets installed as insulation of cold rooms.		
APPLICATION	Wrap directly from roll.			Should be smoothed over applied surface and pressed down firmly. Not recommended for spiral wrapping.			Tape must be removed from liner without breakage or slivering. Edges should be "feathered" by rubbing with a rounded surface such as a door knob.		
OTHER DATA	Some tapes have fire resistant properties, check manufacturers' specifications.			Good heat resistance and waterproofing qualities.			Used in electroplating operations.		
ADVANTAGES	Dead stretch properties are ideal for wrapping irregular surfaces. Economical, easy to apply, and low MVT vapor barrier.			Good aging properties both indoors and outdoors. Will expand and contract readily with changes in temperature.			Good conformability, excellent weathering and good thermal resistance.		
LIMITATIONS	Poor resistance to ketone type solvents.			Will not withstand concentrations of acid or caustic solutions.			Darkens with age.		

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ACCESSORIES
REINFORCING MEMBRANES

GENERAL DESCRIPTION	POLYETHYLENE COATED CLOTH TAPE			KNITTED TAPE					
		MIN	MAX		MIN	MAX		MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Arno C-520	-50	180	Foster Sealfas Lagging Tape					
BASIC MATERIALS AND AVAILABLE FORMS	Polyethylene film over cloth base with rubber based pressure sensitive adhesive.								
USES	General weather resistant tape for sealing joints of weather barrier jackets and sheet metal duct.								
APPLICATION	Spiral wrap.								
OTHER DATA									
ADVANTAGES	Low MVT vapor barrier.								
LIMITATIONS									

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GENERAL DESCRIPTION	CANVAS SHEETING	MIN	MAX	ASBESTOS FELT (Asphalt Saturated)	MIN	MAX	FIBER GLASS MAT (Asphalt Coated)	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Fabric Distributing Company *Foster*			Carey *Johns-Manville* No. 50 Double Coated Flexstone *Firetard Jacket (FR)* Pabco			Pabco Pabcoglas Perma Glas-Mesh Roofing Mat Type 211		
BASIC MATERIALS AND AVAILABLE FORMS	Woven cotton cloth. Grade and weave as specified. Available in a variety of colors.			Asphalt saturated, asbestos felt, coated with mineral filled asphalt.			Glass fiber mat, asphalt coated.		
USES	Lagging cloth jacket over rigid type insulation.			Weatherproofing pipe insulation.			Roofing and pipe insulation wrap.		
APPLICATION	Cloth is sewed over insulation coated with lagging coating. After drying, canvas is given a second coat.			Wire or band in place over insulation.			Wire or band in place over insulation		
OTHER DATA	Coating used is a PVA emulsion.			Some brands have fire-retardant properties.			Basically a roofing material.		
ADVANTAGES	Clean, decorative weather barrier jacket.			Inexpensive, easy to apply weatherproofing.			Inexpensive, easy to apply weatherproofing.		
LIMITATIONS	Not a vapor barrier.			Less abrasion resistance than most other type jackets.			Little resistance to most solvents.		

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GENERAL DESCRIPTION	FIBER GLASS FABRIC (Tar Coated)	MIN	MAX	POLYVINYL CHLORIDE FILM	MIN	MAX	POLYESTER FILM	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Perma Glas-Mesh Perma Film Jacket			Miracle Adhesive Protekinsul			Dupont Mylar		
BASIC MATERIALS AND AVAILABLE FORMS	Close weave glass fiber with an application of 20 to 70 mils thickness of tar.			Prefabricated polyvinyl chloride film outer jacket.			Tough clear plastic film.		
USES	Wrapping of insulated pipes, boilers, tanks, etc.			Cover and protect insulation against weather, abrasion and chemicals.			Jacket for rigid type insulation.		
APPLICATION	Applied over hot surfaces and torch heated. Melted tar produces the necessary adhesion.			Furnished to specified pipe circumferences. Has moistureproof zipper type closure that seals jacket in place.			Held in place with strapping or adhesive.		
OTHER DATA	Can be used on underground piping.			Cut to desired length with ordinary scissors.			Available in tape form.		
ADVANTAGES	Easy to apply.			Easy to apply.			Very high tensile strength.		
LIMITATIONS	Should not be used over asphaltic materials as certain types of tars and asphalts are noncompatible.			Will not withstand flame impingement.			More expensive than most other jacketing materials.		

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GENERAL DESCRIPTION	PREFORMED ALUMINUM	MIN	MAX	PREFORMED STAINLESS STEEL	MIN	MAX	PREFORMED ALUMINUM FITTING JACKETS	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Aseeco Childers Roll Jacketing Corrugated (Sheet) Fleet Marking Alumicor Insul-Coustic Al-Cor-Jac Preformed Metal Premetco Smith Products Smith Aluminum			Insul-Coustic Metal-Clad Mirror Insulation Company	-365 -365	2500 2500	Aseeco Regular Humped Childers Ell-Jacs Mirror Insulation Company		
BASIC MATERIALS AND AVAILABLE FORMS	Preformed aluminum jacketing sheet. Available in various thicknesses and grades. Supplied with a moisture barrier inner-coating to protect jacket from galvanic and corrosive action due to alkaline migration.			Preformed, precut stainless steel jacket with sealed seams and joints. Gauge and type furnished as specified.			Aluminum preformed insulation jackets, fabricated to fit standard pipe fittings. Sizes and grade as specified with moisture barrier inner liner.		
USES	An all-purpose piping and equipment jacketing material to protect insulation from weather, heat, abrasion and chemical spillage.			All-purpose insulation jacket, resistant to heat, fire, weather, corrosion, abrasion and chemicals.			Protect pipe insulation over fittings, especially at elbows.		
APPLICATION	Fastened with aluminum strapping, aluminum sheet metal screws or aluminum rivets. Some brands are furnished with special self-sealing seams and joints.			Fastened with stainless steel strapping. Furnished with special self-sealing seams and joints. Can also be sealed with a specified mastic.			The two matching halves are fastened in place with aluminum bands or aluminum sheet metal screws.		
OTHER DATA	The term preformed applies to the curved characteristic of aluminum sheet as it comes from the roll. Also available in sheet form.			Can be fabricated to fit pipe, tanks and other cylindrical equipment.			Humped type elbow jackets are designed to fit a combination of interchangeable sizes but should not be used where exposed to physical abuse.		
ADVANTAGES	Can be removed and replace without damage. Low emissivity.			Can be removed and replaced without damage. Maintenance free.			Maintenance free, easy to install insulation jacket for pipe fittings.		
LIMITATIONS	Aluminum jacketing is not recommended for highly alkaline areas. Will have higher surface temperature than stainless steel jacketing under like conditions.			Higher initial cost than aluminum.			Not recommended for highly alkaline areas. Should not be used in combination with jackets other than aluminum.		

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ACCESSORIES
JACKETS

GENERAL DESCRIPTION	PREFORMED STAINLESS STEEL FITTING JACKETS	MIN	MAX	PREJACKETED INSULATION (Aluminum)	MIN	MAX	PREJACKETED INSULATION (Stainless Steel)	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Insul-Coustic Mirror Insulation Smith Products Lock-On			Carey Johns-Manville Metal-On Owens-Corning Pabco Pittsburgh-Corning Preformed Metal Pemetco (With fittings included)			Carey Johns-Manville Metal-On Owens-Corning Pabco Pittsburgh-Corning		
BASIC MATERIALS AND AVAILABLE FORMS	Preformed stainless steel insulation jacket, shop fabricated to fit standard pipe fittings. Sizes and type as specified.			Aluminum jacket with inner moisture barrier coating, factory attached to specified insulation material. Thickness, and grade of aluminum can be furnished as specified.			Stainless steel jacket, factory attached to specified insulation. Thickness and type as specified.		
USES	Protect pipe insulation over fittings.			Quickly installed prejacketed insulation used on hot or cold piping. Fire, weather and chemical resistant.			All-purpose, quickly installed pipe insulation and jacket.		
APPLICATION	Fastened in place with stainless steel bands or stainless steel sheet metal screws.			Snaps on over pipe and seals with special lock seam. End joints are sealed with mechanically applied aluminum bands.			Snaps on over pipe, and seals with special lock seam. End joints are sealed with mechanically applied stainless steel bands.		
OTHER DATA	Can be fabricated to fit special fittings and shapes according to specifications.			Higher material cost is offset by savings on installation.			Higher material cost is offset by savings on installation and longer service life.		
ADVANTAGES	All-purpose, maintenance free jacket.			Can be installed or removed quickly without damage. Useful in areas effected by production shut downs.			An all-purpose maintenance free jacket.		
LIMITATIONS	Restricted to special installations due to higher initial cost.			Use in highly alkaline areas is not recommended.					

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GENERAL DESCRIPTION	POLYVINYL FLUORIDE	MIN	MAX	PREJACKETED INSULATION (Reinforced Plastic)	MIN	MAX	PRECASED INSULATED PIPING SYSTEM	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Ruberoid TNA-100	-50	300	Insul-Coustic Armor-Cote	-100	400	Kaiser Ebko Porter-Hayden Ric-Wil		
BASIC MATERIALS AND AVAILABLE FORMS	Polyvinyl fluoride film laminated to neoprene saturated asbestos felt.			1/8 in. thick reinforced plastic jacket, factory applied to specified insulation. Furnished to fit standard pipe and fittings according to specifications.			Prefabricated piping with applied insulation as specified and enclosed in a prefabricated air testable conduit.		
USES	Protects insulation against vapor, water, and weather.			For indoor and outdoor pipe insulation under chemical conditions where periodic washdowns are required. Also used for underground piping.			For underground and overhead piping systems.		
APPLICATION	Wire, band or cement in place over insulation.			Fastens in place with special sealing bands. Joints and seams are sealed with joint cement.			Installed in prefabricated sections with welded conduit connectors or special flange connections.		
OTHER DATA	Low permeability. Fire resistant.			No additional vapor seal is required for cold service.			Detailed drawings and specifications are usually furnished by manufacturer.		
ADVANTAGES	Excellent weathering. Flexible, White.			Lightweight and easy to apply. Resistant to solvents, acids and alkalies.			Several different size lines can be included inside the same conduit.		
LIMITATIONS				Some heat distortion is encountered at 220 F.			High initial cost.		

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GENERAL DESCRIPTION	ELLIPTICAL HEAD JACKET (Aluminum)								
		MIN	MAX		MIN	MAX		MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Preformed Metal Prometco								
BASIC MATERIALS AND AVAILABLE FORMS	Factory fabricated elliptical head jacket, furnished in diameters from 1 foot to 13 feet.								
USES	To cover elliptical heads.								
APPLICATION	Attached to side wall jacketing by 6 inch flange extension.								
OTHER DATA	Inside surface is coated with a baked-on epoxy moisutre barrier.								
ADVANTAGES	Assures uniform fit. Can be removed and replaced without damage.								
LIMITATIONS	Over 42 in. diameter heads are shipped in segments for assembly on the job.								

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GENERAL DESCRIPTION	GRIP NAILS			MACHINE DRIVEN NAILS - STAPLES AND PINS			STAPLES		
		MIN	MAX		MIN	MAX		MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Owens Corning	-459	1000	Spot Nails Boatitch Calwire Brand			Acme Steel Boatitch A. J. Gerrard Keystone Steel and Wire Spot Nails		
BASIC MATERIALS AND AVAILABLE FORMS	Steel			Nails, stapled and pins available in a variety of sizes and grades. Different metals and coatings can be furnished as specified. A special pneumatic or mallet-operated gun is required to drive these fasteners.			Stainless steel or carbon steel.		
USES	Attaching insulation to sheet metal ducts.			Attaching insulation to wood framing, sheathing or sheet metal surfaces.			Secure insulation together and to wood surfaces.		
APPLICATION	Place insulation over steel to be covered (surface must have firm, hard support). Drive nail through insulation into steel. Nail penetrates half-way through metal and pinches for strong grip.			Driven with a special pneumatic or mallet-operated tool or gun.			Driven with special hand-operated stapling machine or hand driven.		
OTHER DATA									
ADVANTAGES									
LIMITATIONS	Corrodes in acid and caustic.								

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GENERAL DESCRIPTION	RIVETS	MIN	MAX	INSULATION CLIPS	MIN	MAX	SURFACE ANCHORS	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Aseeco Insul-Coustic Pli-Grip			Laxsuco Inc.			Miracle Adhesives Miracle Anchors Moore Gemco Tuff-Weld Stick-Klip (Metal)		
BASIC MATERIALS AND AVAILABLE FORMS	Aluminum and stainless steel rivets with special rivet gun.			Steel or aluminum.			Consists of metal or nylon base with a spindle or prong extending from center.		
USES	Fastening aluminum, stainless steel and other metal jackets.			Secure insulation to light gauge metal (Maximum 16 gauge mild stainless)			Attaching and supporting insulation to masonry, wood or metal surfaces.		
APPLICATION				Using rubber mallet, drive clip through insulation and metal, engaging automatic locking tongue.			Plates are cemented to desired surfaces and insulation is attached. Self-locking washers are placed on spindle to hold insulation firmly in place.		
OTHER DATA									
ADVANTAGES									
LIMITATIONS									

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GENERAL DESCRIPTION	WELD NUTS	MIN	MAX	WELDED STUDS, PINS AND CLIPS	MIN	MAX	METAL STRAPPING AND CLIPS	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Shop Fabricated Local Suppliers			KSM Products KSM Stud Weld-Arc KSM C.D. Stud Weld Nelson Stud Welding Nel Weld			Acme Steel Aseeco A.J. Gerrard Insul-Caustic KSM Products Lexauco, Inc. Smith Products Stanley Techalloy		
BASIC MATERIALS AND AVAILABLE FORMS	1/2 in. square steel nuts punched but not threaded.			Steel studs and fastening devices for welding to metal surfaces. Also steel pins (nails 10 gauge and 12 gauge) for welding to ducts and tanks. Can be furnished in mild or stainless steel.			Metal strapping and clips can be obtained in various widths and thicknesses and in different metals.		
USES	Providing anchor points for wires to secure insulation to tanks and other metal surfaces.			Providing anchor points to support and secure insulation to tanks and other metal surfaces.			Securing insulation to pipes and equipment.		
APPLICATION	Welded to metal surfaces on which insulation is to be applied.			Studs are welded to metal surfaces with a portable arc stud welding gun. Pins are welded with a portable power unit and portable capacitor discharge type gun.			Applied around insulation, then tightened, cut to length and clip sealed with a special tool.		
OTHER DATA				Capacitor discharge (CD) method is used on thick metal while arc method is usually used on thicker metal					
ADVANTAGES				Fast method of providing anchors for insulation.					
LIMITATIONS									

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GENERAL DESCRIPTION	METAL STRAPPING (Formative)	MIN	MAX	ANGLE PINS	MIN	MAX	LATH CLIPS	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Acro Acroflex			Pittsburgh-Corning PC Angle Pins			Pittsburgh-Corning Lath Clips		
BASIC MATERIALS AND AVAILABLE FORMS	Formative steel strapping. Consists of a continuous series of angular connected links in 6 foot lengths. Angular lengths are pierced with holes.			Metal. 5 in. x 3/4 in. x 1 in.			Metal		
USES	Can be used to make insulation supports and clamps. Also for formation of safety guards.			Fasten cellular glass blocks to newly poured concrete ceilings.			Fasten wire mesh or lath to cellular glass which is to receive a gypsum plaster.		
APPLICATION	Bend to shape desired.			Inserted into insulation with bent end protruding. Concrete is then poured on insulation.			Clip is inserted in cellular glass on 16 inch centers.		
OTHER DATA	Stamped of 20 gauge steel.			Pins are inserted in cellular glass at a 45 degree angle.			Push-in type spring clips.		
ADVANTAGES									
LIMITATIONS									

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GENERAL DESCRIPTION	STRAP FINGERS	MIN	MAX	EXPANDER BANDS	MIN	MAX	CLAMPS AND SPACERS FOR TRACER LINES	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	A. J. Gerrard			A.J. Gerrard Techalloy			A.J. Gerrard Shop Fabricated		
BASIC MATERIALS AND AVAILABLE FORMS	Die cut stainless steel strap fingers and fasteners. Available in various sizes and materials as specified.			Metal strapping bands corrugated or spring loaded to provide tension. Available in a variety of sizes and materials as specified.			Carbon steel fabricated according to UCCC Standard P-84A.		
USES	Supporting and centering cross strapping around insulation. May be used to transmit vertical load to horizontal straps and to anchor head straps on insulated vessels.			Allow expansion and contraction without damage to insulation.			Support and position steam tracer line before insulation is applied.		
APPLICATION	Secured with special fasteners.			Strapping is cut to desired lengths and spliced with special fasteners.			Bolted in place according to UCCC Standard P-84.		
OTHER DATA									
ADVANTAGES									
LIMITATIONS									

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ACCESSORIES
FASTENERS

GENERAL DESCRIPTION	CRADLES AND SADDLES	MIN	MAX	"T" BARS	MIN	MAX	ANNEALED WIRE	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Insul-Caustic *Insul Shield* Shop Fabricated			Shop Fabricated			Keystone Steel and Wire Local Suppliers		
BASIC MATERIALS AND AVAILABLE FORMS	Steel cradles and saddles fabricated to fit insulated pipe. Supported by attached steel hangers or base plates. Furnished in sizes as specified.			Steel "T" shaped bars welded together and shaped to fit holes in insulation fire brick.			Flexible annealed wire available in a variety of sizes, grades and materials.		
USES	Support pipe and insulation with no metal through insulation.			Secure brick to inside of ducts.			Securing block and pipe insulation to pipe, heads and irregular shapes.		
APPLICATION	Locate according to standard pipe support spacing. Half-sections of insulation are inserted between pipe and saddle and all joints are sealed to protect vapor seal.			Shaped to fit holes in insulation fire brick and welded together.			Loop around pipe insulation with ends, twisted to tighten and fasten together. Also used to attach insulation to anchor points.		
OTHER DATA									
ADVANTAGES									
LIMITATIONS									

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GENERAL DESCRIPTION	GLASS FILAMENT STRAPPING TAPE (Vinyl Reinforced)	MIN	MAX	GLASS FIBER TYING CORD	MIN	MAX	GLASS CLOTH TAPE	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Johns-Manville Dutch Brand No. 400			Owens-Corning	-300	1000	Mystic Hi-Low Temp Glass Cloth	-110	550
BASIC MATERIALS AND AVAILABLE FORMS	Vinyl backing, reinforced with glass strands. Pressure sensitive rubber base adhesive. Widths 1/2 in, 3/4 in., 1 in., and others. Length 60 yards. Thickness 12.5 mils.			Glass fiber threads made into cord with beeswax sizing.			Glass cloth tape with pressure sensitive silicone adhesive. Widths of 1/4 in. to 1 in. Lengths of 30 yards on 3 in. core. Thickness is 0.009 in.		
USES	Strapping tape.			Tying flexible duct insulation in place.			Isolation of dissimilar metals on heat traced lines to prevent galvanic corrosion.		
APPLICATION	Pressure sensitive.			Apply flexible insulation to duct by wrapping typing cord around insulation and knot.			Excellent acid, oil and water resistance. Fair solvent resistance.		
OTHER DATA	Colors available.						Good thermal and electrical properties.		
ADVANTAGES	Waterproof.								
LIMITATIONS									

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ACCESSORIES
TOOLS

GENERAL DESCRIPTION	MITRE KNIFE			RIVET GUN			STRAP STRETCHER		
		MIN	MAX		MIN	MAX		MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Insul-Coustic Owens-Corning			Aseeco Insul-Coustic *Pli-Grip*			Acme Steel A. J. Gerrard Stanley		
BASIC MATERIALS AND AVAILABLE FORMS	Adjustable knife blade mounted in flat surface guide.			One hand, grip operated aluminum rivet gun.			Grip operated band tightener.		
USES	Cut off knife. Cut miter joints in glass fiber or mineral wool type insulation.			Setting blind rivets for fastening aluminum jacketing on pipe insulation, tanks, and towers.			Strapping insulation to pipe and equipment.		
APPLICATION	Adjust blade to depth and angle of cut. Slide blade holder over surface, guided by a straight edge.			Insert loaded rivet gun in prepared hole and squeeze to set.			Tighten and hold band until sealer can be applied.		
OTHER DATA									
ADVANTAGES									
LIMITATIONS									

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ACCESSORIES
TOOLS

GENERAL DESCRIPTION	STRAP SEALER	MIN	MAX	STAPLE AND NAILER GUN	MIN	MAX	STUD WELDING GUN	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Acme Steel A. J. Gerrard Stanley			Spotnails			KSM Products KSM Stud Weld Nelson Stud Welding Nel Weld		
BASIC MATERIALS AND AVAILABLE FORMS	Lever operated seal clip crimper.			Pneumatic or mallet operated nailer gun. Also available in grip operated models.			Pistol type stud welding gun with a selection of power sources available to meet most application requirements.		
USES	Crimp seal-clip in place fastening ends of strap together after being tightened.			Driving nails, pins and staples which are available in an assortment of shapes, sizes, and materials.			High speed precision welding of studs and fasteners for supporting and securing insulation to steel tanks and equipment.		
APPLICATION				Low pressure air operated gun with push-button or trigger control.					
OTHER DATA									
ADVANTAGES									
LIMITATIONS									

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ACCESSORIES
MISCELLANEOUS

GENERAL DESCRIPTION	ANTI-ABRASION COATING	MIN	MAX	ANTI-ABRASION COATING	MIN	MAX	BEDDING COMPOUND	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Dampney Dampney No. 70 Black	-400	800	Carboline Polyclad 933-9 Foster 30-16 (FR) Pittsburgh-Corning Compound 1-A Vimasco Vicarlon No. 500	-320 -350 -327	350 300 400	Arabol M-33-B Insul-Coustic Sure Joint IC405 Pittsburgh-Corning Pittseal III	-100 -100	300 300
BASIC MATERIALS AND AVAILABLE FORMS				Modified solvent type vinyl coating.			Plastic base.		
USES	Application to cellular glass insulation surfaces to resist abrasion.			Application to cellular glass insulation surfaces to resist abrasion.			Insulation joint sealer and bedding compound.		
APPLICATION	Brush or spray.			Brush or spray.			Trowel or caulking gun.		
OTHER DATA	300 square feet per gallon coverage.						Meets Specification MIL-B-19564.		
ADVANTAGES				Will not support combustion in dry state.			Resistant to fire, solvent, acid and alkali.		
LIMITATIONS				Not solvent resistant.					

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GENERAL DESCRIPTION	HEAT RESISTANT COATING	MIN	MAX	HEAT TRANSFER CEMENT	MIN	MAX	COLD WATER PASTE	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Foster 57 x 50	-100	1200	Chemax Tracit Pac-O-Power Tempcon Plastics Thermon Standard T-85 (Weatherproof) T-63 T-5 (Cooling Only)	 -320 - 90 -320 - 90	 750 375 1250 125 to 180	Morningstar-Paisley No. 46-671 Reardon Supercel Paste		
BASIC MATERIALS AND AVAILABLE FORMS	Dark gray coating. Known as "Bore Coating" to the trade.			Inorganic, non-toxic, heat transfer cements.			Glue size wheat cereal cold water paste.		
USES	High temperature lagging adhesive and heavy bodied solvent coating used for stress corrosion inhibition.			Conducting heat efficiently from electric resistance type heating elements or steam tracing to pipe, valves, tanks, platens and dies. Must be applied in conjunction with thermal insulation.			Attaching canvas jacket to high temperature insulation.		
APPLICATION	Spray or brush.			Hand trowelling or with gun.			Mix powder with cold water to consistency desired.		
OTHER DATA	Inhibits stress corrosion in stainless steel when applied as a coating under insulation.								
ADVANTAGES	Also used a high temperature flashing.			Excellent mechanical and thermal shock.			Very inexpensive.		
LIMITATIONS							Not water resistant.		

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GENERAL DESCRIPTION	SOUND BARRIER TYPE FACING FOR THERMAL INSULATION	MIN	MAX	HEAT TRANSFER UNIT	MIN	MAX		MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Cordo Coustitab			Thermon Heat Transfer Unit		375			
BASIC MATERIALS AND AVAILABLE FORMS	Lead-containing, vinyl-coated glass or cotton woven fabric. With or without aluminum foil on one side. Available in pressure sensitive tape.			Consists of two sheets of copper bonded together and expanded to form a panel with channels permitting heat transfer fluids to be circulated. Heat transfer cement is already in place on one side.					
USES	Abating noise and vibration. Can be used as facing for thermal insulation. Many other uses such as radiation barrier.			To maintain storage temperatures and provide heating or cooling for low heat load.					
APPLICATION	Applied with flexible damping adhesive to metal, wood and insulation.			Applied to outside surface.					
OTHER DATA	Used in abating noise and vibration in everything from jet liners to electric typewriters.			Stocked flat in large quantities. Made for curved surfaces.					
ADVANTAGES	Flame retardant.			Efficient heat transfer. Even temperature distribution.					
LIMITATIONS	Little thermal insulating properties.								

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