

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

THERMAL INSULATION AND ACCESSORIES
MANUAL

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TECHNICAL CENTER
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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-Cooustic Corporation is 42-23 54th Road

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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.

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		Fiberglass F-13	Fiberglass XB Board	Fiberglass 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 48" ID, wall thickness 0.05" to 1.0"
ABRASION RESISTANCE % weight loss	1st RUN	20		
	2nd RUN	80		
ALKALINITY, pH				
CAPILLARITY, % by weight				
COEFFICIENT OF EXPANSION				
COMBUSTIBILITY	FLASH	Noncombustible	Noncombustible	Paper binder burns out. Does not explode.
	FLAME MELTING	3200 F	3200 F	3200 F
CORROSION - RUSTING				
CORROSION - STRESS				
CRACKING - HOT SURFACE				
DENSITY, lb./cu ft		12 to 20	25	30 to 40.2
DIMP RESISTANCE				
HARDNESS, in. penetration				
HYGROSCOPICITY, % by weight				
RESISTANCE TO ACIDS		Good at room temperature except HF and H ₂ PO ₄	Good	Good at room temperatures except HF and H ₂ PO 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	0.1% @ 1500 F	0.1% @ 1500 F	0.4% @ 2200 F
	VOLUMETRIC	4.0% @ 2000 F	4.0% @ 2000 F	3.1% @ 1800 F
SPECIFIC GRAVITY	REAL	0.18 to 0.35	0.40	0.48 to 0.88
	APPARENT			
SPECIFIC HEAT, Btu / lb				
STRENGTH - COMPRESSIVE, psi				
STRENGTH - FLEXURAL, psi				
STRENGTH - SHEAR, psi				
STRENGTH - TENSILE, psi				
TEMPERATURE RANGE	CONTINUOUS	Atmos Min 2000 F Max	Atmos Min 2000 F Max	Atmos Min 2000 F Max
	SHORT PERIOD	Atmos Min 2200 F Max	Atmos Min 2300 F Max	Atmos Min 2300 F Max
	CYCLIC	Atmos Min 2200 F Max	Atmos Min 2300 F Max	Atmos Min 2300 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY, Btu / in / sq ft / deg F / hr		0.36 @ 400 F	0.5 @ 500 F	0.60 @ 600 F
		0.88 @ 1000 F	1.2 @ 2000 F	1.31 @ 1500 F
		1.25 @ 2000 F	1.1 @ 1500 F	1.41 @ 2000 F
THERMAL DIFFUSIVITY, sq ft / hour		1.48 @ 1500 F		
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. Good for fire tubes, combustion chamber liners, furnace liners and insulating sheets.
LIMITATIONS				

CHARACTERISTICS

BLOCK, BOARD AND PREFORMED PIPE COVERING

GENERIC CLASS NUMBER		4	5	6
INSULATION TRADE NAMES		Capsulac, Unibestos No. 1200	Concre insulation	Asbestos Sponge Felt, Best Felt, Asbestos Sponge.
BASIC MATERIAL		Amosite asbestos and diatomaceous siliceous	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	1st RUN 2nd RUN		Not applicable	
ALKALINITY, pH		10 to 11	7 to 8	8.4
CAPILLARITY, % by weight		High	High	High
COEFFICIENT OF EXPANSION		25×10^{-6}		
COMBUSTIBILITY	FLASH FLAME MELTING	Noncombustible		Noncombustible
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 16	10 to 20
DROP RESISTANCE			Not applicable	
HARDNESS, 1/16" penetration		Less than 0.43	Not applicable	
HYDROSCOPICITY, % 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 VOLUMETRIC	0.04 % @ 750 F 0.05 % @ 1200 F		0.3 % @ 200 F
SPECIFIC GRAVITY	REAL APPARENT	0.21 to 0.22	0.207	0.42 to 0.53
SPECIFIC HEAT, Btu / lb		0.33	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 RESISTANCE	CONTINUOUS SHORT PERIOD CYCLIC	Atmos Min 1200 F Max Atmos Min 3200 F Max Atmos Min 1200 F Max	Atmos Min 500 F Max Atmos Min 500 F Max Atmos Min 500 F Max	Atmos Min 700 F Max Atmos Min 700 F Max Atmos Min 500 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING		No evidence	No evidence	
THERMAL CONDUCTIVITY, Btu / (hr sq ft deg F / in.)		0.22 @ 100 F 0.27 @ 200 F 0.42 @ 300 F	0.41 @ 100 F 0.52 @ 200 F 0.57 @ 300 F	0.21 @ 100 F 0.32 @ 200 F 0.39 @ 300 F
THERMAL DIFFUSIVITY, sq ft / hour		0.005 @ 400 F and 1200 F	0.21 @ 200 F	0.001 @ 200 F and 300 F
THERMAL SHOCK RESISTANCE		Excellent	Excellent	Good
VIBRATION RESISTANCE		Excellent	Excellent	Good
WARPAGE - IN SERVICE		None	None	
WATER ABSORPTION, % by weight		500	High	High
WATER VAPOR TRANSMISSION		200 to 300 perm-inches	200 to 300 perm-inches	
ADVANTAGES		Relatively high strength. Can be preheated. Resists fracture.	For use on tubes and bent piping. Available in plain or waterproof jacket.	Fast, high tensile strength.
DISADVANTAGES		Loses some of its strength when wet. Only partly satisfactory for bridging gaps.	Must be pushed over pipes and tubes before their erection.	Will not stay in place round on horizontal tubes.

CHARACTERISTICS BLOCK, BOARD AND PREFORMED PIPE COVERING

GENERIC CLASS NUMBER		7	8	9
INSULATION TRADE NAMES		Defenders, A-Dent	Air Cell, Asbestocel	Asbestogel, Deluxe Stonewall, Ply-F-Lux
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	1st RUN			
	2nd RUN			
ALKALINITY, pH			10.4	7 to 11
CAPILLARITY, % by weight				
COEFFICIENT OF EXPANSION				
CONDUCTIBILITY	FLASH	Incombustible	Incombustible	Incombustible
	FLAME MELTING			2300 F
CORROSION - RUSTING				Does not contribute
CORROSION - STRESS				
CRACKING - HOT SURFACE				
DENSITY, lb / cu ft			9 to 17	95 to 115
DROPP RESISTANCE				
HARDNESS, no. 9 penetration				
HYGROSCOPICITY, % by weight				5
RESISTANCE TO ACIDS				Not acid resistant
RESISTANCE TO CAUSTICS				Fair
RESISTANCE TO SOLVENTS			Not affected	Good
SHRINKAGE - HEAT	LINEAR		1 - 3 % @ 200 F	
	VOLUMETRIC			
SPECIFIC GRAVITY	REAL		0.35 to 0.27	1.5 to 1.8
	APPARENT			
SPECIFIC HEAT, Btu / lb				
STRENGTH - COMPRESSIVE, psi				14000
STRENGTH - FLEXURAL, psi				
STRENGTH - SHEAR, psi				
STRENGTH - TENSILE, psi				1775 and 2330
TEMPERATURE RANGE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	Ambient Min	550 F Max	Ambient Min 300 F Max
		Ambient Min	350 F Max	Ambient Min 300 F Max
		Ambient Min	350 F Max	Ambient Min 300 F Max
		Ambient Min	350 F Max	Ambient Min 300 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY, Btu / (hr sq ft deg F / in.)		0.45 @ 100 F 0.52 @ 200 F 0.60 @ 300 F	0.47 @ 400 F	0.47 @ 100 F to 0.51 @ 100 F 0.51 @ 200 F to 0.54 @ 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 24
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 preformed. 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

GENERAL CLASS NUMBER		10	11	12
INSULATION TRADE NAMES		Transite, Perma-board	Asbestos Millboards, Asbestos Millboard (G, 102, 112 and "C"), Detroit Board	L. K. Thermosil Thermoboard, Ray-Therm, Tri-Cable, Kaylo, Caltemp, Cubelite, Calcium Silicate, Hylb
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	1st RUN			20 to 25
	2nd RUN			20 to 40
WEIGHT LOSS				
ALGALGITY, %		7 to 13		8 to 11
CAPILLARITY, % by weight				42 to 525
COEFFICIENT OF EXPANSION				2.8×10^{-5}
COMBUSTIBILITY	FLASH	Incandescence	Incandescence	Incandescence
	FLAME MELTING	1500 F		
CORROSION - RUSTING				Will not cause steel to rust
CORROSION - STRESS				Stress may be produced
CRACKING - HOT SURFACE				Some manufacturers' products will not surface crack
DENSITY, lb/cu ft		100 to 125	50 to 80	10 to 13
DROP RESISTANCE				
HARDNESS, non-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			1.5% @ 1200 F
	VOLUMETRIC			0.2% @ 1000 F
SPECIFIC GRAVITY	REAL	1.4 to 1.6	0.30 to 0.36	2.3 to 2.6
	APPARENT			0.11 to 0.12
SPECIFIC HEAT, Btu / lb				0.22 to 0.24
STRENGTH - COMPRESSIVE, psi				15 to 185 @ 5% deformation 120 to 265 @ 10% deformation
STRENGTH - TENSILE, psi				50 to 75
STRENGTH - BENDING, psi				50 to 202
STRENGTH - TENSILE, psi				7 to 27
TEMPERATURE LIMITS	CONTINUOUS	-50 F Min	Atmos Min	Atmos Min
	SHORT PERIOD CYCLIC	400 F Max 1000 F Max	800 to 1200 F Max	1200 to 1350 F Max 1200 to 1350 F Max
TEMPERATURE LIMIT - SELF-HEATING				No evidence of self-heating unless contaminated
THERMAL CONDUCTIVITY, Btu / (hr ft ² in / deg F / ft)		1.0 @ 100 F to 1.5 @ 100 F		0.25 @ 100 F to .33 @ 100 F 0.41 @ 400 F to 0.51 @ 400 F 0.42 @ 100 F to 0.63 @ 400 F
THERMAL DIFFUSIVITY, sq ft / hour				0.013 to 0.018 @ 400 F and 12 lbs
THERMAL SHOCK RESISTANCE		Poor		Good
VIBRATION RESISTANCE				Good
WARRANTY - IN SERVICE				Some manufacturers' products will warp when used above 750 F
WATER ABSORPTION, % by weight		27		130 to 250
WATER VAPOR TRANSMISSION				21 per ft ² -in
ADVANTAGES		Hard and strong. 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 breaking shop.

BLOCK, BOARD AND PREFORMED PIPE COVERING

GENERIC CLASS NUMBER		12	14	15
INSULATION TRADE NAMES		Nafo-20, Calcilite-HI, L.K.-20.	Rouput Cork, Insulite, LT Cork, Corshoard, BB Corshoard.	Enduro, Hi Temp No 12, Superex, Hy Temp, Type 12, Fracto 12-C, No 12.
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	2 to 10	Good	20 to 30
	2nd RUN	2 to 10		20 to 30
ALSA-UNIT, in		2 to 10.5	5	7 to 8
CAPILLARITY, % by weight		High		2 to 3
COEFFICIENT OF EXPANSION			5×10^{-5}	12×10^{-5} Reheated
COMBUSTIBILITY	FLASH FLAME MELTING	Noncombustible	Will burn. Softens @ 200 F	Noncombustible
CORROSION - METALS		Will not cause steel to rust	Steel should be protected	Will not cause steel to rust
CORROSION - STEELS		Stainless must be protected		Stainless must be protected
CRACKING - HOT SURFACE				
DENSITY, lb / cu ft		11 to 12	6 to 10	21 to 25
DROP RESISTANCE				
HARDNESS, in H penetration		60	Excellent	0.10 to 0.10
HYDROPHOBICITY, % by weight		5	1.0	2 to 5
RESISTANCE TO ACIDS		Poor to fair	Fair	Good
RESISTANCE TO CAUSTICS		Good		Good
RESISTANCE TO SOLVENTS		Good		Not affected
SHRINKAGE - HEAT	LINEAR VOLUMETRIC	2.7 % @ 1000 F 0.7 % @ 1200 F		2.5 % @ 1000 F 0 to 10 % @ 1100 F
	REAL APPARENT	0.17 to 0.22	0.30 to 0.10	0.22 to 0.25 0.24 to 0.28
SPECIFIC GRAVITY				
SPECIFIC HEAT, Btu / lb		0.22	0.43	0.22 to 0.25
STRENGTH - COMPRESSIVE, psi		120 to 130 @ 3 % deformation 150 @ 10 % deformation	5 @ 5 % deformation 25 @ 25 % deformation	12 to 135 @ 5 % deformation 87 to 200 @ 10 % deformation
STRENGTH - FLEXURAL, psi		40 to 50	14 to 21	50 to 87
STRENGTH - SHEAR, psi				43 to 200
STRENGTH - TENSILE, psi				13 to 20
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	Atmos Min 1000 F Max Atmos Min 1000 F Max Atmos Min 1000 F Max	-250 F Min 200 F Max -300 F Min 220 F Max -300 F Min 220 F Max	Atmos Min 1000 F Max Atmos Min 1000 F Max Atmos Min 1000 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.)		0.15 @ 200 F to 0.22 @ 200 F 0.24 @ 400 F to 0.30 @ 400 F 0.40 @ 600 F to 0.50 @ 600 F	0.23 @ -30 F 0.24 @ 0 F 0.26 @ 50 F to 0.27 @ 10 F	0.04 @ 500 F to 0.22 @ 300 F 0.24 @ 500 F to 0.28 @ 500 F 0.27 @ 500 F to 0.31 @ 500 F
THERMAL DIFFUSIVITY, sq ft / hour		0.016 @ 200 F and 12 in	0.0916 @ 0 F and 12 in	0.000 to 0.012 @ 300 F
THERMAL SHOCK RESISTANCE		Excellent	Good	Excellent
VIBRATION RESISTANCE		Good	Excellent	Good
WARPAGE - IN SERVICE				
WATER ABSORPTION, % by weight		Fair		20 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.	Resistant to all wetland contraction and expansion. Can be prefabricated.	Handles well, particularly where required as under layer covering.
LIMITATIONS		When broken, pieces fall apart. Not suitable for bridging gaps.	Will warp slightly and pull apart. Depends on vapor barrier for effective low temperature service.	Loses most of strength when wet. Unsuitable to bridge gaps. Difficult to prefabricate.

CHARACTERISTICS

BLOCK, BOARD AND PREFORMED PIPE COVERING

GENERAL CLASS NUMBER		16	17	18
INSULATION TRADE NAMES		Supercel 44, Type M, Praxair 13-C.	Marinite No. 23, Marprene No. 35, Marinite No. 63, Unarboard.	Yamaguchi
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	1st RUN	25 to 30		Poor
	2nd RUN	45 to 55		
ALKALINITY, pH		3	8 to 11	7.5
CAPILLARITY, % by weight		240	High	None
COEFFICIENT OF EXPANSION		58 x 10 ⁻⁶ Released	5 x 10 ⁻⁶	48 x 10 ⁻⁶
COMBUSTIBILITY	FLASH	Incombustible	Incombustible	Incombustible
	FLAME MELTING			1500 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 - JOY SURFACE				Will across crack
DENSITY, lb / cu ft		21 to 25	No 22-24, No 28 and 1 B-26, No 64-65	8 to 12
DROP RESISTANCE				
HARDNESS, Mohr penetration		8 to 10 to 0.60	0.10	
HYGROSCOPICITY, % by weight			0	0
RESISTANCE TO ACIDS		Good	Resistant to dilute acids	Good except HF and H ₂ SO 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	2% @ 1500 F		0% @ 600 F
	VOLUMETRIC	1 to 1.5 @ 1500 F		
SPECIFIC GRAVITY	REAL	2.2 to 2.3	No 23-0.26, No 36-0.26, No 65-2.0	2.5
	APPARENT	0.24 to 0.40		0.125 to 0.160
SPECIFIC HEAT, Btu / lb		0.25 to 0.28	0.22	0.70
STRENGTH - COMPRESSIVE, psi		120 @ 5% deformation 210 @ 10% deformation		100 @ 0% deformation
STRENGTH - FLEXURAL, psi		65 to 75	125 - 1000	25
STRENGTH - SHEAR, psi		100 to 115	125 - 500	84
STRENGTH - TENSILE, psi		35	No 22-15, 3, No 26-400, No 41-150	94
TEMPERATURE LIMITS	CONTINUOUS	Airtemp Min 1500 to 1800 F Max	Airtemp Min 800 to 1200 F Max	-450 F Min 800 F Max
	SHORT PERIOD	Airtemp Min 1500 to 1800 F Max	Airtemp Min 800 to 1200 F Max	-450 F Min 800 F Max
	CYCLIC	Airtemp Min 1500 to 1800 F Max	Airtemp Min	
TEMPERATURE RISE - SELF-INTERNAL HEATING		No evidence of self heating unless compressed	No evidence of self heating unless compressed	No self internal heating
THERMAL CONDUCTIVITY, W / (sq ft in) (in) F / sq ft		0.35 @ 500 F to 0.44 @ 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 1.43 @ 500 F to 1.75 @ 500 F	0.15 @ 50 F 0.45 @ 200 F 0.55 @ 0 F 0.60 @ 400 F 0.60 @ 70 F 0.64 @ 800 F
THERMAL DIFFUSIVITY, sq ft / hour		0.005 to 0.01 @ 500 F	0.0015 to 0.01 @ 300 F	0.015 @ 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 insulating in 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 pre-fabricated.
LIMITATIONS		Losses strength when wet. Unusable in bridge gaps. Difficult to pre-fabricate.	Not recommended under freezing-thawing conditions.	Not abrasion resistant. Must be used for explosion and combustion.

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CHARACTERISTICS

BLOCK, BOARD AND PREFORMED PIPE COVERING

GENERAL CLASS NUMBER		19	20	21
INSULATION TRADE NAMES		Foamglas Roof Insulation	Heavy Density Structural, 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	1st RUN	Poor	40	40
	2nd RUN			
DENSITY, lb / cu ft		7.5	8 to 15	8 to 10
CAPILLARITY, % by weight		None	Negligible	Negligible
COEFFICIENT OF EXPANSION		40×10^{-6}		
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 corrode	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, 100 lb penetration				
HYDROSCOPICITY, % by weight		0	0	0
RESISTANCE TO ACIDS		Good except HF and H ₂ PO ₄	Good from pH 5 to 7 except HF and H ₂ PO ₄	Good from pH 5 to 7 except HF and H ₂ PO 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	0.5% @ 400 F		
	VOLUMETRIC			
SPECIFIC GRAVITY	REAL	2.5	2.5	2.5
	APPARENT	0.125 to 0.160	0.12 Average	0.12 Average
SPECIFIC HEAT, Btu / lb		0.20	0.20	0.20
STRENGTH - COMPRESSIVE, psi		100 @ 0% deformation		
STRENGTH - FLEXURAL, psi		75	40	40
STRENGTH - SHEAR, psi		84		
STRENGTH - TENSILE, psi		84		
TEMPERATURE RANGE	CONTINUOUS	-450 F Min	-320 F Min	Ambient Min
	SHORT PERIOD CYCLIC	-450 F Min	200 to 500 F Max	150 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING		No self internal heating		
THERMAL CONDUCTIVITY, Btu / hr / sq ft / deg F / in.	0.32 @ -30 F	0.43 @ 200 F	0.14 @ 30 F	0.14 @ 75 F
	0.35 @ 0 F	0.60 @ 400 F	0.25 @ 100 F	0.25 @ 100 F
	0.38 @ 70 F	0.44 @ 600 F	0.35 @ 1000 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	330
WATER VAPOR TRANSMISSION		0	100 perm-inches	100 perm-inches
ADVANTAGES		Impervious to water	Resistant. 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.	

CHARACTERISTICS

BLOCK, BOARD AND PREFORMED PIPE COVERING

GENERIC CLASS NUMBER		22	23	24
INSULATION TRADE NAMES		One Piece, Mono-Sever, Fiber Glass Pipe Insul, Thermoglas, Superglas, Snap-On, Micro-Lok.	Fiberglass I.S. Board, Armaflex I.S. Board.	Fiberglass All Purpose Duct Insulation, Armaflex 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		8 to 10	8 to 10	8 to 10
CAPILLARITY, % by weight		0.04 to 0.25		0
COEFFICIENT OF EXPANSION				
COMBUSTIBILITY	FLASH	450 F for binders		Depends on facing
	FLAME MELTING	1200 F	1200 F	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 4, 4 Average	3 to 3 1/2	1.5 to 2.5
DROP RESISTANCE				
HANDLES, in. to penetration				
HYDROSCOPICITY, % by weight		0	0	0
RESISTANCE TO ACIDS		Good from pH 5 to 7 except HF and H ₃ PO ₄	Good from pH 5 to 7 except HF and H ₃ PO 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	2.3	1.50
	APPARENT	0.045 to 0.057	0.045 to 0.058	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 - 25		
TEMPERATURE RANGE	CONTINUOUS	-50 F Min 300 to 400 F Max	-120 F Min 700 F Max	330 F Min 350 F Max
	SHORT PERIOD CYCLIC	-30 F Min 300 to 400 F Max	-120 F Min 800 F Max	
TEMPERATURE RISE - 1/2" INTERNAL HEATING				
THERMAL CONDUCTIVITY, A (BTU IN. / SQ FT. F / IN.)	0.22 @ 70 F	0.21 @ 300 F	0.22 @ 70 F	0.24 @ 300
	0.24 @ 100 F		0.25 @ 100 F	0.41 @ 400
	0.29 @ 200 F		0.29 @ 200 F	
THERMAL DIFFUSIVITY, sq ft / hour		0.02 @ 100 F	0.02 @ 70 F	0.02 @ 70 F
THERMAL SHOCK RESISTANCE		Good	Good	
WEAR RESISTANCE		Good	Good	
WEAR - 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-parking binder.	
DISADVANTAGES		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	25	27
DISILLATION TRADE NAMES		Fiberglas PF-600 series, Armoglas PF-600 series, JSM Microlite, EPF - 600 series, Papcon - 600 series.	AE Board AE-8 Board	Armoglas Roof Insulation Fiberglas Roof Insulation
BASIC MATERIAL		Fibrous glass and binder	Fibrous glass and binder. Asphalt roofing.	Fibrous glass, binder and asphalt cover.
GENERAL FORM		Semi-rigid board	Rigid board	Board
ABRASION RESISTANCE % weight loss	1st RUN	40	40	40
	2nd RUN			
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 550 F Asphalt	425 F Asphalt 550 F Asphalt, 2400 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)	15 to 18
DROOP RESISTANCE				
HARDNESS, 30 lb penetration				
HYDROSCOPICITY, % by weight		0	0	Less than 1
RESISTANCE TO ACIDS		Good from pH 5 to 7 except HF and H ₂ PO ₄	Good from pH 5 to 7 except HF and H ₂ PO ₄	Good from pH 5 to 7 except HF and H ₂ PO 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 creosote)
SHRINKAGE - HEAT	LINEAR VOLUMETRIC			0 % @ 200 F
SPECIFIC GRAVITY	REAL APPARENT	2.5	2.5 Glass 0.88 to 0.11	2.5 Glass 0.18 to 0.38
SPECIFIC HEAT, Btu / lb		0.20	0.24	0.20
STRENGTH - COMPRESSIVE, psi		0.07 @ 10% deformation for 1 lb to 0.5 @ 10% deformation for 10 1/2 lb	3 @ 10% deformation 0.5 @ 1% deformation	10 @ 10% deformation 10 @ 25% deformation
STRENGTH - FLEXURAL, psi		3 at 1 lb to 40 at 9 lb	10	40
STRENGTH - SHEAR, psi				
STRENGTH - TENSILE, psi		0.2 to 1.0	0.70 Flatwise	
TEMPERATURE RE LIMITS	CENTINUOUS SHORT PERIOD CYCLIC	-200 to -50 F Min 250 to 450 F Max -200 to -50 F Min 250 to 450 F Max	-50 F Min 100 to 100 F Max -50 F Min 100 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)		0.26 @ 100 F to 0.31 @ 100 F 0.32 @ 200 F to 0.43 @ 200 F 0.34 @ 300 F to 0.40 @ 300 F	0.31 @ 70 F	0.24 @ 0 F 0.28 @ 100 F 0.25 @ 50 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	With puncture
VIBRATION RESISTANCE		Good	Good	Good
WARPAGE - IN SERVICE				
WATER ABSORPTION, % by weight		400 to 1000	400	
WATER VAPOR TRANSMISSION		100 perm-inches	2 perm-inches	Less than 0.05 perm-inches
ADVANTAGES		Nonflammable, low conductivity. Wide range of densities and strengths for varied usage.	Lightweight, Resistant.	Lightweight, Resistant.
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.

CHARACTERISTICS

BLOCK, BOARD AND PREFORMED PIPE COVERING

GENERAL CLASS NUMBER	28	29	30
INSULATION TRADE NAMES	Frost Proof, Zero, Non Frost, Built Up Hairfelt, Protecto.	65% Mag., Thermafelt, Super Light, Custom Molded Magnesium, Precision Molded Magnesium.	Block Insul, Armatex, MW Block, Mopu-Block, Grip Tex, PV Super-Temp, Webers MT Block, Hestblock. 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 40 to 45
ALKALINITY, pH		6 to 11	7 to 8
CAPILLARITY, % by weight	High	Low	Low
COEFFICIENT OF EXPANSION		28 x 10 ⁻⁶	Reheat
COMBUSTIBILITY	FLASH FLAME MELTING	Will burn Incandescent	Incandescent 1000 F
CORROSION - WEAVING			
CORROSION - STRIPS		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, durometer		0.71 to 1.10	
HYGROSCOPICITY, % by weight		1.5 to 4.5	
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% @ 1600 F
SPECIFIC GRAVITY	REAL APPARENT	2.2 0.15 to 0.19	3.4 0.22 to 0.35
SPECIFIC HEAT, Btu / lb		0.21	0.22 to 0.23
STRENGTH - COMPRESSIVE, psi		40 @ 5% deformation 60 @ 10% deformation	16 to 30 @ 5% deformation
STRENGTH - FLEXURAL, psi		40 to 50	30 to 70
STRENGTH - SHEAR, psi		25 to 150	40
STRENGTH - TENSILE, psi		15 to 17	30-Parallel to dir. of normal
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	0 F Min 0 F Min 0 F Min 80 F Max 90 F Max 90 F Max Atmos Min Atmos Min Atmos Min 550 to 600 F Max 650 F Max	Atmos Min Atmos Min Atmos Min 1700 to 1900 F Max 1700 to 1900 F Max 1700 to 1900 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING			Some products only
THERMAL CONDUCTIVITY, Btu / (ft ² hr) (deg F / in.)	0.31 @ 30 F	0.24 @ 100 F to 0.31 @ 100 F 0.36 @ 200 F to 0.39 @ 200 F 0.42 @ 400 F to 0.48 @ 400 F	0.28 @ 100 F to 0.34 @ 100 F 0.44 @ 400 F to 0.48 @ 400 F 0.52 @ 400 F to 0.70 @ 600 F
THERMAL DIFFUSIVITY, sq ft / hour		0.004 to 0.012	0.003 @ 100 F and 1000 F
THERMAL SHOCK RESISTANCE		Good	Good
VIBRATION RESISTANCE	Good	Fair	Poor
WARPAGE - IN SERVICE			
WATER ABSORPTION, % by weight	High	Low	Low
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 pipes together in good bending action.	Easily fitted. Flexible to a degree. Withstands considerable expansion and contraction.
LIMITATIONS	Very absorbent. Must be protected against moisture. Will burn. Poor insulator when wet.	Sharp clean edges cannot be maintained. Losses most of strength when wet. Difficult to prebake.	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-5 Felt, LT-6 Felt	For M, BY Board, Thermal-X, Tempelite
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	15		
	2nd RUN	15		
ALKALINITY, pH		8 to 8 1/2		7 to 8
CAPILLARITY, % by weight		Negligible		
COEFFICIENT OF EXPANSION		6.3×10^{-6}		
COMBUSTIBILITY	FLASH	Incombustible		1000 F
	FLAME MELTING			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, 100 lb penetration				
HYGROSCOPICITY, % by weight				
RESISTANCE TO ACIDS		Poor		Fair
RESISTANCE TO CAUSTICS		Fair		Fair
RESISTANCE TO SOLVENTS		Poor		Fair
SHRINKAGE - HEAT	LINEAR	Low		0 % @ 700 F
	VOLUMETRIC			
SPECIFIC GRAVITY	REAL	2.6		2.6
	APPARENT	0.22 to 0.24		0.22 to 0.24
SPECIFIC HEAT, Btu / lb		0.27		0.27
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		15		
TEMPERATURE RANGE LIMITS	CONTINUOUS	-300 F Min	310 F Max	-250 F Min
	SHORT PERIOD CYCLIC			450 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING				Atmos Min 100 to 1000 F Max Atmos Min 100 to 1000 F Max
THERMAL CONDUCTIVITY, Btu / (sq ft) (in) (deg F / hr)	0.27 @ -10 F	0.33 @ 70 F		0.26 @ 100 F
	0.29 @ 0 F	0.34 @ 100 F		0.30 @ 200 F
	0.31 @ 50 F			0.34 @ 300 F
THERMAL DIFFUSIVITY, sq ft / hour		0.0007 @ 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		18 to 22 perms-inches		
ADVANTAGES		Easily fitted.		Resistant.
LIMITATIONS		Soft. Dependent upon outer vapor barrier in low temperature service.		Unsuitable for prefabrication. Dependent upon outer vapor barrier.

CHARACTERISTICS

BLOCK, BOARD AND PREFORMED PIPE COVERING

GENERIC CLASS NUMBER		34	35	36	
INSULATION TRADE NAMES		N-100 Board, N-100 Pipe Covering, N-100 Block, U.S. Mineral Wool N-R Roll Board	Duct Insulation, Insulation Board, Spintex Board, Spun Wool Insulation Board, Spun Wood Duct, USM Pak.	No. 11 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	1st RUN			35	
	2nd RUN			35	
ALKALINITY, pH			7 to 8		
CAPILLARITY, % by weight					
COEFFICIENT OF EXPANSION					
COMBUSTIBILITY	FLASH	Noncombustible	100 F for some, others are noncombustible.	Noncombustible	
	FLAME HEATING	2800 F	1900 F		
CORROSION - RUSTING			Will not cause steel to rust		
CORROSION - STRESS			Seamless must be protected		
CRACKING - HOT SURFACE					
DENSITY, lb / cu ft		3.5 to 10.5	3 to 5	14 to 16	
DROP RESISTANCE					
HARDNESS, in lb / penetration					
HYGROSCOPICITY, % by weight					
RESISTANCE TO ACIDS		Fair	Fair	Not resistant	
RESISTANCE TO CAUSTICS		Fair	Fair		
RESISTANCE TO SOLVENTS		Excellent	Fair		
SHRINKAGE - HEAT	LINEAR	0% @ 700 F	Low	0.2% @ 1500 F	
	VOLUMETRIC				
SPECIFIC GRAVITY	REAL	2.8	2.8		
	APPARENT	0.16	0.05 to 0.12	0.25 to 0.28	
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	Atmos Min 450 F Max	Atmos Min 1200 F Max	
		-300 F Min 600 - 700 F Max	Atmos Min 450 F Max	Atmos Min 1200 F Max	
			Atmos Min 450 F Max	Atmos Min 1200 F Max	
TEMPERATURE RISE - SELF-INTERNAL HEATING					
THERMAL CONDUCTIVITY, W / (ft ² in / (deg F / in))		0.25 @ 100 F	0.23 @ 50 F to 0.26 @ 50 F	0.48 @ 200 F	
		0.29 @ 200 F	0.29 @ 200 F to 0.35 @ 200 F	0.45 @ 400 F	
		0.33 @ 300 F	0.31 @ 400 F to 0.32 @ 300 F	0.47 @ 600 F	
THERMAL DIFFUSIVITY, sq ft / hour			0.013 @ 100		
THERMAL SHOCK RESISTANCE			Good		
VIBRATION RESISTANCE			Fair		
USAGE - IN SERVICE					
WATER ABSORPTION, % by weight					
WATER VAPOR TRANSMISSION					
ADVANTAGES			Resilient, lightweight, used as duct insulation		
LIMITATIONS			Soft	Quartz grain surface	

BLOCK, BOARD AND PREFORMED PIPE COVERING

GENERIC CLASS NUMBER		37	38	39
INSULATION TRADE NAMES		Tufflite Expanded Polystyrene	Armaflex, Dyfoam, Aluminum, A Pyram, Expanded Polystyrene, US Cellulose, Uni-Crete	Tufflite High Density Board
BASIC MATERIAL		Expanded polystyrene	Expanded polystyrene (beach)	Expanded polystyrene
GENERAL FORM		Flexible board	Rigid block, board and pipe covering	Rigid board
ABRASION RESISTANCE % weight loss	1st RUN			
	2nd RUN			
ALCALINITY, pH		6.5 to 7.5	6.5 to 7.5	6.5 to 7.5
CAPILLARITY, % by weight			0	0
COEFFICIENT OF EXPANSION			$75 - 80 \times 10^{-6}$	
COMBUSTIBILITY	FLASH	345 F	470 F Self-extinguishing grade available	470 F
	FLAME	375 F	490 F	490 F
	MELTING	320 F	330 F	320 F
CORROSION - BUSTING				
CORROSION - STRESS				
CRACKING - HOT SURFACE				
DENSITY, lb/cu ft		1.5 to 2.1	0.9 to 1.2	4.3 to 4.7
DROP RESISTANCE				
HARDNESS, 20 lb 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
WARPAGE - HEAT	LONGER VOLUMETRIC	0.7% @ 150 F	1.7% @ 150 F	2.7% @ 175 F
	REAL APPARENT	0.03 to 0.035	0.034 to 0.020	0.03 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 @ 2% deformation
STRENGTH - FLEXURAL, psi			12 to 34	
STRENGTH - SHEAR, psi			10	
STRENGTH - TENSILE, psi		20 to 30	10 to 40	
TEMPERATURE LIMITS	CONTINUOUS	-50 F Min	-100 F Min	-100 F Min
	SHORT PERIOD	180 F Max	175 to 180 F Max	175 F Max
	CYCLIC	-50 F Min	175 F Max	175 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY, btu / (hr sq ft in / °F)		0.22 @ 0 F	0.22 @ -50 F to 0.21 @ -50 F	0.25 @ 40 F
		0.25 @ 70 F	0.20 @ 0 F to 0.22 @ 0 F	
THERMAL DIFFUSIVITY, sq ft / hour		0.03 @ 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 4 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-extinguishing grades.	Will burn.

CHARACTERISTICS

BLOCK, BOARD AND PREFORMED PIPE COVERING

GENERIC CLASS NUMBER		40	41	42
INSULATION TRADE NAMES		Styrofoam, Tufflite.	Styrofoam, Gold Bond Thermal Thane, Urethane Insulation.	Styrofoam, Tufflite Urethane, Gold Bond Thermal Thane, Foamthane, Unarco U-200, Opt 7 Cel, JM St-Thane.
BASIC MATERIAL		Expanded polystyrene	Expanded polyurethane	Expanded polystyrene
GENERAL FORM		Rigid block, board, sheet, and pipe covering.	Rigid block and board	Rigid block, board and pipe covering.
ABRASION RESISTANCE	1st RUN 2nd RUN			
ALKALINITY, pH		5.2 to 7.5	5.5 to 7.5	5.5 to 7.5
CAPILLARITY, % by weight		Negligible	Negligible	Negligible
COEFFICIENT OF EXPANSION		25×10^{-6}	25×10^{-6}	25×10^{-6}
COMBUSTIBILITY	FLASH FLAME MELTING	255 F 290 F 380 F Self-extinguishing	290 F 355 F 400 F Will burn	Self-extinguishing
CORROSION - MUSTING		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	1.5 to 2
DROP RESISTANCE				
HARDNESS, 1/8 in penetration				
HYDROSCOPICITY, % 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	0.025 to 0.045
SPECIFIC HEAT, Btu/lb		0.27	0.40	0.40
STRENGTH - COMPRESSIVE, psi		27 @ 2% deformation 35 @ 5% deformation	30 @ 2% deformation	35 to 50 @ 5% deformation
STRENGTH - FLEXURAL, psi		41 to 45	30 to 50	30 to 40
STRENGTH - SHEAR, psi		30 to 35		
STRENGTH - TENSILE, psi		50 to 70	50	
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	+450 F Min +400 F Min +400 F Min 170 F Max 205 F Max 205 F Max	Tu -250 F Min Tu -250 F Min Tu -250 F Min 190 to 250 F Max 240 to 260 F Max	-400 to -20 F Min 175 to 250 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY, kcu/ft-hr-in (W/m-F/ft-hr)		0.19 @ -50 F to 0.24 @ -50 F 0.13 @ 30 F to 0.20 @ 30 F 0.17 @ 100 F to 0.14 @ 100 F	0.12 @ -50 F 0.13 @ 40 F 0.15 @ 70 F	0.11 @ -50 F 0.13 @ 0 F 0.15 @ 30 F
THERMAL DIFFUSIVITY, sq ft/hr				0.01 to 0.21 @ 0 F
THERMAL SHOCK RESISTANCE		Excellent	Excellent	Excellent
VIBRATION RESISTANCE		Good	Good	Good
WARPAGE - IN SERVICE		None		
WATER ABSORPTION, % by weight		Negligible	21	35
WATER VAPOR TRANSMISSION		0.74 to 0.87 CWB cups perm-inch	0.4 to 1.5 perms-inch	0.4 to 1.5 perms-inch
ADVANTAGES		Dimensionally stable. Resilient. Withstands constant immersion. Low permeating. Can be formed and fabricated.	Low thermal conductivity	Self-extinguishing. Low thermal conductivity.
DISADVANTAGES		Will burn, but is self-extinguishing when flame is removed.	Not self-extinguishing.	Will burn, but is self-extinguishing when flame is removed.

BLOCK, BOARD AND PREFORMED PIPE COVERING

GENERIC CLASS NUMBER		43	44	45
INSULATION TRADE NAMES		Urethane Roof Insulation	Flexible Gynthane, Thermax	Rigid Armatherm, JM Rigid Aerom
BASIC MATERIAL		Expanded polystyrene and roofing membrane	Expanded polystyrene	Expanded rubber
GENERAL FORM		Rigid roof insulation	Flexible board and pipe covering	Rigid pipe covering
ABRASION RESISTANCE % weight loss	1st RSH 2nd RSH			
ALKALINITY, pH				
CAPILLARITY, % by weight		0		
COEFFICIENT OF EXPANSION				
COMBUSTIBILITY	FLASH FLAME MELTING	Will burn	Self-extinguishing grade available	Self-extinguishing
CORROSION - RUSTING				
CORROSION - STRESS				
CRACKING - HOT SURFACE				
DENSITY, lb / cu ft		1.2	1.3 to 3.8	7.5 to 8.5
DROP RESISTANCE				
HARDNESS, on an penetration				
HYGROSCOPICITY, % by weight				
RESISTANCE TO ACIDS				Good
RESISTANCE TO CAUSTICS				Good
RESISTANCE TO SOLVENTS				Fair to poor
SHRINKAGE - HEAT	LINEAR VOLUMETRIC			3 % @ 100 F 5 % @ 220 F
SPECIFIC GRAVITY	REAL APPARENT			0.128 to 0.136
SPECIFIC HEAT, Btu / lb				
STRENGTH - COMPRESSIVE, psi		25 @ 1 % deformation 25 @ 10 % deformation	1 1/2 @ 50 % deformation	
STRENGTH - FLEXURAL, psi		140		
STRENGTH - SHEAR, psi				
STRENGTH - TENSILE, psi			31	
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	Min -400 F Max 275 F	-300 F Min 275 F Max	-400 F Min 220 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY, Btu / (hr) (sq ft) (deg F / in.)		0.12 @ Above Temp	0.25 @ 72 F	0.24 @ 75 F to 0.28 @ 95 F 0.25 @ 100 F to 0.28 @ 100 F
THERMAL DIFFUSIVITY, sq ft / hour				
THERMAL SHOCK RESISTANCE				
VIBRATION RESISTANCE				
WARPAGE - IN SERVICE				
WATER ABSORPTION, % by weight				25
WATER VAPOR TRANSMISSION		0.05 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		Rohatex R-103-B	Armalux, Cell-Tite, Ultra Foam, Acrofoam, Foamed Plastic Tubing, O-C Flex Tubing and Sheet, Rohatex Pipe Insul. See material list for more.	Caraytemp
BASIC MATERIAL		Expanded rubber	Expanded rubber	Expanded silica
GENERAL FORM		Rigid board	Flexible board and pipe covering	Rigid block and pipe covering
ABRASION RESISTANCE	1st RUN	Poor		
	2nd RUN			
ALKALINITY, pH				8.5
CAPILLARITY, % by weight		10		
COEFFICIENT OF EXPANSION		24×10^{-5}	8×10^{-5}	
COMBUSTIBILITY	FLASH	Will burn. Does not melt	Self-extinguishing	Incumbustible
	FLAME MELTING			
CORROSION - RUSTING				Will not cause rusting of metal
CORROSION - STRESS				Will not contribute
CRACKING - HOT SURFACE				
DENSITY, lb/cu ft		1 to 5	8 to 12	8 to 16
DROP RESISTANCE				
HARDNESS, in indentation				
HYDROSCOPICITY, % by weight		5	Low	0.2
RESISTANCE TO ACID		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	10% @ 200 F	2 to 5 @ 200 F	0.7% @ 1200 F 1.2% @ 1800 F
	VOLUMETRIC			
SPECIFIC GRAVITY	REAL	0.07	0.10 to 0.12	0.14 to 0.16
	APPARENT			
SPEED OF HEAT, sec/in		0.125		
STRENGTH - COMPRESSIVE, psi		40 @ 2% deformation	2 to 5 @ 15% deformation	30 @ 1% deformation
STRENGTH - FLEXURAL, psi				
STRENGTH - SHEAR, psi		25		
STRENGTH - TENSILE, psi		60	70 to 150	
TEMPERATURE LIMITS	CONTINUOUS	-100 F Min 140 F Max	-200 to 0 F Min 140 to 170 F Max	Atmos Min 1600 F Max
	SHORT PERIOD	-200 F Min 150 F Max		
	CYCLIC	-200 F Min 180 F Max		
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY, $\text{Btu} / (\text{hr}) (\text{sq ft}) (\text{deg F} / \text{in.})$	0.28 @ -50 F	0.22 @ 70 F	0.24 @ -50 F 0.20 @ 75 F	0.21 @ 500 F
	0.21 @ 0 F	0.23 @ 100 F	0.27 @ 0 F	0.26 @ 800 F
	0.22 @ 30 F		0.28 @ 30 F	0.27 @ 1000 F
THERMAL DIFFUSIVITY, $\text{sq ft} / \text{hour}$				
THERMAL SHOCK RESISTANCE		Excellent		Good
VIBRATION RESISTANCE				
WARPAGE - IN SERVICE				
WATER ABSORPTION, % by weight		10	4 to 12	0.2
WATER VAPOR TRANSMISSION			0.2 perms-inch	
ADVANTAGES		Water resistant. Resilient. Good mechanical strength.	Very flexible. Water resistant. Can be purchased with longitudinal splits.	Low shrinkage. Low water absorption. Can be fabricated. Acid resistant.
LIMITATIONS		Will burn. Not too weather resistant.		Will fracture into pieces.

BLOCK, BOARD AND PREFORMED PIPE COVERING

GENERIC CLASS NUMBER		49	50	51
INSULATION TRADE NAMES		3M Fibergel	Quartz Foam	Glasrock No. 25 Foam
BASIC MATERIAL		Rebonded inert silica	Cellular silica	Fused silica
GENERAL FORM		Rigid pipe covering	Block	Block
ABRASION RESISTANCE % weight loss	1st RUN		Poor if bare	Poor if bare
	2nd RUN			
ALKALINITY, pH			6 to 7	4 to 5
CAPILLARITY, % by weight			0	0
COEFFICIENT OF EXPANSION			0.3×10^{-6}	0.1×10^{-6}
COMBUSTIBILITY	FLASH	Flame Resistant	Not combustible	Not combustible
	FLAME MELTING		3100 F	3100 F
CORROSION - RUSTING				
CORROSION - STRESS				
CRACKING - HOT SURFACE				
DENSITY, lb / cu ft		8	10 to 20, to order	25 to 27
DISC RESISTANCE				
HANDNESS, in penetration				
HYGROSCOPICITY, % by weight				0
RESISTANCE TO ACIDS			Excellent except HF and hot H_2PO_4	Excellent except HF and hot H_2PO_4
RESISTANCE TO CAUSTICS			Fair to cold solutions and spillage	Resistant to light exposure
RESISTANCE TO SOLVENTS			Good	Excellent
SURFACE - HEAT	LINEAR	1.4 % Moist to dry	0 % @ 1000 F	0 % @ 1000 F
	VOLUMETRIC			
SPECIFIC GRAVITY	REAL	0.24	2.2	2.3
	APPARENT		0.15 to 0.2	0.4
SPECIFIC HEAT, Btu / lb			0.27 to 0.30	0.21 to 0.30
STRENGTH - COMPRESSIVE, psi			200 @ 2 % deformation to 500 @ 3 % deformation	150 @ 2 % deformation 225 @ 3 % deformation
STRENGTH - FLEXURAL, psi		20	100 to 1000	500
STRENGTH - SHEAR, psi				
STRENGTH - TENSILE, psi				50
TEMPERATURE LIMITS	CONTINUOUS SHORT PEAKED CYCLES	Atmos Min	500 F Max	2000 F Max
		Atmos Min	500 F Max	3000 F Max
		Atmos Min	500 F Max	Atmos Min 1800 F Max 2200 F Max
		Atmos Min	500 F Max	
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY, Btu / in / sq ft / deg F / hr	0.34 @ 50 F	0.41 @ 200 F	0.40 @ -30 F to 0.60 @ -50 F	0.45 @ -53 F
	0.37 @ 100 F		0.46 @ 100 F to 0.90 @ 100 F	0.50 @ 300 F
	0.35 @ 150 F		1.0 @ 500 F to 2.0 @ 500 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		0.1 perm-inch	0	High
ADVANTAGES		Will not disintegrate in water	Closed cells	
LIMITATIONS		Low mechanical strength. Difficult to produce precise fitting covers.		

CHARACTERISTICS

BLOCK, BOARD AND PREFORMED PIPE COVERING

GENERAL CLASS NUMBER		52	53	54
INSULATION TRADE NAMES		Glasrock No. 50 Foam	Maarock	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	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	Incombustible	Incombustible	Comparable to wood
	FLAME			
CORROSION - RUSTING				
CORROSION - STRESS				
CRACKING - HOT SURFACE				
DENSITY, lb / cu ft		50	123	15 to 18
DROP RESISTANCE				
HARDNESS, 10 lb penetration				
HYDROSCOPICITY, % by weight				14
RESISTANCE TO ACIDS		Excellent except to HF and hot H_2PO_4	Excellent except to HF and hot H_2PO_4	
RESISTANCE TO CAUSTICS				
RESISTANCE TO SOLVENTS				
SHRINKAGE - HEAT	LINEAR	0.06 % @ 2000 F	0.06 % @ 2000 F	
	VOLUMETRIC			
SPECIFIC GRAVITY	REAL	2.2	2.3	
	APPARENT	0.78	1.03	0.26 to 0.29
SPECIFIC HEAT, Btu / lb		0.28 @ 1500 F	0.28 @ 1500 F	
STRENGTH - COMPRESSIVE, psi		1200 @ 2 % deformation		
STRENGTH - FLEXURAL, psi		175	2000	
STRENGTH - SHEAR, psi				
STRENGTH - TENSILE, psi				
TEMPERATURE LIMITS	CONTINUOUS	Atmos Min 2000 F Max	Atmos Min 2000 F Max	Atmos Min Atmos Max
	SHORT PERIOD	Atmos Min 2000 F Max	Atmos Min 2000 F Max	Atmos Min Atmos Max
	CYCLIC	Atmos Min 2000 F Max	Atmos Min 2000 F Max	Atmos Min Atmos Max
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY, Btu / (hr) (sq ft) (deg F / in.)		0.75 @ 300 F	2.25 @ 300 F	0.28 @ 10 F
		1.0 @ 500 F	1.00 @ 500 F	
		1.4 @ 1000 F	1.80 @ 1000 F	
THERMAL DIFFUSIVITY, sq ft / hour		1.8 @ 1000 F	4.00 @ 1000 F	
THERMAL SHOCK RESISTANCE		Excellent	Excellent	
VIBRATION RESISTANCE				
WARPAGE - IN SERVICE		None		
WATER ABSORPTION, % by weight		23 to 30	1	
WATER VAPOR TRANSMISSION				
ADVANTAGES		Excellent thermal shock resistance. Good dimensional stability.	Excellent thermal shock resistance. Good dimensional stability.	
ROTATIONS				Will burn

CHARACTERISTICS

BLOCK, BOARD AND PREFORMED PIPE COVERING

GENERIC CLASS NUMBER		55	56	57
INSULATION TRADE NAMES		Anti-Rust, Non-Rust, Impero	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		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 23	18 to 20	
DROP RESISTANCE				
HARDNESS, to 20 penetration				
HYGROSCOPICITY, % by weight				
RESISTANCE TO ACIDS				
RESISTANCE TO CAUSTICS				
RESISTANCE TO SOLVENTS				
SHRINKAGE - HEAT		LINEAR VOLUMETRIC	1% @ 200 F	
SPECIFIC GRAVITY		REAL APPARENT	6.35 to 6.40	6.39 to 6.32
SPECIFIC HEAT, Btu / lb				
STRENGTH - COMPRESSIVE, psi				
STRENGTH - FLEXURAL, psi				
STRENGTH - BREAK, psi				
STRENGTH - TENSILE, psi				
TEMPERATURE LIMITS		CONTINUOUS SHORT PERIOD CYCLIC	40 F Min 40 F Min 60 F Min	90 F Max 90 F Max 90 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING			Atmos 3/4 in	212 to 225 F Max 212 to 225 F Max 212 to 225 F Max
THERMAL CONDUCTIVITY, Wtu / (sq ft) (sq in) (deg F / in.)				0.32 @ 100 F to 0.34 @ 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.	

CHARACTERISTICS BLANKET, FELT, TAPE AND ROPE

GENERIC CLASS NUMBER		58	59	60	
INSULATION TRADE NAMES		Kenocel, Fibertex XV Felt, Fibertex XSW Blanket, Corafelt, Fibertex XLP, Fibertex XLM, Fibertex XSWF	Fibertex #70 Severe Paper	Fibertex Rope, Fibertex 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	Incombustible except for hinder burn out.	Incombustible	Incombustible except for organic carrier which burns out.	
	FLAME MELTING				
		3000 F	3200 F	3200 F	
COMPACTION			10 to 40 % @ 3 psi		
CORROSION - RUSTING					
CORROSION - STRESS					
DENSITY, lb / cu ft		1 to 14	2 to 10.5	25	
HYDROSCOPICITY, % by weight		3			
RESISTANCE TO ACIDS		Good at room temperature except HF and H ₃ PO ₄ .	Good at room temperature except HF and H ₃ PO ₄ .	Good at room temperature except HF and H ₃ PO 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	0.5 % @ 1500 F	2.5 % @ 2200 F		
	VOLUMETRIC				
SPECIFIC GRAVITY	REAL	0.040 to 0.36	0.15 to 0.17	0.40	
	APPARENT				
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	Alumina Alumina	2000 F Max	Alumina Alumina	2000 F Max
		Alumina Alumina	2200 F Max	Alumina Alumina	2200 F Max
		Alumina Alumina	2200 F Max	Alumina Alumina	2200 F Max
		Alumina Alumina	2200 F Max	Alumina Alumina	2200 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING					
THERMAL CONDUCTIVITY (at indicated mean temp and density) Btu / (hr) (sq ft) (deg F / in.)	Density 6	0.30 @ 1000 F	0.73 @ 1000 F		
		0.35 @ 200 F	0.54 @ 1200 F		
		0.42 @ 400 F	0.66 @ 1400 F		
		0.47 @ 600 F	0.82 @ 1600 F		
		0.54 @ 800 F	1.14 @ 1800 F		
		0.62 @ 1000 F	1.42 @ 2000 F		
		0.71 @ 1200 F	1.94 @ 2200 F		
		0.80 @ 1400 F	2.46 @ 2400 F		
		0.90 @ 1600 F	3.08 @ 2600 F		
		1.00 @ 1800 F	3.70 @ 2800 F		
THERMAL DIFFUSIVITY, sq ft / hour		0.03 @ 800 F and 8 lbs			
THERMAL SHOCK RESISTANCE					
VIBRATION RESISTANCE					
WATER ABSORPTION, % by weight		Saturates	Saturates	Saturates	
WATER VAPOR TRANSMISSION					
ADVANTAGES		Soft, Resistant.	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.			

CHARACTERISTICS

BLANKET, FELT, TAPE AND ROPE

GENERIC CLASS NUMBER		61	62	63
INSULATION TRADE NAMES		Fiberglass Cloth, Fiberglass Tape,	Asbestos Felt Type A,	Asbestos 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 METRIC	Noncombustible except for carrier which burns out.	1500 F	
COMPACTION				
CORROSION - RUSTING				
CORROSION - STRESS				
DENSITY, lb / cu ft			8 to 12	8 to 12
HYDROSCOPICITY, % by weight				
RESISTANCE TO ACIDS		Good at room temperature except HF and H ₂ SO 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% @ 2500 F		
SPECIFIC GRAVITY	REAL APPARENT		0.14 to 0.18	0.14 to 0.18
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 3200 F Max Atmos Min 2200 F Max Atmos Min	Atmos Min 700 F Max Atmos Min 750 F Max Atmos Min 750 F Max	40 F Min 80 F Max 40 F Min 80 F Max 40 F Min 80 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY (at indicated mean temp and density) Btu / (hr) (sq ft) (deg F / in.)			Density 0.0 0.50 @ 200 F 0.61 @ 400 F 0.72 @ 600 F	Density 0.0 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		Gasolins	500	500
WATER VAPOR TRANSMISSION			High	High
ADVANTAGES				For cold water lines
LIMITATIONS				

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 400 F 350 F	For waterproof coating	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)		
SPRINGING-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 Atmos Min Atmos Min	400 to 500 F Max 400 to 500 F Max 400 to 500 F Max	Atmos Min Atmos Min Atmos Min
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY (at indicated mean temp and density) btu / (hr) (sq ft) (deg F / in)		0.85 @ 100 F 0.75 @ 200 F	0.81 @ 200 F	0.10 @ 200 F 0.14 @ 400 F 0.41 @ 600 F
THERMAL DIFFUSIVITY, sq ft / hour				
THERMAL SHOCK RESISTANCE		Resistant		Resistant
VIBRATION RESISTANCE		Excellent		
WATER ABSORPTION, % by weight				100
WATER VAPOR TRANSMISSION				
ADVANTAGES		Flexible, can be wrapped around pipes, tubes, and heat piping.	Flexible	
LIMITATIONS		Soft. Little mechanical strength.	Soft. Little mechanical strength.	

CHARACTERISTICS BLANKET, FELT, TAPE AND ROPE

GENERIC CLASS NUMBER		57	58	59
INSULATION TRADE NAMES		Asbestos Wall Fire Felt, Wall Felt.	Commercial Asbestos Paper	Unarco Wovenlites
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 - BUSTING				Does not contribute
CORROSION - STRESS				
DENSITY, lb / cu ft		40		2 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 mass temp and density) Btu / (sq ft) (in) (deg F / in.)		1.32 @ 200 F 1.40 @ 400 F 1.70 @ 600 F		Density 10 0.10 @ 200 F 0.45 @ 400 F 0.75 @ 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 facing in place.
LIMITATIONS		High conductivity.		Must be prefabricated at factory.

CHARACTERISTICS **BLANKET, FELT, TAPE AND ROPE**

GENERIC CLASS NUMBER		70	71	72
REGISTRATION TRADE NAMES		Grade VDF	Armoglas TWL and TW-F, Fiberglas TWL and TW-F, Fibroc TWL	TWL Metal Mesh, TW-F Metal Mesh, Fibroc MMAL 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	Ignites in air without flame above 800 F Sublimes at 3600.	1400 F	1400 F
	FLAME MELTING			
CONTRACTION				
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 ₂ PO ₄	Good from pH 5 to 7 except HF and H ₂ PO 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 ultra- paraffins and ketones	Good	Good
WORKING - HEAT	LINEAR VOLUMETRIC	1 % @ 1200 F 3 % @ 4500 F		
	REAL APPARENT	1.35 0.977	2.5 0.95 to 0.12	2.5 0.95 to 0.12
SPECIFIC HEAT, btu / lb		Mean in 1800 F - 0.37, 0.38 @ 70 F	0.20	0.20
STRENGTH - COMPRESSIVE, psi				
STRENGTH - TENSILE, psi		6	Low	Low
TEMPERATURE LIMITS	CONTINUOUS	-410 F Min 4500 F Max	-100 F Min 1600 F Max	Athens Min 1000 F Max
	SHORT PERIOD CYCLIC	4500 F Max	-300 F Min -300 F Min	
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY (At indicated temp and density) btu / (hr) (sq ft) (deg F / in.)		Density 5 0.25 @ 70 F in air @ 1 atm 6.0 @ 1500 in Argon @ 1 atm 7.0 @ 4150 in H ₂ @ 1 atm	Density 4 1/4 0.26 @ 70 F 0.38 @ 200 F 0.27 @ 100 F 0.47 @ 300 F	Density 4 1/4 0.26 @ 70 F 0.38 @ 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			500	500
WATER VAPOR TRANSMISSION				100 perm-inches
ADVANTAGES		Generally used at temperatures above 1800 F in vacuum or inert gas atmos- phere.	Resistant.	
LIMITATIONS		Has 0 % volatile material at 1000 F.	Soft. Little strength.	

CHARACTERISTICS BLANKET, FELT, TAPE AND ROPE

GENERIC CLASS NUMBER		73	74	75
INSULATION TRADE NAMES		Synther Glass Blanket	Wearco Woven Glass Felt	Unifelt
BASIC MATERIAL		Fibrous glass	Fibrous glass and wire mesh	Textile-type glass fibers
GENERAL FORM		Needled felt blanket	Felt	Blanket
ALKALINITY, pH		4 to 7	4 to 7	7 to 8 1/2
CAPILLARITY, % by weight		High	High	
COMBUSTIBILITY	FLASH			700 F
	FLAME			1100 F
	MELTING			1100 F
COMPACTION				
CORROSION - RUSTING		Does not contribute	Does not contribute	
CORROSION - STRESS				
DENSITY, lb/cu ft		1 1/4 to 1 1/2	1 1/4 to 1 1/2	1/2 to 3
HYDROSCOPICITY, % by weight		2 to 3	2 to 3	1
RESISTANCE TO ACIDS		Good except HF and H ₃ PO ₄	Good except HF and H ₃ PO 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	0.33	0.34	2.55
	APPARENT			0.012 to 0.018
SPECIFIC HEAT, Btu/lb		0.30	0.30	0.30
STRENGTH - COMPRESSIVE, psi				1/50 @ 10 % deformation @ 1 1/2 lb 1/3 @ 10 % deformation @ 3 lb
STRENGTH - TENSILE, psi				
TEMPERATURE LIMITS	CONTINUOUS	Atmos Min 1100 F Max	Atmos Min 1200 F Max	Atmos Min 375 F Max
	SHORT PERIOD CYCLIC	Atmos Min 1200 F Max	Atmos Min 1200 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 1	0.33 @ 100 F 0.40 @ 400 F	0.33 @ 200 F 0.44 @ 400 F	Density 1/2 0.26 @ 0 F 0.21 @ 50 F 0.30 @ 70 F
		0.37 @ 600 F	0.36 @ 400 F	0.24 @ 100 F 0.49 @ 200 F 0.66 @ 300 F
				Density 3 0.30 @ 0 F 0.21 @ 50 F 0.23 @ 70 F
THERMAL DIFFUSIVITY, sq ft / hour		0.018 @ 400 F	0.02 @ 400 F	0.550 to 0.165 @ 70 F
THERMAL SHOCK RESISTANCE		Excellent	Excellent	
VIBRATION RESISTANCE		Excellent	Excellent	
WATER ABSORPTION, % by weight		High	High	
WATER VAPOR TRANSMISSION		High	High	100 perms-inches
ADVANTAGES			Can be secured in stainless steel or Inconel wire mesh. Can be used as predrilled turbine blanket.	3/4 lb density recommended for tanks. 2 and 3 lb density recommended for duct liners. Very resilient.
LIMITATIONS				

CHARACTERISTICS

BLANKET, FELT, TAPE AND ROPE

GENERIC CLASS NUMBER		76	77	78
INSULATION TRADE NAMES		Microflex, Superflex, Tensaflex.	Armoglas Flex Duct, Fine Fiber, Ultraflex, Microflex, Superflex, Astroflex, Fiberglass Flexible Duct, Thermoglas.	Micro-Bar, Superflex
BASIC MATERIAL		Tensar glass fibers and fine glass (E-glass).	Fine glass fibers and binder.	Fibrous glass.
GENERAL FORM		Blanket	Blanket	Blanket
ALKALINITY, pH		8 to 9	8 to 10	8 to 9
CAPILLARITY, % by weight		None	None	None
COMBUSTIBILITY	FLASH		475 F to 700 F for resin	Base material is noncombustible
	FLAME MELTING		1200 F for resin 800 F to 1300 F	
CONTRACTION		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 10	1 lb density core, 4 lb skin
HYGROSCOPICITY, % by weight		5	5 to 6	
RESISTANCE TO ACIDS		Good except HF	Good except HF and H ₂ PO ₄	Good for most acids from pH 3 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	NEAL	2.34	2.5	
	APPARENT	0.912 to 0.927		
SPECIFIC HEAT, Btu / lb		0.23	0.20	0.23
STRENGTH - COMPRESSIVE, psi			0.02 @ 10% deformation to 0.10 @ 70% deformation	
STRENGTH - TENSILE, psi				
TEMPERATURE LIMITS	CONTINUOUS	Atmos Min 350 F Max	370 F Max	300 F Max
	SHORT PERIOD	Atmos Min 350 F Max	370 F Max	250 F Max
	CYCLIC	Atmos Min 350 F Max	370 F Max	250 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY at indicated mean temp and density in / (ft ² in / (sec F / in))	Density 1/4		Density 1/2	Thermal Conductance at 75 F 1" thickness = 0.12 1/2" thickness = 0.45
	0.34 @ 100 F		0.30 @ 100 F to 0.34 @ 300 F	
	0.48 @ 300 F		0.40 @ 100 F to 0.48 @ 300 F	
THERMAL DIFFUSIVITY, sq ft / hour	Density 1		Density 2	
	0.26 @ 100 F		0.23 @ 100 F to 0.31 @ 300 F	
	0.35 @ 300 F		0.29 @ 100 F to 0.36 @ 300 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.	

CHARACTERISTICS

BLANKET, FELT, TAPE AND ROPE

CENTRIC CLASS NUMBER		79	80	81
INSULATION TRADE NAMES		Fiberglass Mat-Faced Duct Liner. Armoglas Mat-Faced Duct Liner.	Fiberglass Foil Faced Building Insulation	Grade WDF
BASIC MATERIAL		Fibrous glass with mat surface	Fibrous glass	Graphite
GENERAL FORM		Blanket	Blanket or 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	Grading is not without flame above 550 F. Sublimates at 6600 F.
	COMPACTION			
CORROSION - RUSTING				
CORROSION - STRESS				
DENSITY, lb / cu ft		1.5 to 2.5	0.85 to 0.88	5 to 10
HYDROSCOPICITY, % 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 9 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 % @ 1200 F 0.1 % @ 4500 F
	SPECIFIC GRAVITY		2.5 0.91	1.50 0.970
SPECIFIC HEAT, Btu / lb		0.20	0.20	Mean to 1300 F - 0.37 0.18 @ 70 F
STRENGTH - COMPRESSIVE, psi		Low		
STRENGTH - TENSILE, psi		50	Low	2.5
TEMPERATURE LIMITS	CONTINUOUS	-300 F Min 100 F Max	Above 420 150 F Max	-455 F Min 4500 F Max
	SHORT PERIOD CYCLIC	-300 F Min 250 F Max -300 F Min 250 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 / (sq ft) (deg F / in.)		0.25 @ 70 F 0.31 @ 500 F 0.35 @ 200 F	0.25 @ 50 F 0.29 @ 70 F 0.31 @ 100 F	Density 5 1.2 @ 70 F in air @ 1 micron 0.2 @ 3100 F in vacuum @ 10 microns 2.0 @ 3500 F in vacuum @ 10 microns
THERMAL DIFFUSIVITY, sq ft / hour		0.03 @ 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 1500 F in vacuum or inert gas atmosphere. Max oil volatile at 5000 F.
LIMITATIONS				

CHARACTERISTICS **BLANKET, FELT, TAPE AND ROPE**

GENERIC CLASS NUMBER		82	83	84
INSULATION TRADE NAMES		Hair Felt	HD Hair Felt	Spun Wool Blanket, Mineral Wool Blanket, E.P. Blanket, Copro-Fibre, Sparoc 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 9		7 to 8
CAPILLARITY, % by weight				
COMBUSTIBILITY	FLASH	Chars at 200 F	Combustible	Incombustible
	FLAME MELTING			1800 F
COMPACTION				
CORROSION - RESTING				Will not cause steel to rust
CORROSION - STRESS				
DENSITY, lb / cu ft		8 to 10	10	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			0% @ 1200 F
	VOLUMETRIC			
SPECIFIC GRAVITY	REAL			2.30
	APPARENT	0.15 to 0.38	0.18	0.12 to 0.19
SPECIFIC HEAT, Btu / lb			0.33 (10 F to 315 F)	0.10 to 0.22
STRENGTH - COMPRESSIVE, psi			> @ 2% deformation	< @ 10% deformation
STRENGTH - TENSILE, psi			Length 12, Circumference 15.	
TEMPERATURE LIMITS	CONTINUOUS	-150 F Min 200 F Max	-500 F Min 200 F Max	-500 F Min 1000 to 1700 F Max
	SHORT PERIOD	-150 F Min 200 F Max	-150 F Min 200 F Max	-100 F Min 1000 to 1700 F Max
	CYCLIC	-150 F Min 200 F Max	-150 F Min 200 F Max	-100 F Min 1000 to 1200 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING				Some will self internal heat
THERMAL CONDUCTIVITY (at indicated stress temp and density) Btu / (hr) (sq ft) (deg F / in.)		0.28 @ 70 F	0.24 @ 100 F 0.24 @ 100 F	0.31 @ 200 F to 0.44 @ 300 F 0.30 @ 400 F to 0.50 @ 600 F
				0.43 @ 500 F to 0.59 @ 600 F 0.55 @ 600 F to 0.80 @ 800 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	41
WATER VAPOR TRANSMISSION		10 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. Resistant.
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, Cold Bond M.W. Felt.	E.P. Bonded Blanket	Armstrong 100 and 101, Copr-Fibre No 46, Mupdet Type 1200, Tab-Lok, Dairick 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		8 to 9	7 to 8.5	7 to 8
CAPILLARITY, % by weight				
CONSISTENCY	FLASH	500 F		
	FLAME MELTING	Some are impermeable. 1400 F to 300 F		Recombustible 2000 F
COMPACTION				
CORROSION - RUSTING		Will not cause rust or rot.	Will not cause rust or rot.	
CORROSION - STRESS				
DENSITY, lb / cu ft		2 to 3	4 to 6	5 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	0 % @ 450 F		0 % @ 1200 F
	VOLUMETRIC			
SPECIFIC GRAVITY	REAL	0.06 to 0.12	0.10 to 0.13	2.6 0.10 to 0.20
	APPARENT			
SPECIFIC HEAT, Btu / lb		0.22	0.20 to 0.22	0.22
STRENGTH - COMPRESSIVE, psi				
STRENGTH - TENSILE, psi				
TEMPERATURE LIMITS	CONTINUOUS	350 F Min 450 to 600 F Max	Atmos Min 450 F Max	Atmos Min 1200 F Max
	SHORT PERIOD CYCLIC	450 to 600 F Max	Atmos Min 450 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 / (sq ft) (in) (deg F / hr.)		Density 4 0.25 @ 100 F to 0.28 @ 100 F 0.30 @ 200 F to 0.32 @ 200 F 0.26 @ 200 F to 0.43 @ 300 F	0.26 @ 300 F 0.30 @ 400 F	0.28 @ 100 F to 0.29 @ 100 F 0.35 @ 400 F to 0.43 @ 400 F 0.48 @ 600 F to 0.52 @ 600 F
THERMAL DIFFUSIVITY, sq ft / hour		0.01 to 0.025 @ 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	Rairasil A-100 Blanket, Rairasil B-100 Felt.	
BASIC MATERIAL		Quartz 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			
COMPACTION			3000 F	
CORROSION - RUSTING			Resists compaction to densities greater than 1	
CORROSION - OTHERS				
DENSITY, lb / cu ft		3 to 6	4 1/2 to 8 installed	
HYGROSCOPICITY, % by weight			10	
RESISTANCE TO ACIDS			Good except H ₂ SO ₄	
RESISTANCE TO CAUSTICS			Poor	
RESISTANCE TO SOLVENTS			Resistant to all common organic solvents	
SHRINKAGE - HEAT	LINEAR	2 1/2 % @ 1800 F 5 % @ 2000 F	1 % @ 1800 F 5 % @ 2000 F	
	VOLUMETRIC			
SPECIFIC GRAVITY	REAL	0.545	2.2 0.07 to 0.10	
	APPARENT			
SPECIFIC HEAT, Btu / lb			0.19	
STRENGTH - COMPRESSIVE, psi		5 @ 5 % deformation	35 @ 66 % 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 (as indicated by test temp and density) Btu / (sq ft) (deg F / in.)		0.28 @ 200 F 0.41 @ 400 F 0.72 @ 800 F	0.43 @ 800 F to 0.50 @ 800 F 0.43 @ 800 F to 0.51 @ 800 F	
			0.85 @ 1000 F to 0.90 @ 1000 F 0.75 @ 1200 F to 0.80 @ 1200 F 0.82 @ 1400 F to 0.88 @ 1400 F	
THERMAL DIFFUSIVITY, sq ft / hour			0.43 to 0.51 @ 1000 F	
THERMAL SHOCK RESISTANCE				
VEGETATION RESISTANCE				
WATER ABSORPTION, % by weight			Slight	
WATER VAPOR TRANSMISSION			No resistance	
ADVANTAGES		Soft. Resilient.	Soft. Resilient. Contains no organic binder. Available with lacing. Pure SiO ₂ . Also available in fabric, tape, sleeving, yarn, cordage and rope.	
LIMITATIONS		Little mechanical strength.	Little mechanical strength.	

CHARACTERISTICS CEMENT

GENERIC CLASS NUMBER		91	92	93
INSULATION TRADE NAMES		Structural Coating Cement	Kaolite-20, L.W. Blascross, Kaolite 22.	Vissical, E.P. No 108.
BASIC MATERIAL		Alumina-silica	Alumina-silica	Alumina-silica and asbestos fibers
GENERAL FORM		Semi-refractory setting cement	Semi-refractory, fireproofing hydraulic cement.	Semi-refractory hydraulic cement.
ABRASION RESISTANCE % weight loss	1st RUN 2nd RUN	Increases 21 % after exposing to 1000 F		4 5
ADHESION	WET DRY			2 to steel
ALKALINITY, pH		9 to 10		
CAPILLARITY, % by weight				
COEFFICIENT OF EXPANSION		3×10^{-6}		
COMBUSTIBILITY	FLASH FLAME MELTING	Incombustible 3200 F	Incombustible	Incombustible
CORROSION - RUSTING				
CORROSION - STRESS				
COVERAGE, bags / 100 lb			15 to 21	17
DENSITY, lb / cu ft		115 to 122	48 to 70 lb per bag	54 to 56
HARDNESS, mm penetration				
HYGROSCOPICITY, % by weight				
RESISTANCE TO ACIDS		Good at room temperature except HF and H ₂ PO ₄		
RESISTANCE TO CAUSTICS		Fair to poor at room temperature		
RESISTANCE TO SOLVENTS		Excellent		
SHRINKAGE - HEAT	LINEAR VOLUMETRIC	1 % @ 1800 F 1 % @ 2100 F		
SHRINKAGE - WET TO DRY VOLUMETRIC, %				0 to 1
SPECIFIC GRAVITY	REAL APPARENT	1.8 Average		0.97
SPECIFIC HEAT, Btu / lb		0.273 @ 1000 F 0.245 @ 2100 F		
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 2100 F Max Atmos Min 2300 F Max	Atmos Min 2000 to 2200 F Max Atmos Min 2000 to 2200 F Max Atmos Min 2000 to 2200 F Max	Atmos Min 1900 to 2000 F Max Atmos Min 1900 to 2000 F Max Atmos Min 1900 to 2000 F Max
THERMAL CONDUCTIVITY, Btu / (sq ft (deg F / in.)		2.44 @ 600 F 2.44 @ 1000 F 2.45 @ 1400 F	1.42 @ 400 F 1.52 @ 800 F 1.64 @ 1000 F	1.75 @ 1200 F 1.55 @ 1400 F 1.61 @ 1600 F
THERMAL DIFFUSIVITY, sq ft / hour				
THERMAL SHOCK RESISTANCE		Excellent		
VIBRATION RESISTANCE				
WATER ABSORPTION, % by weight				
WATER VAPOR TRANSMISSION				
ADVANTAGES		Coating for metals, graphic, and refractories.	Can be troweled or gunned.	Low shrinkage.
LIMITATIONS		Limited shelf life.		

NOTE: Unless otherwise indicated, cement characteristics apply in dry set condition.

CHARACTERISTICS CEMENT

GENERIC CLASS NUMBER		94	95	96	
INSULATION TRADE NAMES		M Therm	T M Short Fiber, E.P. No. 22, T M Short	Carry 303, R.E.N. No. 200, JM No. 552, X and M No. 152, Roberoid No. 115, Cominco Finishing, T-M, EP-10.	
BASIC MATERIAL		Alumina-pillex and asbestos	Mine run asbestos	Adhesive and bonding slays	
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	Noncombustible	Noncombustible	Noncombustible	
	FLAME MELTING				
CORROSION - RUSTING					
CORROSION - STRESS					
COVERAGE, board ft / 100 lb		68.5		18	
DENSITY, lb / cu ft		16.5		40 to 70	
WATER RESISTANCE, non-penetration				0.55	
HYDROSCOPICITY, % 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	1.285		0.61 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	2500 F Max	Atmos Min 1500 F Max	Atmos Min 1000 F Max	
		2700 F Max	Atmos Min 1200 F Max	Atmos Min 1000 F Max	
		2900 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 1.3 @ 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				0.154	
WATER VAPOR TRANSMISSION					
ADVANTAGES		At extremely high temperature insulating cement often used as expansion joint.		Sticks to all surfaces. Finishes medium hard.	
LIMITATIONS					

NOTE: Unless otherwise indicated, test characteristics apply to dry wet conditions.

CHARACTERISTICS CEMENT

GENERIC CLASS NUMBER		57	58	59
INSULATION TRADE NAMES		LF-20, K. F. No. 42, 520-Ho. 382, Rytherold No. 216, 55-21, C-10	Carey No. 100, MKP Polish, H. Glor.	Carey No. 707, Amblerex 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	1st RUN 5 weight loss	18 45	14 to 20 12 to 20	
ADHESION	WET DRY			
ALKALINITY, pH		1 to 2		
CAPILLARITY, % by weight				
COEFFICIENT OF EXPANSION				
COMBUSTIBILITY	FLASH FLAME MELTING	Incombustible	Incombustible 1900 F	Incombustible
CORROSION - RUSTING				
CORROSION - STRESS				
COVERAGE, sq ft / 100 lb		24	25 to 35 dry	
DENSITY, lb / cu ft		35 to 40	40 to 60	
HARDNESS, min penetration				8.17 to 8.55
HYDROSCOPICITY, % 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, %			5 to 15	
SPECIFIC GRAVITY	REAL APPARENT		2.57 + 0.07	
SPECIFIC HEAT, Btu / lb				
STRENGTH - COMPRESSIVE, psi			175 @ 1% deformation	150 @ 5% deformation
STRENGTH - FLEXURAL, psi				
STRENGTH - SHEAR, psi				
STRENGTH - TENSILE, psi				
TEMPERATURE LOADS	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 150 to 1800 F Max Atmos Min 150 to 1800 F Max Atmos Min 150 to 1800 F Max
THERMAL CONDUCTIVITY, Btu / (hr) (sq ft) (deg F / in.)		0.61 @ 100 F to 1.5 @ 100 F 0.62 @ 200 F to 1.5 @ 200 F to 1.12 @ 400 F	0.63 @ 200 F to 1.4 @ 200 F 1.12 @ 400 F to 1.7 @ 400 F	to 1.00 @ 100 F 0.73 @ 200 F to 1.00 @ 200 F 0.81 @ 300 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 stresses.	Hard smooth white surface.	Very smooth finish.
LIMITATIONS			For finish work only.	

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

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CHARACTERISTICS CEMENT

GENERIC CLASS NUMBER		100	101	102
INSULATION TRADE NAMES		Caretemp Asbestos Cement	Caretemp Cement	Hy Temp No. 12, Supertex, Hy Temp, Franco H. T. Cement
BASIC MATERIAL		Asbestos fibers	Calcium silicate	Diatomaceous silica
GENERAL FORM		Caretemp finishing cement	Insulating cement	Insulating Cement
ABRASION RESISTANCE % weight loss	1st RUN		14	10
	2nd RUN		28	20
ADHESION	WET DRY			
ALKALINITY, pH				9
CAPILLARITY, % by weight			224	240
COEFFICIENT OF EXPANSION				
COMBUSTIBILITY	FLASH FLAME MELTING	Indecomposable	Indecomposable	Indecomposable
CORROSION - RUSTING				
CORROSION - STRESS				
COVERAGE, board ft / 100 lb		35 dry, 20 wet	35	
DENSITY, lb / cu ft		50 to 60	19 to 23	23 to 32
HARDNESS, max penetration			0.35	0.45 to 1.20
HYGROSCOPICITY, % by weight			4	
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			0.28	0.22 to 0.28
STRENGTH - COMPRESSIVE, psi			100 to 1 % 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 1900 F Max
				Atmos Max 1900 F Max
THERMAL CONDUCTIVITY, Btu / (hr) (sq ft) (deg F / in.)			0.10 @ 100 F 0.07 @ 500 F 0.17 @ 200 F 0.74 @ 800 F 0.25 @ 300 F 0.43 @ 1000 F	0.10 @ 200 F to 0.15 @ 200 F 0.78 @ 500 F to 0.90 @ 500 F 0.55 @ 800 F to 0.45 @ 600 F
THERMAL DIFFUSIVITY, sq ft / hour			0.0015 @ 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 Caretemp.		Good for high temperatures.
LIMITATIONS			Not recommended for hard finishes	Soft, little mechanical strength.

NOTE: Values shown are typical.

UCASB01736508

ENHANCED CEMENT

CEMENT

GENERIC CLASS NUMBER		103	104	105	
INSULATION TRADE NAMES		Thermalite, 95% Magnesium Cement, Magnesium Cement.	Armatemp No. 100, BEH No. 1, MW-50 Super 111, Super 66, Weber Super 45, 3M No. 150, Sup-Tite, Munder A-1, Holman No. 1, Green Insul C. Usarun 100, O. C.-500, Comvite No. 1, One Shot. See Materials list for more.	Armatemp No. 10, Super Powerhouse Utility Thermal Finish, Silica, One Coat, Quik-Set, No. 112, No. 101, NE Plus Ultra. See Materials list for more.	
BASIC MATERIAL		Magnesium carbonate 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	25	24 to 45	15 to 35	
	2nd RUN	50	48 to 70	25 to 55	
ADHESION	WET		1 to 8	5	
	DRY		7 to 12		
ALKALINITY, pH		10 to 11	8.5 to 13	8 1/2 to 12 1/2	
CAPILLARITY, % by weight		236	High	High	
COEFFICIENT OF EXPANSION					
COMBUSTIBILITY	FLASH	Noncombustible	Noncombustible	Noncombustible	
	FLAME MELTING		2000 F	1800 F	
CORROSION - RUSTING				None	
CORROSION - STRESS					
COVERAGE, board ft / 100 lb		55 to 70	45 to 60	30 to 40	
DENSITY, lb / cu ft		10 to 20	22 to 30	27 to 44	
HARDNESS, mm penetration		1 to 10	1 to 2.5		
HYGROSCOPICITY, % by weight		4	2 to 2.5	0.5 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	1 % @ 110 F		1 to 3 % @ 1200 F	
	VOLUMETRIC				
SHRINKAGE - WET TO DRY VOLUMETRIC, %		22	13 to 27	0 to 6	
SPECIFIC GRAVITY	REAL	2.2		2.2	
	APPARENT	0.29 to 0.32	0.33 to 0.42	0.43 to 0.70	
SPECIFIC HEAT, Btu / lb		0.24	0.21 to 0.23	0.22 to 0.25	
STRENGTH - COMPRESSIVE, psi		110 @ 10 % deformation	23 to 50 @ 5 % deformation 31 to 60 @ 10 deformation	40 to 225 @ 5 % deformation	
STRENGTH - FLEXURAL, psi			100 to 120		
STRENGTH - SHEAR, psi					
STRENGTH - TENSILE, psi					
TEMPERATURE LIMITS:	CONTINUOUS SHORT PERIOD CYCLIC	Ambient Min 500 to 600 F Max	Ambient Min 1500 to 1700 F Max	Ambient Min 1000 to 1800 F Max	
		Ambient Min 500 F Max	Ambient Min 1700 to 2100 F Max	Ambient Min	
		Ambient Min 500 F Max	Ambient Min 1500 to 2100 F Max	Ambient Min	
		Ambient Min 500 F Max	Ambient Min 1500 to 2100 F Max	Ambient Min	
THERMAL CONDUCTIVITY, Btu / (hr) (sq ft) (deg F / in.)		0.38 @ 100 F to 0.51 @ 200 F	0.44 @ 200 F to 0.57 @ 200 F	0.44 @ 200 F to 0.75 @ 200 F	
		0.45 @ 200 F to 0.51 @ 200 F	0.52 @ 400 F to 0.74 @ 400 F	0.61 @ 400 F to 0.94 @ 600 F	
		0.48 @ 300 F to 0.54 @ 300 F	0.62 @ 600 F to 0.86 @ 600 F	0.85 @ 600 F to 1.03 @ 600 F	
THERMAL DIFFUSIVITY, sq ft / hour		0.085 @ 100 F	0.064 to 0.31 @ 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 95% Magnesium Insulation	Good base coat insulating cement	Hydraulic setting.	
LIMITATIONS		High shrinkage. Not moisture resistant.	Will set when wet.	Poor adhesion to hot surfaces.	

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

CHARACTERISTICS CEMENT

GENERIC CLASS NUMBER		106	107	108
INSULATION TRADE NAMES		Pyro-Gem Cement, Fireproofing Cement	Gleason Cement	E. P. No. 12, No. 800, Combino No. 3, Zonolite High Temp.
BASIC MATERIAL		Mineral wool, asbestos fibers and hydraulic binder	Mixed silica	Expanded vermiculite
GENERAL FORM		Hydraulic setting fireproofing cement	Bonding and facing cement	Insulating cement
ABRASION RESISTANCE % weight loss	1st RUN	15 to 25		35
	2nd RUN	25 to 40		50
ADHESION	WET			Peel on hot surface
	DRY	15		Good on cold surface
ALKALINITY, pH		8 to 10		
CAPILLARITY, % by weight				
COEFFICIENT OF EXPANSION			0.3×10^{-6}	
COMBUSTIBILITY	FLASH	Incombustible	Incombustible	Incombustible
	FLAME MELTING	3200 F		
CORROSION - RUSTING				
CORROSION - STRESS				
COVERAGE, board ft / 100 lb		30		55 Wet
DENSITY, lb / cu ft		38 to 55	135	18 to 32
HARDNESS, Mohs penetration				
HYDROSCOPICITY, % by weight				
RESISTANCE TO ACIDS		Excellent	Excellent except to HF and hot H_2PO_4	
RESISTANCE TO CAUSTICS		Excellent		
RESISTANCE TO SOLVENTS		Excellent		
*WATERAGE - HEAT	LINEAR	1 to 4% @ 1500 F		
	VOLUMETRIC			
*WATERAGE - WET TO DRY	LINEAR	1 to 2		18
	VOLUMETRIC, %			
*SPECIFIC GRAVITY	REAL			
	APPARENT	0.61 to 0.88		0.19
SPECIFIC HEAT, Btu / lb		0.22	0.26 @ 1200 F	0.22
*STRENGTH - COMPRESSIVE, psi		115 @ 5% deformation		
*STRENGTH - FLEXURAL, psi			125	
*STRENGTH - SHEAR, psi				
*STRENGTH - TENSILE, psi				
TEMPERATURE LIMITS	CONTINUOUS	Atmos Min 2000 F Max	Atmos Min 2000 F Max	Atmos Min 1800 F Max
	SHORT PERIOD	Atmos Min 2000 F Max	Atmos Min 2000 F Max	Atmos Min 1800 F Max
	CYCLIC	Atmos Min 2000 F Max	Atmos Min 2000 F Max	Atmos Min 1800 F Max
THERMAL CONDUCTIVITY, $u / (hr) (sq ft) (deg F / in.)$		0.35 @ 500 F to 0.5 @ 500 F 1.12 @ 500 F to 0.5 @ 500 F 1.22 @ 1000 F to 1.50 @ 1000 F	2.25 @ 300 F 3.4 @ 1500 F 3.00 @ 500 F 6.84 @ 1600 F 4.03 @ 1000 F 7.40 @ 3000 F	0.78 @ 200 F 1.16 @ 1000 F 0.48 @ 500 F
THERMAL DIFFUSIVITY, sq ft / hour		0.0105 @ 500 F and 40 lbs		0.015 @ 200 F
THERMAL SHOCK RESISTANCE			Excellent	
CRACK RESISTANCE				
WATER ABSORPTION, % by weight			†	
WATER VAPOR TRANSMISSION				
ADVANTAGES		1" provides approximately two hours fire protection. Can be applied by spraying coating or troweling.	Excellent thermal shock resistance.	Good coverage.
LIMITATIONS				Soft. Little mechanical strength.

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

CHARACTERISTICS LOOSE AND FILL

GENERIC CLASS NUMBER		105	110	111
INSULATION TRADE NAMES		Knocool, JM Cardliner, Fiberglas Bulk Short Staple Fiber,	Neolite L.W. Fill, JM 2400 L.W. Aggregate, JM Zelle L.W. Aggregate.	Asbestos Fibers, Crystallized Crystallite,
BASIC MATERIAL		Alumina-silica	Alumina-silica	Asbestos
GENERAL FORM		Bulk fibers	Aggregate	Bulk fibers
ALKALINITY, pH				7 to 8
COMBUSTIBILITY	FLASH FLAME MELTING	Incombustible 2700 F	Incombustible 2700 F	Incombustible 2700 F
COMPACTION				
DENSITY, lb / cu ft		4 to 12 installed	10 to 50 installed	20 to 50
HYGROSCOPICITY, % by weight				3
RESISTANCE TO ACIDS		Good for most at room temperature except HF and H ₂ PO 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 800 to 1200 F Max Atmos Min Atmos Min
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY, Btu / (sq ft) (deg F / in.)		Density 4 0.55 @ 400 F 2.21 @ 1600 F 1.24 @ 1000 F 2.53 @ 1400 F 1.88 @ 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		Insoluble		55
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.		

CHARACTERISTICS LOOSE AND FILL

GENERIC CLASS NUMBER		112	113	114
INSULATION TRADE NAMES		Wier, D-2, N. Winclose D-2, Winclose	Thermax	Granulated Cork, Navoid 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	900 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. Squishy in hydrocarbon solvents.	Inert	
SPECIFIC GRAVITY	REAL APPARENT	1.84 0.54	1.8 0.5	0.19 to 0.21
SPECIFIC HEAT, Btu / lb		0.43 @ 100 F, 0.48 @ 200 F, 0.52 @ 300 F.	0.18	
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	44 to 300 F Min 212 to 300 F Max	-405 F Min 3000 F Max -415 F Min 6000 F Max -425 F Min 5000 F Max	-200 F Min 200 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY, Btu / (sq ft) (sq in) (sec F / in.)		Density 40 0.4 to 0.6	Density 32.4 0.4 @ 1000 F	0.33 @ 10 F
THERMAL DIFFUSIVITY, sq ft / hour				
THERMAL SHOCK RESISTANCE		Cooling rate below 150 F should not exceed 2 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.	Quenches in air without a flame above 800 F. Oxidation stops when source of heat is removed. Sublimates at 5500 F.	Will burn. Depends upon vapor barrier for low temperature service life.

CHARACTERISTICS LOOSE AND FILL

GENERIC CLASS NUMBER		115	116	117
INSULATION TRADE NAMES		Micro Cel T-4	Celatom MN-K3, Sil-O-Cel Coarse	Celatom MN-25, 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		Incumbustible	Incumbustible
COMPACTION				
DENSITY, lb / cu ft		5 to 8	15 to 27	10 to 17
HYGROSCOPICITY, % by weight			4	6
RESISTANCE TO ACIDS			Good	Good
RESISTANCE TO CAUSTICS			Soluble in caustic solution	Soluble in caustic solution
RESISTANCE TO SOLVENTS			Good	Good
SPECIFIC GRAVITY	REAL APPARENT	2.45	2.12 0.34 to 0.42	2.10 0.34 to 0.27
SPECIFIC HEAT, Btu / lb			0.25 Approximately	0.23 Approximately
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	-450 F Min -450 F Min -450 F Min 1300 F Max 1300 F Max 1300 F Max	Atmos Min Atmos Min Atmos Min 1800 F Max 1600 F Max 1800 F Max	Atmos Min Atmos Min Atmos Min 1600 F Max 1600 F Max 1600 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY, Btu / (ft ² in / (deg F / hr))		Density 6 0.20 @ -115 F	Density 22 0.16 @ 800 F 0.16 @ 1000 F 0.16 @ 1200 F 0.16 @ 1400 F	Density 12.6 0.16 @ 800 F 0.16 @ 1000 F 0.16 @ 1200 F 0.16 @ 1400 F
		Density 8 0.22 @ -115 F	Density 24 0.12 @ 200 F 0.11 @ 400 F 0.12 @ 600 F	Density 17 0.12 @ 200 F 0.12 @ 400 F 0.12 @ 600 F
THERMAL DIFFUSIVITY, sq ft / hour			0.002 @ 500 F	0.01 @ 500 F
THERMAL SHOCK RESISTANCE			Good	Good
VIBRATION RESISTANCE				
WATER ABSORPTION, % by weight		High	High	High
ADVANTAGES		Good for cryogenic service. Non-abrasive.	Used to insulate high temperature gassy walls.	Used to insulate high temperature gassy walls.
LIMITATIONS		Will readily pick up moisture.		

CHARACTERISTICS LOOSE AND FILL

GENERIC CLASS NUMBER		118	119	120
INSULATION TRADE NAMES		Celatom MF 57, Sil-O-Cel C-3	Gilulite A, Gilulite B, Gilulite C, Gilulite Special B,	Gilco-Gard
BASIC MATERIAL		Calcined diatomaceous silica	Gilsonite	Gilsonite
GENERAL FORM		Loose	Granular	Granular
ALKALINITY, pH		5 to 7	7	
COMBUSTIBILITY	FLASH	Incombustible	200 F	Softening 275 F to 395 F
	FLAME MELTING			
COMPACTION				
DENSITY, lb / cu ft		25 to 31	Bulk 40, Packed 44	Bulk 40, Packed 50
HYGROSCOPICITY, % by weight		1	Approaches zero	
RESISTANCE TO ACIDS		Good	Good except sulfuric	
RESISTANCE TO CAUSTICS		Soluble in caustics	Good	
RESISTANCE TO SOLVENTS		Good	Little or none in alcohols. Soluble in hydrocarbon solvents.	
SPECIFIC GRAVITY	REAL	2.15 0.41 to 0.48	1.04 0.44	
	APPARENT			
SPECIFIC HEAT, Btu / lb		0.25 Approximately	0.25 @ 100 F, 0.50 @ 200 F 0.60 @ 300 F	
TEMPERATURE LIMITS	CONTINUOUS	Ambos Min 2000 F Max	300 to 520 F Max 300 to 520 F Max	Ambos Min 260 F Max
	SHORT PERIOD CYCLIC	Ambos Min 2000 F Max Ambos Min 2000 F Max		
TEMPERATURE RISE - SELF-INITIAL HEATING				
THERMAL CONDUCTIVITY, Btu / (hr) (sq ft) (deg F / in.)		Density 24 0.84 @ 100 F 0.78 @ 200 F 0.80 @ 300 F	Density 40 0.43 @ 100 F 0.35 @ 200 F 0.65 @ 300 F	Density 60 0.72
		Density 31 0.92 @ 200 F 1.03 @ 400 F 1.14 @ 600 F	Density 44 0.43 @ 100 F 0.65 @ 200 F 0.65 @ 300 F	
		1.26 @ 800 F 1.27 @ 1000 F 1.40 @ 1200 F 1.60 @ 1400 F		
THERMAL DIFFUSIVITY, sq ft / hour		0.17 @ 300 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 urethane 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 setting prohibits water penetration when water table 12" above pipe depth. Does not require curing. Gives corrosion protection.
DISADVANTAGES			Must be heat cured after installation.	

CHARACTERISTICS LOOSE AND FILL

GENERIC CLASS NUMBER	121	122	123
INSULATION TRADE NAMES	TWL Shredded, TW-F Shredded	Sub Zero Insul Wool	Youngs 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	Flash Flame Melting	Flash Flame Melting
COMPACTION			
DENSITY, lb / cu ft	2 to 12	2 to 12	2.5 to 2.8
HYGROSCOPICITY, % by weight	NH	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 pH 7 to 10	Good from pH 7 to 10
RESISTANCE TO SOLVENTS	Good	Good	Good
SPECIFIC GRAVITY	REAL APPARENT	REAL APPARENT	REAL APPARENT
SPECIFIC HEAT, Btu / lb	0.20	0.20	0.20
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	CONTINUOUS SHORT PERIOD CYCLIC	CONTINUOUS SHORT PERIOD CYCLIC
TEMPERATURE RISE - SELF-INTERNAL HEATING			
THERMAL CONDUCTIVITY, Btu / (sq ft) (deg F) / in.	Density 4 0.24 @ 70 F 0.25 @ 100 F 0.26 @ 200 F	Density 4 0.24 @ 70 F 0.25 @ 100 F 0.26 @ 200 F	Density 4 0.24 @ 70 F 0.25 @ 100 F 0.26 @ 200 F
THERMAL DIFFUSIVITY, sq ft / hour	0.0157 at 100 F and 5 in		
THERMAL SHOCK RESISTANCE	Resistant		Good
VIBRATION RESISTANCE			
WATER ABSORPTION, % by weight	600	600	1800
ADVANTAGES	Can be poured or packed into large or small space.	Resistant, insulating. 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.

CHARACTERISTICS LOOSE AND FILL

GENERIC CLASS NUMBER		124	125	126
INSULATION TRADE NAMES		Vitreous "E" Micro Fibers	Formglas 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			4	12 to 20
HYGROSCOPICITY, % by weight			0	
RESISTANCE TO ACIDS		Good except for HF and H ₃ PO ₄	Good except for HF and H ₃ PO ₄	
RESISTANCE TO CAUSTICS		Resistant to weaker caustics.	Good	
RESISTANCE TO SOLVENTS				
SPECIFIC GRAVITY	REAL APPARENT	2.5	0.10	0.19 to 0.40
SPECIFIC HEAT, Btu / lb				
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	Atmos Min 1500 F Max Atmos Min Atmos Min	-200 F Min 800 F Max 500 F Max 800 F Max	Atmos Min 800 F Max Atmos Min 900 F Max Atmos Min 800 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING				
		0.24 @ 70 F	0.4 @ 70 F	0.44 @ 90 F to 1.0 @ 90 F
THERMAL CONDUCTIVITY, Btu / (hr) (sq ft) (deg F / in.)				
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 absorbent.

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CHARACTERISTICS

LOOSE AND FILL

GENERIC CLASS NUMBER		127	128	129
INSULATION TRADE NAMES		Granulated Wool, Type T B, Copy-Fibre Gran., Bantroc Gran., Pakinsul, Pouring Wool.	Loose Wool, Loose Mineral Wool, Type H-2, Type H-4, Copy-Fibre Loose, Bantroc 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		4 to 8	5 to 9	
COMBUSTIBILITY	FLASH FLAME	Incombustible		Incombustible
	MELTING	1800 F	1800 F	
COMPACTION				
DENSITY, lb / cu ft		3 to 20	3 to 20	3
HYDROSCOPICITY, % 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	2.70	2.70	
	APPARENT	0.045 to 0.22	0.045 to 0.22	0.045
SPECIFIC HEAT, Btu / lb		0.22	0.22	
TEMPERATURE LIMITS	CONTINUOUS	To - 250 F Min 1000 to 1500 F Max	-300 F Min 1000 to 1500 F Max	-400 F Min 1400 F Max
	SHORT PERIOD	To - 250 F Min 1000 to 1500 F Max	-300 F Min 1000 to 1500 F Max	
	CYCLIC	To - 250 F Min 1000 to 1500 F Max	-300 F Min 1000 to 1500 F Max	
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY, ktu / (hr) (sq ft) (deg F / in.)	Density 10	0.51 @ 400 F	Density 10	0.51 @ 400 F
	0.28 @ 100 F	0.72 @ 400 F	0.28 @ 100 F	0.72 @ 400 F
	0.34 @ 200 F	0.84 @ 800 F	0.34 @ 200 F	0.84 @ 800 F
	0.42 @ 300 F		0.42 @ 300 F	
	Density 1	0.34 @ 400 F		
	0.29 @ 100 F	0.72 @ 800 F		
	0.34 @ 100 F	0.84 @ 800 F		
	0.44 @ 300 F			
THERMAL DIFFUSIVITY, sq ft / hour				
THERMAL SHOCK RESISTANCE		Good	Good	
VIBRATION RESISTANCE				
WATER ABSORPTION, % by weight		High	High	
ADVANTAGES		Soft Resistant	Resistant, Type H-4 and Bantroc 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.

CHARACTERISTICS LOOSE AND FILL

GENERIC CLASS NUMBER		130	131	132
INSULATION TRADE NAMES		Insul-tel, Armaul.	Micro Quartz Powder	Refrasil F-100
BASIC MATERIAL		Perlite and asphalt	Quartz fibers	Fibrous silica
GENERAL FORM		Granular	Loose	Loose
ALKALINITY, pH				5 to 7
COMBUSTIBILITY	FLASH	370 F	Incombustible	Incombustible
	FLAME MELTING	380 F		
COMPACTION				Resists compaction to greater than 7 lb density
DENSITY, lb / cu ft		28		1 to 2
HYGROSCOPICITY, % by weight		Nil		2 to 10
RESISTANCE TO ACIDS		Good		Good except HF and H ₂ SO ₄
RESISTANCE TO CAUSTICS		Good		Poor
RESISTANCE TO SOLVENTS		Soluble in hydrocarbon solvents		Resistant to all common organic solvents
SPECIFIC GRAVITY	REAL		2.65	2.2
	APPARENT			0.05 to 0.14
SPECIFIC HEAT, Btu / lb				0.19
TEMPERATURE LIMITS	CONTINUOUS	90 F Min 450 F Max	Atmos Min 2500 F Max	-320 F Min 1800 to 2000 F Max
	SHORT PERIOD		Atmos Min 2500 F Max	-320 F Min 2000 F Max
	CYCLIC		Atmos Min 2500 F Max	-320 F Min 2500 F Max
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY, Btu / (sq ft) (sq ft) (deg F / in.)		Density 25 0.47 @ 74 F 0.61 @ 155 F 0.81 @ 325 F	0.28 @ 200 F 0.78 @ 800 F 1.02 @ 1200 F	Density 2 1.57 @ 1200 F 2.00 @ 1400 F 0.45 @ 400 F 0.90 @ 600 F 1.20 @ 1000 F
				Density 4 0.40 @ 800 F 0.55 @ 900 F 0.75 @ 1000 F 0.90 @ 1200 F
THERMAL DIFFUSIVITY, sq ft / hour				0.054 @ 1000 F and 1 lb
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 210 F. Cannot be used under water. Cannot be installed in extremely wet weather.	Low mechanical strength.	Low mechanical strength.

CHARACTERISTICS LOOSE AND FILL

GENERIC CLASS NUMBER		131	134	135
INSULATION TRADE NAMES		Stalocel	Temokins	
BASIC MATERIAL		Silica aerogel	Expanded vermiculite	
GENERAL FORM		Loose	Loose	
ALKALINITY, pH		3.8 to 4	8 to 10	
COMBUSTIBILITY	FLASH	Incombustible		Incombustible
	FLAME MELTING	400 F		1200 F
COMPACTION			20% @ 15 psi. 21% @ 25 psi	
DENSITY, lb / cu ft		4 to 2.4	4 to 10	
HYGROSCOPICITY, % by weight		10 to 15	2	
RESISTANCE TO ACIDS		Will deteriorate in HF, reacts with H_2PO_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	2.2	2.2 to 2.7	
	APPARENT	0.064 to 0.10	0.11 to 0.12	
SPECIFIC HEAT, Btu / lb		0.205 @ 147 F	0.26 @ 0 F 0.24 @ 200 F	
TEMPERATURE LIMITS	CONTINUOUS	-250 F Min 1300 F Max	-350 F Min 1000 F Max	
	SHORT PERIOD	-131 F Min 1300 F Max	-350 F Min 1000 F Max	
	CYCLIC	-457 F Min 1300 F Max	-350 F Min 2000 F Max	
TEMPERATURE RISE - SELF-INTERNAL HEATING				
THERMAL CONDUCTIVITY, Btu / (hr) (sq ft) (deg F / in.)		Density 0.3 0.12 @ -100 F 0.16 @ 100 F 0.13 @ 70 F 0.15 @ 150 F 0.21 @ 300 F	Density 4 to 7 0.41 @ 70 F 0.42 @ 100 F 0.56 @ 200 F	
			Density 7 to 10 0.59 @ 400 F 0.46 @ 70 F 1.10 @ 800 F 0.54 @ 200 F 1.32 @ 1000 F 0.71 @ 400 F 1.74 @ 1400 F	
THERMAL DIFFUSIVITY, sq ft / hr		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 has actually damaged by water.	

CHARACTERISTICS REFLECTIVE

GENERIC CLASS NUMBER		136	137	138
INSULATION TRADE NAMES		Alcoa, Aluminum Foil, Metallifol.	Alfol	Alcoa, Alumifol.
BASIC MATERIAL		Aluminum foil	Aluminum foil	Aluminum
GENERAL FORM		Various thicknesses of foil	Foil fabricated blankets	Sheet
CAPILLARITY, % by weight		0	0	0
COEFFICIENT OF EXPANSION		33×10^{-6}	13×10^{-6}	15×10^{-6}
COMBUSTIBILITY	FLASH FLAME MELTING	1200 F	Depends on material other than foil used to make blanket.	1500 F
CORROSION - RUSTING				
CORROSION - STRESS				
DENSITY, lb / cu ft		168 for aluminum		
EMISSIVITY - HEAT		0.01 (each surface)	0.35 (each surface)	0.05 (each surface)
HYDROSCOPICITY, % 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	Alcoa Min 400 F Max 500 F Max	Alcoa Min 200 F Max Alcoa Min 300 F Max Alcoa Min 300 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 in fit into joints 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		Alfo-102, Alfo-103, Alfo-104, 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			129×10^{-7}	129×10^{-7}
COMBUSTIBILITY	FLASH FLAME MELTING	Incumbustible		Incumbustible
		1200 F	1200 F	1200 F
CORROSION - OXIDATION			Will not cause steel to rust	Will not cause steel to rust
CORROSION - STRESS			Will not contribute	Will not contribute
DENSITY, lb / cu ft			8 to 9	8.15
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	0.18
SHRINKAGE			0	0
STRENGTH			Standard structure meets normal service requirements. X-Ray case available for severe service.	Standard structure meets normal service requirements. X-Ray 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 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 0.35 @ 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 absorbent. 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 absorbent. 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

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		29×10^{-6}		
COMBUSTIBILITY	FLASH	Noncombustible		
	FLAME MELTING			
		3600 F		
CORROSION - RESTING		Will not cause steel to rust		
CORROSION - STRESS		Will not contribute		
DENSITY, lb / cu ft		8 to 9		
EMISSIVITY - HEAT		0.1 to 0.24 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		0.8 to 0.94 per stainless steel surface		
SPECIFIC GRAVITY	REAL	8.0		
	APPARENT	0.134 to 0.135		
SPECIFIC HEAT, Btu / lb		0.12		
SHRINKAGE		0		
STRENGTH		Standard structure meets normal service requirements. X-Ray case available for severe service.		
TEMPERATURE LIMITS	CONTINUOUS	- Min Atmos to 1500 F Max - Min Atmos to 1500 F Max - Min Atmos to 1500 F Max		
	SHORT PERIOD CYCLIC			
TRANSMITTANCE (W, Wt. / Wt. sq ft outer surface, deg F)		Depends on number of layers and temperature difference across insulation.		
THERMAL CONDUCTIVITY, Btu / ft-hr (sq ft) (deg F / sq ft)				
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 jackets sealed to provide vapor barrier. Not moisture absorbent. Highly resistant to external fires. Prefabricated for pipes, fittings and equipment.		
LIMITATIONS		Must be preformed to fit. • Notes: - 100 in Atmosphere. See particular product.		

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, Calico Asbestos.	Calico Heat Shield Calico Steam Shield	No Drip, Cooper's Creek C-4.
BASIC MATERIAL		Asbestos	Asbestos fibers, mineral fibers	Asphalt and granulated cork or mica.
GENERAL FORM		Sprayed	Sprayed	Expansion mortar
ABRASION RESISTANCE % weight loss	1st RUN 2nd RUN			
ADHESION	WET DRY			
ALKALINITY, pH		10		
CAPILLARITY, % by weight		250		
COEFFICIENT OF EXPANSION		0.000001		
COMBUSTIBILITY	FLASH FLAME MELTING	Incombustible	Incombustible	Will burn 200 F Softening
CORROSION - RUSTING		Inhibits steel corrosion		
CORROSION - STEELS				
COVERAGE, sq ft / 100 lb		37 to 150		12 sq ft / gal - 1/2" thick
DENSITY, lb / cu ft		8 to 14	9 to 15	
HARDNESS, 20 to Penetration		3		
HYGROSCOPICITY, % by weight		3		
RESISTANCE TO ACIDS		Not recommended for liquid exposure		
RESISTANCE TO CAUSTICS		Good		
RESISTANCE TO SOLVENTS		Excellent		
EXPANSION - HEAT	LINEAR VOLUMETRIC			
EXPANSION - 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	Asbestos Min 1800 to 2000 F Max Asbestos Min Asbestos Min	-20 F Min 180 to 200 F Max
THERMAL CONDUCTIVITY, Wm / (ft² in) (Btu ft / hr ft² in)		0.32 @ 100 F 0.55 @ 400 F 0.38 @ 200 F 0.60 @ 700 F 0.45 @ 400 F	0.38 @ 70 F 0.47 @ 400 F	0.45
THERMAL DIFFUSIVITY, sq ft / hour		0.010 to 0.012		
THERMAL SHOCK RESISTANCE				
VIBRATION RESISTANCE		Good		
WATER ABSORPTION, % by weight		400		
WATER VAPOR TRANSMISSION		155		
ADVANTAGES		Used as fireproofing	Used as fireproofing	Used for condensation control. Can be sprayed or trowelled.
LIMITATIONS				Will burn.

CHARACTERISTICS

SPRAYED, FOAMED, AND FORMED IN PLACE

GENERIC CLASS NUMBER		148	149	150
INSULATION TRADE NAMES		Swatcheck, Kama 74, Tostep 60-24, Insulapne 60E, No Koroda K Kote, Pitt-Chem 411 D, Densolite 2037, Prosear 420.	Ercote 2-FB-X, Foster 60-21, Pip-Chem 411 FB, Coopers Creek C-4.	Flashtork, Rubbercork.
BASIC MATERIAL		Asphalt and granulated cork or latex	Styrenolous and rock fillers	Granulated cork and rubber
GENERAL FORM		Solvent mastic	Solvent mastic	Moldable mastic sheet insulation
ABRASION RESISTANCE	1st RUN			
	2nd RUN			
ADHESION	WET			
	DRY			
ALKALINITY, pH				
CAPILLARITY, % by weight				
COEFFICIENT OF EXPANSION				
COMBUSTIBILITY	FLASH	Will burn	Self extinguishing	
	FLAME			
	MELTING			
CORROSION - RUSTING				None
CORROSION - STRESS				
COVERAGE, board ft / 100 lb			25	
DENSITY, lb / cu ft			40 to 50 dry	
HARDNESS, in 10 penetration				
HYDROSCOPICITY, % 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		2.04 to 2.64	
	APPARENT			
SPECIFIC HEAT, Btu / lb				
STRENGTH - COMPRESSIVE, psi				
STRENGTH - FLEXURAL, psi				
STRENGTH - SHEAR, psi				
STRENGTH - TENSILE, psi				
TEMPERATURE LIMITS	CONTINUOUS	To - 50 F Min	-20 F Min	-100 F Min
	SHORT PERIOD	150 to 200 F Max	100 F Max	200 F Max
	CYCLIC	140 to 160 F Max	-20 F Min	-100 F Min
		150 to 200 F Max	200 F Max	200 F Max
THERMAL CONDUCTIVITY, Btu / (hr sq ft deg F / in.)		0.2 to 0.3		
THERMAL DIFFUSIVITY, sq ft / hour				
THERMAL SHOCK RESISTANCE				
VIBRATION RESISTANCE				
WATER ABSORPTION, % by weight			10 % Max	
WATER VAPOR				
ADVANTAGES		Used for condensation control.	Used for condensation control.	If possible.
LIMITATIONS		Will burn.		

SPRAYED, FOAMED, AND FORMED IN PLACE

GENERIC CLASS NUMBER		151	152	153
INSULATION TRADE NAMES		Latex Insulmax 3018.	Stalcam, Nopocelast	Stalcam, Nipko-Foam 25 and Foam F, Nopocelast.
BASIC MATERIAL		Latex resins and cork or silica	Foamed polyurethane	Foamed polyurethane
GENERAL FORM		Extruded sheets	Sprayed, forms flexible open-cell insulation	Sprayed, rigid, closed-cell insulation.
ABRASION RESISTANCE	1st RUN % weight loss			
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, in. penetration				
HYDROSCOPICITY, % 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		-50 F Min 150 to 250 F Max	To -200 F Min 150 to 275 Max
THERMAL CONDUCTIVITY, Btu / (hr) (sq ft) (deg F / in.)				
THERMAL DIFFUSIVITY, sq ft / hour				
THERMAL 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.	

SPRAYED, FOAMED, AND FORMED IN PLACE

GENERIC CLASS NUMBER		154	155	156
INSULATION TRADE NAMES		Statom, Nopocelam	Expansion, Statam, Genfil, Etko-Foam 2 P, Nopocelam	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	FLAME FLAME MELTING			Fire retardant Non-flowing
CORROSION - BULGING				
CORROSION - STRESS				
COVERAGE, board ft / 100 lb			Does not contribute	10 gal / 100 sq ft, 1/2" thick
DENSITY, lb / cu ft		2	2 to 20 and 75	
HARDNESS, on 40 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 26 @ 10 % deformation	
STRENGTH - FLEXURAL, psi				
STRENGTH - SHEAR, psi			15	
STRENGTH - TENSILE, psi				1250
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	140 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	-30 F Min 185 F Max -20 F Min 185 to 200 F Max -10 F Min 160 to 200 F Max
THERMAL CONDUCTIVITY, Btu / (hr) (sq ft) (deg F / in.)			0.12 @ 70 F	0.31
THERMAL DIFFUSIVITY, sq ft / hour				
THERMAL SHOCK RESISTANCE				Good
VIBRATION RESISTANCE				Excellent
WATER ABSORPTION, % by weight			35	
WATER VAPOR TRANSMISSION			2 perm-inches	0.82 perm-inch
ADVANTAGES				Variety of colors. Will not drip in a fire. Hazard free in wet and dry state. Used for condensation control.
LIMITATIONS				

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-92	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 9	4 to 6 depending on density of septa
EXPANSIVITY - HEAT				5 to 60
HYGROSCOPICITY, % by weight				
RESISTANCE TO ACIDS				
RESISTANCE TO CAUSTICS				
RESISTANCE TO SOLVENTS				
REFLECTANCE - HEAT				0.97
SPECIFIC GRAVITY	REAL			2.6
	APPARENT			0.10
SPECIFIC HEAT, Btu / lb				0.21
SHRINKAGE				
STRENGTH				
TEMPERATURE LIMITS	CONTINUOUS	-452 F Min	Atmos Max	-452 F Min 1000 F Max
	SHORT PERIOD	-452 F Min	Atmos Max	-452 F Min 1000 F Max
	CYCLIC	-452 F Min	Atmos Max	-452 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, 2.6×10^{-5} for SI-44 based on one-foot thickness at 80 F and -320 F surface temperatures.	2.2×10^{-5} for SI-62, 1×10^{-5} for SI-92 based on one-foot thickness at 80 F and -320 F surface temperatures.	1×10^{-5} for one-foot thickness at -112 F mean temperature and 5 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 11 to 20 SI-44 15 to 70 Lower cost for better performance than specified powder system.	Layers per inch: SI-62 20 to 100 SI-92 75 to 150 Lower cost for better performance than specified powder system.	Lower cost for better performance than specified powder systems.
LIMITATIONS		Stringent vacuum requirement.	Stringent vacuum requirement.	Stringent vacuum requirement.

CHARACTERISTICS

CRYOGENIC EVACUATED SYSTEMS AND MATERIALS

GENERAL CLASS NUMBER		160	161	162
INSULATION TRADE NAMES		Micro-Cel T-4	Heat Fused AA, Heat Fused Fibre Glass (HF)	Perlon Parilla
BASE MATERIAL		Synthetic sodium silicate	Fine glass fibers	Raylon
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			Incombustible
	FLAME MELTING		1200 F	
CORROSION - METALS				
CORROSION - STRIPS				
DENSITY, lb/cu ft		5 to 6	4 and 16	3
EMISSIVITY - HEAT			0.6	
HYGROSCOPICITY, % by weight				
RESISTANCE TO ACIDS				
RESISTANCE TO CAUSTICS				
RESISTANCE TO SOLVENTS				
REFLECTANCE - HEAT				
SPECIFIC GRAVITY	REAL	2.43	2.5	0.022
	APPARENT		0.004 and 0.26	
SPECIFIC HEAT, Btu / lb			0.20	
SHRINKAGE				
STRENGTH			14 psi material will support atmospheric loading with minimum compression when this exterior skin is used	
TEMPERATURE LIMITS	CONTINUOUS	-459 F Min 1200 F Max	-459 F Min 1000 F Max	-400 F Min 1400 F Max
	SHORT PERIOD	-459 F Min 1200 F Max	-459 F Min 1000 F Max	-400 F Min 1400 F Max
	CYCLIC	-459 F Min 1200 F Max	-459 F Min 1000 F Max	-400 F Min 1400 F Max
TRANSPARENCY (U)		18×10^{-5} @ -172 F mean temperature, high vacuum and one foot thickness.	5×10^{-4} for 4 psi, 2.5×10^{-4} for 16 psi. One foot thickness, -115 mean temperature and 11 micron pressure.	12×10^{-5} @ -172 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.

CHARACTERISTICS

CRYOGENIC EVACUATED SYSTEMS AND MATERIALS

GENERIC CLASS NUMBER		163	184	
INSULATION TRADE NAMES		Sendocel A	Linde CE-3	
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 3400 F		
CORROSION - RUSTING				
CORROSION - STRESS				
DENSITY, lb / cu ft		3	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		0.203 @ 147 F		
SHRINKAGE				
STRENGTH				
TEMPERATURE LIMITS	CONTINUOUS SHORT PERIOD CYCLIC	-457 F Min -457 F Min -457 F Min	1800 F Max 1800 F Max 1800 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		25 x 10 ⁻⁵ @ -172 F mean tempers + atm., one foot thickness, and high vacuum		
THERMAL CONDUCTIVITY, Btu / (hr) (sq ft) (deg F / in.)		22 x 10 ⁻⁵ for one foot thickness and absolute pressure of 50 microns. At 80 F and -310 F surface temperatures.		
THERMAL SHOCK RESISTANCE				
VIBRATION RESISTANCE				
WATER ABSORPTION, % by weight				
WATER VAPOR TRANSMISSION				
ADVANTAGES		Can be pressed 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

<u>Company</u>	<u>Full Name and Address</u>
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

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
Asseco	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 Hector Street New York 6, New York
B.E.H.	Baldwin-Ehret-Hill, Inc. 500 Breunig 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

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
Caillcote	The Caillcote 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

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 Eastis 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

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 Sarnia, Ontario Canada
Insul-Cooustic	Insul-Cooustic 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
Lexusco Inc.	Lexusco 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

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
600 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

Mundat

Mundat Cork Corporation
7101 Tomnelle 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

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
Pacora	Pacora, Inc. 300 West Sedgley Avenue Philadelphia 40, Pennsylvania
Pennsalt Pennsalt	Pennsalt Chemicals Corporation Matrona, 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

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

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

Tufflite Plastics

Tufflite Plastics, Inc.
Ballston Spa
New York

Twinsburg-Miller

Twinsburg-Miller Corporation
P. O. Box 207
Twinsburg, 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

Zenolite

Zenolite Company
135 South LaSalle Street
Chicago 3, Illinois

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 155. 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.

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 24 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.

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 cause 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 $k/\rho \times \text{heat} \times \text{density}$. 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.

APPENDIX I

UCASB01736546

M A T E R I A L S
BLOCK, BOARD, AND PREFORMED PIPE COVERING

BASIC MATERIAL	GENERAL DESCRIPTION	MANUFACTURERS	TRADE NAMES	TEMP. LIMITS		DENSITY LB/FT ³	GEL EL. MOD.
				MIN.	MAX.		
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	Fibertex T-13 Block	Atmos.	1000	13	
Alumina-Silica Fiber and Binder (Board)	Alumina-silica fibers combined with inorganic binders. Used for heat shields, walls, baffles, etc. Rigid.	Carborundum	Fibertex XB Board	Atmos.	1000	35	
Alumina-Silica Fiber and Binder (Tubes)	Alumina-silica fiber paper combined with a small amount of inorganic binder in form of tubes. Used as furnace liners, etc. Rigid.	Carborundum	Fibertex T-30 Tubes	Atmos.	2000	35	
Asbestos Fiber and Diatomaceous Silica (Pipe Covering)	Amphibole asbestos fibers combined with diatomaceous silica and sprayed with a silicate binder. Low shrinkage. Good mechanical strength. Rigid.	Hulsco Foundry Pittsburgh Corning	Caposite Lithosol No. 1200	Atmos. Atmos.	1200 1200	14 75	
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 Insulube	Atmos.	500		
Asbestos Fiber (Sponge Felt) (Block and Pipe Covering)	Built up of asbestos inner felt laminated and cemented together to form a relatively spongy material. Resilient. Forty layers per inch. Flexible.	Carey Kearney & Matthews Mundt Nicollet	Asbestos Sponge Felt Best Felt Asbestos Sponge Asbestos Sponge Felt	Atmos. Atmos. Atmos. Atmos.	700 700 700 700	23 - 33 26 - 30	1
Asbestos Fiber (Block and Pipe Covering)	Built up of alternating layers of plain and indented asbestos paper. Approximately 32 layers per inch. Semi-rigid.	Carey Nicollet	Defender "1" Dens	Atmos. Atmos.	350 650		
Asbestos Fiber (Air Cells) (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 Kearney & Matthews Kearney & Matthews Kearney & Matthews Mundt Mundt Nicollet Nicollet Nicollet Nicollet Nicollet	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 1/4" Corrugated Air Cell 1/2" Corrugated	Atmos. Atmos. Atmos. Atmos. Atmos. Atmos. Atmos. Atmos. Atmos. Atmos. Atmos. Atmos. Atmos.	300 300 300 300 300 300 300 300 300 300 300 300 300	9 11 13 16	2
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	Asbestocem Pha-F-Lex Deluxe Sheetrock	Atmos. +50 Atmos.	600 600 600	95 103 95	3
Asbestos Fiber and Cement (Board)	Asbestos and cement formed into board. Used as facing in plants requiring incombustible boards. Rigid.	Johns-Manville National Gypsum	Transite Perma-board	-50 -50	600 600	124 120	11
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 Nicollet Ruberoid	Asbestos Millboard "C" Duroc Board Asbestos Millboard 105 Asbestos Millboard 102 Asbestos Millboard 210 Asbestos Millboard "C" Asbestos Millboard Asbestos Millboard	Atmos. Atmos. Atmos. Atmos. Atmos. Atmos. Atmos.	1200 1000 800 1000 1100 1300 1000	56 56 56 57 56 56	11
Calcium Silicate (Block and Pipe Covering)	Hydrous calcium silicate reinforced with a small amount of asbestos fibers. Good compressive strength. Rigid.	Armstrong B. K. R. Carey Eagle-Vickor Johns-Manville Kearney & Matthews Mundt Owens-Corning Pabco Ruberoid Union Asbestos	L. K. Thermasil Calcium Silicate Silco Thermosil Max-Therm Tri-Celux Kelsa Celtrap Calcibond Calcium Silicate	Atmos. Atmos. Atmos. Atmos. Atmos. Atmos. Atmos. Atmos. Atmos. Atmos. Atmos.	1200 1200 1350 1200 1200 1230 1210 1200 1210 1210 1210 1200	11 11 12 12 12 12 12 12 12 12 12	12

MATERIALS BLOCK, BOARD, AND PREFORMED PIPE COVERING

BASIC MATERIAL	GENERAL DESCRIPTION	MANUFACTURERS	TRADE NAMES	TEMP. LIMITS		DENSITY LB/CU FT	GEN. INC. CLASS NUMBER
				Min	Max		
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 Kayto-20 Calisila 161	Atmos	1500	13	13
Cork, Vegetable (Board and Pipe Covering)	Granules of vegetable cork compressed and bonded by molten to form board and pipe covering. Good structural strength. Water resistant. Not vapor resistant. Rigid.	Armstrong Armstrong Mundel National Cork United Cork	LT Cork Corkboard Jointite Novolex Cork BK Corkboard	-250	300	2	14
Diatomaceous Silicate (Block and Pipe Covering)	Calcined diatomaceous silicate blended with other insulating materials and bonded with asbestos fiber. Rigid.	B. E. N. Carey Johns-Manville Kingsley & Mattison Mundel Fabco Refractory and Insulation	Enduro Block Hi Temp No. 18 Block Superox Block Hy Temp Type 18 Block Prasco 14-C Block No. 18	Atmos	1500	24	15
Diatomaceous Silicate (Block and Pipe Covering)	Similar to above except has lower thermal conductivity and temperature limits. Rigid.	Johns-Manville Mundel Fabco	Superox M Type M Prasco 15-C	Atmos	1500	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	Marlette 23 Marlette 28 Marlette 55 Unarco Board	Atmos	800	23	17
Glass, Cellular (Block and Pipe Covering)	Morgansol, pure glass containing millions of separated hermetically sealed cells, each filled with dead air. High resistance to moisture, vapor, and acid attack. Incombustible. Good strength. Rigid.	Pittsburgh Corning	Foamglas	-450	800	8	18
Glass, Cellular (Board)	Same description as that above. Rigid.	Pittsburgh Corning	Foamglas Roof Insulation	-450	800	8	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-Fisher Owens-Corning Owens-Corning Fabco	Armoglas P. F. Armoglas P. F. Dual Temp Superglas Fiberglas Heavy Density Sectional Fiberglas Heavy Density Sectional Dual Temp Fabco Heavy Density Sectional	Atmos	450	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-Fisher Owens-Corning	Armoglas Low Pressure Superglas Low Pressure Fiberglas Low Pressure	Atmos	250	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. N. Carey Eagle-Fisher Johns-Manville Mundel Owens-Corning Pittsburgh Plate Glass Quinton-Bacon	Armoglas One Piece MSSB-Kover Thermoglas Superglas Mirro-Lok Superglas Fiberglas One Piece Fiber Glass Pipe Insulation Ecap-On	-30	400	4	22
Glass, Fibrous with Binder (Board)	Fibrous glass and binders. Used for boilers, ducts and other heated equipment. Resilient. Semi-rigid.	Armstrong Owens-Corning	Armoglas I.S. Board Fiberglas I.S. Board	-120	200	3	23
Glass, Fibrous (Board)	Fibrous glass board for duct insulation. Available with several facings. Semi-rigid.	Armstrong Eagle-Fisher Owens-Corning	Armoglas Duct Insulation Type I Type II Superglas All Purpose Duct Insulation Type I Type II		250	1.8	24

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M A T E R I A L S
BLOCK, BOARD, AND PREFORMED PIPE COVERING

BLOCK, BOARD, AND PREFORMED PIPE COVERINGS

BASIC MATERIAL	GENERAL DESCRIPTION	MANUFACTURERS	TRADE NAMES	TEMP LIMITS MIN MAX	DENSITY LB/CU FT	G.C. IN.
Glass, Fibrous with Binder (Board)	Glass fibers with phenolic resin binder. Supplied in several densities. For use on equipment, ducts, and cold rooms.	Armstrong Eagle-Picher John-Manville Durez-Corning Fabco	Armaglas PF-611 Armaglas PF-612 Armaglas PF-613 Armaglas PF-614 Armaglas PF-615 Armaglas PF-616 Armaglas PF-617 Armaglas PF-618 EPF-611 EPF-612 EPF-613 EPF-614 EPF-615 EPF-616 EPF-617 EPF-618 J.M. Microline Fiberglas PF-611 Fiberglas PF-612 Fiberglas PF-613 Fiberglas PF-614 Fiberglas PF-615 Fiberglas PF-616 PF-613 PF-615 PF-617 Fiberglas PF-614 Fiberglas PF-615	- 30 250 - 30 250 - 30 450 - 30 450 -300 450 -300 450 -300 450 -300 450 - 50 250 - 50 250 - 50 450 - 50 450 -300 450 -300 450 -300 450 - 50 300 + 50 250 + 50 250 + 50 450 -300 450	2 2 1/2 3 1/4 4 1/4 5 7 3/4 9 10 1/2 2, 1 1/2, 3 2 2 1/2 3 1/4 7 3/4 9 10 1/2 3 1/4 5 5 2 1/4 5	
Glass, Fibrous with Binder (Board)	Glass fibers with phenolic resin binder. Completely sheathed in asphalt. Used in cold storage rooms. Rigid.	Armstrong Owens-Corning	Armaglas AE Board Fiberglas AE-6 Board	+ 50 90 + 50 100	6 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 Owens-Corning	Armaglas Roof Insulation Fiberglas Roof Insulation	Airmax Airmax	175 175	12 12
Hair and Wool Felt	Layers of hair felt surrounded by layers of wool felt, with inner layer of wool felt. Used as is to retard freezing of water lines. Semi-rigid.	Carey John-Manville Kosabe & Mattison Mundel Microlet	Protecto Zeno Non Frost Built-up Hair Felt Frost-Proof	0 90 0 90 0 90 0 90 0 90	20 - 22	
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. Absorbent, will soften when wet. Rigid.	Armstrong F.E.H. Carey Eagle-Picher John-Manville Mundel Yabco	85% Magnesium Thermolite Super Light 85% Magnesium 85% Magnesium Custom Molded Magnesium Weatherable Molded 85 % Magnesium	Airmax Airmax Airmax Airmax Airmax Airmax Airmax	600 600 600 550 600 600 500	11 11 11 11 11 11 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 Armstrong H.E.H. Bigelow-Liptak Kerrick Forty-Eight General Refractories Holmes John-Manville Mundel North American Refrac. Union Asbestos Eagle-Picher	High Temp Block Insul. Armasemp M.W. Block Moog Block BL-19 Block Insul. Grip Tek Webcor HT Block Geolux MX-11 Unblock HT Barcor Type No. 17 Natch Block Insul. Usarco Mineral Wool Insulation Block PV Super Temp	Airmax Airmax Airmax Airmax Airmax Airmax Airmax Airmax Airmax Airmax Airmax Airmax Airmax	1200 1800 1800 1900 1900 1900 1900 1900 1700 1700 1700 1900 1900	16 - 20 15 14 - 16 16 - 20 16 - 22 14 - 17 16 - 20 17 - 19 18 18 - 20 15 - 20 16 - 20
Mineral Wool with Binder (Boards)	Mineral wool combined with a water-resistant asphaltic binder. Rigid.	John-Manville	Rock Cork Board	-300 120	12	
Mineral Wool with Binder (Board)	Mineral wool with binder. Used for low temperature applications mainly. Semi-rigid.	Eagle-Picher Eagle-Picher Eagle-Picher	LT-4 Felt LT-6 Felt LT-8 Felt	-300 450 -300 450 -300 450	5 5 5	

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MATERIALS

BLOCK, BOARD, AND PREFORMED PIPE COVERING

BASIC MATERIAL	GENERAL DESCRIPTION	MANUFACTURERS	TRADE NAMES	TEMP. LIMITS		DENSITY LB/CU FT	GENERIC CLASS NUMBER
				MIN	MAX		
Mineral Wool with Binder (Block and Board)	Mineral wool fibers bonded with resin binder. Resilient, Semi-rigid.	B. E. H. Derrick Eagle-Picher Johns-Manville	Therma-K Template MT Board Buroc M	Atmos	700	10	33
Mineral Wool with Binder (Block, Board and Pipe Covering)	Mineral wool fibers bonded with resin binder.	Tuffy-Eight U.S. Mineral Wool	N-150 2 lb felt	-350 -300	700 400	8 8	34
Mineral Wool with Binder (Board)	Fine mineral wool fibers bonded together with thermosetting resin. Available plain or with vapor barrier facings. Semi-rigid.	Armstrong B. E. H. Gardline Board Johns-Manville Macer U. S. Mineral Wool	Atmantemp Spun Wool Duct Duct Insulation Insulation Board Spun Board Spun Wool Insulation Board 15 lb felt	Atmos Atmos Atmos Atmos Atmos Atmos	450 450 450 450 450 450	7 7 7 4, 6, 8 3-8 3-7	35
Fibrous, Asbestos Fibers and Binder (Block)	Knitted from expanded perlite, asbestos fibers, amosite asbestos fibers and hydraulic binder. Rigid.	Refractory and Insulation	No. 12 Insulation Block	Atmos	1200	14-16	36
Polystyrene, Expanded (Board)	Closed cell expanded polystyrene. Low water absorption. Flexible.	Tuffite Plastics	Tuffite Expanded Polystyrene	-50	150	2	37
Polystyrene, Expanded (Board)	Expanded beads of polystyrene molded into shape. Lightweight. Moisture resistant. Resilient. Available in standard or self-sealing grades. Rigid.	Alumicel Corporation Armstrong Dyfoam Corporation Johns-Manville Macer S. E. Mineral Wool United Cork	Alumicel Armalite (Block and board only) Dyfoam J Foam (Block only) Expanded Polystyrene U.S. Cellulose Uni-Cork	-400 -400 -400 -400 -400 -400	175 175 175 180 175 175	1 1 1 1 3 3	38
Polystyrene, Expanded (Board)	Expanded polystyrene. Higher density than items above. Has higher compressive strength.	Tuffite Plastics	Tuffite 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-sealing. Rigid.	Dow Chemical Tuffite Plastics Tuffite Plastics	Styrofoam Tuffite Tuffite 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 Oxygen Barrett	Barrett Gold Band Thermo Thane Vestrene Insulation	-350	200 180	1.5-2 1.5-1.8 1.8-2	41
Polyurethane, Expanded (Block, Board and Pipe Covering)	Foamed polyurethane. Same as above except is self-extinguishing. Rigid.	American Latex Johns-Manville National Oxygen Praxair Insulation Pittsburgh Corning Tuffite Plastics Union Asbestos	Barfoam (Block and board only) M-Thane Gold Band Thermo Thane (Block and board only) One 1 Cel Foamthane Tuffite Urethane Unirox U-200	-280 -350 -350 -330 -300 -400	250 200 200 175 250 200	1.5-2 2 1.3-1.8 1.8-2 2.2 2-2	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		1.8	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.	Barfoam Thermax	-300	275	1.1-3.8 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 Armuflex 2 lb Rigid Armuflex	-400 -400	220 270	8 8	45

MATERIALS BLOCK, BOARD, AND PREFORMED PIPE COVERING

BASIC MATERIAL	GENERAL DESCRIPTION	MANUFACTURERS	TRADE NAMES	TEMP. LIMITS		DENSITY LB/CU FT
				MIN.	MAX.	
Rubber, Expanded. (Board)	Foamed synthetic rubber. Will burn. Good structural strength. Rigid.	Rubstex	Rubstex H-101-S	-300	140	4 - 5
Rubber, Expanded. (Board and Pipe Covering)	Foamed synthetic or natural rubber. Closed cells. Used also on tubing. Flexible.	Armstrong	Armastex 22 (Pipe covering)	-400	180	1
		Armstrong	Sheet Acoustex	-500	130	2
		Goodyear	Flexible Tubing Insulation	0	200	3
		Goodyear	Cell-Tite Tubing	-20	200	4 - 12
		Goodyear-Bacon	Urethane Foam	0	220	5
		Johns-Manville	Aerobond	22	200	6
		Mundt	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
		Pfaff	Pre-O-Cel	-40	220	7 - 8 1/2
Silica, Expanded Fibers and Slacks (Block and Pipe Covering)	Expanded silica with a special binder and reinforced with inorganic fibers. Has low water absorption. Low shrinkage. Acid resistant. Rigid.	Carby	Carby Temp	Atmos	1600	5 - 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 Fibrovel	Atmos	300	2
Silica, Cellular. (Block)	Pure cellular silica. Rigid.	Glasrock Products	Quartz Foam		2000	10 - 20
Silica, Fused. (Block)	Fused silica block. Chemically inert. Rigid.	Glasrock Products	Glasrock No. 20 Foam		1300	23
Silica, Fused. (Block)	Foamed, fused silica block. Chemi- cally inert. Excellent thermal shock resistance. Rigid.	Glasrock Products	Glasrock No. 49 Foam	Atmos	2000	30
Silica, Fused. (Board and Sheet)	Foamed, fused silica material. Chemi- cally inert. Excellent thermal shock resistance. Rigid.	Glasrock Products	Mesrock	Atmos	2000	115
Wood Fibers, Roof Insulation. (Board)	Shredded wood fibers bonded into rigid, moisture resistant insulating board. Rigid.	Johns-Manville National Gypsum	JM Roof Insulation Gold Bond Fiberboard Roof Insulation	Atmos Atmos	Atmos Atmos	10 - 12 10 - 12
Wool Felt with Vapor Barrier (Pipe Covering)	Wool felt sheets formed into pipe insula- tion. Reinforced asbestos jackets to in- crease the insulation's resistance to moisture. For use on cold water lines. Semi-rigid.	Carby Johns-Manville Kearney & Harrison Mundt Nicollet	Imperfo Anti-Sweat No-Sweat Anti-Sweat Anti-Sweat	40 40 40 40 40	80 80 80 80 80	23
Wool Felt (Pipe Covering)	Wool felt sheets formed into pipe insula- tion. Low resistance to moisture. For use on cold and hot water lines. Semi-rigid.	Carby Johns-Manville Kearney & Harrison Mundt	Perfofo Pre-Shrink Duplex Wool Felt	Atmos Atmos Atmos Atmos	225 225 212 212	18 - 20

MATERIALS BLANKET, FELT, TAPE, AND ROPE

BASIC MATERIAL	GENERAL DESCRIPTION	MANUFACTURERS	TRADE NAMES	TEMP. LIMITS		DENSITY LB/CU FT	GENERIC CLASS NUMBER
				MIN	MAX		
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 Fibersax XV-Felt Fibersax XSK Blanket Fibersax XLM Blanket Fibersax XLM Blanket Fibersax XSWF Faced Blanket Cerafelt	Atmos Atmos Atmos Atmos Atmos Atmos Atmos	1000 1000 1000 1000 1000 1000 1000	4.3 - 5 5 - 6	58
Alumina-Silica Fiber (Paper)	Alumina-silica fiber paper. Available in several widths and thicknesses. Available with or without inorganic binder.	Carborundum	Fibersax 910 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	Fibersax Rope Fibersax Cord and Yarn	Atmos Atmos	2000 1000	25	60
Alumina-Silica Fiber (Cloth and Tape)	Woven cloth and tape. Reinforced with wire or glass filament to give more strength.	Carborundum	Fibersax 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	Insultherm Felt Type A	Atmos	700	10	62
Asbestos, Woven (Felt)	Identical to item above except that blanket is treated to resist water. For cold water. Can be employed in cotton mangle.	Union Asbestos	Insultherm Felt Type B	40	80	10	63
Asbestos, Wtsp. (Tape)	Long-fibered asbestos coatings enclosed within a rubber, woven asbestos jacket. Outer surface coated. For spiral wrapping of lines.	Kenabey & Stratton Johns-Manville Union Asbestos	Kay KM Tape Thermotape Kastec Insulate	Atmos Atmos Atmos	400 400 200		64
Asbestos Wrap (Tape)	Identical to item above except is wider and is wrapped and faced instead of being spirally wound.	Johns-Manville	Thermotape	Atmos	400		65
Asbestos Fiber in Envelope (Blanket)	Asbestos cloth in envelope form filled with asbestos fibers.	Johns-Manville Union Asbestos	Asbestos Blanket Union Asbestos Blanket	Atmos Atmos	350 150	9 - 11	66
Asbestos Fiber Felted (Felt)	Soft flexible asbestos felt.	Johns-Manville Nicotex	Asbestos Roll Fire Felt Roll Felt	Atmos Atmos	1000 1000		67
Asbestos Fiber (Paper)	Asbestos fiber and binder.	Johns-Manville Nicotex Rohmco	J.M. Commercial 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 0.0002" carbon fibers. Approximately 2% volatile material. Must be gas or vacuum cured above 400 F. 1/4" thick. Reinforced grades available.	National Carbon	Grade VDS Carbon Felt	-455	4200	5.2	70
Glass, Fibrous, Without Binder (Blanket)	Fibrous glass without binder but with mineral oil lubricant.	Armstrong Owens-Corning Pabco	Armoglas TW-L Armoglas TW-F Fiberglas TW-L Fiberglas TW-F Pabco TW-F	-300 -500 -300 -300 -300	1000 1000 1000 1000 1000	4 1/2 4 1/2 4 1/2 4 1/2 4 1/2	71
Glass, Fibrous, Without Binder, Metal Encased (Blanket)	Same as above except is faced on one or both sides with metal fabric.	Armstrong Owens-Corning Pabco	Armoglas TW-L Metal Mesh Armoglas TW-F Metal Mesh Fiberglas TW-L Metal Mesh Fiberglas TW-F Metal Mesh Pabco Metal Mesh	Atmos Atmos Atmos Atmos Atmos	1000 1000 1000 1000 1000	4 1/2 4 1/2 4 1/2 4 1/2 4 1/2	72

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MATERIALS

BLANKET, FELT, TAPE, AND ROPE

BASIC MATERIAL	GENERAL DESCRIPTION	MANUFACTURERS	TRADE NAMES	TEMP LIMITS		DENSITY LB/CU FT	OTHER
				MIN	MAX		
Glass, Fibrous, Needled Felt. (Blanket)	Needled glass fiber felt made into blanket. Reinforced.	Union Carbide	Union Glass Blanket	Atmos	1200	5	
Glass, Fibrous. (Felt)	Woven glass rovings frequently encased with stainless or inoper wire mesh.	Union Carbide	Union Woven Glass Felt	Atmos	1200	5	
Glass, Fibrous, Textile Type. (Blanket)	Long textile-type glass fibers and phos- phoric binder. Very resistant. Available in a variety of densities and linings.	Gastin-Bacon	Ditraline	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 phosphoric binder. Available in a variety of densities and linings.	Johns-Manville	Microtex	Atmos	350	3/4, 1, 1 1/2, 2, 2 1/2 and 3.	
		Mundel	Superflex	Atmos	350	3/4, 1, 1 1/2 and 2	
		Pittsburgh Plate Glass	Temflex	Atmos	350	3/4, 1, 1/2, 2, 1 1/2, 2 and 3.	
Glass, Fibrous. (Blanket)	Made from extremely fine glass fibers and bonded with a phosphoric binder. Available in variety of densities and linings.	Armstrong	Armoglas Flexible Duct		370	1/2 - 1	
		B. E. H.	Fibre Fyber		370	1/2 - 2	
		Carey	Thermoglas		370	1/2 - 3	
		Gastin-Bacon	Eluraline		370	1/2 - 3	
		Johns-Manville	Microflex		370	1/2 - 3	
		Mundel	Superflex		370	1/2 - 3	
		Owens-Corning	Fiberglas Aerocore (PF 200 Series)		370	1/2 - 20	
		Owens-Corning	Fiberglas Flexible Duct (GL-310 Series)		370	1/2 - 1	
		Pabco	Pabco Flexible Duct (PF-300 Series)		370	1/2 - 1	
		Pittsburgh Plate Glass	Superflex		370	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 Superflex		200 200		
Glass, Fibrous. (Blanket)	Fibrous glass blanket with a glass mat surface. Used as a duct liner.	Armstrong	Armoglas Mat-Faced Duct Liner	-200	350	1.5 - 2.5	
		Owens-Corning	Fiberglas Mat-Faced Duct Liner	-200	160	1.5 - 2.5	
Glass, Fibrous. (Blanket)	Fibrous glass building insulation. Full- kraft laminated to fine fibrous glass. Comes in rolls or bales and with or with- out vapor barrier.	Owens-Corning	Fiberglas Full-Faced Building Insulation	Atmos	150	3/4	
Graphite (Felt)	Felt made from 9.999 carbon fibers. No volatile. Inert gas or vacuum required above 800 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 90%, when secured in place with inner 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	13 13	

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MATERIALS

BLANKET, FELT, TAPE, AND ROPE

BASIC MATERIAL	GENERAL DESCRIPTION	MANUFACTURERS	TRADE NAMES	TEMP. LIMITS		DENSITY LB/CU FT	GEN. CLASS. NUMBER
				MIN.	MAX.		
Mineral Wool Blanket. Metal Backing. (Blanket)	Felted mineral wool secured between various types of metal fabrics. Furnished as desired with metal mesh, metal back, smooth lead or zinc lead. Compressible. Flexible.	A. F. Green Armstrong B. E. H. Bigelow-Liptak Corby Detrick Eagle-Picher Forty-Eight General Refractories Holmes Johns-Manville Mundel Refractory and Insulation Rock Wool Manufacturing	Blanket Insulation Armstrong Spun Wool Blanket Metal Mesh Blanket BN-12 Industrial Mineral Wool Blanket Spun Wool Blanket EP Blanket Copr-Fibre Optica Mineral Wool Blanket Metal Mesh Blanket Searoc Blanket Mineral Wool Blanket Mineral Fiber Blanket Delta Mesh Blanket		1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200	10 10 9 10 8 8 10 10 10 8 8 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 Mundel U.S. Mineral Wool Detrick	Armstrong Spun Wool Blanket BEN Spun Felt Mineral Wool Felt Copr-Fibre LT Felt B. E. Felt Sponex Gold Bond Hand-Batter USA 2 In. Felt Spun Wool Felt	-150 -150 -150 -150 -150 -150 -150 -150	450 450 450 450 450 450 450 450	3 - 8 3 - 8 1 1/2 - 4 3 - 8 3 - 8 3 - 8 3 - 8 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	5 - 8	86
Mineral Wool with Metal Fabric (Blanket Pipe Covering)	Mineral wool fibers secured between expanded metal mesh or wire mesh. Pre-cut for pipe size. Installed by wrapping around pipe and lacing or hooking.	Armstrong B. E. H. Detrick Eagle-Picher Forty-Eight Mundel	Armstrong 100 and 101 No. 100 and 101 Mineral Wool Fib-Lok Copr-Fibre No. 45, Lace-On Type 1200	Atmos Atmos Atmos Atmos Atmos Atmos	1200 1200 1200 1200 1200 1200	6 - 10 6 - 10 9 - 12 9 8 - 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 4	88
Alumina Fibrous. (Felt and Blanket)	Long fiber, organic free, flexible, corrosion resistant. Lightweight. Also available in tape, fabric, sleeving, yarn, cordage and rope.	H. J. Thompson H. L. Thompson	Refirall A-100 Refirall B-100	-320 -320	2000 2000	4 1/2 - 8 4 1/2 - 8	89

MATERIALS CEMENT

BASIC MATERIAL	GENERAL DESCRIPTION	MANUFACTURERS	TRADE NAMES	TEMP. LIMITS		DENSITY LB/CU FT	GENERAL CLASS NUMBER
				MIN.	MAX.		
Alumina-Silica Fiber (Cement)	Alumina-silica fibers bonded with borosilicate air setting binder. Available in paste or liquid. Limited shelf life.	Carborundum	Fiberflex Coating Cement	Atmos	2000	125	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. Glasscrete	Atmos Atmos Atmos	2000 2100 2000	45 52 70	92
Alumina-Silica and Asbestos Fibers (Semi-refractory Hydraulic Setting Cement)	Asbestos fibers and alumina-silica materials. Water mixed.	Carey Eagle-Picher	Vulfrax No. 104	Atmos Atmos	1800 2100	38	93
Alumina-Silica and Asbestos Fibers (Insulating Cement)	Alumina-silica fibers, asbestos and high temperature bonding materials.	Derrick	Hi Therm	Atmos	2300	20	94
Asbestos Fiber (Misc-rup Finishing Cement)	Made from misc-rup asbestos fibers. Can be used straight or with Portland Cement to get harder, whiter surface. Water mixed.	Carey Eagle-Picher Mundel National Gypsum Nicolet Ruberoid	TM Short No. 20 TM Short Fiber TM Short TM Short TM Short Fiber	Atmos Atmos Atmos Atmos Atmos Atmos	1000 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 Kearney & Matthews Mundel Ruberoid U. S. Mineral Wool	No. 303 No. 200 No. 99 No. 352 No. 152 TM No. 115 Cymenco Finishing	Atmos Atmos Atmos Atmos Atmos Atmos Atmos Atmos	1000 1000 1000 1000 1000 1000 1000 1000	40 - 70 50 - 80 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-Lysak 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 - 40 42 - 45 46	97
Asbestos Fiber (Hard Finish Cement)	Asbestos fibers and bonding clay. Makes a smooth, hard finish.	Carey Derrick Foxy-Eight	No. 100 NHD Finish Hi Glass	Atmos Atmos Atmos	1000 1000 1000	30 - 40 42 - 45 55	98
Asbestos Fiber (Insulating Cement)	Used chiefly as an asbestos insulating cement.	Carey Kearney & Matthews	No. 701 Amblex No. 2	Atmos Atmos	755 1000	50 - 60 45 - 52	99
Asbestos Fiber (Carbonyl Finishing Cement)	Made for use over Carbonyl insulation. Dries to a smooth hard white finish.	Carey	Carbonyl Asbestos Cement	Atmos	1000	50 - 60	100
Calcium Silicate Cement	Composed of amorphous material as zeolitic silicate block insulation. Not recommended for hard finishes.	Pabco	Calcium Cement	Atmos	1200	13 - 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 Kearney & Matthews Pabco	Hi Temp No. 19 Supertex Cement Hi Temp Cement Pabco H. T. Cement	Atmos Atmos Atmos Atmos	1900 1900 1900 1900	27 23 - 32 24 - 31	102

MATERIALS
CEMENT

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MATERIALS

LOOSE AND FILL

BASIC MATERIAL	GENERAL DESCRIPTION	MANUFACTURERS	TRADE NAMES	TEMP. LIMITS		DENSITY LB./CU. FT.	GEN. CL.
				MIN.	MAX.		
Alumina-Silica Fiber (Loose Fibers)	Fibrous alumina-silica designed for fill applications. Used for packing in furnace joints, etc.	Habcock and Wilson Carborundum Johns-Manville	H and W Kaowool Fibertex Bulk Fiber Suple Fibers Jm Carbfiber	Atmos.	2500	As shipped	11
Alumina-Silica (Loose Aggregate)	Lightweight alumina-silica aggregate used for fill.	Habcock and Wilson Johns-Manville	Lucina L.W. Fill JM 2400 L.W. Aggregate JM Lucina L.W. Aggregate	Atmos. Atmos. Atmos.	2000 2400 2400	80 31	11
Asbestos Fibers	Loose asbestos fibers. Comes in various grades and densities.	Carey Johns-Manville National Gypsum Nippon Pulco Ruberoid Union Asbestos U.S. Mineral Wool	Asbestos Fibers Asbestos Fibers Gold Bond Asbestos Fibers Asbestos Fibers Asbestos Fibers Asbestos Fibers Carded Crystalline USM Asbestos Yarns	Atmos. Atmos. Atmos. Atmos. Atmos. Atmos. Atmos. Atmos.	1200 1000 800 1200 1200 1200 1200 1200	10 - 40	11
Diatomaceous	Fill type diatomaceous insulation for pouring in trench to insulate underground pipes. Must be kept cured.	Wilco Chemicals Wilco Chemicals Wilco Chemicals	Wilcolite Grade A Wilcolite Grade B-1 Wilcolite Grade B-2	40 212 300	212 300 300		11
Carbon (Loose Powder)	MT Carbon Black.	Thermatomic Carbon	Thermas.	-450	5000	30	11
Cork, Vegetable Granulated.	Vegetable Cork, granulated (raw) or regranulated (baked). Available in numerous grades.	Armstrong Murdal National	Granulated Cork Granulated Cork Novoid Granulated	-200 -200 -200	200 200 200	35	8
Calcium Silicate	Synthetic calcium silicate. Good handling properties. Must be fully resealed for low temperature service.	Johns-Manville	Micro Cel T-4	-450	1200	3 - 4	11
Diatomaceous Silica, Coarse.	Pure mineral diatomaceous silica milled to a coarse powder.	Eagle-Picher Johns-Manville	Celatom NN-83 Sil-G-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 NN-33 Sil-G-Cel Fine	Atmos. Atmos.	1600 1600	10 - 17 17 - 17	11
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-G-Cel C-3	Atmos. Atmos.	1600 1600	26 25 - 32	11
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	Gilsonite Type A Gilsonite Type B Gilsonite Type C Gilsonite Type Special B	320 300 420 355	300 365 320 355	44 44 44 44	11
Gilsonite Granules	Similar to above. Does not need curing.	American Gilsonite	Gilso-Gard	Atmos.	300	50	12
Glass, Fibrous, Shredded.	Fibrous glass with mineral oil lubricant. Low "k" value.	Armstrong Owens-Corning	Armstrong TWL and TW-F Shredded Fiberglas TWL and TW-F Shredded	-300 -300	1000 1000	2 - 12 2 - 12	11
Glass, Fibrous.	Shredded, unlubricated fibrous glass. Can be used for cryogenic service. Can be used in liquid oxygen service.	Owens-Corning	Shi Zero Insulation Wool	-300	1000	2 - 12	11
Glass, Fibrous.	Fibrous glass wool for pouring and blowing into cavity space.	Owens-Corning Owens-Corning	Fiberglas Pouring Wool Fiberglas Blowing Wool	-200 -200	250 250	1 1	11
Glass, Fibrous.	High silica-type glass of various diameters available. Good electrical properties.	Johns-Manville	Vitrex "E" Micro Filter	Atmos.	1500		12
Glass, Cellular Pellets.	Expanded glass pellets. Used for pouring. Each pellet foamed with thermally stable cells.	Pittsburgh Corning	Foamglas Pellets	-300	800		123
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.	800		126

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LOOSE AND FILL

BASIC MATERIAL	GENERAL DESCRIPTION	MANUFACTURERS	TRADE NAMES	TEMP. LIMITS		DENSITY LB/CU FT	SPECIFIC CLASS NUMBER
				MIN	MAX		
Mineral Wool, Granulated.	Mineral wool fibers in granulated form for filling cavity spaces. Soft. Low "h" value.	Armstrong P. E. H. Eagle-Picher Forty-Eight Holmes Foundry Johns-Manville Mason National Gypsum Refractory and Insulation U.S. Gypsum U.S. Mineral Wool	Armstrong Granulated Spun Wool Granulated Wool Type 12 Cape Fibre Granulated Granulated Wool Eagle Granulated Granulated Wool Gold Bond Pouring Wool Pakinsol Thermalite Pouring Wool USM Granulated Wool	-350 -250 -300 -300 -350 -350 -350 -300	1200 1200 1200 1200 1000 1200 1300 1000 1200 1300	3 - 10 3 - 10 3 - 20 7 - 12	127
Mineral Wool, Loose.	Mineral wool fibers in loose form. For filling cavity spaces. Soft. Low "h" value.	A. P. Green Armstrong P. E. H. Highlow-Liptak Corry Eagle-Picher Forty-Eight General Refractories Holmes Foundry Johns-Manville Mason National Gypsum National Gypsum Refractory and Insulation U.S. Gypsum U.S. Mineral Wool	Loose Wool Armstrong Loose Spun Wool Loose Wool W-12 Loose Mineral Wool Type H-2 Type H-4 Cape Fibre Loose Griffin Loose Mineral Wool Loose Wool Banyon Loose Loose Wool Loose Wool Shocking Wool Loose Wool Thermalite Blowing Wool U.S. M. Loose Wool	-300 -250 -250 -300 -300 -300 -300 -300 -300 -300 -300 -300 -300 -300 -300 100	1200 1200 1200 1200 1000 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200	7 - 10 8 - 8 3 - 20 8 - 12 3 - 10	128
Perlite	Expanded perlite.	Johns-Manville Zonolite	Perlon Perlite	-400 -400	1400 1400	3 3	129
Perlite and Asphalt (Granular Underdrain 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 Migro Adhesives	Armahl Insul-It	80 80	450 450	26 26	130
Quartz, Fine Fibers.	Quartz fibers, more than 95% 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	Refract 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	Sandocel	-457	1700	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

MATERIALS REFLECTIVE

BASIC MATERIAL	GENERAL DESCRIPTION	MANUFACTURERS	TRADE NAMES	TEMP. LIMITS		DENSITY LB/CU FT	OTHER CLASS. NUMBER
				MIN	MAX		
Aluminum (Foil)	Reflective aluminum foil. Various thicknesses. Some foils reinforced by attachment to membrane materials.	Alcoa Gustaf-Nayon Johnson Foil Kaiser Reynolds U.S. Mineral Wool	Alcoa Foil Aluminum Foil Aluminum Foil Kaiser Foil Metallization Aluminum Foil	Almos Almos Almos Almos Almos Almos	500 500 500 500 500 500		136
Aluminum Foil (Blanket)	Reflective foils fabricated into rolls or folded strips. Designed for building insulation.	Reflectal Corporation	Alfol	Almos	200		137
Aluminum (Sheet or Roll)	Reflective sheets of various thicknesses. In rolls or sheets.	Alcoa Aluminum Corporation Kaiser Reynolds	Alcoa Aluminal		1100 1100 1100 1100		138
Aluminum and Asbestos (Blanket)	Aluminum foil bonded to flat or corrugated asbestos paper.	Nauplet Reflectal Corporation Reflectal Corporation Reflectal Corporation	Foil Laminates Alfol No. 101 (Corrugated) Alfol No. 102 (Flat) Alfol No. 103 (Flat)	Almos Almos Almos	500 500 500	12 - 14 lbs per 100 sq ft 8 - 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 H AL Mirror DT	Almos 32 -100 -100	500 1000 Almos Almos 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 H SC Mirror DT	Almos 32 -100 -100	500 1000 Almos Almos 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 H SS Mirror DT	Almos 32 -100 -100	500 1000 Almos Almos 1000		142

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MATERIALS

SPRAYED, FOAMED, AND FORMED IN PLACE

BASIC MATERIAL	GENERAL DESCRIPTION	MANUFACTURERS	TRADE NAMES	TEMP LIMITS		DENSITY LB/CU FT	GENERIC CLASS NUMBER
				MIN	MAX		
Asbestos (Sprayed)	Asbestos fibers applied by spraying to form a continuous, seamless blanket on any surface contour.	Columbia Asbestos Armstrong Armstrong Kashey & Matison Kashey & Matison	Calco-Asbestos Sprayed "Limpet" Asbestos LW-25 Sprayed "Limpet" Asbestos LB-2 Sprayed "Limpet" Asbestos LW-25 Sprayed "Limpet" Asbestos LB-2	Atmos	1350	8 - 14	145
				-20	750	8 - 14	
				-40	1350	8 - 14	
				-40	700	8 - 14	
				-40	1350	8 - 14	146
Asbestos and Mineral Fibers (Sprayed)	Asbestos fibers and small pellet mineral fibers with inorganic binders. Latex-type water emulsion bonding adhesive.	Columbia Asbestos Columbia Asbestos	Calco - Heat Shield Calco - Blank Shield	Atmos	1800	8 - 12	
				Atmos	2000	11 - 13	
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.	Coppers Creek Mortell	C-4 Emulsion Compound No Drip	-20	200		147
				-20	180		
Asphalt and Cork or Mica (Sprayed and Formed in Place)	Solvent asphaltic compound filled with granulated cork or mica. Used for condensation control.	Coppers Creek Eagle-Picher Earl Paint Foster John-Manville Lion Oil Mortell Pittsburgh Chemicals Wilson Chemicals	C-4 Solvent Compound Sewalcheck Elate IX Elate IX InsulKote SGC InsulKote K Kote Insulmat 2072 553 Type D Pioneer 820	-40	250		148
				Atmos	150		
				-40	300		
				-32	280		
				-40	250		
				-50	275		
				-60	300		
				-50	300		
Bituminous and Cork Fillers	Bituminous solvent type filled coating. Will disintegrate but will not support combustion after curing time. Self-extinguishing.	Coppers Creek Earl Paint Foster Pittsburgh Chemicals	C-4 Bituminous Elate 3-FR-X 80 - 31 553 FR	-20	200		149
				-20	200		
				-20	200		
Cork and Rubber (Sheet - Formed in Place)	Moldable granulated cork and rubber. Used to bond-mold over fittings on cold lines.	Armstrong National Cork	Plasticork Rubbercork	-300	200	17	150
					200		
Latex Resin and Cork or Mica (Sprayed and Formed in Place)	Water emulsion latex base with cork or mica.	Mortell	Latex Insulmat 2018				151
Polyurethane, Foamed (Sprayed, Flexible)	Polyurethane sprayed and allowed to foam in place to a flexible, open-cell insulation.	American Latex Nopco Chemical	Stafam Nopcofoam	-80	180		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	Stafam Eko-Foam 25 Eko-Foam F Nopcofoam	-80	160	2 1/2	153
				-200	275	2	
				-200	210		
Polyurethane, Foamed (Poured, Flexible)	Polyurethane poured and foamed in previously prepared mold or cavity. Makes a flexible open-cell insulation.	American Latex Nopco Chemical	Stafam Nopcofoam	-60	180	2	154
Polyurethane, Foamed (Poured, Rigid)	Polyurethane poured and foamed in previously prepared mold or cavity. Makes a rigid closed-cell insulation.	American Latex Armstrong Earl Paint Nopco Chemical	Stafam Kapsulfoam Eko-Foam 2 P Nopcofoam	-80	180	2 1/2 - 20	155
				-50	180	2, 3 and 4	
				-200	275		
Vinyl and Cork or Mica (Sprayed and Formed in Place)	Vinyl base filled with cork or mica. Will resist fire.	Vynseco	WC-1 Type C	-20	180		156

APPENDIX CRYOGENIC EVACUATED SYSTEMS AND MATERIALS

BASIC MATERIAL	GENERAL DESCRIPTION	MANUFACTURERS	TRADE NAMES	TEMP LIMITS		DENSITY G/CM ³	GEN CL NO.
				MIN	MAX		
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 51-10 Linde 51-12 Linde 51-44	-450 -450 -450	Atmos Atmos Atmos		3
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 51-82 Linde 51-81	-450 -450	Atmos Atmos		1
Aluminum Foil and Glass Mat (Sheet)	Multilayers of aluminum reflective foil spaced by glass fiber mat to be used in a vacuum application.	Owens-Corning	Fiberglas Cryogenic Insulation	-450	1000		3
Calcium Silicate (Loose)	Synthetic calcium silicate. Good handling properties.	Johns-Manville	Micro-Cel T-4	-450	1200	1.4	11
Glass Fiber (Sheet)	Very fine diameter glass fiber, heat fused to specified thickness and density without organic binders. Available with and without interleaving aluminum foil. For use in high vacuum.	H. E. Thompson Owens-Corning	Heat Fused Fiber Glass (HFF) Heat Fused AA	-450 -450	1000 1000	4-12 4-12	3
Perlite (Loose)	Expanded perlite. Used under high vacuum.	Johns-Manville Zonolite	Perlon Perlite	-400 -400	1100 1400	3 3	1
Silica Aerogel (Loose)	Small hollow spheres of silica. Used under high vacuum.	Monsanto	Santocel A	-450	1200	6	11
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 at mercury in the insulating space.	Linde Company	Linde CS-5	-450	Atmos	11	1

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ACCESSORIES

ACCESSORIES **MISCELLANEOUS ASBESTOS PRODUCTS**

GENERAL DESCRIPTION	ASBESTOS PAPER (Welders 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	Carvy	0 800
	Kensley & Mattison #2 & 104	0 1000			Johns-Manville	0 800
					Kensley & Mattison	0 800
					Vulcanoid	0 800
BASIC MATERIALS AND AVAILABLE FORMS	Long fiber asbestos with binder. 12 pounds per cubic foot		Asbestos paper reinforced with glass threads. Almost 100% inorganic. Maximum asbestos fiber content of 44% with 5% maximum Fe ₂ O 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 55 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 slurry 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						

ACCESSORIES
MISCELLANEOUS ASBESTOS PRODUCTS

GENERAL DESCRIPTION	ASBESTOS ROLL BOARD		ASBESTOS MILL BOARD (Commercial Grade)		ASBESTOS MILL BOARD (Gasket Grade)				
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, *F	Carey Roll Board	MIN 0	MAX 600	Carey	MIN 0	MAX 1000	Johns-Manville J-M "C" Grade	MIN 0	MAX 1000
	Johns-Manville Roll Board	0	600	Johns-Manville J-M 100	0	1000	Kearney & Mantion K & M 101	0	1000
	Kearney & Mantion K & M 101	0	600	Kearney & Mantion K & M 101	0	1000	Hubersid Gasket Quality	0	1000
	Hubersid Roll Board	0	600	Hubersid 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 1/8 in. thick, 42 in x 48 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 600 F.		Fire retardant. Maximum recommended continuous exposure temperature is usually 600 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									

ACCESSORIES **MISCELLANEOUS ASBESTOS PRODUCTS**

GENERAL DESCRIPTION	ASBESTOS MILL BOARD (Welder's Grade)		ASBESTOS MILL BOARD (Heavy Density)		ASBESTOS TARN	
	MIN	MAX	MIN	MAX	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Caray No. 1 Hard	0	1300	Johns-Manville No. 219	0	1300
	Johns-Manville Grade "C"	0	1300	Kearney & Mattison No. 301	0	1300
	Kearney & Mattison No. 801	0	1300	Johns-Manville		
				Kearney & Mattison		
				Haydenson-Manhattan		
				Union Asbestos Usarco		
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 2/16 in. and 1/4 in.		Long asbestos fibers usually mixed with a portland cement binder. Sheets are 36 in. x 48 in., 47 in. x 48 in. and 48 in. x 54 in. with thicknesses ranging from 1/8 in. to 1/2 in.		Made from long fiber asbestos rovings mechanically twisted. Grades are available that are reinforced with wire or with fibers. Grades, cuts and ply described 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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ACCESSORIES
MISCELLANEOUS ASBESTOS PRODUCTS

GENERAL DESCRIPTION	ASBESTOS ROPE		ASBESTOS CLOTH		ASBESTOS CLOTH (Clad in Aluminum Foil)	
	MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	MIN	MAX	MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	MIN	MAX
	Detrick Johns-Manville Kasebey & Mattison Raybestos-Manhattan Union Asbestos Unarco Brand			Johns-Manville Kasebey & Mattison Raybestos-Manhattan Union Asbestos Unarco Brand		
BASIC MATERIALS AND AVAILABLE FORMS	Long fiber asbestos yarn, twisted or braided to obtain rope. Grade, size and ply as specified for desired application.		Long fiber asbestos forcing 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 areas around manhole covers.		Asbestos curtains, fire smothering blankets, fire fighting suits and insulation sheathing material.		Fire entry suits, fire curtains, blankets and garments. Jetting 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 Box Test at 2500 F. Low vapor permeability.	
ADVANTAGES			Will not deteriorate, decay, or burn.		Will not crack or peel while being stitched or sewed.	
LIMITATIONS						

ACCESSORIES **MISCELLANEOUS ASBESTOS PRODUCTS**

GENERAL DESCRIPTION	ASBESTOS FELT		ASBESTOS FELT (Asphalt Saturated)		ASBESTOS FELT (Heavy Asphalt Felt and Asbestos Paper)	
	MIN	MAX	MIN	MAX	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Johns-Manville Fire-Felt	1000	Carey		Carey Fireclad	
	Raybestos-Machaden Pyrotex		Johns-Manville Weatherproofing Felt Double-Coated Flexstone		Johns-Manville Fireclad Jacket	
			Pabco			
BASIC MATERIALS AND AVAILABLE FORMS	Soft flexible asbestos felt in roll form.		Asphalt saturated asbestos felt.		Laminates of heavy asphalt saturated felt and plain asbestos paper.	
USES	Wrapping for pipe to 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						

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	John-Manville J-M Chemical	1000	John-Manville Styles 119, 120, 121 and 122 Wessley & Matthews Raybestos-Madhattan Union Asbestos Unarco		Wessley & Matthews Raybestos-Madhattan 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-reinforced type can be furnished for additional strength. Thicknesses 4.012 in to 5/16 in.		Asbestos fibers braided and woven into tubing of a variety of sizes and wall thicknesses.	
USES	Insulating steel tanks, reproofing 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						

ACCESSORIES ADHESIVES

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	-20 100	Armstrong	-75 150
	Caray	-100 150	Laykold Insul Adhesive	-20 100	Cold Erection Plastic	-75 150
	Hydro-Gard	-100 150	Bitumote Products	-20 100	Caray	-75 150
	Esso	-100 150	Lap Cement	-20 100	Insulation Seal	-40 200
	Oil	-100 150	Insulation Mastic	-20 100	Coopers Creek	-40 200
	Lion Oil	-100 150	Emulsion No. 114	-20 100	C-4	-40 200
	Mobil Oil	-100 150	Caray, Ebonite	-20 100	Flintkote	-50 125
	Pure Asphalt	-100 150	Coopers Creek, C-4	-20 100	QC 101	-50 125
	Texaco	-100 150	Flintkote	-20 100	QC 102	-50 125
	No. 20	0 200	N-13-RPC	-20 100	C 10	-50 125
	No. 35	0 200	Emulsion Type No. 2	-20 100	Trowel Mastic	-50 125
	No. 10	0 200	Forty-Eight, Buckfast	-20 100	Foster	-50 125
	Whit	-100 150	Insul-Concrete	-20 100	#0-25	-50 125
	No. 120 and No. 3128	-25 200	I-C 230, I-C 231	-20 100	SI-02	-50 125
	No. 2230	-25 200	Johns-Manville	-40 150	Insul-Concrete	-50 125
	Hot Asphalt (FR)	-50 175	Lapsite	-20 100	Vapo-Bare IC-120	-40 200
			S.A. Adhesive	-20 100	IC-321	-40 200
			Morlingstar-Patsley	-40 200	Johns-Manville	-40 200
			SS-274	-40 200	Lapsite	-40 200
			Pittsburgh Chemical	-50 175	Lion Oil	-40 200
			Seal-Maxine 307 SF	-25 100	Mokorade Sealcoat	-40 200
			Pittsburgh-Corning	-25 100	Morlingstar-Patsley	-40 200
			PC Emulsion	-25 100	Vapor-Spread No. 43 - T85	-20 200
			Pure Asphalt	-20 150	National Cork	-20 150
			No. 20 and No. 31	-20 150	KBH Cement	-20 150
			Ruberoid	-40 150	Esso	-50 200
			Lap Cement	-40 150	Pittsburgh-Corning	-50 200
			Texaco	0 150	Whit	-40 200
			Emulsified No. 24 and No. 30	-20 150	Pioneer No. 311 and No. 312	-40 200
			Whit	-20 150		
			Pioneer W-35	-20 150		
BASIC MATERIALS AND AVAILABLE FORM	Blended from a variety of basic asphalt 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 asphalt emulsified in water, usually with clay or similar materials as emulsifying agents. These compounds differ greatly in the degree of hardness of the basic asphalt. Asbestos filled emulsions are also available.		Blend of different basic asphalt with various degrees of hardness. Can contain inert mineral fillers. The asphalt 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 gap 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 250 to 450 F. Surface should be primed first.		Trowel, brush or spray. Do not apply at temperature less than 40 F or outside drying rate.		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, alkalis and water but not to most solvents.		Cannot be treated to protect from freezing while being shipped or stored. Resistant to acids, alkalis and water but not to most solvents.		Resistant to acids, alkalis 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 mastic.		Must be used with adequate ventilation to eliminate fire hazards and prolonged breathing of toxic vapors.	

ACCESSORIES **ADHESIVES**

GENERAL DESCRIPTION	ASPHALT, RUBBER FILLED (Emulsion)			ASPHALT, RUBBER FILLED (Solvent Type)			ASPHALT, SILICATE AND ASBESTOS FILLED		
		MIN	MAX		MIN	MAX		MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Armstrong Armstrong 538		300	Pure Asphalt I-101 Adhesive	-20	150	Pittsburgh Chemical Pig Chem K-201	-20	150
	Flintkote No. 748		180	St. Clair Rubber AC-15-220	-20	180	Hi-Temp Mastic	-20	150
	Tusnet 32 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 asphalt, asbestos, silica, fire retardant resin and pigments. No volatile solvents.		
USES	On flexible duct insulation and other applications where a vapor seal is required.			Erection adhesive for cork, glass fibers, foams, 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 alkalis. Not resistant to solvents.			Resistant to alkalis. 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 fumes and prolonged breathing of toxic vapors.					

UCASB01736571

ACCESSORIES ADHESIVES

GENERAL DESCRIPTION	COAL TAR (Hot Pitch)			COAL TAR (Sleep Pitch)			COAL TAR (Emulsion)		
		MIN	MAX		MIN	MAX		MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Bartlett	-25	120	Bartlett	-25	150	Coopers Creek Pitchmastic No. 51	-20	200
	Coopers Creek C-4 Adhesive	-25	120	Pittsburgh Chemical	-25	150	Koppers Bitumastic No. 44	-25	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 lapped 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 units of insulation. Poor solvent resistance.		
ADVANTAGES	Resistant to dilute acids and alkalis. 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.		

ACCESSORIES ADHESIVES

GENERAL DESCRIPTION	COAL TAR (Cut Back)	MIN		SODIUM SILICATE (With Fibrous Asbestos)	MIN	MAX	SODIUM SILICATE (With Clay and Water)	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Coopers Creek Black No. 920	-20	140	Arabel M-8B Carey Dairick Eagle-Picher Insulatic Foster SI-27 and SI-32 Insul-Concrete Tamp-Sure I-C 450 John-Manville Kearney & Matthews North American Refractories Narco Block-Stick Pabco Refactory & Insulation Rock Stick Ruberoid	40 40 60 80 80 50 50 60 60 60 60 60 60 60 60 60	200 300 300 300 300 300 300 300 300 300 300 300 300 300 300 300	Forty-Eight Blockstick	32	140
BASIC MATERIALS AND AVAILABLE FORMS	Black coal tar pitch dissolved in organic solvents. Contains 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 magnets 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 alkalis. Not as water absorbent as most coal tar epoxies.			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.		

ACCESSORIES ADHESIVES

GENERAL DESCRIPTION	SODIUM SILICATE (With Fibrous Asbestos)		RESIN EMULSION (LAGGING ADHESIVE)		RESIN BASE (ACOUSTICAL ADHESIVE)	
	MIN	MAX	MIN	MAX	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Carry Carystemp Adhesive		Arcoel		Armstrong	
			No. 80-88-05, E-110-B	0 200	Acoustic Cement	-25 100
			V-120 Series	40 100	340 Cement	-25 150
			E-1055-B	0 200	Flakmate	
			Flakmate		Acoustite (B)	-25 100
			F-101	0 150	No. 75	0 140
			F-102	0 160	J M Company	
			Lagging Adhesive -		EC-401	-25 100
			Types 1 and II	-50 172	Vinisco	
			Formic		Lag 100	-50 100
			31-32, 31-32W, 31-42W	-30 150		
			Insul-Coastal			
			I-C 140	-20 180		
			I-C 130	-20 180		
			Mortaguard-Painter			
			Lag-Spray No. 72-77N	-30 160		
			Pittsburgh-Corning			
			CS White Paint	-25 125		
			St. Clair Rubber			
			Chaircoat	-30 100		
			Fuller			
			Fuller's No. 1362	-20 200		
			Surface Coatings			
			CS Paint	-25 125		
			Vinisco			
			Vinisco-Lag 100	-50 180		
			Vinisco-Lag 100 (FR)	-30 180		
BASIC MATERIALS AND AVAILABLE FORMS	Sodium silicate with fibrous asbestos. Five gallon and one gallon containers.		Resin emulsion. Resin is usually a poly-vinyl acetate.		Solvent type. Resin base, smooth spreading adhesive.	
USES	Cementing together of highly moisture resistant Carystemp insulation and other insulations.		Bonding canvas, asbestos or glass lagging cloths to all types insulations. Also as a bonding wood for polyvinyl film aluminum foil to glass, asbestos, wood and other fibrous materials.		Economic adhesive, for installing thermal and acoustical insulations of medium density on iron, steel, aluminum and wood.	
APPLICATION			Brush, spray or dip. To saturate lagging cloth first coat with (1) pint water per gallon. Do not apply below 45 F.		Spread with a "V" notched trowel on wet surface. Press insulation in place with sliding motion say 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 for slow burning coating. Resistant to water, mild acids, alkalis 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.	

ACCESSORIES ADHESIVES

GENERAL DESCRIPTION	RESIN BASED (Vinyl Adhesives)		SYNTHETIC RUBBER (Emulsion)		SYNTHETIC RUBBER (Solvent Type)	
		MIN MAX		MIN MAX		MIN MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Adhesive Products Vinylgrip	-20 250	Flintstone T-222	-20 180	Alumetex Corporation No. 101	-20 2
	Posier 22-18	0 200	Miracle Adhesive PF 232	-20 250	Arabul L-1-B, L-2-B, L-3-B	-20 2
	I.M. Company EC-775	-40 250	Moore Tuff-Bond Fabricating Adhesive	-10 250	Flintstone F-201 and F-202	-20 2
	Rubber and Adhesive Bondmaster G-415-22	-40 250	St. Clair Rubber SC-3145	-40 220	Posier, No. 715	-20 2
	St. Clair Rubber SC-3321 (Non-stain)	-40 190			Puller, No. 808 and No. 811	-20 2
	SC-3367	-40 200			Isomul-Couette I-C 201	-20 2
	U.S. Rubber Company 34 8310	-40 250			I-C 210	-20 2
					I.M. Company EC-165, EC-833	-20 21
					Miracle Adhesive PF 23	-20 21
					Moore Tuff-Bond No. 71-C	-20 21
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.	
	Especially good for bonding vinyl and nitrile rubber. Very versatile and will adhere to nearly any surface.		Bonding rough textured fabrics, wool burl, glass fiber and sheet cork. Bonding insulation to backing.		Adhering low density insulation material and tape of vapor barrier foils and facing.	
	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.	
	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.	
	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.	
	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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ACCESSORIES ADHESIVES

GENERAL DESCRIPTION	SYNTHETIC RUBBER (Fire Retardant - Solvent Type)		SYNTHETIC RUBBER (Resin-Solvent Type)		SYNTHETIC RUBBER (Resin-Solvent Type)				
	MIN	MAX	MIN	MAX	MIN	MAX			
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Aracel, L-1-B	-20	250	Armstrong No. 329	-40	260	St. Clair Rubber SC-4815 (Clear)	-20	300
	Flintkote No. 118	-20	200	Carbolite F1	-20	230	SC-4817 (Green)	-20	300
	Footers			Flintkote Company F-202	-20	200	SC-4821 (White)	-20	300
	Galvite Duct-Flex 81-98	-20	200	Insul-Gum No. 274	-20	230			
	Insul-Gum I-C 213 and 214	-20	250	Insul-Gum I-C 210	-20	300			
	I-M Company, SC-890	-20	250	Marsinglar-Paisley 48-784	-30	300			
	Moore			National Cork WBC Cement		360			
	Tuff-Bond No. 7	-20	300	St. Clair Rubber SC-4710 (Tan)	-40	225			
	Tuff-Bond No. 8	-20	250	SC-4501 (White)	-40	225			
	Marsinglar-Paisley Tape Spread 72-163 (FR)	-20	225	U.S. Rubber Company M-460	-40	200			
	66-538	-20	225						
	Pittsburgh-Corning P.C. Pittcoat 333 (FR)	-20	250						
	Hubber & Asbestos Bondmaster 3143	-10	225						
	St. Clair Rubber SC-4801	-20	300						
	SC-4823 (Non-burning solvent)	-20	300						
	U.S. Rubber Company M-613	-20	300						
	Vimkepo								
	Lux-Seal F	-20	200						
BASIC MATERIALS AND AVAILABLE FORMS	Synthetic rubber with a non-flammable solvent or chlorinated rubber with a less evaporating solvent.		Oil resistant synthetic rubber, resin reinforced and aromatic hydrocarbon or ketone solvents.		Synthetic rubber, natural resins and naphtha solvent.				
USES	Adhering low density insulations and tape of vapor barrier foils and facings on metal ducts, to 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 bare 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 resins 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.				

ACCESSORIES ADHESIVES

GENERAL DESCRIPTION	RECLAIMED RUBBER (Water Dispersed)		RECLAIMED RUBBER (Solvent Type)		RECLAIMED RUBBER-RESIN (Solvent Type)	
	MIN	MAX	MIN	MAX	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Flinthkote No. 749	100	Alumetex Corporation No. 102	-120 130	Flinthkote No. 717	-20
	Instal-Coatline Sure Stick 1-C 220	-60 100	Instal-Coatline 1-C 240	+ 20 175	Miracle Adhesive	-30
	Johns-Manville EA Adhesive	-30 300	F M Company EC 104	- 20 100	MF 21	-30
	F M Company EC 121	-50 300	EC-184	- 10 140	PF 42	-30
	Moore Tuff-Bond No. 3-A	-10 100	EC-234	- 20 175	PF 52	-30
	Pharmaco PA 310	-30 250	EC-274	- 20 175	PF 122	-30
			EC 290	- 20 140	No. 5144	-40
			Moore Tuff-Bond - Gen. Purpose	- 30 185	Where - Tuff-Bond H-102-H	-20
			Tuff-Bond No. 9A	- 30 180	Rubber & Asbestos	-20
			Tuff-Bond No. 8	- 30 160	Bondmaster K 363	-20
			Mortenson-Panley 66-661		Bondmaster K 455	-20
			St. Clair Rubber SC-15-160A	- 20 210	St. Clair Rubber SC-15-160A	-20
			SC-1504	- 20 250	SC-15-272	-20
			U.S. Rubber Company M6218	- 10 150		
			M5038	- 10 150		
BASIC MATERIALS AND AVAILABLE FORMS	Reclaimed rubber, water.		Reclaimed rubber and petroleum naphtha solvents.		Reclaimed rubber and resins with aliphatic hydrocarbon solvents.	
USES	Bonding sound deadener pads, flexible insulating materials, rubber and linoleum to metal, substrate and wood. Also used with high and low density glass fibers.		General purpose adhesive for rigid block and board type insulation 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 to coat on less porous surface. Bonds can be made almost immediately.	
OTHER DATA	Formulation varied by different manufacturers to obtain desired characteristics such as increased life resistance and temperature limitations. Non-dissolvable.		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 characteristics 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 or provide adequate ventilation when applied, and during drying period.	

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ACCESSORIES ADHESIVES

GENERAL DESCRIPTION	RECLAIMED RUBBER-ROSIN (Solvent Type)		NEOPRENE (Water Dispersed)		NEOPRENE (Solvent Type)				
	MIN	MAX	MIN	MAX	MIN	MAX			
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Moringstar-Paisley 48-731 St. Clair Rubber EC-15-145	-30	320	Fuller 14K2 K30 K306 St. Clair Rubber EC-2552 EC-3244	-40 -40 -30 -40 -30	150 150 150 150 150	Adhesive Products Gripwel Carbolite No. 7-1 Flexkote No. 874 Insul-Coatite Quick-Dry I-C 207 Modura Tack-Bond Quik-Set Penkote Neokote Stic-Klip Type "F" U.S. Rubber Company M-6124	-40 -40 -30 -40 -30 -30 -40 -40 -40 -40	300 250 250 250 250 250 225 250 250
	Reclaimed rubber, wood-rosin and napha solvent.		Synthetic rubber and water.		Synthetic rubber with toluol solvent or petroleum napha blend.				
	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, doors and ceilings.				
	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.				
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 60 F.					
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.					
Poor resistance to gasoline and oil.		Poor resistance to aromatic solvents, which cause swelling action. Will fracture in containers below 32 F.		Non-vulcanizing adhesive that is volatile and flammable. Health and fire protection should be noted during storage and application.					

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. 528	-100 500	Carbolite Carbo-Fix S Moore Tuff-Bond No. 500	0 225 -80 300	Carbolite KA 2EA KA 4EV Surface Coatings Biron 2501	-20 75 -20 33 -75 261
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 on new surfaces. Especially recommended for polycarbonate.	
APPLICATION	Brush, roller or trowel for No. 528. 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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ACCESSORIES ADHESIVES

GENERAL DESCRIPTION	PUR EPOXY								
	Foster #2-01	MIN	MAX		MIN	MAX		MIN	MAX
		0	250						
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F									
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									

ACCESSORIES FABRICATION CEMENTS

GENERAL DESCRIPTION	RUBBER LATEX MORTAR (Two-Part)		RESIN CEMENT (Two-Part)		KEENE'S CEMENT				
		MIN	MAX		MIN	MAX			
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Camp Company			Catloote			U.S. Gypsum		
	Laticrete Mortar	-40	200	Resin Cement PR400	0	250	Keene's Cement	-25	1100
	Carbolite								
	Hardtop No. 3	-40	200						
	Flexcrete								
	Laticrete Patch		200						
	Flexcrete								
	42-48 Flexite	-100	200						
	Miraflex Adhesive								
	ST 1000	-40	210						
Wobay Corporation of America									
Laticrete-37	-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 insulation to themselves, metal, and masonry. Also in 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 45 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, flame-retardant and non-toxic.			Bond strength exceeds strength of brick.		Fast setting. Hydraulic setting. Will not fracture cellular glass on drying.			
LIMITATIONS	Pot life from 45 to 45 minutes. Materials 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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ACCESSORIES
FABRICATION CEMENTS

GENERAL DESCRIPTION	REFRACTORY CEMENT		SODIUM-SILICATE STARCH		SODIUM SILICATE (With Fibrous Asbestos)	
	MIN	MAX	MIN	MAX	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Franco Product North American Refractories Harquest Penash Pechler FCC Refractory & Insulation Super 1000 3600 Cement	100 1000 100 1000 80 1100 100 1000 100 1500	Local Suppliers Sodium Silicate Starch	80 600	Carey Fibrous Adhesive Detrick Fibrous Adhesive Eagle-Picher Insulate Foster #1-2T and #1-#2 Insul-Gonic Temp-Save No. 210 Johns-Manville Fibrous Adhesive Kenabey & Materson Fibrous Adhesive North American Refractories Marco Block-Stik Penco Fibrous Adhesive Refractory & Insulation Block-Stik Richmond Fibrous Adhesive	60 600 60 600 60 300 60 600 60 600 60 500 60 400 60 400 60 400
BASIC MATERIALS AND AVAILABLE FORMS	Wet, air-setting, refractory type cement.		Powdered 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 valves and filling covers.		Bonding calcium silicate and amosite fiber insulation.		Cementing laminations of magnesite, mineral wool and asbestos products in high temperature usage.	
APPLICATION	Trowel or brush.		Trowel or brush.		Spot or job, 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.	

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	Look Oil				Asph				Pittsburgh-Corning			
	Nokoroda Beams and Backing Cement	-50	300		Hi-Heat 76-147	50	350		Mastic 100	-50	125	
	Nokoroda Seal Kote (PR)	-40	325		Coopers Creek	-40	150					
	Nokoroda Low Temp	-100	200		C-4	-50	150					
	Tajmar				C-4 Heavy	-50	150					
	1405 Plastic Material	0	340		Dalyish	-50	350					
	1407 Plastic Material B	0	340		Durkonal	-50	350					
	Wibbo				Flintkote	-50	125					
	Pioneer 313 and 361	-50	350		C-38 LT	-20	250					
					Trowel Mastic	-20	250					
				Forster								
				40-25	-20	200						
				60-45	-10	350						
				John-Manville								
				Zerokel	0	350						
				Look Oil								
				Seal Kote	-40	325						
				Seal and Backing Cement	-50	300						
				Low Temp	-100	200						
				Pittsburgh Chemical								
				507	-50	200						
				507 SF	-50	175						
				X-201 Hi Temp	-50	100						
BASIC MATERIALS AND AVAILABLE FORMS	Heavy consistency asphaltic series, 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 resistance to acids, alkaline materials and solvents.			
LIMITATIONS	Solvent fumes are usually flammable and toxic during application.				Must be sealed before painting				Maximum temperature limit is only 125.			

UCASB01736583

ACCESSORIES **JOINT SEALERS**

GENERAL DESCRIPTION	VINYL-ASPHALT		NON-ASPHALTIC (Fire Retardant)		MINERAL OIL BASE	
	MIN	MAX	MIN	MAX	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Vimaseal Visalene No. 40 - 20	180	Foster 80-10 (FV) 85-10 (FV) Smith-Corbin E-C 233 E-C 400 - 20 - 100	320 320 320 320	Foster 50 - 45 (Cartridges) Johns-Manville Unifast Standard Neoprene Nasural Type H Neofast Type T Pentax Caulking - 100 - 35 - 35 - 35 - 35 - 35	320 320 320 320 320 320
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 alkalis.		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.			

ACCESSORIES **JOINT SEALERS**

GENERAL DESCRIPTION	SYNTHETIC RESIN BASE			SYNTHETIC RUBBER			SYNTHETIC RUBBER (Polybutene Tapes)		
		MIN	MAX		MIN	MAX		MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Adhesive Products	- 80	250	Carbolite	- 30	200	Pecora	-70	190
	Insul-Seal	- 30	200	1202-23	- 100	300	Extra-Seal Tape	-20	190
	Flexikote	- 30	200	Insul-Compound	- 35	250	81 Clear Rubber	-20	190
	Sealing Compound G-272	- 30	200	ARMOR-CONC 1-C 401	- 35	250	SC-1395	-20	190
	Positex	- 30	200	Johns-Manville	- 35	250			
	RS-3007	- 30	200	Volcanal	- 35	250			
	Insul-Compound	- 30	200	Type HF Narmco	- 35	250			
	Super-Joint 1-C 402	- 30	200	Monroe	- 30	200			
	Johns-Manville	- 30	200	Tuff-Bond No. 12	- 30	200			
	Althaus	- 30	200	Pyramax	- 30	250			
Miracle Adhesive	- 30	250	K-1-415	- 30	250				
FD 400	- 30	250	Pittsburgh-Corning	- 30	250				
Pittsburgh-Corning	-190	200	Pittscol 222 (FR)	- 30	250				
Pittscol H1	- 30	400	Pittscol 222	- 30	250				
Pyramax	- 30	400							
ST-1 Permagum	- 30	400							
Vimaseal	- 30	400							
"J" Seal 102	0	200							
BASIC MATERIALS AND AVAILABLE FORMS	Synthetic resin with short fillers.			Synthetic rubber with fillers and solvents.			Polybutene and butyl rubber base non-drying synthetic resin. Volatile solvent with short 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 not varied by manufacturers to furnish different grades and classifications.			Dries to hardness of 14 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 maximum temperature extremes from -65 to 450 F.		
LIMITATIONS	Must be stored in cool place.						Little resistance to some solvents.		

ACCESSORIES **JOINT SEALERS**

GENERAL DESCRIPTION	SILICONE RUBBER		SILICONE (Heat Resistant Sealers)		POLYVINYL ACETATE (Caulking Compound)	
	MIN	MAX	MIN	MAX	MIN	MAX
Dow Corning Silastic RTV 791 -100 500 Foster 30-43 -20 600 Vinaco No. 102						
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F						
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. Filler 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.					

ACCESSORIES **JOINT SEALERS**

GENERAL DESCRIPTION	POLYSULFIDE RUBBER			EPOXY BASE			FITTING PUTTY		
		MIN	MAX		MIN	MAX		MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Better Finishes Flexible Sealant No. 44182	-50	250	Adhesive Products Isopox	-50	250	Foster 55-11	-50	150
	Carbolite Caulking Compound			Better Finishes No. 44-185	-50	150	Model		
	T62	-60	225	Carbolite			Brake Putty	-50	150
	T63	-60	225	T63	-50	200			
	T64	-60	225	Foster 40-57	-50	200			
	Fuller Hesswald Sealant - 420	-60	250	Fuller					
	Peapack			608 Series	-104	250			
	Synmacoth GC-2, GC-3	-35	275	Proseal					
				Flexpoint	-50	150			
BASIC MATERIALS AND AVAILABLE FORMS	Polysulfide liquid polymer rubber base. Can be furnished in a variety of colors.			Epoxy 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, applicator of 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 ranges 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			
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	American Bitumuls			Armstrong			American Bitumuls		
	Bonding Primer	-10	150	No. 3 Asphalt Paint	0	180	Collix Jet Seal	-30	200
	Bitumuls, Primer	-20	160	Bitumuls			Bitumuls		
	Flintkote, C-13-HPC	-30	160	Black Asphalt Paint	-30	130	Tarcrete	-30	190
	Feather, 10-15	0	200	Coopers Creek			Pure Asphalt		
	Isol-Gonastic			Primer (Black)	-50	180	170 Sealant	-20	200
	IC 330 and 331	-20	200	C-4 Primer	0	200			
	Johns-Manville			C-4 Primer (TB)	0	200			
	Insul-Kote Primer E & S	-20	250	Primer No. 33	-40	250			
	Lion Oil			Flintkote					
	Nokorode Brush Cement	-30	150	Asphalt Primer	-40	150			
	Mormagster-Farley			Asphalt Primer C-11	-20	200			
	64-784 M Speed	-40	200	Oneside Primer C-12	-40	150			
	National Cork			No. 267	-20	180			
	Pish Emulsion			Feather					
	Pittsburgh Chemical			SI-00	0	200			
	PC Asphalt Emulsion	-25	180	Isol-Gonastic					
	Pure Asphalt			Primer IC 330	-50	250			
	No. 58 Protective Coating	-20	150	Lion Oil					
	Texaco			Nokorode S. P. Asphalt	-30	150			
	No. 20	0	150	Nokorode Brush Cement	-30	150			
No. 23	0	150	Pittsburgh Chemical						
No. 24	0	150	Isol-Plastic 4122 Primer	-40	250				
No. 25	0	150	Pittsburgh-Earning						
No. 1044	0	180	Primer Sealer 3A	-50	150				
Witch			Pure Asphalt, No. 7 Primer	-30	150				
Witcher W-15	-20	150	Texaco, No. 1405	0	180				
			Pipe Primer	0	180				
			No. 1044	0	180				
			Wings						
			Primer No. 330	-50	150				
BASIC MATERIALS AND AVAILABLE FORMS	Liquid asphalt emulsion, light consistency.		Asphalt and petroleum solvents.		Coal tar, water dispersed, especially formulated to be used with asphalt since coal tar and asphalt are normally non-compatible.				
USES	Primer and surface sealer for metal, wood, masonry and insulation especially on damp surfaces. Increases bonding of subsequent asphalt mastic.		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, alkalis 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.				

ACCESSORIES **PRIMERS AND SURFACE SEALERS**

GENERAL DESCRIPTION	SYNTHETIC RESIN (Solvent Type)		ASPHALT SEALER (Anti-Bleed)		FRICTION TAPE SEALER (Asphalt Compound)	
	MIN	MAX	MIN	MAX	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMIT, °F.	Forster 51-12 (FR)	-20	250	Insul-Cosmetic No. 528 (Alcohol-Resin Base)	-20	250
	Insul-Cosmetic	-20	250	Rubber Corporation of America E-7729 (Rubber Base)	-50	125
	Burr-Note No. 310	-20	250			
	Morningstar-Patley 18-333	-50	150			
	Pittsburgh Chemical Insul-Decor 5425P	-40	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	Forster 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.	

ACCESSORIES **FINISH COATINGS**

GENERAL DESCRIPTION	COAL TAR PITCH (Emulsion)		ASPHALT BASE (Aluminum Powder)		ASPHALT EMULSION (Cold Room Finish)	
	MIN	MAX	MIN	MAX	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	American Bitumuls	-200 200	Armstrong	-25 200	American Bitumuls	-20 200
	Colfax Jet Seal	-20 200	Alum. Cold Storage Paint	-25 200	Weathercoat	-20 200
	Bitucote	-20 200	Bitumuls, Alum. Paint	-25 175	Mastic Undercoat	-20 200
	Tarcrete	-20 200	Coopers Creek	-20 200	Armstrong Cork	-25 200
	Flintkote	-20 200	Asphalt Aluminum Paint	-20 200	SP Emulsion	-25 200
	Oil Resistant Sealer	-20 200	Earl Paint	-20 200	Plastic Emulsion	-25 200
	Pure Asphalt	-20 200	Ertak Oilsealer	-20 200	Bitucote	-20 200
	5 To Sealcrete	-20 200	Flintkote	-20 200	Black Plaster Finish	-20 200
			Asphalt Alum. Paint	-20 200	No. 12A-14	-20 200
			Asphalt Alum. Paint C-17	-20 175	Coopers Creek	-20 200
			Foster	0 400	Asphalt Emulsion	-20 200
			50-65	0 400	Flintkote	-20 200
			Isol-Coastic	-20 250	Sanded Premix	-20 200
			I-C 514	-20 250	C-13A	-20 200
			Lion Oil	-20 200	National Cork	-25 200
			Pekolite Vehicle	-20 200	Flint Emulsion	-25 200
			National Cork	-20 200	Pure Asphalt	-20 200
			Aluminum Paint	-20 200	Isol Mastic	-20 200
			Pekolite	-20 200		
			Plutonium Chemical	-20 200		
			Isol Mastic 404E	-20 200		
			Pure Asphalt No. 82	-20 200		
BASIC MATERIALS AND AVAILABLE FORMS	Coal tar pitch emulsion.		Selected asphalt and aluminum powder blended with proper solvents.		Asphalt with asbestos fibers, sand, and 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-60355.		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 drugs.	
ADVANTAGES	Good acid and alkali resistance.		Resistant to most acids and alkalis.		Excellent shrinkage resistance. Finished surface has moisture resistant properties.	
LIMITATIONS	Manufacturers' specifications should be checked since some coal tars are not compatible with asphalt.		Poor resistance to most solvents.		Must be protected from freezing during shipping, storage, 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	-4	160	Arabof L-1-B	-20	160	Fibrex Decoralt	-20	150
	Earl Pains Exelco 3330	-25	125	Armstrong Armaflex Finish	-20	160	Pittsburgh Chemical Colorcoat 251	-40	220
	Foster Exelco	-40	160	Carbolite Polyclad 632-3	-40	160			
	Foster Exelco	-20	200	Foster Virect Vinyl Insul-Consolid	-20	160			
	Insul-Consolid			IC 420	-50	100			
	Exelco-Kote No. 110			IC 503 (FR)	-20	220			
	Exelco-Kote No. 110 (FR)			U.S. Rubber Cold Vinyl Dip 4904	-40	160			
	Exelco-Kote No. 102 (FR)								
	Marshall-Kote-Palmer								
	Exelco-Kote No. 72-778	-50	180						
	Pittsburgh-Corning								
	Exelco-Kote (LT)	-25	125						
	Exelco-Kote	-25	125						
	Exelco-Kote	-25	125						
	Exelco-Kote	-50	180						
BASIC MATERIALS AND AVAILABLE FORMS	Vinyl resin emulsion.			Vinyl resins with special solvents			Acrylic resin latex, pigments and fillers.		
USE	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 insulation to provide a tough, weather-resistant film.			Coating fresh and old concrete and asphaltic mastic. Give protection against oil and normal chemicals.		
APPLICATION	Used to adhere jacket to insulation. First coating is then applied to the exterior surface of the fabric for finish.			Brush, trowel or spray.			Brush or spray. Should not be applied at temperatures below 40 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	Heat washable coating. Resistant to oil, dirt, water and abrasion.			Good film will not support combustion. Good resistance to dilute acids and alkalis.			Decorative weather-resistant coating.		
LIMITATIONS	Must be protected from temperatures under 20 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.		

ACCESSORIES FINISH COATINGS

GENERAL DESCRIPTION	LATEX AND CEMENT (Plaster Finish)		FIBERED PLASTER (Scratch Coat)		PERLITE PLASTER (Scratch Coat)	
	MIN	MAX	MIN	MAX	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Armstrong Monoglass	-30 100	National Gypsum Gold Bond Fiber Paper	0 100	National Gypsum Gypsolite	0 100
	Cerbolite 3340	-30 100	Fibrex	0 100	U. S. Gypsum Stroncolite	0 100
	Cumy Company Automatic	-30 150	U.S. Gypsum Boudcrete	0 100		
	Flintkote	-30 150	Red Top Fibrex	0 100		
	Water Insulation Coating	-30 150				
	Permacel	-30 150				
	Penitrowel Latex (Fiber)	-30 150				
	Pittsburgh-Corning P. C. Type 1	-75 150				
	Surform Coatings PG Type "B"	-75 150				
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 strips not exceeding 1/2 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.	

ACCESSORIES

FINISH COATINGS

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						
	Paton 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.								

ACCESSORIES **WEATHER BARRIER COATINGS**

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			Coopers Creek			American Bitumuls		
	Colma Jet Seal	-20	200	Black No. 738	-20	180	Laykold Clay Emulsion	-20	100
	Bitucote			Koppers			Bitucote		
	Tarcrete	-20	200	Hydromatic 50	-20	160	Insulation Mastic	-20	180
	Koppers			Pittsburgh Chemical			Flintkote		
	Bioplastix No. 28	-50	200	Tarvac 101	-	-	N-15-HPC	-20	200
	Pittsburgh-Chemical			Pittsburgh-Corning			C-15-HPC	-30	150
	Tarvac 100	-	-	Pitcrete 90	-20	180	Waterproofing WAE Type V	-20	125
	Pure Asphalt						Insul-Crete		
	L-70 Sealcrete	-20	200				IC-110	-20	200
							IC-220	-20	200
							Pure Asphalt No. 20 F Emulsion	-10	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 asphalt. 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 protection 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 alkalis.			Breathing pipe coating.		
LIMITATIONS	Manufacturer should be consulted before using as an asphalt coating. Some coal tars are not compatible with asphalt.			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.		

ACCESSORIES **WEATHER BARRIER COATINGS**

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			Bimonta			Baldwin-Ebret-Hill		
	Layhold Mastic	-20	200	No. 12	-20	150	Asphalt Cutback	-40	400
	Armstrong, Insulmastic	-20	200	Curry			Coopers Creek		
	Baldwin-Ebret-Hill, Fiberglass	-20	200	No. 51 Emulsion	-20	100	Weather Barrier	-40	250
	Bitumuls, Protomuls	-20	200	Ebmast	-30	150	Weather Barrier (FB)	-40	250
	Coopers Creek			Coopers Creek			Detrick, Durland	-50	250
	Emulsified Asphalt	-30	250	Black Asphalt Emulsion	-20	150	Eagle-Picher		
	Emulsified Asphalt (FB)	-20	150	Foster			Elastic	0	250
	Detrick, Thermomast	0	150	Gr-20 Mastic	-20	250	Hamplast	0	250
	Eagle-Picher, Insulast	-20	400	Pure Asphalt			East Paint		
	Fiberglass, Cold-A	-20	200	No. 30	-20	150	Elkote-X	-40	250
	Thermomast	-20	200				Foster		
	Type T	-20	300				50-25 Trowel	-20	200
	Foxy-Eight, Waterseal	-32	400				50-25 Spray	-20	200
	Foster, Gr-21 M.I. Mastic	0	300				Blue-Gl		
	Insul-Coustic						Nukrode heat Form	-20	275
	Weather-Burn 101	-20	300				Nukrode heat Form (KH)	-20	275
	Emulsion 370, Emulsion 331	-20	200				Marmogast-Passley		
	John-Manville						50-25	-20	200
	Insul-War ET and EQ	-10	250				Patco	-20	250
	Mormingstar-Passley						Pittsburgh-Corning		
	Hi-Spide No. 42-124	-40	200				Puqote 300	-30	300
	National Cork						Pure Asphalt		
	Weather Mastic (HT)						511 Weatherproof Coating	-20	200
	North American Refractories								
	Narco-Built-Seal	-20	450						
	Pittsburgh Chemical								
	Asphalt Emulsion	-20	200						
	Pittsburgh-Corning								
	P.C. Pittcon 600 B	-20	275						
	Pure Asphalt, Insul. Mastic	-10	250						
	Red & White, Weather-Kote	-10	250						
BASIC MATERIALS AND AVAILABLE FORMS	Asphalt (acetylene) emulsion and asphalt (fibers). Filler content is varied to get desired temperature limits.			Asphalt liquid emulsion with approximately 55% solids.			Basic asphalt and petroleum solvents. 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. Solventized 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 painting.		
OTHER DATA	Breathable-type insulation coating.			Also used as a surface primer and adhesive on porous surfaces.			Products marked (FB) 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. (Wipier 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.		

ACCESSORIES **WEATHER BARRIER COATINGS**

GENERAL DESCRIPTION	ASPHALT EMULSION (Chemical Dispersion Type)		VINYL EMULSION (Film Coating)		VINYL EMULSION (Heavy Bodied)	
	MIN	MAX	MIN	MAX	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Detrick		Flinckota (FR)		Foster	
	Permaseal	200	F-100	-10 150	Sealite Mascon	0 150
	Eagle-Picher	-20 250	Foster		Insul-Coastic	
			Lagious (FR)	-50 150	VI-AC Mascon 511	-40 230
			Insul-Coastic		Pittsburgh-Corning	
			Sore-Kote 110 (FR)	-20 200	Pinnole 405	20 150
			Sore-Kote 111 (FR)	-20 210	Vinapace	
			Perm-Kote 100 (FR)	-20 270	Vinapace WC-1	20 150
			Morningstar-Painley			
			Lag-Sect No. 32-278 (FR)	0 150		
		66-658	-50 150			
		Pittsburgh Chemical				
		Tarmastic 105				
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-resistant coating for insulation where a tough, white adhesive-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	Breathable type of coating when first applied and approaches low vapor transmission properties of outbacks 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 freezing during shipping, storage and application.		Must be protected from freezing during shipping, storage, and application.	

ACCESSORIES **WEATHER BARRIER COATINGS**

GENERAL DESCRIPTION	VINYL WEBBING		ACRYLIC EMULSION		SILICONE RESIN	
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F		MIN	MAX		MIN	MAX
	Carbolite			Flakolite		
	Polyvinyl Web Spray	-10	150	Decorah	-20	200
	Vinyl Webbing	-40	150			

W E E T H E R B A R R I E R C O A T I N G S

GENERAL DESCRIPTION		LATEX MASTIC (Two-Part)					
		MIN	MAX			MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Plinkote						
	Mastic White (J.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, insamed 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.						

ACCESSORIES **VAPOR BARRIERS**

GENERAL DESCRIPTION	COAL TAR EMULSION (Continue)			HOT MELT ASPHALT (Continue)			ASPHALT CUTBACK-FIBERED (Boiler Wall Coating)		
		MIN	MAX		MIN	MAX		MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Coppers Creek			Mobil OH			Baldwin-Ehren-Hill		
	Panzhumaite No. 61	-20	200	Hot Melt	-50	150	Trowel and Spray Grade	-50	400
	Koppers			Exxon			Carey		
	Bituplastic 28	-50	300	Hot Melt	-50	150	RTU Cement		
	Bituplastic 32	-20	400				Detrick		
							Dynalene - Hi Temp	-32	700
							Dynalene - Regular	-20	400
							Formulac	-20	400
							Engle-Picher		
							Statolene	0	400
							John-Manville		
							Resinote ST	0	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 top at temperatures from 250 F - 400 F.			Trowel, spray or brush.		
OTHER DATA	Resistant to dilute acids and strong alkalis, naphtha 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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ACCESSORIES **VAPOR BARRIERS**

GENERAL DESCRIPTION	ASPHALT CUTBACK (Refrigerant Type Coatings)		SYNTHETIC LATEX (Coatings)		ALUMINUM FOIL (Pressure Sensitive)	
	MIN	MAX	MIN	MAX	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Flintkote		Footex		Alumiseal	
	No. C-19	-20 250	Sealmax 10-30	0 180	Zaro Perm	-72 302
	Lion Oil		Morningstar-Paisley		Cordco	
	Nokapack Seal Kote	-40 325	Lag-Seal No. 12-119	0 180	Cordoglas (FR)	0 320
	Nokapack Seal Kote (VH)	-40 325			R M Company	
					No. 425 (0.003 in.)	
					No. 428 (0.003 in.)	
BASIC MATERIALS AND AVAILABLE FORMS	Blend of special asphaltic, 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 monitoring 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 insulation.		Products vary in the type backing, mastics 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 temperatures above 40 F and material must be protected from freezing.			

ACCESSORIES VAPOR BARRIERS

GENERAL DESCRIPTION	MODIFIED EPOXY COATING		POLYETHYLENE FILM		MYLAR AND ALUMINUM FILM				
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Carbo-Kote Epoxy 184 Surface Coatings Surco No. 2501	MIN	MAX	Viking Company Via Queen Film	MIN	MAX	Aluminate Zero Perm	MIN	MAX
		-30	200		-70	150			
		-75	200						
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.		Simpled, 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.						

ACCESSORIES VAPOR BARRIERS

GENERAL DESCRIPTION		POLYVINYL CHLORIDE FILM							
		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, 22 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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ACCESSORIES WEATHER VAPOR BARRIERS

GENERAL DESCRIPTION	ASPHALT CUTBACK (Fibrous Mastic) (Continued)		ASPHALT CUTBACK (Fibrous Mastic)		ASPHALT CUTBACK (Fibrous Mastic) (Continued)	
		MIN MAX		MIN MAX		MIN MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Linco Oil		Armstrong		Linco Oil	
	Nokorode Seal Kote	-40 325	Weatherproof Mastic	-20 250	No Flash Nokorode	-40 325
	Nokorode Seal Kote (FR)	-40 325	Beldwin-Ehret-Hill		Regular Nokorode	-40 325
	Nokorode Seal Kote (No Flash) (FR)	-40 325	Trowel Spray Grade	-	Nokorode Seal Kote	-40 325
	National Cork		Stibacole		Nokorode Seal Kote (FR)	-40 325
	Weather Mastic (LT)	-	No. 5	-40 200	Nokorode Seal Kote (No Flash) (FR)	-40 325
	Pittsburgh Chemicals		Coopers Creek		National Cork	-
	Isol-Mastic 4010 (FR)	0 250	Regular	-40 250	Weather Mastic (LT)	-
	Isol-Mastic 4010	-40 250	Fire Retardant	-20 400	Pittsburgh Chemicals	
	Pure Asphalt		Eagle-Picher	-	Isol-Mastic 4010 (FR)	0 250
	No. 511	-20 200	Statastic	-	Isol-Mastic 4010	-40 250
	No. 511 (FR)	-20 200	Stamastin	-	Pure Asphalt	
	Wisco		Flintkote		No. 511	-20 200
	Pioneer 1008	-50 300	Trowel Mastic	-20 250	No. 511 (FR)	-20 200
			C-25	-20 200	Wisco	
			C-18	-20 225	Pioneer 1008	-50 300
			Forty-Eight			
			Weatherproof	32 350		
			Foster			
			55-55 CI Mastic	-20 200		
			60-55 CI Mastic	-20 200		
			Isol-Mastic			
			Vaporsure 125 and 121	-40 300		
			Johns-Manville			
			Insulcrete 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 as 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)			

ACCESSORIES **WEATHER VAPOR BARRIERS**

GENERAL DESCRIPTION	ASPHALT CUTBACKS (Pigmented)		RESIN BASE		Polyvinyl Acetate	
	MIN	MAX	MIN	MAX	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Flintkote C-335	-20 175	Foster 40-45 Aluminaum	-20 200	Better Finishes No. 65-24	-40 180
	Foster 50-52	-20 200	40-50	-20 200	Insul-Concrete No. 520	-60 180
	50-52	-20 200	40-50	-20 200	No. 521	-50 180
	Insul-Concrete No. 540, 561	-40 175	Insul-Concrete No. 503	-20 225	No. 551 (Modified)	-20 220
	Pittsburgh Chemical 4010 R	0 250			Pittsburgh-Coating PC Pittcoat 400	-50 180
	4010 AL					
	Wingo					
	Pioneer No. 507	-50 230				
BASIC MATERIALS AND AVAILABLE FORMS	Asphalts, pigments and mineral spirits. High solids content.		Resin base with solvents 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 flexibility and chemical resistance 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, solid 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.	

ACCESSORIES **WEATHER VAPOR BARRIERS**

GENERAL DESCRIPTION	CHLORINATED RESINS (Solvent Type)		RUBBER BASE			
	MIN	MAX	MIN	MAX		
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Armstrong	-20	200	Carbolite	-20	200
	LT Sealer	-20	200	Neoprene W	-20	200
	CC Navy Sealer	-20	200	Pennsalt	-40	225
	National-Cork	-	-	Kroonco	-30	185
	Navy Sealer	-	-	Moore	-	-
				Tall-Seal Coating		
BASIC MATERIALS AND AVAILABLE FORMS	Chlorinated resins, drying oils, fillers and solvent.		Synthetic rubber resins 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, masonry 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 48 hours drying time.			
OTHER DATA	Meets special MIL P-278 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.			

ACCESSORIES **HEAT RESISTANT COATINGS**

GENERAL DESCRIPTION	MINERAL CEMENT		ASPHALT CUTBACK (Fibrated Mastic)		LUMINESCENT TYPE	
	MIN	MAX	MIN	MAX	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	O'Neal Floors Fire-Ban No. 40	-100 300	Pittsburgh Chemicals X-201 Ht-Temp Mastic	-20 400	Vinnaco F.R.P. 42-6 Foslay 60 x 41	-20 300 -20 200
BASIC MATERIALS AND AVAILABLE FORMS	High temperature cement with silica aggregates.		Special blend of soft asphaltic, asbestos, silica, fire retardant resins and pigments. No volatile solvents.		Butylated melamine formaldehyde luminescent pigments 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 120 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 metal.		Luminescent action begins at 420 F. Luminescent 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 alkalis.		Must have solvent free use area.		After fire exposure refractory finish must be washed off and coating renewed.	

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ACCESSORIES **REINFORCING MEMBRANES**

GENERAL DESCRIPTION	GLASS FIBER FABRIC (Uncoated)		GLASS FIBER FABRIC (Asphalt Coated)		GLASS FIBER FABRIC (Coal Tar Coated)	
	MIN	MAX	MIN	MAX	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Chicago Manufacturing Co. Johns-Manville Duramex Twinburgh-Miller Glaslok Brand C178R		Johns-Manville Duramex (Asphalt Coated) Permaglas-Mach Type 201 20 x 20 Type 202 20 x 10 Type 203 24 x 24 Type 210 10 x 10 Twinburgh-Miller Glaslok Brand Style 1020 Style 1025 Style 1010		Johns-Manville Duramex (Coal Tar Coated) Permaglas-Mach Type 203 20 x 20 Type 204 15 x 15 Twinburgh-Miller Glaslok Brand Style 1020 T Style 1025 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 48 in. widths.		Glass fiber open weave fabric coated with special asphalt. Can be furnished in either rolled sheet or tape form. Basic widths 24 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 24 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 HRC-80165A.		Also used as reinforcing membrane in commercial roofs, walls and floors. Federal Specification HRC-80165A.	
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.	

ACCESSORIES **REINFORCING MEMBRANES**

GENERAL DESCRIPTION	GLASS FIBER FABRIC (Starch Coated)		GLASS FIBER FABRIC (Resin Coated)		GLASS FIBER FABRIC (Aluminum Treated)	
	MIN	MAX	MIN	MAX	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Poster Open Weave Glass-Mesh		Chicopee Manufacturing Co. Type 1 (10 x 8) mesh Type 2 (8 x 8) mesh Type 3 (15 x 14) mesh Type 4 (20 x 20) mesh Type 5 (34 x 24) mesh Fiberglass Yellow Jacket Poster Hilmar-Hall Sealite No. 10 Sealite No. 20 S M Company No. 340 No. 342 Fiberglass-Mesh Type 312 Glass Sheet Type 303-10 x 10 mesh Type 216-10 x 10 mesh Type 208-10 x 10 mesh Twinsburg-Miller Glaslok Brand White Weave (1070 mesh) Vishard Vi Cloth No. 30 (10 x 10) Vi Cloth No. 20 (20 x 20)	-22° 350 -30 400 -50 400	Fiberglass-Mesh Type 307 20 x 20 mesh Twinsburg-Miller Glaslok Brand Style 1020 A1 Style 1020 A2	
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 mastic.	
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 mastic which are not compatible with the asphalt or tar based fabrics.		Can be used with nonasphaltic mastic requiring fire resistant materials.		Minimum breaking strength is 15 lbs./1 in. wide strip.	
ADVANTAGES			Easy to handle, high heat resistance. Lightweight, strong material. Will not rot and has no shrinking action.		Serves as reinforcement against mechanical damage.	
LIMITATIONS			Additional cost of mastic or sealer is usually required after fabric is embedded.		Additional cost of mastic or sealer is required after fabric is embedded.	

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ACCESSORIES **REINFORCING MEMBRANES**

GENERAL DESCRIPTION	GLASS FIBER MAT		COTTON FIBER FABRIC (Asphalt Coated)		COTTON FIBER FABRIC (Tar Coated)	
	MIN	MAX	MIN	MAX	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	John-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 membranes, open weave, saturated with coal tar. Available in either rolled sheet or tape form.	
USES	Reinforcement of materials.		Reinforces 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 asphalt since certain coal tars and asphalts are non-compatible.	

ACCESSORIES **REINFORCING MEMBRANES**

GENERAL DESCRIPTION	HEX WIRE NETTING (Galvanized)		HEX WIRE NETTING (Stainless Steel)		HEX WIRE NETTING (Monel)	
	MIN	MAX	MIN	MAX	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 Tschallay Local Suppliers		A. J. Gerrard Gilbert & Bennett Tschallay 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 0.041 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 .025 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 asphalt or back-up blankets.		High strength, anti-corrosive, and best resistant netting.		Base for sheathing 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. The 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. Monel has resistance to atmospheric salt and industrial fumes.	
LIMITATIONS					Higher cost can be justified by using only in corrosive areas.	

ACCESSORIES REINFORCING MEMBRANES

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		Arma CS57 Johns-Manville No. 351 No. 362 Permacel No. 472 Polyken No. 200 No. 332	
BASIC MATERIALS AND AVAILABLE FORMS	Available in cold drawn steel wire in diameters from 0000 to 12 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 bucco mesh, floor mesh and roof mesh.				Known to the trade as "General Insulation 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.	

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	Armo E 505 John-Manville No. 253 No. 254 I M Company No. 390 Permacel No. 601 Polyken No. 218 No. 219	-10 100	Armo C-330 (10 mil) C-335 (34 mil) John-Manville Treston E-12 I M Company No. 948 No. 922	-20 120 -40 120 -10 140 -12 176	Armo No. C-604 No. C-311 No. C-508 (FBI) Permacel 9526 Polyken No. 219 No. 218	-40 200 -40 200 -40 226 -10 180 -10 180
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, alkalis, weathering, and abrasion.		General weather resistant tape for sealing joints of weather barrier jackets and about metal ducts.	
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	60 lb to 30 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 insulation are limited.		Poor resistance to ketone type solvents.	

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GENERAL DESCRIPTION	VINYL FILM TAPE		ALUMINUM FOIL TAPE		LEAD FOIL TAPE				
		MIN	MAX		MIN	MAX			
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Arco			Alumiseal			3 M Company		
	No. C-300 (Elec)	-20	250	Zero Perm	-75	175	No. 420		
	No. C-52B			Johns-Manville			Permacel		
	Johns-Manville			No. 230			P-141		
	Tyndex V-10	32	175	3 M Company					
	Tyndex V-20	32	175	No. 425 (.003 in.)					
	Vinyl Color Tape No. 128	-	-	No. 428 (.0052 in.)					
	3 M Company			Permacel					
	No. 21			P-112					
	No. 22								
	No. 38								
	No. 50								
	No. 61								
	No. 472								
	No. 473								
No. 474									
Mylar									
No. 8405									
No. 8407									
No. 8410									
No. 8420									
Permacel									
P-32 (.5 mil)	-	-							
Polyken									
No. 552 (.007 in.)	0	175							
No. 572 (.010 in.)	0	175							
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. (Nos. 475 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.		Molecule and radiation barrier for joints in aluminum sheets installed as insulation of cold rooms.			
APPLICATION	Wrap directly from roll.			Should be smoothed over exposed surface and pressed down firmly. Not recommended for spiral wrapping.		Tape must be removed from liner without breakage or shivering. 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 MVV 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.			

ACCESSORIES REINFORCING MEMBRANES

GENERAL DESCRIPTION	POLYETHYLENE COATED CLOTH TAPE		EXISTED TAPE			
		MIN MAX		MIN MAX		MIN MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS. °F	Armo C-525	-85 150	Foster Sealing Taping 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						

JACKETS

GENERAL DESCRIPTION	CANVAS SHEETING		ASBESTOS FELT (Asphalt Saturated)		FIBER GLASS MAT (Asphalt Coated)	
	MIN	MAX	MIN	MAX	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Fabric Distributing Company Foster		Carney Johns-Manville No. 30 Double Coated Fiberglass Fireward Jacket (TV) Fiboco		Fiboco Fiberglass Fiberglass 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.	

ACCESSORIES JACKETS

GENERAL DESCRIPTION	FIBER GLASS FABRIC (Per Cord)		POLYVINYL CHLORIDE FILM		POLYESTER FILM	
	MIN	MAX	MIN	MAX	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Fiberglass Mesh Parma Vins Jacket		Miracle Adhesive Protection		Dupont Mylar	
BASIC MATERIALS AND AVAILABLE FORMS	Glass weave glass fiber with an application of 20 to 70 mils thickness of tar.		Prefabricated polyvinyl chloride film water jacket.		Tough clear plastic film.	
USES	Wrapping of insulated pipes, boilers, tanks, etc.		Cover and protect insulation against weather, abrasion and chemicals.		Jackets for rigid type insulation.	
APPLICATION	Applied over hot surfaces and torch heated. Molten tar produces the necessary adhesion.		Furnished to specified pipe circumference. 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 asphalt are incompatible.		Will not withstand flame impingement.		More expensive than most other jacketing materials.	

TABLE 2 TICKETS

GENERAL DESCRIPTION	PERFORMED ALUMINUM		PERFORMED STAINLESS STEEL		PERFORMED ALUMINUM FITTING JACKETS		
	MIN	MAX	MIN	MAX	MIN	MAX	
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Aazena Chidrens Roll Jacketing Corrugated (Sheet) First Marking Aluminum Insul-Coustic Al-Cor-Lux Preformed Metal Protection Smith Products Smith Aluminum		Insul-Coustic Metal-Clad Micron Insulation Company	-365 -365	1300 2500	Aazena Regular Rumped Chidrens Ell-Lux Micron 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, pre-cut stainless steel jacket with sealed seams and joints. Gauge and type furnished as specified.		Aluminum preformed insulation jackets. Manufactured to fit standard pipe fittings. Size and grade as specified with moisture barrier inner coat.		
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 after fitting, 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 power 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.		Rumped 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 replaced without damage. Low conductivity.		Can be removed and replaced without damage. Maintenance free.		Maintenance free, easy to install, standard 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.		

ACCESSORIES JACKETS

GENERAL DESCRIPTION	PREFORMED STAINLESS STEEL FITTING JACKETS		PREJACKETED INSULATION (Aluminum)		PREJACKETED INSULATION (Stainless Steel)	
		MIN. MAX.		MIN. MAX.		MIN. MAX.
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Inval-Consul Myror Insulation Smith Products Lock-On		Carvy John-Manville Metal-On Owens-Corning Fibco Pittsburgh-Corning Preformed Metal Fibstec (With fittings included)		Carvy John-Manville Metal-On Owens-Corning Fibco 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 pre-jacketed 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 affected 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.			

ACCESSORIES JACKETS

GENERAL DESCRIPTION	POLYVINYL FLUORIDE		PREJACKETED INSULATION (Reinforced Plastic)		PRECASED INSULATED PIPING SYSTEM		
		MIN	MAX		MIN	MAX	
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Ruberoid TNA-100	-80	300	David-Consolidated Armor-Cote	-100	400	Kaiser Epiro Purvis-Hayden Rin-Wil
BASIC MATERIALS AND AVAILABLE FORMS	Polyvinyl fluoride film laminated to non-pneum 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 alkalis.		Several different size lines can be included inside the same conduit.		
LIMITATIONS			Some heat distortion is encountered at 320 F.		High initial cost.		

ACCESSORIES JACKETS

GENERAL DESCRIPTION	ELLIPTICAL HEAD JACKET (Aluminum)								
		MIN	MAX		MIN	MAX		MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Prelimed Metal Protection								
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 jacking by 6 inch flange extension.								
OTHER DATA	Inside surface is coated with a baked- on epoxy moisture 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.								

ACCESSORIES
* * * * *

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	Orange Corrug	-450 1000	Spot Nails Boatitch Galvne Brand		Arctic Steel Bostitch A. J. Gertard 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 doors.		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 to acid and caustic.					

FASTENERS

GENERAL DESCRIPTION	RIVETS		INSULATION CLIPS		SURFACE ANCHORS	
	MIN	MAX	MIN	MAX	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Asarco Insul-Clasp PH-Grip		Lexcon 100.		Miracle Adhesives Miracle Anchors Moore Gripco Full-Weld Stitch-Rip (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 patches.		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						

ACCESSORIES FASTENERS

GENERAL DESCRIPTION	WELD NUTS		WELDED STUDS, PINS AND CLIPS		METAL STRAPPING AND CLIPS	
		MIN	MAX		MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Shop Fabricated Local Suppliers			KSM Products KSM Stud Weld-Arr KSM C.D. Stud Weld Nelson Stud Welding Hel Weld	Acme Stud Assoco A.J. Gervard Insul-Clasitic KSM Products Lansco, Inc. Smith Products Stanley Tachology	
BASIC MATERIALS AND AVAILABLE FORMS	1/2 in. square steel nuts punched hot and threaded.		Steel studs and fastening devices for welding to metal surfaces. Also steel pins (available 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						

ACCESSORIES FASTENERS

GENERAL DESCRIPTION	METAL STRAPPING (Formative)		ANGLE PINS		LATH CLIPS	
	MIN	MAX	MIN	MAX	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. 5/16 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 18 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						

ACCESSORIES FASTENERS

GENERAL DESCRIPTION	STRAP FINGERS		EXPANDER BANDS		CLAMPS AND SPACERS FOR TRACER LINES	
		MIN MAX		MIN MAX		MIN MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS. °F	A. J. Gerrard		A. J. Gerrard Tomball		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-64A.	
USES	Supporting and centering cross strapping around insulation. May be used to transmit vertical load to horizontal strapping 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 applied with special fasteners.		Bolted in place according to UCCC Standard P-64.	
OTHER DATA						
ADVANTAGES						
LIMITATIONS						

ACCESSORIES FASTENERS

GENERAL DESCRIPTION	CRADLES AND SADDLES		"T" BARS		ANNEALED WIRE	
	MIN	MAX	MIN	MAX	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Insul-Coustic 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. Purchased in sizes as specified.		Steel "T" shaped bars welded together and shaped to fit holes in insulating fire brick.		Flexible annealed wire available in a variety of sizes, grades and materials.	
USE	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 angle, twisted to tighten and fasten together. Also used to attach insulation to anchor points.	
OTHER DATA						
ADVANTAGES						
LIMITATIONS						

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ACCESSORIES FASTENERS

GENERAL DESCRIPTION	GLASS FILAMENT STRAPPING TAPE (Vinyl Reinforced)		GLASS FIBER TYING CORD		GLASS CLOTH TAPE	
		MIN	MAX		MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Johns-Manville Dutch Brand No. 400			Owens-Corning	-300	1000
BASIC MATERIALS AND AVAILABLE FORMS	Vinyl backing, reinforced with glass strands. Pressure sensitive rubber liner 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 basewax string.		
USES	Strapping tape.			Tying flexible duct insulation in place.		
APPLICATION	Pressure sensitive.			Apply flexible insulation to duct by wrapping tying cord around insulation and knot.		
OTHER DATA	Colors available.					
ADVANTAGES	Waterproof.					
LIMITATIONS						

ACCESSORIES TOOLS

GENERAL DESCRIPTION	MITRE KNIFE			RIVET GUN			STRAP STRETCHER		
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Insul-Count Owens-Corning	MIN	MAX	Aasaco Insul-Count Pit-Grip	MIN	MAX	Aasaco Steel A. J. Derrard Stanley	MIN	MAX
BASIC MATERIALS AND AVAILABLE FORMS	Adjustable knife blade mounted to flat surface guide.			One hand, grip operated aluminum rivet gun.			Grip operated band tightener.		
USES	Cut off knife. Cut square 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 welder can be applied.		
OTHER DATA									
ADVANTAGES									
LIMITATIONS									

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ACCESSORIES TOOLS

GENERAL DESCRIPTION	STRAP SEALER		STAPLE AND NAILER GUN		STUD WELDING GUN	
	MIN	MAX	MIN	MAX	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Arma Seal A. J. Gerrard Stanley		Pneumatic		KEM Products KEM Stud Weld Nelson Stud Welding Hot 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	Crump 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						

ACCESSORIES MISCELLANEOUS

GENERAL DESCRIPTION	ANTI-ABRASION COATING		ANTI-ABRASION COATING		BEDDING COMPOUND				
	MIN	MAX	MIN	MAX	MIN	MAX			
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Dampney Dampney No. 20 Black	-400	500	Carbolene Polyclad 223-S			Arctol M-22-B	-100	300
				Foster 80-15 (250)	-220	250	Inquil-Coosile		
				Pittsburgh-Corning Compound 1-A	-220	300	Bare Joint JC403		
				Vimarco			Pittsburgh-Corning Pinnal III	-100	300
				Vikarlon No. 500	-327	400			
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-R-10567.				
ADVANTAGES			Will not support combustion in dry state.		Resistant to fire, solvent, acid and alkali.				
LIMITATIONS			Not solvents resistant.						

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ACCESSORIES MISCELLANEOUS

GENERAL DESCRIPTION	HEAT RESISTANT COATING		HEAT TRANSFER CEMENT		COLD WATER PASTE		
	MIN	MAX	MIN	MAX	MIN	MAX	
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	FIMAT 85 x 38	-100 1200	Chemax			Mortagelast-Palalay No. 46-571 Reardon Superdri Paste	
			Tract				
			Max-O-Power				
			Temproon Plastic				
			Thermoseal				
			Standard	-320	180		
			T-85 (Weatherproof)	- 80	375		
			T-85	-320	1258		
			T-5 (Cooking Only)	- 80	125		
					to 180		
BASIC MATERIALS AND AVAILABLE FORMS	Dark gray coating. Known as "Bore Coating" in the trade.		Inorganic, non-toxic, heat transfer cement.		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, plate heat exchangers, etc. 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 as high temperature flaking.		Excellent mechanical and thermal shock.		Very inexpensive.		
LIMITATIONS					Not water resistant.		

ACCESSORIES **MISCELLANEOUS**

GENERAL DESCRIPTION	SOUND BARRIER TYPE FACING FOR THERMAL INSULATION		HEAT TRANSFER UNIT				
		MIN	MAX	MIN	MAX	MIN	MAX
MANUFACTURERS AND TRADE NAMES WITH TEMPERATURE LIMITS, °F	Corda Constitab			Thermox 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	Absorb 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 bonding adhesive to metal, wood and insulation.		Applied to outside surface.				
OTHER DATA	Used in slating 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.						