

BASIC TYPES OF INSULATION

TABLE 1.A LOW TEMPERATURE

-75°C (-103°F) through 15°C (60°F)

Type	Form	Temp. Range	K-Factor* Metric/ Imperial	Mean Temp. C (F)	Notes
GLASS CELLULAR	Pipe Covering Block	-268°C to 427°C -450°F to 800°C	.048 (.33) @	4° (40°)	Good strength, water and vapour resistant, non-combustible, poor abrasion resistance.
GLASS FIBER	Pipe Covering Board Blanket	to 455°C to (850°F) to 538°C to (1000°F) to 538°C to (1000°F)	.035 (.24) @ .032 (.22) @ .030 (.21) @	4° (40°) 4° (40°) 4° (40°)	Good workability, non-combustible, water absorbent. Readily available. Vapour retarder required. Low compressive strength.
ELASTOMERIC FOAM	Pipe Sheet Roll	-40°C to 104°C -40°F to 220°F	.038 (.27) @	10° (50°)	Closed cell good workability, finish not required. Limited thickness to meet flame spread/smoke. Required UV protection.
POLYSTYRENE (Extruded)	Pipe Covering Board	-183°C to 74°C -297°F to 165°F	.035 (.24) @	4° (40°)	Lightweight, good, workability. Check manufacturers' data. Combustible. Some are treated for fire retardancy. All are closed cell except polystyrene expanded.
POLYSTYRENE (Expanded)	Pipe Covering Board	-40°C to 80°C -40°F to 175°F	.036 (.25) @	4° (40°)	
POLYURETHANE	Pipe Covering Sheet	-40°C to 107°C -40°F to 212°F	.025 (.18) @	4° (40°)	K-value may change as these materials age. Combustible. High flame spread and smoke.
POLYURETHANE	Pipe Covering Sheet Roll	-70° C to 100°C -94°C to 212°F	.036 (.25) @	10° (50°)	
POLYISOCYANURATE	Pipe Covering Sheet	-183°C to 140°C -297°F to 300°F	.025 (.18) @	4° (40°)	Lightweight, good workability. Check manufacturers' data. Some are treated for fire retardancy. K Values may change with age.

NOTE: Special attention must be given to installation and vapour seal.

*K-Factor Metric = W/m.K (Imperial = Btu.in./h.ft². °F)

TABLE 1.B I

15° C (60° F) through INTERMEDIATE TEMPERATURES

315° C (600° F)

Type	Form	Temp. Range	K-Factor* Metric/ Imperial	Mean Temp. C (F)	Notes
CALCIUM SILICATE	Pipe Covering Block Segments Type I	to 649°C (1200°F)	.065 (.45) @	93° (200°)	High compression strength, good workability, water absorbent, non-combustible. High flexural strength. Resistant to abrasion. See manufacturers' data for shrinkage factors.
GLASS CELLULAR	Pipe Covering Block Segments	to 427°C (800°F)	.050 (.35) @ .063 (.44) @	24° (75°) 93° (200°)	Good strength, water and vapour resistant, non-combustible, poor abrasion resistance. Subject to thermal shock. For applications over 204°C (400°F) see manufacturers' specifications.
GLASS FIBER	Pipe Covering Board	to 455°C (850°F) to 538°C (1000°F)	.037 (.26) @ .033 (.23) @	24° (75°) 24° (75°)	Good workability, non-combustible, water absorbent. Low compression resistance.
GLASS FIBER	Blanket	to 538°C (1000°F)	.033 (.23) @	24° (75°)	General purpose material, many facings available.
MINERAL FIBER	Pipe Covering Block Board Blanket	to 649°C (1200°F) to 1035°C (1895°F) to 649°C (1200°F) to 649°C (1200°F)	.037 (.26) @ .037 (.26) @ .037 (.26) @ .048 (.33) @	24° (75°) 24° (75°) 24° (75°) 24° (75°)	Good workability, non-combustible. Water absorbent. Low compression resistance.
PERLITE (Expanded)	Pipe Covering Board	to 649°C (1200°F)	.076 (.53) @	93° (200°)	Good workability, non-combustible. Poor abrasion resistance. Special packaging required to protect materials. Corrosion inhibitor.
ELASTOMERIC FOAM	Pipe Covering-I Sheet-II Roll	-40°C to 105°C -40°F to 220°F	.043 (.30) @	24° (75°)	Closed cell, finish not required, good workability. May require UV protection. Flame spread/smoke limited)
POLYSTYRENE (Extruded)	Pipe Covering Board	-183°C to 74°C -297°F to 165°F	.037 (.26) @	24° (75°)	Lightweight, excellent workability, combustible although some are treated for fire retardancy (check manufacturers' data sheet for properties) High flame spread/smoke. Check manufacturers' data sheets for values. K value may change as these materials age.
POLYSTYRENE (Expanded)	Pipe Covering Board	-40°C to 80°C -40°F to 175°F	.039 (.27) @	24° (75°)	
POLYURETHANE	Pipe Covering	-40°C to 105°C -40°F to 225°F	.027 (.19) @	24° (75°)	

SECTION 2
INSULATION MATERIALS AND PROPERTIES

POLYETHYLENE	Pipe Covering	-70°C to 100°C -94°F to 212°F	.037 (.26) @	24° (75°)	
POLYISOCYANURATE	Pipe Covering Board	-183°C to 149°C -297°F to 300°F	.027 (.19) @	24° (75°)	Lightweight, good workability. Check manufacturers' data sheets. Some are treated for fire retardancy. K values may change with age

CEMENTS – See Table 1.C

*K-Factor Metric = W/m.K (Imperial = Btu.in./h.ft². °F)

TABLE 1.C HIGH TEMPERATURE

315°C (600°F) through 815°C (1500°F)

Type	Form	Temp. Range	K-Factor* Metric/ Imperial	Mean Temp. C (F)	Notes
CALCIUM SILICATE	Pipe Covering Block Segments Type I Type II	to 649°C (1200°F) to 871°C (1600°F)	.087 (.60) @ .101 (.70) @	260° (500°) 260° (500°)	High compressive strength, good cutting characteristics, water absorbent, non-combustible. High flexural strength. Resistant to abrasion. See manufacturers' data for shrinkage factors.
CLASS CELLULAR HIGH TEMP	Pipe Covering Block Segments	to 427°C (800°F)	.103 (.72) @	260° (500°)	Good strength, water and vapour resistant, non-combustible, poor abrasion resistance. Subject to thermal shock. For application over 204°C (400°F), see manufacturers' specifications.
GLASS FIBER	Pipe Covering Board Blanket	to 455°C (850°F) to 538°C (1000°F) to 538°C (1000°F)	.083 (.58) @ .086 (.60) @ .086 (.60) @	260° (500°) 260° (500°) 260° (500°)	Good workability, water absorbent, non-combustible. Check manufacturers' data for specific properties. Low compression resistance.
MINERAL FIBER	Pipe Covering Block Board Blanket	to 649°C (1200°F) to 1035°C (1895°F) to 649°C (1200°F) to 649°C (1200°F)	.072 (.50) @ .092 (.64) @ .101 (.70) @ .101 (.70) @	260° (500°) 260° (500°) 260° (500°) 260° (500°)	Good workability, non-combustible. Low compressive resistance. Water absorbent.
PERLITE (Expanded)	Pipe Covering Block	to 649°C (1200°F)	.106 (.74) @	260° (500°)	Good workability, non-combustible, friable. Check manufacturers' data for specific properties. Poor abrasion resistance. Special packaging required to protect material. Corrosion inhibitor.
CERAMIC FIBER (Refractory Fiber)	Blanket Board	to 1260°C (2300°F) to 1260°C (2300°F)	.086 (.60) @ .080 (.56) @	260° (500°) 260° (500°)	Temperature range varies with manufacturer, style and type.
CEMENTS Hydraulic Setting Cement High Temperature Mineral Wool Finishing Cement (Mineral Fiber or Vermiculite)	Type I Type II Type III	38-649°C (100-1200°F) 38-870°C (100-1600°F) 38-980°C (100-1800°F)	.180 (1.05) @ .160 (1.12) @ .150 (1.26) @	250° (482°) 250° (482°) 250° (482°)	One coat application – insulating and finishing. Slow drying, rough texture – Pointing and insulating and filling. Used over basic insulation – Smooth finish usually 1/8" or 1/4" thick application.

PROTECTIVE COVERINGS AND FINISHES

PLEASE NOTE: The following items are classified for use as weather barriers and/or vapour retarders. They also serve other purposes listed for protective coverings (i.e. mechanical abuse, corrosion, appearance, and hygienic), but each must be considered on its own merits for these aspects.

TABLE 2.A WEATHER BARRIERS*

Type	Composition	Fasteners	Notes
JACKETS:	1. Films laminated to felts or foil	Contact adhesives and/or tape	Corrosion resistant, bacteria and mildew resistant
	2. Stainless steel (various alloys – available with factory-applied moisture retarder)	Bands, screws or rivets	Excellent mechanical strength, corrosion, mildew and bacteria resistant. Excellent fire resistance.
	3. Galvanized steel (coated and with factory-applied moisture retarder)	Bands, screws or rivets	Good mechanical strength and fire resistance.
	4. Aluminum alloys (preferably with factory-applied moisture retarder)	Bands, screw or rivets	Good mechanical strength, good workability, poor fire resistance.
	5. Polyvinyl Chloride (PVC)	Mechanical fasteners, adhesive, or matching tape	May require protection from ultra-violet radiation. Resists chemicals and bacteria. Washable surface for food processing applications.
	6. High Impact Plastics (ABS)	ABS welding adhesive or mechanical fasteners	
	7. Plastic film (PVDC)	Adhesive or tape	Corrosion. Bacteria, mildew and chemical resistance. May require protection from ultra-violet radiation. Workable surface for food processing applications.
MASTICS:	1. Asphalt emulsion	Apply with reinforcing mesh	Water base, a breather mastic
	2. Asphalt cut-back	Apply with reinforcing mesh	Solvent base, also a vapour barrier
	3. Resin emulsion	Apply with reinforcing mesh	Tough, resilient film
	4. Polyvinyl acetate	Apply with reinforcing mesh	Tough, resilient film
	5. Acrylic	Apply with reinforcing mesh	Tough, resilient film

*Covering shall not be termed a weather barrier unless its joint and overlaps are adequate to prevent the entry of rainwater (See Section 2.5)

TABLE 2.B VAPOUR RETARDERS*

Type	Composition	Notes
JACKETS:	1. Foil-Scrim Laminate	Seal joints. Mechanical strength is less than metal or plastic. Easy installation.
	2. High Impact Plastics (ABS)	Seal with welding adhesive.
	3. Film Laminate	Seal with contact adhesive and/or tape.
MASTICS:	1 Asphalt cut-back	Apply with reinforcing mesh. Combustible.
	2. Resins – solvent type	Brush or spray application.
	3. Elastomeric Polymer	Apply with reinforcing mesh. Combustible.

NOTE: A perm rating of 0.05 is recommended on mechanical insulation coverings to be considered a vapour retarder.

*Covering shall not be termed a vapour retarder unless joints are sealed to prevent the entry of vapour.