The Insulation Contractors Association Qld. Inc.

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STANDARD SPECIFICATION

THERMAL AND ACOUSTIC INSULATION

FOR
H.V.A.C. INDUSTRY AIR HANDLING EQUIPMENT
CHILLED WATER AND REFRIGERATION PIPEWORK
HOT WATER AND STEAM PIPEWORK
BITUMEN TANKERS
EXTERNAL FIRE PROTECTION OF DUCTWORK AND PENETRATIONS
ACOUSTIC LAGGING OF SOIL WASTE PIPES

PRESENTATION COPY
REVISED 2013

DISCLAIMER

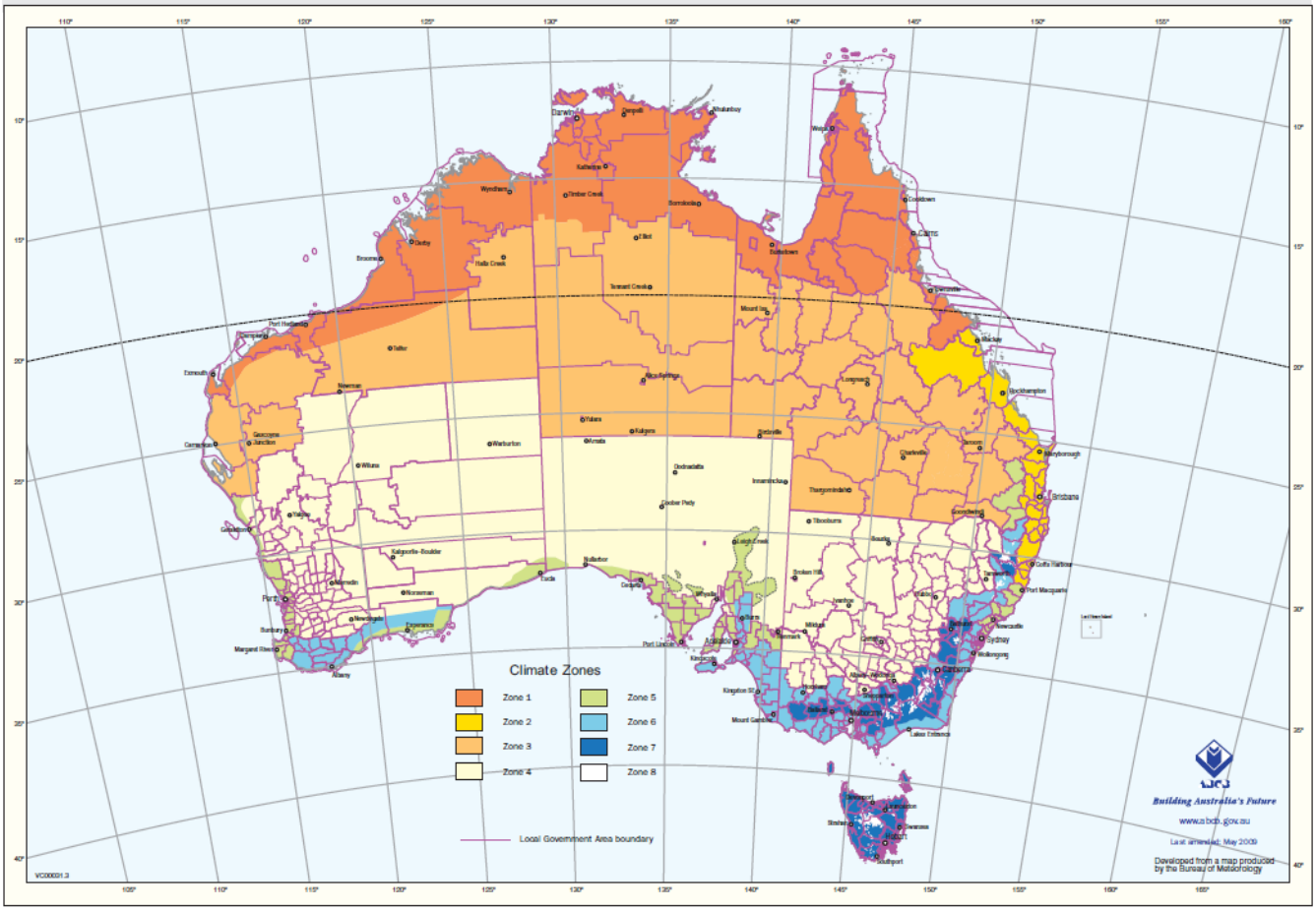
The contents of this Specification are designed as a guide and for information purposes only. T.I.C.A. Qld. Inc. is an Association of Insulation Contractors and Suppliers, whose purpose is to comply with the specification and instructions of the Consulting Engineers and Architects. This specification is to be used in conjunction with and not to supersede the Mechanical Services Consulting Engineers specification.

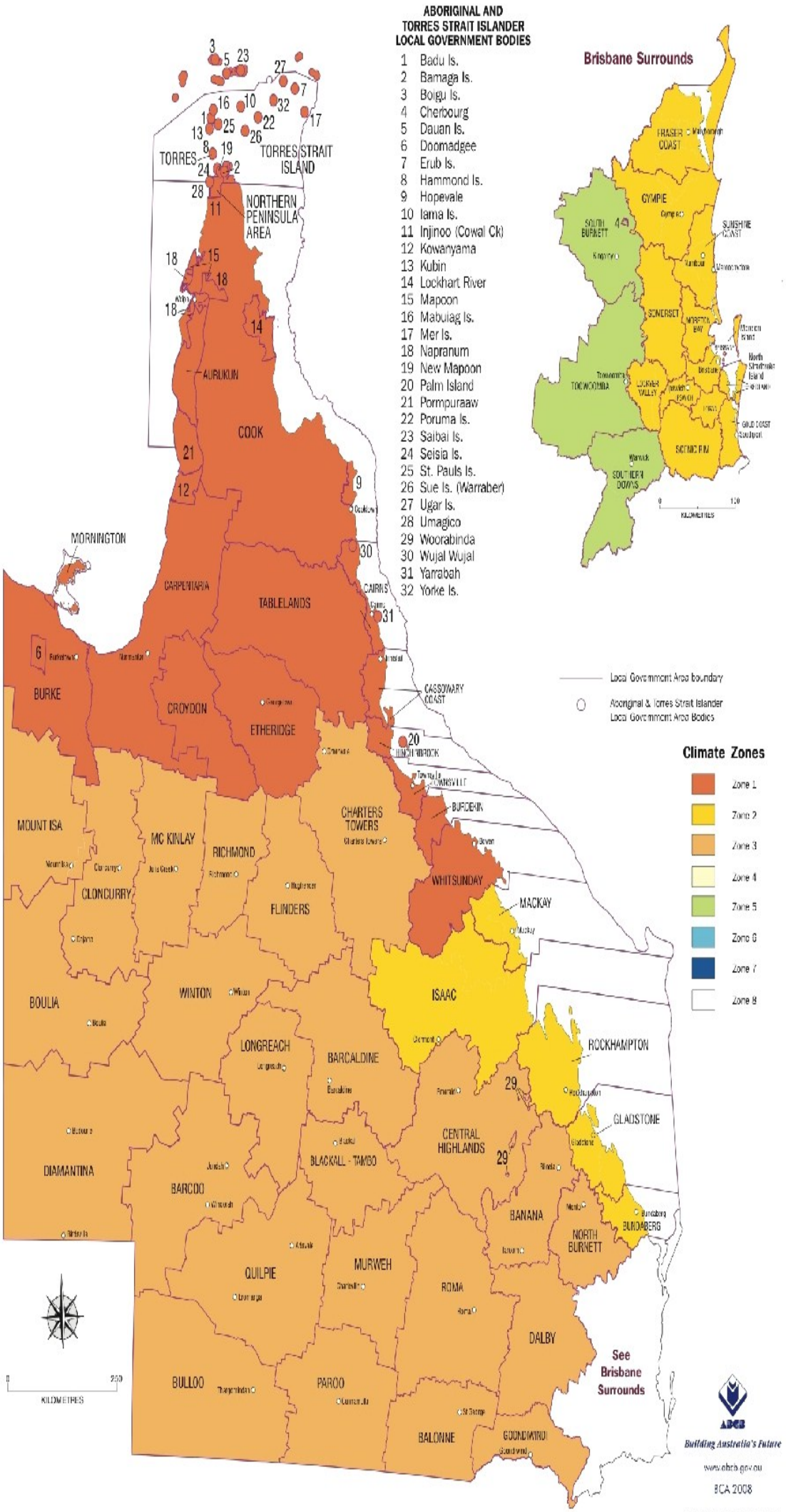
The intent of this specification is to supply a commercially acceptable product, and no responsibility will be accepted by T.I.C.A. Qld. Inc. or its Members for any misconceptions or misunderstandings arising from the use of this Standard and its Addendums.

BCA 2010 / NCC 2011

STEP A. Select the Climate Zone

The BCA/NCC specifies minimum deemed to satisfy performance for HVAC ductwork and piping dependent upon on the climate zone your building is in. Locate the climate zone your building is in from the following map.




ABORIGINAL AND
TORRES STRAIT ISLANDER
LOCAL GOVERNMENT BODIES
1 Badu Is.
2 Bamaga Is.
3 Boigu Is.
4 Cherbourg
5 Dauan Is.
6 Doomadgee
7 Erub Is.
8 Hammond Is.
9 Hopevale
10 Iama Is.
11 Injinoo (Cowal Ck)
12 Kowanyama
13 Kubin
14 Lockhart River
15 Mapoon
16 Mabuiag Is.
17 Mer Is.
18 Napranum
19 New Mapoon
20 Palm Island
21 Pormpuraaw
22 Poruma Is.
23 Saibai Is.
24 Seisia Is.
25 St. Pauls Is.
26 Sue Is. (Warraber)
27 Ugar Is.
28 Umagico
29 Woorabinda
30 Wujal Wujal
31 Yarrabah
32 Yorke Is.
Brisbane Surrounds
TORRES
TORRES STRAIT ISLAND
NORTHERN PENINSULA AREA
AURUKUN
COOK
MORNINGTON
CARPENTARIA
TABLELANDS
CAIRNS
CASSOWARY COAST
BURKE
CROYDON
ETHERIDGE
MOUNT ISA
MC KINLAY
RICHMOND
CHARTERS TOWERS
BURDEKIN
WHITSUNDAY
MACKAY
CLONCURRY
FLINDERS
BOULIA
WINTON
ISAAC
LONGREACH
BARCALDINE
ROCKHAMPTON
GLADSTONE
CENTRAL HIGHLANDS
DIAMANTINA
BLACKALL - TAMBO
BARCOO
BANANA
NORTH BURNETT
BUNDABERG
QUILPIE
MURWEH
ROMA
DALBY
BULLOO
PAROO
BALONNE
GOONDIWINDI
See Brisbane Surrounds
FRASER COAST
GYMPIE
SUNSHINE COAST
SOUTH BURNETT
SOMERSET
MORETON BAY
TOOWOOMBA
LOCKYER VALLEY
SCENIC RIM
GOLD COAST
SOUTHERN DOWNS
KILOMETRES
Local Government Area boundary
Aboriginal & Torres Strait Islander Local Government Area Bodies
Climate Zones
Zone 1
Zone 2
Zone 3
Zone 4
Zone 5
Zone 6
Zone 7
Zone 8
ABCB
Building Australia's Future
www.abcb.gov.au
BCA 2008
Developed from a map produced by the Bureau of Meteorology

STEP B. Determine the Thermal Performance Required by the BCA/NCC

Look up the R-Value required for the type of air conditioning system and location of the duct from the table below (BCA/NCC Vol. 1 Spec. J5.2).

3.1 Ductwork - Minimum Required Material R-Value

		Climate Zones							
	Location	1	2	3	4	5	6	7	8
BCA 2010	Conditioned Space	R1.2	R1.2	R1.2	R1.0	R1.2	R1.0	R1.0	R1.6
	Exposed to Sun	R3.0	R3.0	R3.0	R3.0	R3.0	R3.0	R3.0	R3.4
	All other	R2.0	R2.0	R2.0	R2.0	R2.0	R2.0	R2.0	R2.4
NCC 2011	Conditioned Space	R1.2	R1.2	R1.2	R1.2	R1.2	R1.2	R1.2	R1.6
	Exposed to Sun	R3.0	R3.0	R3.0	R3.0	R3.0	R3.0	R3.0	R3.4
	All other	R2.0	R2.0	R2.0	R2.0	R2.0	R2.0	R2.0	R2.4

** Note: All R-Values are material R-Values (R_{MAT})*

6. PIPEWORK – MINIMUM REQUIRED MATERIAL R-VALUE

The BCA/NCC also covers pipe insulation energy efficiency which in part require:

6.1 Application Material R-Value required by BCA/NCC

Read off the required R-Value from the table below, then choose the appropriate Bradford product from Section 5.2.

	Climate Zone							
Location	1	2	3	4	5	6	7	8
Heating water piping for systems of not more than 65kWheating capacity								
Located Internally	R1.0	R1.0	R1.0	R1.0	R1.0	R1.0	R1.0	R1.3
Enclosed wall space, sub-floor or roof space	R1.1	R1.1	R1.1	R1.1	R1.1	R1.1	R1.1	R1.4
Outside or unenclosed sub-floor or roof space	R1.2	R1.2	R1.2	R1.2	R1.2	R1.2	R1.2	R1.5
Heating water piping for systems of more than 65kWheating capacity								
Located Internally	R1.0	R1.0	R1.0	R1.0	R1.0	R1.0	R1.0	R1.7
Enclosed wall space, sub-floor or roof space	R1.1	R1.1	R1.1	R1.1	R1.1	R1.1	R1.1	R1.8
Outside or unenclosed sub-floor or roof space	R1.2	R1.2	R1.2	R1.5	R1.2	R1.5	R1.5	R1.9
Cooling water piping for systems of not more than 65kWr capacity								
Located Internally	R1.0	R1.0	R1.0	R0.6	R1.0	R0.6	R0.6	R0.6
Enclosed wall space, sub-floor or roof space	R1.1	R1.1	R1.1	R0.7	R1.1	R0.7	R0.7	R0.7
Outside or unenclosed sub-floor or roof space	R1.2	R1.2	R1.2	R0.8	R1.2	R0.8	R0.8	R0.8
Cooling water piping for systems of more than 65kWr capacity but not more than 250kW capacity								
Located Internally	R1.7	R1.7	R1.7	R1.3	R1.7	R1.3	R1.3	R1.0
Enclosed wall space, sub-floor or roof space	R1.8	R1.8	R1.8	R1.4	R1.8	R1.4	R1.4	R1.1
Outside or unenclosed sub-floor or roof space	R1.9	R1.9	R1.9	R1.5	R1.9	R1.5	R1.5	R1.2
Cooling water piping for systems of more than 250kWr capacity								
Located Internally	R2.0	R2.0	R2.0	R1.7	R2.0	R1.7	R1.7	R1.3
Enclosed wall space, sub-floor or roof space	R2.1	R2.1	R2.1	R1.8	R2.1	R1.8	R1.8	R1.4
Outside or unenclosed sub-floor or roof space	R2.2	R2.2	R2.2	R1.9	R2.2	R1.9	R1.9	R1.5
Refrigerant not more than 20C								
Pipe nominal diameter								
15mm - 40mm	R1.3	R1.3	R1.3	R1.3	R1.3	R1.3	R1.3	R1.3
50mm - 80mm	R1.7	R1.7	R1.7	R1.7	R1.7	R1.7	R1.7	R1.7
100mm - 125mm	R2.0	R2.0	R2.0	R2.0	R2.0	R2.0	R2.0	R2.0
150mm	R2.0	R2.0	R2.0	R2.0	R2.0	R2.0	R2.0	R2.0
200mm	R2.7	R2.7	R2.7	R2.7	R2.7	R2.7	R2.7	R2.7
Refrigerant more than 20C but not more than 200C (See Cooling Water tables above)								
Steam and condensate not more than 1200C								
Pipe nominal diameter								
15mm - 40mm	R1.0	R1.0	R1.0	R1.0	R1.0	R1.0	R1.0	R1.0
50mm - 80mm	R1.0	R1.0	R1.0	R1.0	R1.0	R1.0	R1.0	R1.0
100mm - 125mm	R1.3	R1.3	R1.3	R1.3	R1.3	R1.3	R1.3	R1.3
150mm	R1.3	R1.3	R1.3	R1.3	R1.3	R1.3	R1.3	R1.3
200mm	R1.3	R1.3	R1.3	R1.3	R1.3	R1.3	R1.3	R1.3
Steam more than 1200C								
Pipe nominal diameter								
15mm - 40mm	R1.5	R1.5	R1.5	R1.5	R1.5	R1.5	R1.5	R1.5
50mm - 80mm	R1.5	R1.5	R1.5	R1.5	R1.5	R1.5	R1.5	R1.5
100mm - 125mm	R1.5	R1.5	R1.5	R1.5	R1.5	R1.5	R1.5	R1.5
150mm	R1.8	R1.8	R1.8	R1.8	R1.8	R1.8	R1.8	R1.8
200mm	R2.1	R2.1	R2.1	R2.1	R2.1	R2.1	R2.1	R2.1

Note: Piping to be insulated includes all flow and return piping, cold water supply piping within 500mm of the connection to the heating and cooling system and pressure relief piping within 500mm of the connection to the heating and cooling system. Tanks, vessels and heat exchangers must comply to BCA Vol 1 Spec. J5.4 - R-Values range from R1.3 - R2.5.

SCOPE

This standard specification sets out the requirements in regard to the quality of materials and standards of workmanship which shall be adopted in the supply and erection of thermal and acoustic insulation.

SECTION 1

FOR DUCTWORK, AIR HANDLING EQUIPMENT, FAN CHAMBERS CONDITIONERS AND APPARATUS CONNECTIONS, HANDLING AIR BETWEEN 1ºC AND 65ºC.

SECTION 2

FOR CHILLED WATER - REFRIGERATION PIPEWORK – VESSELS – METALSHEATHING.

SECTION 3

FOR HOT WATER - STEAM PIPEWORK - VESSELS - METAL SHEATHING.

SECTION 4

INSULATING AND METAL SHEATHING OF BITUMEN TANKERS.

SECTION 5

DESIGN REQUIREMENTS FOR EXTERNAL FIRE PROTECTION OF DUCTWORK AND PENETRATIONS.

STANDARDS

AS 1045	Method of Measurement of absorption coefficients in a reverberation Room
AS 1301	Methods of test for pulp and paper (metric units) P419ts – Water vapour Transmission rate of paper.
AS 1366	Rigid cellular plastics sheets for thermal insulation Part 1 – Rigid cellular Polyurethane Part 2 – Rigid cellular Polyisocyanurate Part 3 – Rigid cellular Polystyrene
AS 1530	Methods for fire tests on building materials, components and structures. Part 3 – Test for early fire hazard properties of materials. Part 4 – Fire-resistance tests of elements of construction.
AS1668	SAA Mechanical Ventilation and Air conditioning Cod Part 1 – Fire precautions in buildings with air handling systems.
AS 3252	Glossary of terms for thermal insulation of buildings.
ASTMC335	Standard test method for steady state heat transfer properties of Horizontal pipe insulation.
ASTMD882	Fibrous Glass Duct Construction Standard.
SMACNA	
BS 874-1908	Methods for Determining Thermal Insulation Properties, with Definitions Of Thermal Insulating Terms.
ASTMC 518-70	Thermal Conductivity of Materials by means of the Heat flow Meter.
AS 4200	Pliable building membranes and underlays.
AS 4254	Ductwork for air conditioning systems in buildings.

STANDARD SPECIFICATION

Insulation & Sound Absorption

Section 1

CONTENTS

STANDARD SPECIFICATION

Insulation & Sound Absorption

Section 1

MATERIALS

1. DUCTWORK INSULATION MATERIALS

TERMINOLOGY: To AS 2352.

MINERAL WOOL: Resin bonded to form batt, board or blanket.

Maximum thermal conductivity: 0.036 W/mK at 20oC.
Alkalinity: pH 7 - 9
Moisture absorption: Non-hydroscopic.
FLEXIBLE TYPE: Be in a flexible blanket form.

SEMI-RIGID TYPE:
Form: Batt or board.

Rigidity: A mean deflection of 6mm for a 50mm thick material and 20mm for a 25 mm thick material, tested as follows:

- Freely support a 900 mm x 1500 mm test piece on its longer sides:
- Allow the test piece to stand for 10 minutes and measure the vertical deflection:
- Turn the test piece over and repeat the test;
- Average the results.

Early Fire Hazard Characteristics: To AS 1530 Part 3:
- Spread of flame index: 0
- Smoke developed index: 3

Acoustic requirements: No less than the following table:

Table 1: **Reverberation from method to AS 1045**:

Insulation	**Absorption coefficients (nominal) at:**				
	125Hz	**250Hz**	**500Hz**	**1000Hz**	**2000Hz**
Perforated foil faced:					
25mm thick:	**0.10**	**0.25**	**0.68**	**0.94**	**0.82**
50mm thick:	**0.21**	**0.62**	**0.96**	**0.94**	**0.83**
Perforated metal clad:					
50mm thick:	**0.20**	**0.73**	**1.00**	**0.99**	**0.89**

MATERIALS (CONT'D)

DUCTWORKS INSULATION SURFACE FACINGS

TYPE A:

Use Fletcher's 450, Bradford Thermofoil 750,
or approved equal EXTRA HEAVY DUTY.
Physical properties: Tensile Strength (ASTM D828)

Longitudinal Direction	13.0 kN/m
Transverse Direction	10.5 kN/m

INTERNAL FACING:

Perforations: Uniformly spaced 2.5mm diameter holes providing 10% open area.

EXTERNAL FACING AS VAPOUR BARRIER:
Water vapour permeance: To AS 1301 P419ts Condition B

- Creased: 2.26 ng/N.s (maximum);
- Uncreased: 1.13 ng/N.s (maximum)

DUCTWORK PRESSURE SENSITIVE TAPES

PRECISION PAPER COATING:

Material:	PPC 493 Green Star VOC Rating
Adhesive:	Non-toxic, high tack synthetic pressure sensitive type.
Liner:	Silicone coated paper.
Backing:	Aluminum foil laminate.
Width:	Suit Insulation thickness plus apply 38mm wider than insulation. e.g. 50 mm Insulation - 72mm Tape

VENTURE TAPES:
Material: Venture Tape 1529cw
Designed for use as Vapour Seal on Aluminium Faced Insulation Products

PROPERTIES FOR PPC:

- Tensile strength 100N/25 mm (average minimum)
- Shear Adhesion: To Table 3.2 Shear Adhesion Tests
- Peel Adhesion: at 180ºC 17 N/25 mm (average minimum)
- (When tested to SMACNA fibrous Glass Duct Construction Standard)
- Water vapour permeance : To AS 1301 P419ts Condition B.
- Creased: 2.26 ng/N.s (maximum)
- Uncreased: 1.13 ng/N.s (maximum)

PROPERTIES FOR VENTURE:

- Tensile strength: 54.2 N/25mm
- Peel Adhesion: 9.7 N/25mm
- Shear Adhesion: > 24 hrs @ 15.2 kPa

GENERAL

1. ELECTRIC DUCT HEATER INSULATION

REQUIREMENT: Provide ductwork housing electric duct heaters with 6mm minimum thickness internal insulation as specified in AS 1668, Part 1, Clause 4.4.2. and method shown on drawing T.I.C.A.-01.

2. CUSHION HEAD BOX

REQUIREMENT: Refer to Cushion Head Box Drawing T.I.C.A.-02.

3. DAMPERS

INTERNAL: Leave clearance between the insulation and the edge of the splitter or manually operated damper blades, to prevent damage to the insulation where the damper sweeps.

EXTERNAL: For manual and motorized dampers provide insulated sheet metal hat sections to encase the dampers. Make the hat sections removable for maintenance of damper mechanism.

4. INSULATION AT FLEXIBLE CONNECTIONS

COVERAGE: Cover connection with flexible fiberglass blanket complete with vapour barrier to thickness of adjacent ductwork insulation.

WEATHER PROTECTION: Where connections are exposed to the weather, protect the connection with a weatherproof sheet metal cover by the Air-conditioning Contractor.

5. INSULATION OF REGISTERS

EXTENT: Provide insulation to registers as follows:

- Registers within 4m of a doorway to unairconditioned space.
- Registers in a roof space or other unairconditioned space.
- Vapour Sealing Lap

GENERAL (CONT'D)

6. DUCTWORK INSULATION FIXINGS

FIXING PINS: The following types, installed in accordance with the manufacturer's instructions may be used:

- Welded pin with integral head;
- Welded pin with press-on head;

Characteristics: Fixing pins shall:

- Be corrosion resistant:
- Not damage insulation:
- Not project more than nominally through the insulation:
- Indefinitely sustain a 25 kg tensile dead load test perpendicular to the duct wall:
- Be the correct length for the specified insulation thickness:

INSULATION REQUIREMENTS & METHODS

1. DUCTWORK INSULATION SYSTEM SELECTION

EXTENT AND TYPES OF INSULATION: The requirements for extent, types and required thickness to be clearly shown on the drawings or schedules in the specification.

2. DUCTWORK INTERNAL INSULATION SYSTEMS

TYPE STANDARD (INTERNAL)
Insulation type: Semi-rigid
Surface finish: Factory applied perforated reinforced aluminium foil laminate

TYPE METAL (INTERNAL)
Insulation type: Semi-rigid for rectangular ductwork
Flexible for circular and flat oval ductwork
Surface finish: Perforated metal clad.

3. DUCTWORK EXTERNAL INSULATION SYSTEMS

TYPE STANDARD (EXTERNAL)
Insulation type: Flexible
Surface finish: Factory applied reinforced aluminium foil laminate
Vapour barrier: Required

TYPE METAL (EXTERNAL)
Insulation type: Semi-Rigid
Surface finish: Metal clad
Vapour barrier: Factory applied reinforced aluminium foil laminate

INSULATION REQUIREMENTS & METHODS (CONT'D)

4. DUCTWORK INTERNAL INSULATION APPLICATION (STANDARD INTERNAL)

REQUIREMENT: Place the insulation so that the surface designed to be exposed faces the air stream. Completely cover with liner the portion of the duct designated to be lined, using an individual piece of insulation for each side of the duct.

Edges: Factory bond aluminium foil laminate to the insulation to allow a turn back of the facing under the insulation for a distance of not less than 75 mm without crushing the edges. Bond the turn back to the insulation. Do not join insulation or laminate unless the size of duct makes this impractical. Allow insulation to extend proud of duct work at each end to allow cushion joints to fully seal during assembly.

Fixing pins: Support the edges using fixing pins spaced at 300 mm approximate centre's parallel to the edge and within 50 mm of an end or 75 mm of a joint. Elsewhere, fix the insulation at 300 mm maximum centre with a minimum of one row per duct side.

Clips: Use bevel edged metal speed clips with a minimum diameter 20 mm. Secure speed clip flush to the face of the insulation without depressing the surface more than 5 mm.

5. DUCTWORK INTERNAL INSULATION APPLICATION (METAL INTERNAL)

REQUIREMENT: Place the insulation so that the surface designed to be exposed faces the air stream. Support the insulation against the duct surfaces with 0.5mm zinc anneal sheet metal uniformly perforated with 2.5 mm diameter holes providing 10% open area, and cut and folded to the inside dimension of the duct to form an overlapping joint at a corner. Rivet the overlapping surfaces at 300 mm approximate centre's.

COVERAGE: Completely cover with liner the portions of the duct designated to be lined. Overlap the adjacent sides at the corners. Use as individual piece of insulation for each side of the duct. Where this is not possible, butt the edges of adjacent pieces.

FIXING: Use Z. Section 0.6 galvanized steel barrier fastened to the ductwork with blind pop rivets. Provide conductivity barrier to prevent cold tracking. For duct sides over 600 mm hold in position at 600 mm maximum centre's with a minimum of one row of rivets per duct side, keeping cold bridging to a minimum.

INSULATION REQUIREMENTS & METHODS (CONT'D)

6. DUCTWORK EXTERNAL INSULATION APPLICATION (STANDARD EXTERNAL)

REQUIREMENT: Wrap the insulation around the outside of the duct. Completely cover with insulation the portions of the duct designated to be insulated. Keep the number of joints to a minimum.

JOINTS: Square and butt together the edges of adjacent pieces of insulation.

VAPOUR SEALING: Lap the vapour barrier at least 50 mm at the joints. Seal with REINFORCED ALUMINIUM FOIL TAPE.
Width of tape used should be approx. 38mm wider than the thickness of insulation to allow adequate lap along join.
(e.g. 25mm Insulation >63mm tape / 50mm Insulation >75mm tape).

FIXING:

Pins: For horizontal ducts above 600 mm hold the insulation in position on the underside by means of fixing pins spaced at 400 mm maximum centre's with a minimum, of one row. For vertical duct above 600 mm and above provide pins to all sides at maximum of 400 mm centre's.

Straps: Use 12 mm wide poly strapping at 500 mm centre's to support insulation.

7. DUCTWORK EXTERNAL INSULATION APPLICATION (METAL EXTERNAL)

REQUIREMENT: Insulation for this method to be semi rigid complete with vapour barrier before applying metal sheathing.

SUPPORT: Support the insulation against the duct surface with 0.6 mm galvanized sheet steel cut and folded to the outside dimensions of the insulation.

JOINT IN SHEATHING: Lap the joints in the sheathing for a distance of not less than 30 mm and rivet at 200 mm centre's. Factory made joints may be of the grooved seam or spot welded types. Use self tapping screws where the removal of the sheathing for maintenance or access to dampers and the like is required.
SEALING: Where exposed to weather seal the joints with a silicone mastic sealant.

8. ACOUSTIC WALLS AND CEILINGS

REQUIREMENT: Provide the following:-

Resin bonded mineral wool.

Minimum thickness - 50 mm

Semi rigid batt or board form.

Be fixed behind 0.6 mm acoustic grade perforated zinc anneal sheet having uniformly spaced perforations of 2.5 mm diameter providing 10% open area.

FIXING:

Use 50 x 50 x 50 mm Z sections manufactured from 0.6 mm galvanized steel fixed to walls or ceilings with 'Expandable Anchors' or equal, at 600 mm centre's. Leave the Z sections 150 mm clearance above all floors and be finished at this point with 'U' channels manufactured from 0.6 mm galvanised steel.

Cut the insulation batts or boards to size and fit between the Z sections.

Perforated sheeting shall then be fitted to the Z sections with a minimum overlap of 20 mm at all joints. At exposed edges of sheets and at all flashings around ducts, doors and openings the edge of the sheeting to have a 10mm feather to give a neat finish. Fix the perforated metal with pop rivets at 200 mm centre.

9. BUILT UP AIR FILTER PLENUMS

REQUIREMENT: In filter access area plenums only. Cover all insulated areas (including floor) with 0.6 thick perforated zinc anneal steel sheeting.

WALLS AND CEILING: Overlap sheeting a minimum of 20mm on all edges and rivet to galvanised steel Z or channel section.

FLOOR: For insulated floors provide Z sections one way at 200mm centre's on the longest side.

STANDARD SPECIFICATION
Section 2
Chilled Water - Refrigeration Pipe work - Vessels - Metal Sheathing

CONTENTS

CHILLED WATER - REFRIGERATION PIPEWORK

VESSELS - METAL SHEATHING

SECTION 2

MATERIALS

1. PIPEWORK INSULATION MATERIALS - INSULATION

EARLY FIRE HAZARD CHARACTERISTICS: To AS 1530 Part 3:

Not to exceed the following:

- Spread of flame index: 0
- Smoke developed index: 5

TERMINOLOGY: To AS 2352

MINERAL WOOL: Fibres made from molten glass and rock (includes glasswool), resin-bonded to form one-piece tubular section.

Requirement: Do not use mineral wool for below ambient pipe work with the following exceptions:

Refer Fire Rating Drawing in back of Specification TICA Drawings - 1-2-3.

For filling air gaps around valves and fittings.

For wrapping of flexible connections to maintain flexibility.

EXPANDED POLYSTYRENE (E.P.S.): To AS 1366 Part 3, Class S and colour coded brown, machine cut to form tubular half-sections for pipe insulation or batts for insulating fittings.

ELASTOMERIC SPONGE: Chemically blown closed-cell PVC or equivalent elastomeric material formed into tubular sections for pipe insulation, or sheets for insulating fittings, with a smooth natural finish, and vapour barrier properties.

Thermaflex or Thermabreak

Vapour barrier permeability: Not greater than 0.25 metric permeability/cm when tested by the desiccant method to ASTM C335.

2. PIPEWORK INSULATION SURFACE FACINGS

MATERIAL:

Use Insulation Solutions Sisalation 450, Bradford Thermofoil 750 or approved equal EXTRA HEAVY DUTY GRADE
Physical Properties:
Tensile Strength (ASTM D828)
Longitudinal Direction 13.0 kN/m
Transverse Direction 10.5 kN/m

EXTERNAL FACING AS VAPOUR BARRIER

Water vapour permeance: To AS 1301 P419ts Condition B

- Creased: 2.26 ng/N.s (maximum)
- Uncreased: 1.13 ng/N.s (maximum)

3. PIPEWORK PRESSURE SENSITIVE TAPES

MATERIAL:	Precision 493 or Venture Tapes 1529cw.
Adhesive:	Non toxic, high tack synthetic pressure sensitive type.
Liner:	Silicone coated paper.
Backing:	Aluminium Foil Laminate
Width:	48 mm minimum

-OR-

MATERIAL:	Precision 400F or approved.
Adhesive:	Non toxic, high tack synthetic pressure sensitive type.
Liner:	Silicone coated paper.
Backing:	Aluminum Foil Laminate

4. TANK AND VESSEL INSULATION MATERIAL

EXPANDED POLYSTYRENE (E.P.S.): To AS 1366 Part 3, Class S and colour coded brown, moulded to the contour of the tank or vessel.

GENERAL

1. PIPEWORK SUPPORTS

Spacers:
For cold pipe systems: Polyurethane Blocks Extra Heavy Duty Foil

To insulated pipe: Provide a spacer between the bracket and the pipe, of length not less than 20mm either side of the bracket width to allow a continuous vapor barrier to be maintained for visual inspection and of thickness equal to the insulation. Apply the reflective foil laminate vapour barrier between the spacer and the bracket of full width to allow continuation of the vapour barrier. If metal sheathing is required metal is to butt to the bracket to allow metal sheathing to be swaged down on each side of the bracket. The bracket is not to be removed so as the vapour barrier integrity will be maintained.

REQUIREMENT: Complete the vapour barrier and metal sheathing band at pipe supports during the construction stage to prevent removal of brackets at the insulation stage.

2. CONDENSATE DRAINS:

REQUIREMENT: Use Thermaflex Pacific OR Thermobreak Insulation elastomeric closed cell pipe insulation with a minimum of 13 mm wall thickness on condensate drains and on low or medium temperature pipe work where limited space prohibits the use of other specified insulation. Where practical install without slitting; where slitting is unavoidable, it shall be glued and taped with PPC No 441 PVC Sealing Tape.

GENERAL (CONT'D)

3. *NOTE TO MECH. CONTRACTORS*

DRIP TRAY: Provide and fit stainless steel drip trays for all chilled water pumps strainers and uninstalled fittings. Tray to be sized to collect condensate from the above items and be fitted with a 20 mm drain piped to waste.

INSULATION REQUIREMENTS AND METHODS

1. PIPEWORK EXTENT OF INSULATION

COLD PIPING: Piping carrying fluids at temperatures below ambient for chilled water piping cold refrigerant and condensate piping, and associated valves and fittings.

VAPOUR BARRIER: To be continuous over insulation on all piping carrying fluids at temperatures below ambient.

2. PIPEWORK INSULATION THICKNESS

MINIMUM THICKNESS: To the following table:

(BCA requirements may override the Table)

Pipe Size

	15-40mm	50-80mm	100-125mm	150mm	200mm
	Insulate in two layers - all joints to be staggered				
Below 35ºC	75mm	75mm	125mm	150mm	200mm
Below 20ºC	65mm	75mm	75mm	100mm	100mm
		Single Layer			
Below -2ºC	50mm	65mm	70mm	75mm	100mm
Over 2ºC 9ºC	40mm	40mm	50mm	50mm	50mm
9ºC to 20ºC	25mm	25mm	25mm	40mm	50mm

3. PIPEWORK VAPOUR BARRIER TYPES

METHOD 1:
REFLETIVE FOIL LAMINATE
Fletcher Insulation heavy-duty sisalation 450, Bradford Thermofoil 750 or approved equal.

METHOD 2:
MASTIC: An approved No. 10 water based fire resistant mastic, reinforced with an open-weave glass fibre fabric. **This method does not comply with fire tests AS 1668.2.**

PIPEWORK INSULATION APPLICATION

MATERIAL: Use E.P.S. for all applications unless other type shown. E.g.

Thermobreak or Thermaflex.

REQUIREMENT: Use for pipes carrying fluids at temperatures below ambient.

METHOD 1:

PROCEDURES: Except for factory insulated pipe, do not begin to apply insulation until pipework pressure testing is complete. Before installing insulation, ensure that scale, rust, grease and the like has been removed from the pipework surface by the Mechanical Contractor and that the surface to be insulated is clean and dry.

PROTECTION: Ensure that all steel pipework has had one coat of zinc phosphate primer applied by the Mechanical Contractors before insulation commences.

PREPARATION:

TYPE A: Use machine cut pipe sections to specified thickness. Factory bond the aluminium foil laminate to the insulation with a longitudinal lap.

APPLICATION: In order to prevent cold tracking and also moisture travelling along the pipe work, apply a coating of adhesive conforming to early fire hazard properties to all mating surfaces of the insulation sections. In addition, apply a coating of the same adhesive to the internal surface of the ends of the insulation sections mating to the pipe to the length of 150mm each end.

TYPE B: Use machine cut pipe sections to specified thickness.
Factory bond the aluminium foil laminate to the insulation with a longitudinal lap of not less than the wall thickness. Internal diameter of the insulation section to be 2 mm larger than pipe.

APPLICATION: Apply an oil based mastic, **Fosters - 30-45 to steel pipe.**
All mating faces of polystyrene on joints between sections. To the
section of pipe to be insulated.
To the faces of the polystyrene and the pipe support blocks at the joints**.**
Do not use 30-45 on copper pipes.

Longitudinal joints to be staggered a minimum of 25 mm between sections.

BENDS: Cut the insulation into segments to follow the contour of the bend, glue together and fix to the pipe work. Use mitered elbows where this is not possible.

LONGITUDINAL LAP: Seal the aluminium foil laminate to complete the vapour barrier.

FITTINGS AND VALVES: Use PPC No. 5903 BUTYL/CORK tape to provide a continuous cover and to fill gaps. Then seal with reinforced aluminium foil tape to provide a seal completely free of perforations or leaks.

STRAPS: Fix the insulation at 450 mm centre's using poly strap.

INSULATION REQUIREMENTS AND METHODS (CONT'D)

FITTINGS, VALVES AND FLANGES: The insulation to be cut and formed to fit around fittings, valves and flanges. Where not possible use mineral wool insulation or pug to fill the air gap. Where the insulation thickness has been reduced, apply a further layer of polystyrene section to maintain the thickness specified for the pipe. Items protruding through the insulation to be sealed with PPC

METHOD 2:

REQUIREMENT: Completely as for Method 1 with the following exceptions:

Delete the factory bonded aluminium laminate.

Use metal straps in lieu of poly strap.

Apply vapour barrier as follows.

VAPOUR BARRIER APPLICATION:

First Coat: Apply one tack coat of Fosters 30/90 Vapour Safe Mastic or Equal to the entire surface of the insulation by gloving at the rate of 0.8 litres /per square metre.

Glass Fabric: Over this wet coat a single layer of open weave No. 10 glass fabric cloth 0.1 mm thick and approximately 0.051 kg/m2 to be laid. Draw cloth smooth and tight with all joints lapped not less than 50 mm.

Finish Coat: Apply finish coat of Fosters 30/90 Vapour Safe Mastic or Equal to the entire surface of the insulation by gloving at the rate of 1.6 litres /per square metre within 30 minutes after the first coat application.

Note: This application doesn't conform with AS 1530 or AS 1668 Part 1

INSULATION REQUIREMENTS AND METHODS (CONT'D)

5. PIPEWORK METAL SHEATHING

MATERIAL: Zinc anneal sheet.

THICKNESS: 0.5 mm

INSTALLATION: Cut and roll the metal sheathing to the correct size. Longitudinal and transverse joints to be lapped a minimum of 40 mm with all exposed edges swaged. Position longitudinal and vertical joints to the most sheltered location. Cone down at terminations and transitions.

BENDS: Provide pre drilled lobster back bends containing at least three segments. Use mitered elbows where the size of the pipe work or the radius of the pipe bend does not allow the use of segmented bends. Each segment to have an inner and outer swage formed at the transverse edges. The longitudinal joint to be fixed using pop rivets of correct length ensuring the vapour barrier is not damaged.

FIXING: Sheathing to be clamped at 450 mm maximum centre's with 12 mm x 0.5 mm galvanized straps.

WEATHERPROOFING: Weatherproof external joints and fixings with non-setting mastic.

SERVICEABLE ITEMS: Provide removable boxes or cover plates to allow ease of access for equipment requiring maintenance. Where screws are used for removable boxes there are not to penetrate the vapour barrier. Alternatively obtain approval from Superintendent's Representative to provide drained stainless steel drip trays as an alternative to insulating valves and fittings where the integrity of the vapour barrier cannot be maintained.

- At motorized chilled water control valves
- At valves requiring regular maintenance and adjusting.

REQUIREMENT:

- All insulated strainers
- Valves at pumps
- Control valves
- Flexible connections
- Demountable joints

STANDARD SPECIFICATION

HOT WATER - STEAM PIPING

SECTION 3

CONTENTS

HOT WATER STEAM PIPING

SECTION 3

MATERIALS

1. PIPEWORK INSULATION MATERIALS

EARLY FIRE HAZARD CHARACTERISTICS: To AS 1530 Part 3:

Not to exceed the following:
Spread of flame index: 0
Smoke developed index: 3
TERMINOLOGY: To AS 2352

MINERAL WOOL: Fibres made from molten glass, rock (includes glasswool), resin-bonded to form one-piece tubular section.

ELASTOMERIC SPONGE: Chemically blown closed-cell PVC or equivalent elastomeric material formed into tubular sections for pipe insulation, or sheets for insulating fittings, with a smooth natural finish, and vapour barrier properties.

Vapour barrier permeability: Not greater than 0.25 metric permeability/cm when tested by the desiccant method to ASTM C335.

2. PIPEWORK INSULATION SURFACE FACINGS

MATERIAL:
Use Fletcher Insulation Sisalation 450, Bradford Thermofoil 750, or approved equal EXTRA HEAVY DUTY GRADE
Physical Properties:

Tensile Strength (ASTM D828)
Longitudinal Direction 13.0 kN/m
Transverse Direction 10.5 kN/m

EXTERNAL FACING AS VAPOUR BARRIER
Water vapour permeance: To AS 1301 P419ts Condition B

Creased:	2.26 ng/N.s (maximum)
Uncreased:	1.13 ng/N.s (maximum)

3. PIPEWORK PRESSURE SENSITIVE TAPES

PRECISION PAPER COATING:

MATERIAL: PPC No. 493 Reinforced Aluminium Foil Tape
Tensile Strength:
Green Star VOC Rating
Adhesive: Non toxic, high tack, Mould Inhibiting, Synthetic Adhesive.
Liner: Silicone coated paper.
Width: 48 mm minimum

-OR-

MATERIAL: Precision 400 F or approved equal.
Adhesive: Non toxic, high tack synthetic pressure sensitive type.
Liner: Silicone coated paper.
Backing: Aluminium Foil Laminate
Width: 48 mm minimum

-OR-

VENTURE TAPES:
Material: Venture Tape 1529cw

Designed for use as VapourSealon Aluminium Faced Insulation Products

HOT WATER STEAM PIPING

SECTION 3

3. TANK AND VESSEL INSULATION MATERIAL

MATERIAL
Bradford Supertel Board
Bradford Fibretex 350 or equal
Fletchers Light Equipment Insulation
Fletchers Industrial Equipment Insulation
Thermobreak or Thermaflex not to be used over 80 degrees.

GENERAL

1. PIPEWORK SUPPORTS

Spacers:
For cold pipe systems: Polyurethane Blocks Extra Heavy Duty Foil

To insulated pipe: Provide a spacer between the bracket and the pipe, of length not less than twice the bracket width and of thickness equal to the insulation. Apply the reflective foil laminate vapour barrier between the spacer and the bracket of full width to allow continuation of the vapour barrier. If metal sheathing is required provide a .5 zinc anneal band between the vapour barrier and bracket to allow metal sheathing to be swaged down on each side of the bracket.

REQUIREMENT: Complete the vapour barrier and metal sheathing band at pipe supports during the construction stage to prevent removal of brackets at the insulation stage.

2. BUILDING PENETRATIONS

REQUIREMENT: See TICA Drawings -- 1-2-3.

INSULATION REQUIREMENTS AND METHODS

1. PIPEWORK EXTENT OF INSULATION

REQUIREMENT: Insulate the

following: HOT PIPING:

- Steam, condensate, heating, warm and hot water pipe work:
- Pipe work hazardous to personnel, e.g. blow down piping:
- Piped services where trace heating is incorporated:

Exceptions: Do not insulate:

- Sludge and drain valves in pipe work carrying hot fluids:
- Condensate waste pipes, unless otherwise specified.
- Steam trap assemblies.
- Items requiring regular service.
- Valves-strainers or the like

INSULATION REQUIREMENTS AND METHODS (CONT'D)

PIPEWORK INSULATION THICKNESS

2. **(BCA Compliance may override the table)**

MINIMUM THICKNESS: To the following table:

Pipe Size	15-40mm	50-80mm	100-125mm	150mm	200mm
20°C to 90°	25mm	25mm	25mm	40mm	50mm
Up to 120°C	25mm	40mm	40mm	50mm	50mm
Up to 175°C	25mm	40mm	50mm	50mm	65mm
Up to 200°C	40mm	50mm			

3. **PIPEWORK INSULATION APPLICATION - (MINERAL WOOL)**

REQUIREMENT: Use for pipes carrying fluids at temperatures above

ambient. **SURFACE FINISH:** Use factory bonded aluminium foil laminate.

APPLICATION: Fit the insulation tightly to the pipework surface without gaps. Close butt the ends of insulation sections. Use the minimum number of joints. If the insulation is in half-sections, make only half-circumferential joints at any one place. Finish the insulation surface to a neat, true, smooth appearance without irregularities.

4. PIPEWORK INSULATION APPLICATION - (ELASTOMERIC SPONGE)

APPLICATION: For hot water run outs only

REQUIREMENT: Use elastomeric closed cell pipe insulation with a minimum of 13 mm wall thickness on hot water and medium temperature Pipe work up to a max temperature of 80ºC.

APPLICATION: When practical install without splitting; where splitting is unavoidable, it shall be glued and taped with PPC or Venture.

MATERIAL: Thermobreak of Thermaflex

5. PIPEWORK METAL SHEATHING

MATERIAL: ZINCANNEAL

SHEET THICKNESS: 0.5 mm

INSTALLATION: Cut and roll the metal sheathing to the correct size. Longitudinal and transverse joints to be lapped a minimum of 40mm with all exposed edges swaged. Position longitudinal and vertical joints to the most sheltered location. Cone down at terminations and transitions.

INSULATION REQUIREMENTS AND METHODS (CONT'D)

5. PIPEWORK METAL SHEATHING

MATERIAL: Zinc anneal sheet.

THICKNESS: 0.5mm

INSTALLATION: Cut and roll the metal sheathing to the correct size. Longitudinal and transverse joints to be lapped a minimum of 40 mm with all exposed edges swaged. Position longitudinal and vertical joints to the most sheltered location. Cone down at terminations and transitions.

BENDS: Provide pre-drilled lobster back bends containing at least three segments. Use mitered elbows where the size of the pipe work or the radius of the pipe bend does not allow the use of segmented bends. Each segment to have an inner and outer swage formed at the transverse edges. The longitudinal joint to be fixed using pop rivets of correct length.

FIXING: Sheathing to be clamped at 450 mm maximum centres with 12 mm x 0.5mm galvanised straps.

WEATHERPROOFING: Weatherproof external joins and fixings with non-setting mastic.

6. TANK AND VESSEL INSULATION APPLICATION

MATERIAL THICKNESS: Unless shown otherwise.
(BCA Compliance may override the table)

Temperature Range	Required Thickness
Up to and including 90 deg. C.	50mm
90 deg. C. to 175 deg. C.	75mm
Over 175 deg. C.	As specified

Installation

Wrap insulation of the required thickness around the tank or vessel with all joints Tightly abutted and strapped at a maximum of 500mm centre's. Form ends with cut segments of insulation to match the contours of the tank or vessel.

Encase the entire tank or vessel (excluding the base of a vertical tanks) with metal sheathing of the type specified for adjacent pipe work. Provide serviceable items, (manholes, tube bundles) with removable boxes or cover plates to allow maintenance to be carried out.

7. TANK AND VESSEL METAL SHEATHING

MATERIAL: Zinc anneal Sheet.

THICKNESS: 0.5mm

APPLICATION: Provide metal sheathing method

STANDARD SPECIFICATION

INSULATING & METAL SHEATHING OF BITUMEN TANKERS

SECTION 4

CONTENTS

Materials

SECTION 4

ASSOCIATED STANDARDS

The following Standards, including any subsequent amendments, shall apply:

A. AS 1530, Part 3 - 1976 - Test for early fire hazard properties of materials.
B. BS 874-1908 - Methods for Determining Thermal Insulating Properties, with Definition Definitions of Thermal Insulating Terms.
C. A.S.T.M.C. 518-70 - Thermal Conductivity of Materials by means of the Heat flow Meter.

2. INSULATION MATERIALS AND METHODS

GENERAL: Materials used for Thermal Insulation treatment, when tested for Early Fire Hazard Properties in accordance with AS 1530, Part 3, shall meet the following standards -

- Spread of Flame Index not to be greater than 0.
- Smoke Developed Index not to be greater than 3.
- Submit test certificates from a recognized testing laboratory to certify that the material offered has been tested and shown to have achieved the above standards.

Type: Materials used for Thermal Insulation shall have a Thermal Conductivity at a mean temperature of 20oC of not more than 0.032W/mk when tested in accordance with BS 874 or ASTMC 518-70.

3. THICKNESS OF INSULATION R-Values

THICKNESS: The insulation shall be 50mm thick.
MATERIAL: Fletcher High Temperature, Bradford High Temperature or equal.

4. FIXING INSULATION

FIXING: Place the insulation around the outside of the tank and hold in place with 13mm aluminium Banding evenly spaced at 400 mm centre's. The banding is to be tied off at all joins with Aluminium Banding Clips.

5. FIXING TO METAL SHEATHING TO OUTSIDE OF TANKER

SHEETING: The Insulation to be completely metal sheathed with 22 gauge aluminium. Silicone sealer to be applied on all joints before overlapping with another sheet - overlaps to be a minimum of 50mm.

RIVETS: Aluminium to be fixed to the bottom supports with sealed aluminium pop rivets, inserted through aluminium body washers of 32mm diameter.

SEALER: Both ends of tanker to be joined to the sides by a Pittsburgh seam. Silicone sealer to be applied to joints before joining.

6. EXTRANEOUS FITTINGS

REQUIREMENT: All ladders and lighting to be detached from tanker by the manufacturer before insulating and sheeting is applied.

Section 5

Where ductwork is required to be protected from possible fire, special treatment of the ductwork is required.

Ductwork shall be protected with a system that meets the requirements of AS 1530 part 4 and AS 1668 part 1.

Stair pressurization ducts shall be protected from fire outside the duct in terms of STABILITY, INTEGRITY AND INSULATION.

Ducts used for exhausting air from the fire compartment shall be protected such that fire from the inside or outside will not cause collapse (STABILITY) or fissures (INTEGRITY) and shall also meet the INSULATION requirement when passing through other compartments in the building. This insulation requirement may be waived by the relevant authority where no combustible materials can come into contact with the ductwork.

- · Sprayed coatings
- · Board systems
- · Lightweight panels
- · Purpose made ducts

SPRAYED COATINGS: Spray material base, consists of one of the following - Rockwool, Vermiculite. Cement or Cellulose materials which have binders and inhibitors added. Finish varies from soft to very hard. Sprays usually provide fire resistance of 1 to 2 hours, others give up to 4 hours. Care should be taken to ensure system offered meets criteria required - especially for large ducts. Application is by special spray machines designed for the product being used. Often a number of coats have to be applied to ensure required thickness.

BOARD SYSTEMS: Boards are manufactured using Vermiculite, Cementacious mixes and laminated materials such as steel and cement. A wide range of proprietary brands are available giving protection which varies from 15 minutes to 4 hours. Fixing of boards is normally by gluing, screwing or a combination of both.

LEIGHTWEIGHT PANELS: These high-density panels are manufactured from Rockwool and have a fiberglass scrim coating. Density is 200 kg m3. Panels are fixed by using glue or patent fixings, which allow for fast installation and replacement. The panels are clean to use and their lightweight makes for fast, easy installation.

PURPOSE MADE DUCTS: These are usually designed to travel through fire protected areas and are often joined to conventional ducts outside the protected areas. Construction is of special sandwich panels made from sheets of perforated steel with a cement centre. Thickness of these sheets are 6mm and 9mm. The robust nature of these ducts ensures that little or no mechanical damage occurs and eliminates maintenance. Protection up to 4 hours can be obtained and the system is often used in large air plenum, gas ventilation and external duct applications. The material has the advantage of providing a walk able surface, which will not sustain damage.

SEALING OF PENETRATIONS: A large variety of products exist for sealing flues, pipes, ducts and cables, which pass through fire walls and floors. The range varies from special fire rated mortars, through mastics, silicones to purpose made "pillows", Rockwool sections and pipe collars. Care should be taken to ensure products offered conform to AS 1540 Part 3.

As all fire rated installations need certification, it is often better to employ the services of contractors specializing in this type of work. T.I.C.A. members who carry out this type of work provide advice as to systems needed to meet specific requirement.

Thermal & Acoustic Insulation
Contractors Australia

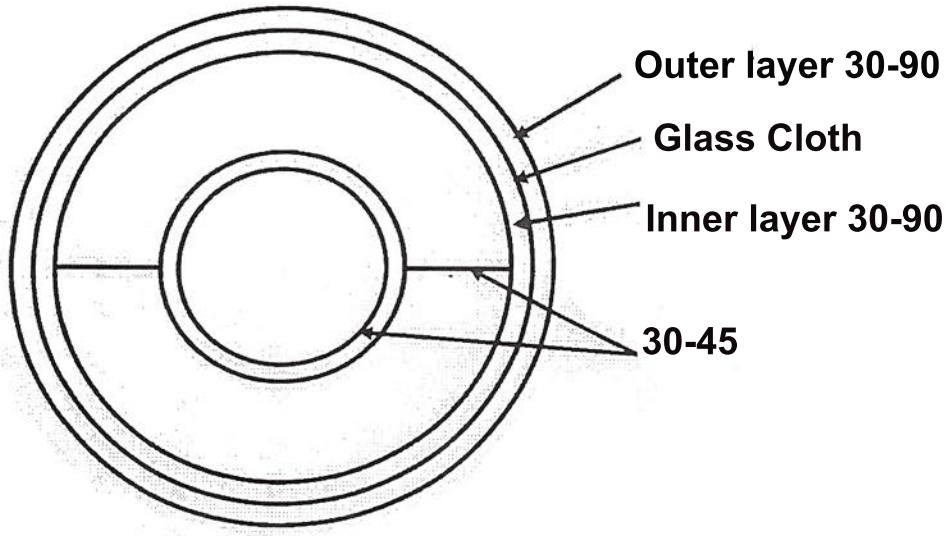
Insulation of Chilled Water Pipework Industry Best Practice

December 2010

METHOD 1

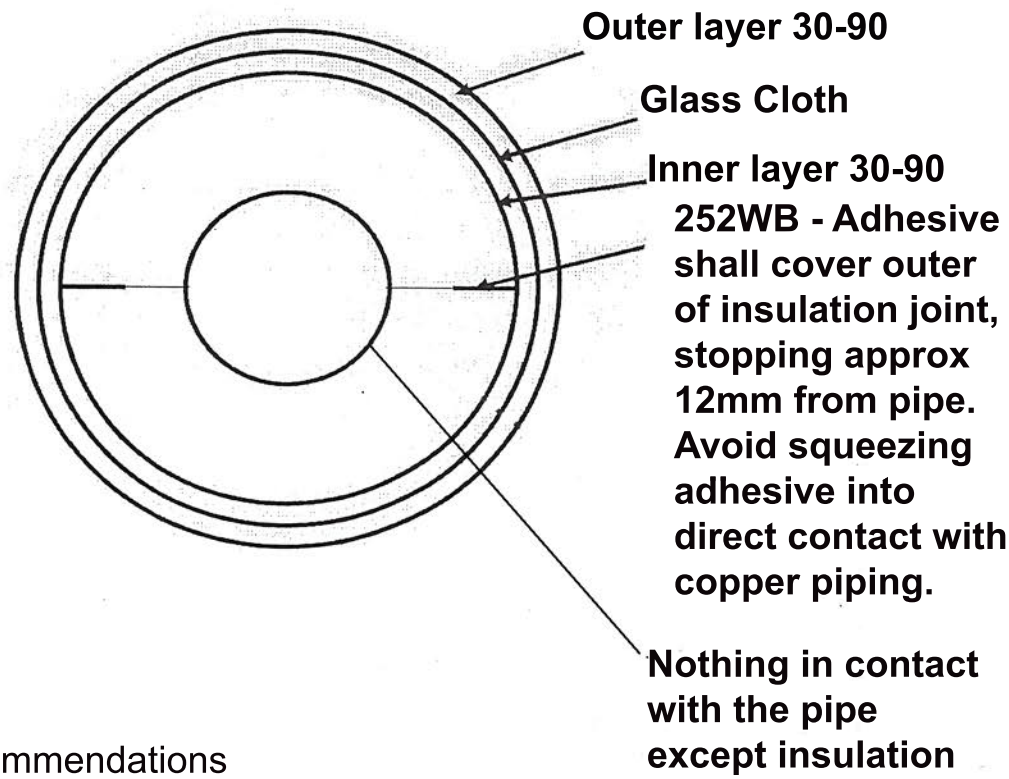
1.Steele pipe with 30-45 and 30-90 -Mastic

Pipe above 200 diameter



2. Copper pipe with 30-90 and 252WB to adhere insulation

Pipe below 200 diameter

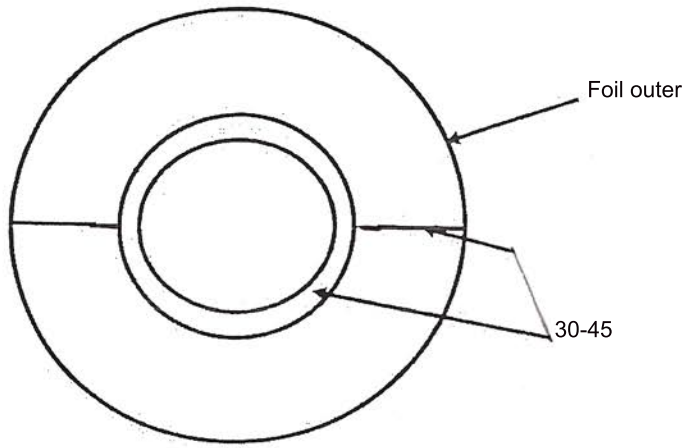


HB Fuller Recommendations

Method 2

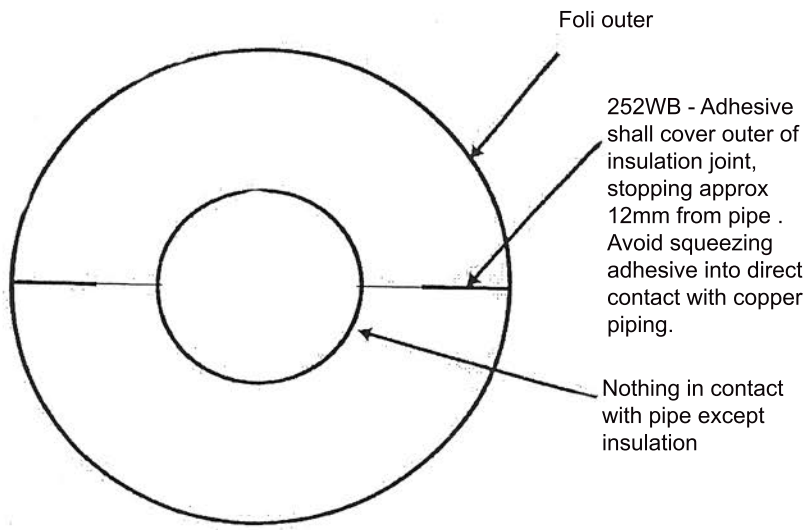
3. Steel pipe with 30-45, 252WB to adhere insulation and foil as outer barrier.

Pipe above 200 diametere



4. Use of Foster 252WB to adhere insulation on copper pipe, with foli provididing outer membrane. Note: 252WB is only performing an adhesive role.

Pipe below 200 diameter



HB Fuller Recommendations

H.B. Fuller

A.B.N: 37 003 638 435 ACN: 003 638 435

H.B. Fuller Company Australia Pty Ltd
PO Box 4202,
Dandenong Sth VIC 3175

PH: 613 9797 6222 FAX: 613 9797 6299

August 25th, 2009

TICA QUEENSLAND BRANCH
PO Box 8258
Woolloongabba, Qld, 4102
Australia

Att: Mr Andrew Hudson

Dear Andrew,

Please find attached a Technical Data Sheet for Foster Foamseal 30-45 sealant, designed to seal the joints of cellular glass and other insulations against the entrance of moisture and as a bedding compound on iron or steel surfaces.
As you can see the data sheet includes the statement "Not suggested for use with copper, aluminium or plastic pipe work." We believe that a TICA guide or guides recommend the use of Foster Foamseal 30-45, without reference to the pipe material concerned. We therefore request that these be modified to say Foster Foamseal 30-45 is not recommended for copper, aluminium or plastic pipe work.
For info our colleagues in the USA question the need for a compound on copper pipe, while it is required for iron or steel.
A similar letter has been sent to TICA Australia and branch contacts for New South Wales and Victoria.
Thank you for your attention.

Yours faithfully,

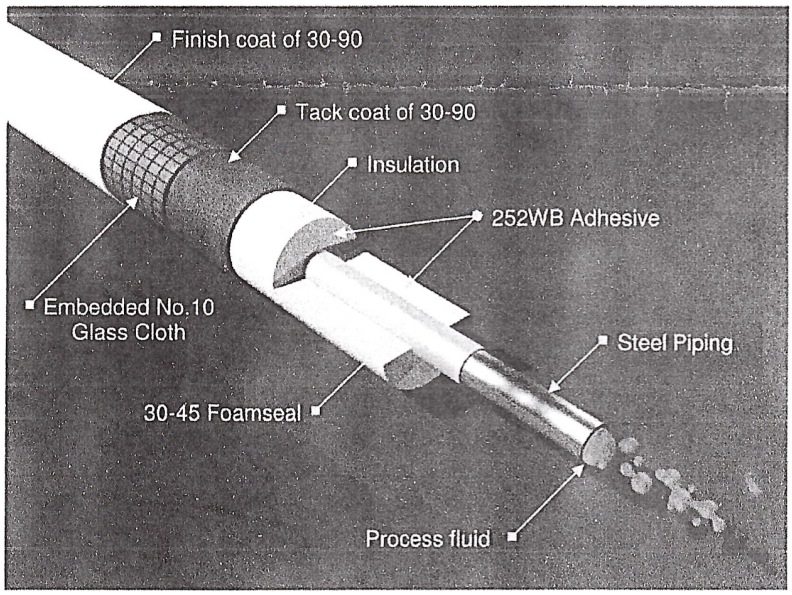
Robin Storey
Business Development Manager, Agents and Distributors

H.B. Fuller Foster®

16-22 Red Gum Drive ■ Dandenong South, Vic 3175 Australia ■ Ph: 1800-423-855 ■ Fax: 1800-420-055 ■ www.fosterproducts.com

Specification No. 2.1: Cold Work insulation

Vessel Temperature:	-20°C to 15°C
Insulation used:	Polystyrene, Glass wool, Polyester
Application:	Internal/external light duty
Examples:	Chilled water piping; coolant/refrigerant lines



1. Ensure pipe surface is clean, dry and free of rust, grease, and oil.
2. Apply Foster® Foamseal™ 30-45 to steel pipework at a coverage rate of 2.5 lt/m^2. Do not thin.
3. Attach pipe sections using Foster® 252WB™ applied to all surfaces at a rate of 0.5 lt/m^2, including longitudinal and butt joints between sections. Press insulation into pipe and other sections to remove air bubbles and ensure the absence of gaps.
4. Flash insulation sections using Foster® Foamseal™ 30-45 at a wet film thickness of 3.2mm.
5. Apply a tack coat of Foster® Vapour-Safe™ 30-90 to entire external surface of insulation at a coverage rate of 0.8 lt/m^2 (wet film thickness of 0.8mm).
6. Embed No.10 glass cloth into wet coating, overlapping all seams by 50mm. Smooth out all wrinkles.
7. Within ½ hour after tack coat application, apply a finish coat of Foster® Vapour-Safe™ 30-90 at a coverage rate of 0.8 lt/m^2 (wet film thickness of 0.8mm).

Note: Foster® Foamseal™ 30-45 sealant is not suggested for direct contact with copper, aluminium or plastic piping.

Foster®

30-45

Product Data Sheet

PROPERTIES

COLOUR: Grey

APPLICATION CONSISTENCY:
Trowel, or power extrusion

SPECIFIC GRAVITY:
1.44kg/l

AVERAGE SOLIDS:
99% by weight

COVERAGE RANGE:
Trowel: 1.6 – 3.5l/m^2
At 1.6 – 3.2mm wet film thickness

DRYING TIME 23ºC / 50% RH:
To Touch: 24 hours
Full Set: 7 days

SERVICE TEMPERATURE LIMITS:
-73ºC to 149ºC

WATER VAPOR PERMEANCE (ASTM E 96):
0.013 metric perm-cm (0.008 perm-inch).
The water vapor transmission through 25mm of impermeable insulation in 30 X 45cm blocks with 6.4mm joints of 30-45 is too small to measure.

WET FLAMMABILITY:
No flash to boiling, 93ºC

COMBUSTIBILITY:
Combustible. Flame spread and fuel contribution negligible when used as sealant in 3.2mm wide joints of incombustible insulation.

Visit us on the Foster® US website at www.fosterproducts.com

FOSTER® FOAMSEAL™ SEALANT

FOSTER® FOAMSEAL™ Sealant is a grey vapor barrier sealant designed for use with rigid thermal insulation including polystyrene foam. It remains flexible and tough in joints and will not shrink or crack during repeated cycles of high and low temperatures.

FOSTER® FOAMSEAL™ Sealant seals the joints of cellular glass and other insulations against the entrance of moisture. When used as a bedding compound on iron or steel surfaces and as a joint sealant, 30-45 provides additional protection to the blocks of insulation. Damage to the insulation due to migration of moisture is minimized.

FOSTER® FOAMSEAL™ Sealant is water and weather resistant and is often used as a sealant and flashing compound where structural parts must penetrate an insulation surface.

FOSTER® FOAMSEAL™ Sealant contains no asbestos, lead, mercury, or mercury compounds.

LIMITATIONS
Store between 4ºC and 38ºC.

Apply between 10ºC and 43ºC.

Allow to cure one week before placing in heated service.

Application of Foster® Foamseal™ Sealant to all pipe work must fully comply with all application guidelines and recommendations, in particular, Specification No. 2.1 and2.1: Cold Work Insulation, which can be found at www.hbfuller.com.au or by contacting HB Fuller at 16-22 Red Gum Drive, Dandenong South, Vic 3175, or telephone 1800-423-855. Not suggested for use with copper, aluminium or plastic pipe work.

Not suggested for use under solvent base elastomeric mastics and coatings, if minor surface discoloration and/or dirt pick-up would be objectionable. Discoloration can be minimized by allowing 24 to 48 hours cure time before top coating.

Make certain this product is completely dry and the area free from product odour if food is involved.

01/'09

H.B. Fuller Australia Pty Ltd

16-22 Red Gum Drive ○ Dandenong South ○ Vic 3175 Australia ○ Ph: 1800-423-855 ○ Fax: 1800-420-055

APPLICATION GUIDE
FOSTER® FOAMSEAL™ SEALANT
30-45

MATERIAL PREPARATION
DO NOT THIN. Apply only to clean, dry surfaces. Keep container closed when not in use.

APPLICATION
Apply by trowel, putty knife, power extrusion or bulk caulking gun. When sealing insulation joints apply FOSTER® FOAMSEAL™ Sealant at 1.6 to 3.2mm wet film thickness and press mating surfaces together firmly to squeeze out air bubbles and to obtain complete contact. When flashing, do not trowel out to feather edge, but maintain a minimum of 3.2mm wet film thickness throughout the entire area of use. Use membrane as specified. For best results, allow to cure 24-48 hours before top coating with solvent-based elastomeric mastics or coatings.

POWER EXTRUSION
FOSTER® FOAMSEAL™ Sealant may be applied using a wide variety of power (pressure) extrusion equipment suitable for use with oil base sealants. Typical viscosity range: 0.5 - 1.0 million cps.

CLEAN-UP
Clean tools and equipment with mineral spirits (flammable) or chlorinated solvent (non-flammable).

ISO 9001 SGS

CUSTOMER SERVICE — 1800 423 855

For industrial use only. Keep out of reach of children.
Consult Material Safety Data Sheet and container label for further information.

252WB

Product Data Sheet

PROPERTIES

COLOUR: Light Brown

APPLICATION CONSISTENCY: Trowel or spatula

SPECIFIC GRAVITY:
~1.40kg/l

COVERAGE RANGE:
(Varies with type of substrate)
Wet coverage shown below is for smooth surfaces. Rough or uneven surfaces require higher application rates to ensure proper coverage and adhesion.
1.0 - 1.1kg/m^2, based on wet film weight.
0.7 to 0.8 l/m^2, based on volume

DRYING TIME 23ºC / 50% RH:
Skinning time: 20 minutes
Dry Through: 24 Hours under normal conditions
(23 degrees C, 50% RH) with smooth surfaces, provided one or both substrates are porous.

SERVICE TEMPERATURE LIMITS:
-5ºC to 90ºC

WET FLAMMABILITY:
N/A - No flash to boiling, 100ºC

TESTING COMPLIANCE:

FOSTER 252WB ADHESIVE is tested to **AS2329**, Mastic Adhesives for Fixing Wallboards.

FOSTER 252WB ADHESIVE

FOSTER 252WB ADHESIVE is a water based acrylic adhesive designed for bonding expanded and extruded polystyrene and polyurethane insulation, rigid fiberglass insulation to itself as well as to other porous and non-porous common building materials including plywood, timbers, particleboard, metal, plasterboard and concrete. After curing it forms a strong yet flexible bond capable of withstanding thermal shock and mechanical impact.

FOSTER 252WB ADHESIVE has fast initial grab to minimize slippage and dries to form a strong bond with high heat resistance. It has a pasty consistency and bridges gaps up to 9mm, so is effective when used on uneven surfaces.

FOSTER 252WB ADHESIVE also may be used as a construction adhesive for bonding substrates such as particleboard, plywood, fibre cement, plasterboard, wall paneling to wooden and metal studs, strip flooring to joists, adhering skirting boards, architraves and trims to walls, replacing loose tiles on walls (not recommended for floor tiles) and for fixing polystyrene wall panels to timber and other porous construction materials.

FOSTER 252WB ADHESIVE contains no asbestos, lead, mercury, or mercury compounds.

LIMITATIONS
Store and apply between 4ºC and 38ºC, protect from freezing until dry.

Ensure **FOSTER 252WB ADHESIVE** is properly cured before placing in service.

Do not use between two impermeable surfaces.

5/08

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www.fosterproducts.com

H.B. Fuller Australia Pty Ltd

16-22 Red Gum Drive ○ Dandenong South ○ Vic 3175 Australia ○ Ph: 1800-423-855 ○ Fax: 1800-420-055

APPLICATION GUIDE
FOR
FOSTER 252WB ADHESIVE

MATERIAL PREPARATION
DO NOT THIN. Apply only to clean, dry, oil-free surfaces. Keep container closed when not in use.

APPLICATION

1. Apply adhesive to one surface, using a trowel or spatula to ensure sufficient coverage. On rough surfaces, a thicker application of FOSTER 252WB ADHESIVE is required as necessary to assure complete contact between the insulation and the other substrate. To apply by trowel, use a serrated trowel with 6mm deep notches on 12mm centers. Trowel over the entire surface being adhered.
2. Within 15 minutes of application bring both surfaces into contact with sufficient force to ensure the adhesive comes into contact completely with both substrates. Maintain this force until a slip resistant bond is achieved.
3. Where both surfaces are smooth and porous, a slip resistant bond will be achieved in approximately 30 minutes at 25 degrees C, extending to 60 minutes at 10 degrees C. When one surface is non porous and uneven, allow 8 to 12 hours to develop a firm slip resistant bond. During the time the slip resistant bond is developing ensure both substrates are kept firmly together with strapping, clamping or mechanical fasteners.
4. Extend strapping or clamping times where substrates are not smooth and higher coating weights of FOSTER 252WB ADHESIVE are applied.
5. In heavy duty applications e.g. where using **FOSTER 252WB ADHESIVE** in flooring applications, follow flooring manufacturers instructions, including the use of permanent mechanical fasteners. Where flooring manufacturers instructions are not available contact HB Fuller for further information.

PACK SIZE
20lt pail – resource number 6020681500

PAINTING
Once cured, 252WB can be painted using water based paints.

CLEAN-UP
Use clean fresh water for cleaning trowels and other equipment before product dries. Dry product may be removed mechanically with a suitable knife or scraper.

REGISTERED COMPANY ISO 9001 SGS

CUSTOMER SERVICE — 1800 423 855

For professional use only. Keep out of reach of children.
Consult Material Safety Data Sheet and container label for further information.

Foster™

30-90

Product Data Sheet

PROPERTIES

COLOUR: 30-90 White

APPLICATION CONSISTENCY:
Trowel, glove, or airless spray.

SPECIFIC GRAVITY:
1.38 kg/l

AVERAGE SOLIDS:
71% by weight

COVERAGE RANGE:
(Subject to the nature of material being coated). Wet coverages shown below are for smooth non-porous surfaces. Porous or rough surfaces will require higher usage rates to attain required dry thickness.
2.4l/m^2 at 2.4mm wet thickness
1.6l/m^2 at 1.6mm wet thickness

DRYING TIME 23°C / 50% RH:
To Touch: 4 hours
Through: 24 hours

SERVICE TEMPERATURE LIMITS:
-29°C to 82°C

WATER VAPOR PERMEANCE:
ASTM E 96 Procedure B: 0.009/metric perms at 1.1mm (0.013 perms at 43 mils dry)
ASTM F 1249: 0.05 metric perms at 0.94mm (0.08 perms at 37 mils dry). Tested at 38°C and 90% RH.

WET FLAMMABILITY:
Flash point: None to boiling, 100°C.

SURFACE BURNING CHARACTERISTICS (AS1530.3.1989):
Ignitability Index: 11
Spread of Flame Index: 0
Heat Evolved Index: 3
Smoke Developed Index: 5
Applied to 6mm non-combustible substrate. The results of this fire test may be used to directly assess fire hazard, but it should be recognized that a single fire test method will not provide a full assessment of fire hazard under all fire conditions.

Visit us on the Foster US website at
www.fosterproducts.com

FOSTER VAPOR-SAFE® MASTIC

FOSTER VAPOR-SAFE MASTIC is a high solids water base, fire resistive, flexible vapour barrier finish for most types of thermal insulation, including polystyrene foam. It may be used over dry concrete, finishing cement, and most metals.

VAPOR-SAFE MASTIC is non-flammable when wet and has a mild latex "paint type" odour. It is designed for heavy duty/industrial use on pipes, vessels, ducts, and equipment operating below ambient temperatures. It may also be used indoors.

VAPOR-SAFE MASTIC has the water resistance and low water vapour permeance normally found only in solvent based products. It can be used in high humidity environments, and greatly retards water vapour permeation.

VAPOR-SAFE MASTIC is ideal for vapour sealing ASJ, FRK, and FSK jackets and board facings at joints, laps and over staple and weld pin punctures. It is an excellent duct board closure sealant. Do not exceed 3.2mm wet film thickness.

VAPOR-SAFE MASTIC conforms with current USDA requirements regarding use in meat and poultry processing areas under federal inspection. Letter of certification is available upon request.

VAPOR-SAFE MASTIC contains no asbestos, lead, mercury, or mercury compounds.

LIMITATIONS
Store and apply between 4°C and 38°C, protect from freezing until dry.
To resist rain washoff, allow at least 8-12 hours drying time above 10°C, with a relative humidity of 50%. Higher humidity and/or lower temperature may retard drying.
Always select Vapor-Safe Mastic in the white color for use over Polystyrene on outdoor installations.
Always test foil and paper facings for acceptable adhesion before using.
Outdoor horizontal surfaces must always drain completely. A pitch of at least 4cm/m is recommended.
After long term outdoor exposure 30-90 may weather to an off-white color.

5/04

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APPLICATION GUIDE FOR FOSTER VAPOR-SAFE® MASTIC 30-90

MATERIAL PREPARATION
DO NOT THIN. Apply only to clean, dry, oil free surfaces. Keep container closed when not in use. Stirring is usually not necessary.

APPLICATION
To prevent water vapour and moisture infiltration, proper and complete flashing is required. Follow flashing specifications.

HEAVY DUTY/INDUSTRIAL OUTDOOR
1. Apply a tack coat of Foster Vapor-Safe Mastic (color as selected) at 0.8l/m^2.
2. Embed Foster MAST-A-FAB white membrane into the wet tack coat. Smooth membrane to avoid wrinkles and overlap all seams at least 5cm. Apply finish coat of Vapor-Safe Mastic, within 1/2 hour after the tack coat application, at 1.6l/m^2.
3. This application shall provide a minimum dry film thickness of 1.4mm.

Over cellular glass insulation, increase the coverage to 2.9l/m^2.

INDOOR AND LIGHT DUTY OUTDOOR
Apply as above except that the finish coat shall be 0.8l/m^2 and the minimum dry film thickness shall be 0.9mm.

MOISTURE BARRIER SEALER
1. Where required at all fittings and at specified intervals of straight-run pipe insulation, apply Foster Vapor-Safe Mastic at 1.6mm thick to all butt joints of pipe insulation and onto the bore of the insulation for a minimum of 5cm from the joint.
2. Position insulation, press firmly into place making certain that a complete unbroken seal is obtained.

TROWEL
Use clean steel trowel. Apply each coat in full thickness before initial set. Avoid excessive troweling.

BRUSH OR GLOVE
Use a good brush (suitable for water based paints), making strokes as long as possible over the surface. Apply with full brush and spread out evenly. Do not overwork.

SPRAY
Vapor-Safe Mastic may be airless spray applied. For spray equipment information, please consult Airless Spray Recommendations or contact your Spray Equipment Supplier. Average Viscosity Range: 100,000 -120,000 cps. Corrosion resistant pumps and fittings are suggested.

CLEAN-UP
Use fresh water to clean brushes and equipment before product dries. Dry product may be removed with hot soapy water (with ammonia added) or strong solvents such as chlorinated solvent (non-flammable) or xylol (flammable).

CUSTOMER SERVICE — 1800 423 855

For industrial use only. Keep out of reach of children.

Consult Material Safety Data Sheet and container label for further information.

#10 Glass Fibre Reinforcing Mesh

Product Data Sheet

DESCRIPTION

Foster #10 glass cloth is a high strength open weave pre-sized and resin treated fibre-glass cloth. It is used in conjunction with various types of coatings to provide reinforcement of and thickness control for the coating, and to provide a method to bridge gaps, joints and crevices in the insulation. It will not burn, and meet or exceed all government or private safety codes.

Foster #10 glass cloth incorporates a thread count of 9 strands by 8 strands per square inch into its construction. The standard roll size is 99cm x 45m x 0.2mm in thickness. A roll weighs 1.5 ounces per square yard, and is packaged 4 rolls per carton.

ADVANTAGES

Chil-Glas glass fibre reinforcing mesh, unlike competitive cotton, plastic, or glass treated products, has extremely high tensile strength and provides dimensional stability. It is resistant to most acids and alkalis, and will not burn, rot, mildew, or decay. Foster #10 glass cloth is easier to apply and fabricate when compared to competitive materials. It may be cut with a knife or scissors, and is easily handled. Foster #10 glass cloth is flexible and can be readily flashed to adjoining surfaces.

USES

Foster #10 glass cloth is an excellent multi-purpose glass fibre reinforcing mesh. It is normally used when applying a high solids content coating to small surfaces such as fittings. Foster #10 glass cloth is also used when a low solids content coating is applied over large insulated surfaces, such as tanks or spheres.

APPLICATION

Embed the Foster #10 glass cloth into a tack coat of the protective coating, and then apply a finish coat immediately. Be sure to overlap all seams of the Foster #10 glass cloth at least 50mm. Follow the application instructions for the mastic or coating selected.

SPECIFICATIONS MET

Foster #10 glass cloth is incombustible and will not contribute to flame spread or smoke development.

Foster #10 glass cloth contains no asbestos, lead, mercury, or mercury compounds.

Visit us on the Foster US website at
www.fosterproducts.com

11/04

REGISTERED COMPANY ISO 9001 SGS

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STANDARD SPECIFICATION

Acoustic treatment for soil waste and storm water pipes

Section 10

FORWORD

Most acoustic treatments fail not because of faulty product but due to poor workmanship. Studies show that lagging can be a very good form of noise control, provided it is correctly applied.
The factors limiting the performance of lagging in practical situations are shown to be poor fitting, exposed pipe/flanges and physical coupling the outer cover and the pipe.

2013

THE IINSULATION

CONTRACTOR'S

ASSOCIATION

Author: Mark Beattie

T.I.C.A.

Standard Specification

Acoustic Lagging of Soil and Waste Pipes.

PRESENTATION COPY

REVISED 2013

Disclaimer

The contents of this Specification are designed as a guide to good practice and for information purpose only. TICA is an association of insulation contractors and suppliers whose purpose is to comply with the specification and instruction of the responsible Acoustic Consultant, Engineer or Architect.

This specification is to be used in conjunction with and not to supersede the Hydraulic Services specification.

The intent of this specification is to provide guidance for the supply and installation of a commercially acceptable product.

TICA makes no recommendation as to the types or properties of acoustic lagging or cladding to be used in the acoustic insulation of pipes.

It is expected that the users of the specification will make their own assessments of its applicability to their own particular circumstances. No responsibility will be accepted by TICA or its members for any misconception, misunderstanding, loss, injury or damage in any way arising from its use.

FOREWORD

Properly specified and applied, pipe lagging can provide very effective noise control. However, as with any acoustic treatment, attention to detail and good workmanship in the application and fixing of the lagging materials to the pipe is essential if the specified system is to perform to its full potential.

In practical situations, the acoustic performance of a lagging system can be severely degraded by poorly cut and fitted lagging, gaps left at joints, exposed pipe flanges and other situations where a continuous cover is not maintained. Similarly, acoustic pipe insulation will not perform to specification if there is direct mechanical contact between the pipe and the lagging cover (the cladding) or between the lagging cover and adjoining building components.

This specification describes work procedures, which if followed, will ensure that properly selected acoustic pipe insulation performs as required in reducing noise from soil and waste pipes

It is TICA's goal that this specification be applied by the insulation contractor and used as a bench mark of standard practice for Acoustic Consultants and Engineers, Certifiers and Builders.

TICA makes no recommendation on the type or types of acoustic insulation to be used in the acoustic treatment of pipes. TICA leaves this determination to the Acoustic Engineers.

TICA recognizes that acoustic values are achieved using systems & as such include the following Building Code of Australia Deemed-to-Satisfy Provisions.

BUILDING CODE OF AUSTRALIA. (Excerpt)

F5.6 Sound insulation rating of services

Deemed-to-Satisfy Provisions

(a) If a duct, soil, waste or water supply pipe, including a duct or pipe that is located in a wall or floor cavity, serves or passes through more than one sole-occupancy unit*, the duct or pipe must be separated from the rooms of any* sole-occupancy unit *by construction with an Rw + Ctr (airborne)*

not less than—

(i) 40 if the adjacent room is a habitable room *(other than a kitchen); or*

*(ii) 25 if the adjacent room is a kitchen or non-*habitable room*.*

(b) If a storm water pipe passes through a sole-occupancy unit *it must be separated in accordance with*

(a)(i) and (ii).

NOTICE TO BUILDERS AND PLUMBERS

When installing pipes that require acoustic insulation, it is essential that sufficient room is left between the pipe and other building elements such as walls, ceilings, beams, columns or slabs to permit the ready installation of pipe lagging and cladding.

In all cases the minimum distance between the pipe to be lagged and adjacent building components must be sufficient to ensure that the pipe insulation system can be installed to its design thickness, while avoiding direct contact between the cladding and surrounding components

Contact between pipe cladding and surrounding building components will reduce and in some cases, negate any noise reduction. Compression of the lagging, in the situation of a "tight fit", will reduce its ability to decouple the motion of the pipe from the cladding and thus limit noise reduction. In either case the pipe insulation will not perform to specification.

CONTENTS

1. SCOPE

1.1 This specification defines the special requirements of acoustic insulation for soil, waste and storm-water pipes. It deals with the particular requirements for installing such acoustic pipe insulation. It is a standard to be applied by the insulation contractor.

1.2 The specification applies to the acoustic pipe insulation systems which consist of lagging comprising fibrous insulation or open cell polymer foam and a flexible cladding. The lagging and cladding may be separately applied, however in most situations to which this specification applies, the lagging and cladding will be pre-bonded and supplied as an assembly.

1.3 Specific requirements for installation of sheet metal cladding are outside the scope of this Specification. Guidance in relation to the installation of such cladding is provided in OMCA 1992[1] and ISO 15665:2003 [2].

1.4 This specification does not apply to the acoustic design or selection of pipe insulation.

2. DEFINITIONS

2.1 Pipe

In this specification the word pipe is used to refer to all items included in the scope, unless the context indicates otherwise.

2.2 Acoustic Pipe Insulation

Acoustic pipe insulation consists of a porous sound-absorbing lagging retained behind an impermeable cover (or cladding).

For this specification, the flexible cover will usually comprise of a mass loaded polymer acoustic barrier. The outer surface of the barrier will be faced with a vapour barrier/foil laminate.

3. OBJECTIVES OF ACOUSTIC PIPE INSULATION

(a) Noise Sources

i. Noise radiated by the pipe is typically generated by the turbulent motion of fluids within the pipe or by such motions in items connected to it. Thus flushing toilets, emptying baths, bends and junctions within the run of the pipe and equipment such as pumps and valves attached to it act as sources of pipe noise. Noise from such sources will propagate over large distances within the pipe and may cause loss of amenity and nuisance in parts of a building which are otherwise remote from the original noise source.

ii. Properly specified and applied, acoustic pipe insulation provides an effective means to reduce such noise.

3.1 ACOUSTIC PIPE INSULATION COMPONENTS

3.1.1 Lagging

The lagging isolates and decouples pipe vibrations from the cladding. To perform acoustically the lagging must be both porous and resilient. The lagging functions as an isolating layer by absorbing acoustical and vibrational energy emitted by the pipe and converting it into heat.

3.1.2 Cladding

The cladding functions as a barrier to sound radiated by the pipe. To provide an affective barrier to the passage of sound the cladding must have significant mass and must be completely sealed. Typical flexible claddings include an aluminium foil outer cover which acts as an impermeable barrier to protect the porous lagging from moisture absorption. The cover also provides some mechanical protection.

3.1.3 Sheet Metal Cladding

Sheet metal cladding may be required when the acoustic pipe insulation is at risk from mechanical damage and/or the effects of weather exposure.
Sheet metal cladding may be used as an outer cover for an enclosed flexible lagging and cladding system or, subject to appropriate specification, may be used as a substitute for a flexible cladding.

4. MATERIALS

4.1 Lagging and Cladding

4.1.1 For this specification acoustic lagging and cladding materials shall be as determined by those responsible for acoustic design.

4.1.2 To ensure that the appropriate materials are supplied and used the specification of acoustic lagging and cladding systems should include a full description of the types of materials to be used. This description should include all acoustically relevant parameters necessary for the selection and supply of the correct materials.

(a) Where a pre-bonded acoustic pipe insulation system is to be used, the specification should state:

i. The pre-bonded pipe insulation system and its manufacturer;

ii. The thickness of the lagging component (mm) and the thickness (mm) and surface density of the cladding (kg/m2);

(b) Where the lagging and cladding are to be supplied separately, the specification should state:

i. The type of lagging (open cell polymer acoustic foam or fibrous acoustic insulation) and its manufacturer;

ii. The thickness of the lagging component (mm), its density (kg/m2) and (where required) flow resistance.

iii. The type of cladding and its manufacturer.

v. The thickness (mm) and surface density of the cladding (kg/m2). Any

v. other relevant parameters.

4.2 Cladding as Vapour Barrier

Water vapour permeance when tested to AS1301 P419ts Condition B

(a) Creased 2.26 ng/N.s (maximum)
(b) Uncreased 1.13 ng/N.s (maximum)

4.3 Pressure Sensitive Tape

4.3.1. Material: Use Precision 493 or Venture 1529CW
Adhesive: non-toxic, high tack, pressure sensitive adhesive.
Width: no less than 48mm

4.3.2. Properties, Tape used should have high strength, flexibility, conformability with high stick / high holding power. Tapes should bond and seal well across a wide range of temperatures.

4.4 Mechanical Fastening

4.4.1. Mechanical fasteners must be applied over all site applied tape joins. Use Zip Ties or 15 mm wide poly strapping at 600 mm centre's to support acoustic insulation.

5. ACOUSTIC PIPE INSULATION - APPLICATION

5.1 General Requirements

5.1.1. Isolation of pipe vibrations from the cladding is essential for the acoustic pipe insulation to provide effective noise reduction. Coverage of the pipe by the lagging must be continuous; there must be no points of contact between the cladding and the pipe. Any such contact between cladding and pipe will limit the noise reduction achieved. In some cases, due to the greater surface area of the cladding relative to that of the pipe, amplification of pipe noise may occur.

5.1.2. Pipe cladding must be installed in a manner which avoids direct mechanical contact between the cladding and surrounding building components.

Contact between the cladding and surrounding building components will reduce and in some cases negate any noise reduction. Compression of the lagging, in the situation of a "tight fit", will reduce its ability to decouple the motion of the pipe from the cladding and thus limit noise reduction. In either case the insulation will not perform to specification.

5.1.3 There shall be no gaps in the pipe insulation: joints between adjoining areas of lagging should be neatly made so as to avoid gaps in the lagging cover. The cladding should overlap at all joints as per the manufacturer's specification and should be sealed with pressure sensitive tape.

5.1.4 The cladding should be mechanically fixed in place using appropriate strapping to ensure that the noise reduction initially achieved is not compromised by the tendency for lagging and cladding materials to spring open over time.

5.2 Extent of Acoustic Pipe Insulation

The extent of waste pipe to be acoustically insulated shall be as specified by those responsible for the acoustic design.

5.3 Testing

Do not begin to apply insulation until pipe work pressure testing is complete.

5.4 Preparation

5.4.1. Make sure the surface to be acoustically treated is clean and dry.

5.4.2. Ensure the acoustic pipe insulation to be used is clean, dry and free from rips and tears.

5.5 Joint Types and Treatment

5.5.1 Original product lap join

i. As shown in Figure 1a, where the decoupler material has been removed to create a smooth original product lap only one join is produced, requiring the tape treatment of one join.

Figure 1a

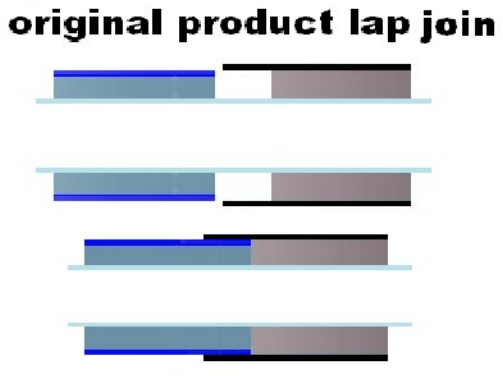
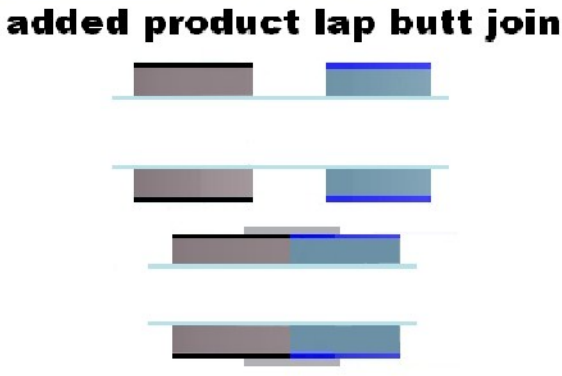


Figure 1b



ii. This is the only join treatment allowed on longitudinal joins.

iii. Suggested clause 4 describing butt joints and where they are allowed.

5.5.2. As shown in Figure 1b, where butt joins are used on transverse sections, a strip of loaded polymer/vinyl material devoid of decoupler:

(a) Must be wrapped around the joint once with a 50mm overlap on length. Refer Figure 2a and

i. The added lap should be applied centrally over the join between acoustic materials. Refer Figure 2b and

ii. Tape and ties will be applied to each edge (there are 2) of the added lap.

(b) The material used to produce an added lap must have equal or greater weight per square metre (surface density kg/m2) and thickness to the cladding component of the acoustic pipe insulation system.

Figure 2a

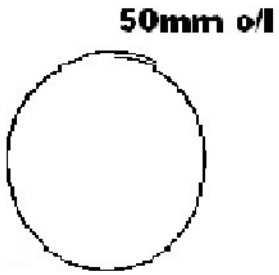
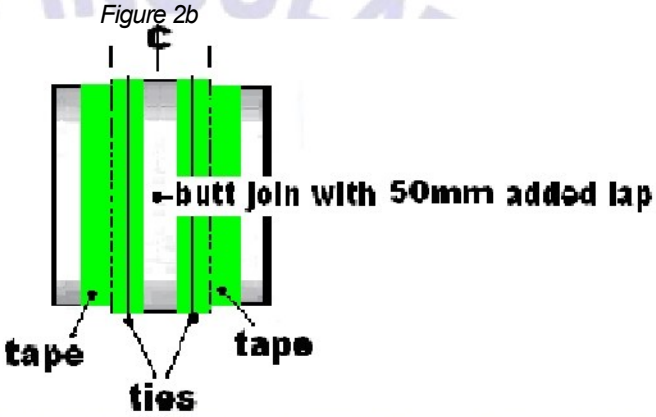


Figure 2b



5.5.3. Plain butt join

For this specification, plain butt joints, (i.e. butt joints which do not incorporate an overlap) are not permitted except in the situation of the inside curve of the segments of bends. All such joints must be properly and uniformly reinforced so that separation of the joint does not occur (refer **Figure 3b and Sections 5.6 to 5.8)**

5.6 Application of Pressure Sensitive Tape

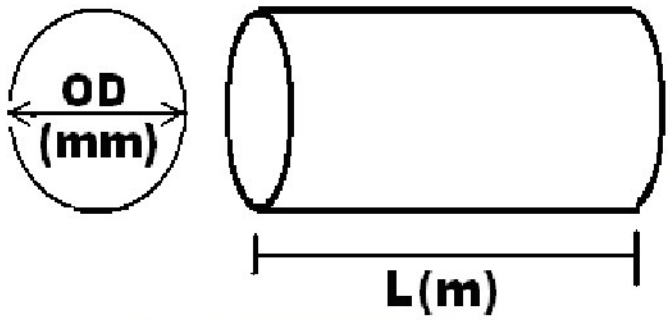
i. The surface to which the tape is to be applied should be free of oil, dust and dirt. The surface should be cleaned with a dry cloth.
ii. Care must be taken to apply the tape on centre so that there is adequate area on both sides of the join for the tape to bond.
iii. Uneven width distribution will put additional shear stress on the smaller side of the tape join. Do not
iv. over stretch the tape as this will create buckles and voids in the contact area.
v. Tape should be wiped firmly onto the surface. The more pressure that is applied, the greater the bond will be between tape and the surface.

6 Straight Pipe Sections

When acoustic pipe insulation is to be produced from rolls and not supplied as a factory pre-cut product, apply the following method.

6.1.1 Measure the outside diameter (OD) in millimeters (mm) and the length (L) in meters (m) of the pipe to be insulated as shown in Figure 3.

Figure 3



6.1.2 To calculate the required width (W) of acoustic material, apply the following formula,

$$W = \pi (OD + (2 \times T)) + OL$$

Where:

W	= Width
OD	= *Outside diameter of the pipe to be insulated*
π	= 3.14 (pi)
T	= Thickness of acoustic insulation (can vary from 15mm to 50mm plus)
OL	= Overlap (normally 50mm)

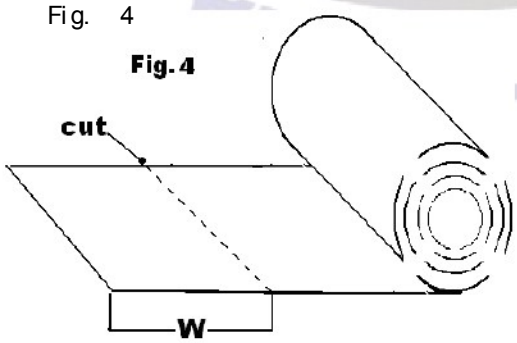
Example

For 100mm pvc waste pipe with 25mm thick acoustic pipe insulation.

$$W = 3.14 \times (100 + (2 \times 25)) + 50 = 521mm$$

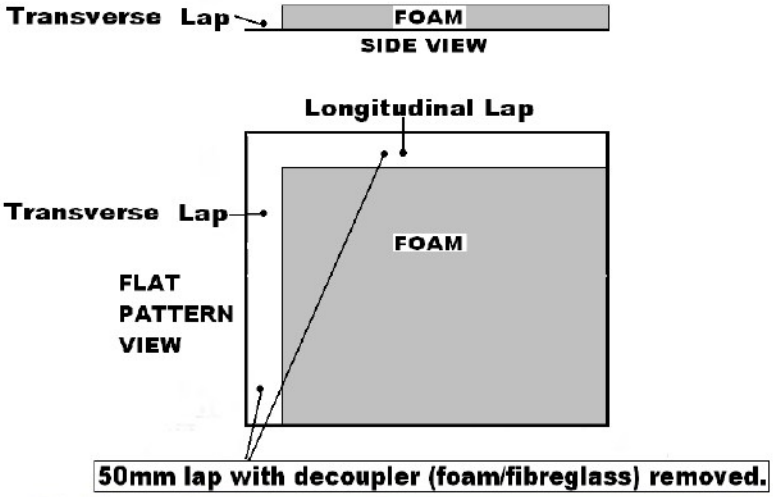
6.1.3 After calculating the width of product required, cut roll. (Most acoustic pipe insulation material can be cut with a sharp knife or scissors). **Refer Figure 4**.

Fig. 4



(a) When the required width of acoustic material has been cut, 50mm of decoupler material foam/fibreglass) shall be removed from the longitudinal and transverse joins leaving a 50mm lap of loaded polymer/vinyl barrier. **Refer Figure 5**.

Figure 5



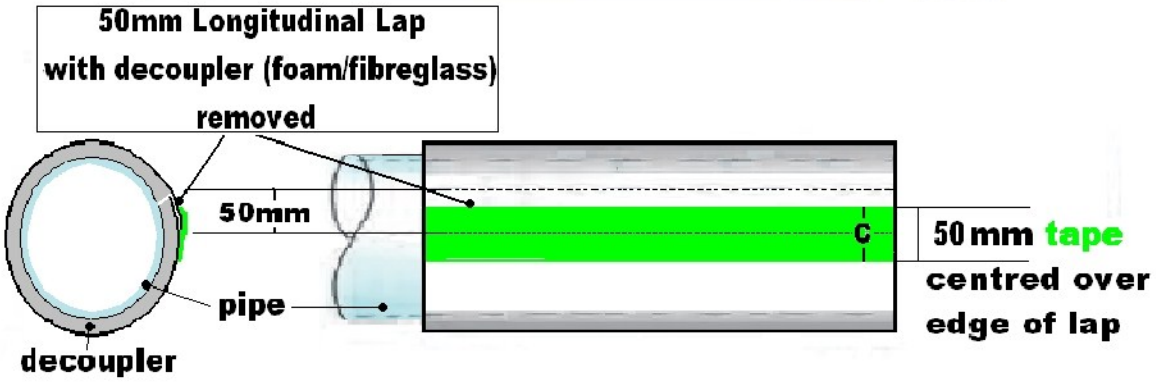
(b) In some cases the installer may decide to use butt joins on the Transverse joints in the acoustic pipe insulation - requirements for such joints are shown in Clause 5.6.2 **Figure 2a**.

NOTE:
Butt joins are not acceptable for longitudinal joints. Longitudinal joints must always incorporate a 50mm overlap as part of the original product. (Added product overlaps are not acceptable for longitudinal Joints.)

6.1.4. Wrap acoustic material around the pipe.

(a) On Longitudinal joins, where the lagging material has been cut back 50mm and removed from the cladding to create a smooth, flat cladding overlap, a 50mm wide pressure sensitive reinforces aluminium tape (refer Section 5.7) shall be applied to seal and reinforce the join (refer Figure 6).

Figure 6



(b) Materials comprising acoustic pipe insulation have "high memory" that, unless restrained by robust fastenings, will tend to spring outwards from the pipe. Due to this circumstance, the following practices shall be adopted:

i. The acoustic material be taped with 50mm reinforced aluminium tape (wrapped around a minimum of 1.5 times)

ii. A mechanical fastening applied over tape as shown in Figure 7.

iii. Tape and mechanical fastenings must be applied along length of pipe at 600mm intervals. This

iv. applies regardless of the type of transverse join used, as shown in Figure.7.

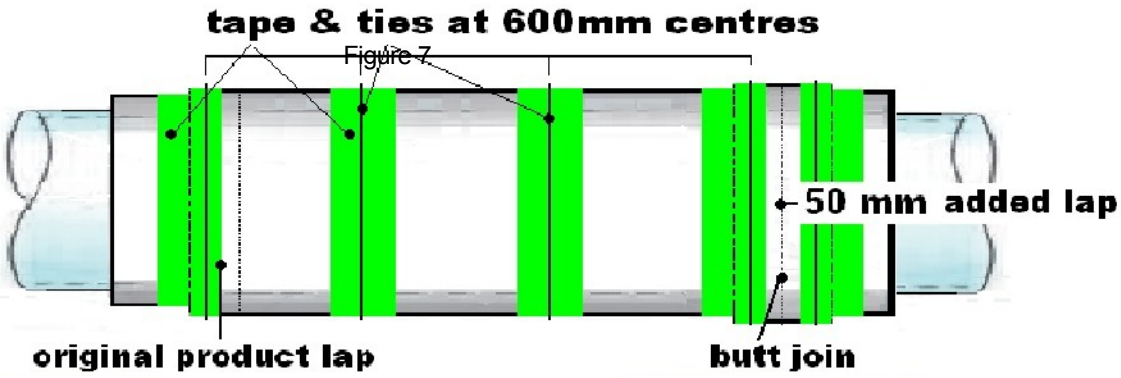


Figure 7

6.2 PIPE FITTINGS

6.2.1. For this specification pipe fittings Include, but are not limited to, 90, 45 & 30 deg bends, T Junctions, Y Junctions, and Traps;

6.2.2. Free-hand fabrication of fittings is not permitted. Only fittings with fine tolerances (minimum gaps) manufactured in the following ways will be accepted:

(a) Fittings fabricated on site or in factory using pattern templates developed on the basis of sheet metal fabrication / boiler making principles outlined in Dickason's The Geometry of Sheet Metal Work.

(b) Fittings manufactured using factory precision cut fittings, delivered to site.

6.2.3. Bends present a change of direction for fluids moving in the pipe and are consequentially a source of pipe noise. Thus to reduce noise breakout to the maximum extent possible:

(a) Care must be exercised to ensure gaps between lobster-back segments are kept to an absolute minimum;

(b) Longitudinal joints in the pipe insulation must be kept inside the throat (inside curve) of the pipe to the extent that this is possible.

6.2.4. 90 DEGREE BEND

For this specification, a 90°bend shall:

1) Be a lobster back bend containing three (3) segments; and 2)

Each segment shall be taped & mechanically fastened.

(a) **Refer to Figure 8a for built in laps.**

(b) **Refer to Figure 8b for added laps.**

Figure 8a

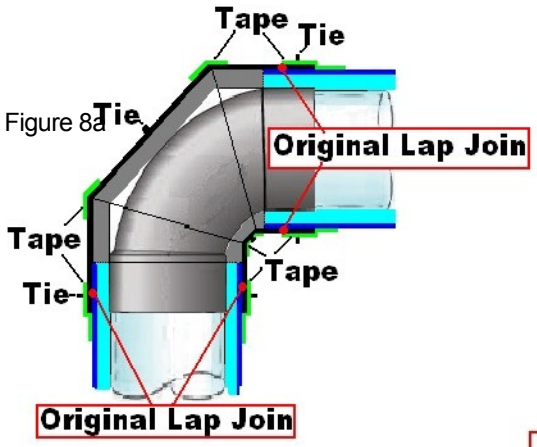
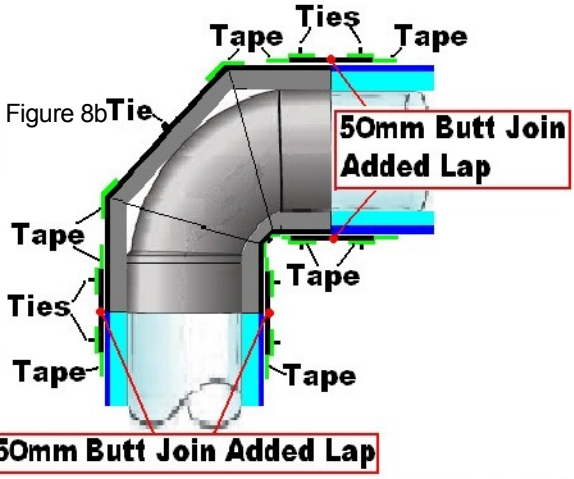


Figure 8b



6.2.5. 45 DEGREE BEND

For this specification, a 45°bend shall:

1) Be a lobster back bend containing two (2) segments. and

2) Each segment shall be taped & mechanical fastened.

(a) **Refer to Figure 9a for built in laps.**

(b) **Refer to Figure 9b for added laps.**

Figure 9a

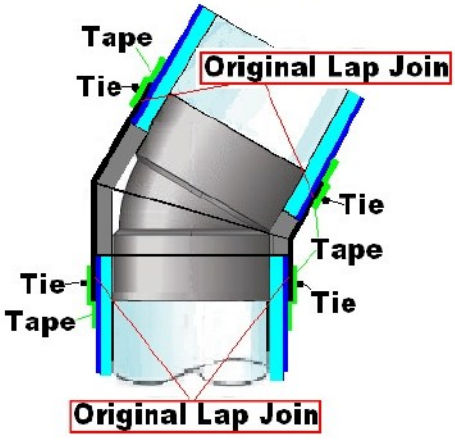
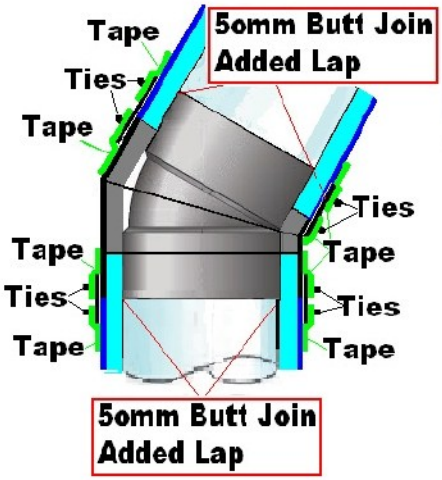


Figure 9b



6.2.6 T-JUNCTIONS

For this specification, a T-junction shall:

1) Be made with minimum joins; and

2) Each joint shall be taped; and

3) The completed assembly shall be mechanically fastened at three (3) points. Refer

i) Figure.10a for built in laps.

ii) **Refer Figure.10b for added laps.**

Figure 10a

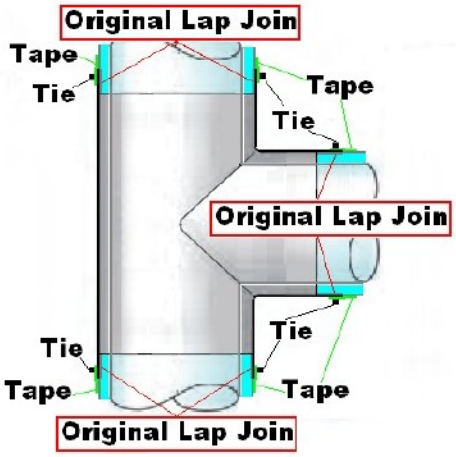
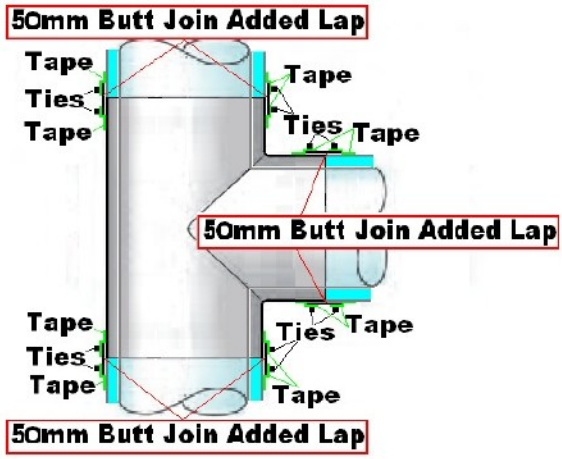


Figure 10b



6.2.7 Y JUNCTIONS Be made with minimum joins; and

1) Each joint shall be taped; and

2) The completed assembly shall be mechanically fastened at three (3) points.

i) Refer Figure 11a for built in laps

ii) Refer Figure 11b for added laps.

Figure 11a

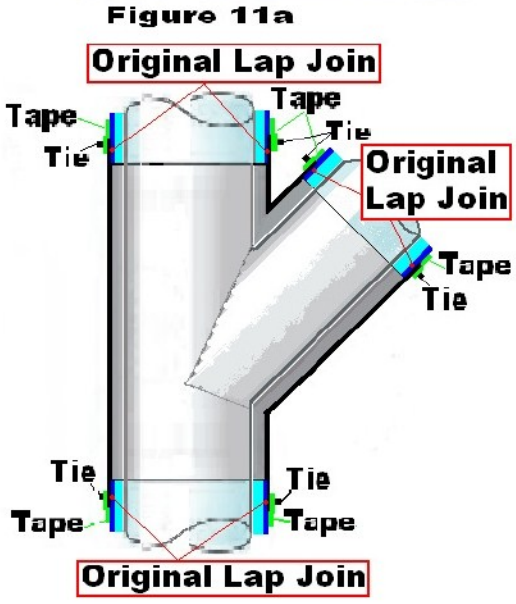
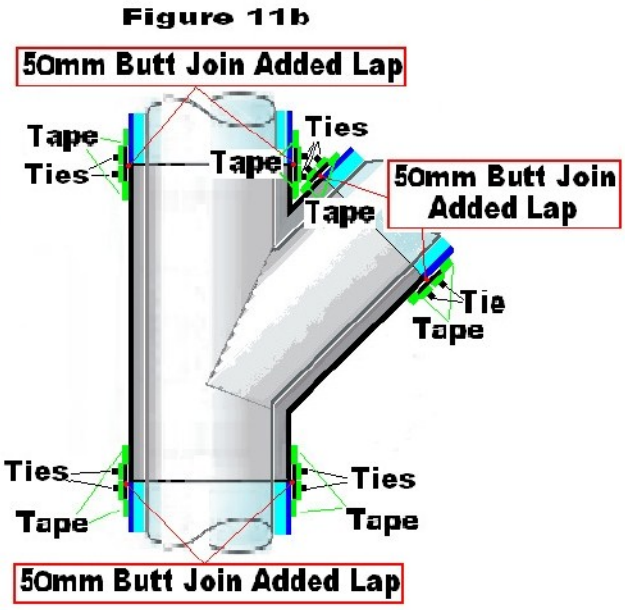


Figure 11b



6.2.8 Access Points

For this specification, pipe access points:

1) Shall incorporate a cap that fits over the outside of the acoustic insulation; and

2) Shall be made using the same material as the acoustic pipe insulation; and

3) The cap shall be made with a return of a least 50mm plus the thickness of the acoustic pipe insulation.

For example-: for 25mm thick acoustic pipe insulation the cap shall incorporate a return of 75mm (25mm pipe insulation + 50mm additional return = 75mm overall length of cap. Refer Figure 12a.

4) The cap shall be held in place by a tie, this allows for ease of removal without damage to the acoustic insulation. Refer Figure 12b.

6.2.9. Traps

A suggested template for acoustically insulating traps is shown in **Figure 13a**. The exact requirements for insulating traps will vary due to the many types available; however, the template can be used in most situations with some modification in height and width.

1. The installation of the pipe insulation for the trap is best done by prefabricating the wrap (including all laps) prior to placement on the trap.
2. The height of the pipe insulation assembly shall be sufficient to ensure that the lagging at the base of the trap is not compressed against the pipe (i.e. the height of the insulation assembly for the trap plus one thickness of pipe insulation.
3. The holes for the pipes entering and leaving the trap can be pre-measured and applied as shown in **Figure 13b**.
4. Insulation for the pipes entering and leaving the trap must finish inside the trap insulation surround, with sufficient overlap to accommodate pipe movements. Refer **Figure 13d.**
5. Joints should be taped and mechanical fastening applied as shown in **Figure 13c**:

(a) **A**: - At least two (2) ties applied horizontally, 1 above the leaving pipe and 1 below. (This will stop the insulation sliding off the trap)

(b) B: - At least one tie running from the top of the trap (hard against the concrete and supported from the concrete). This will support the base. Care should be taken to ensure that the vertical tie(s) do not compress the lagging against the base of the pipe

(c) C: - One tie applied to the end of the each pipe leading into and leaving the trap.

NOTE: Traps are a significant source of pipe noise. Care must be taken to ensure there are no gaps in the acoustic pipe insulation envelope about the trap (including where the pipe insulation abuts the underside of the slab.

Figure 13a

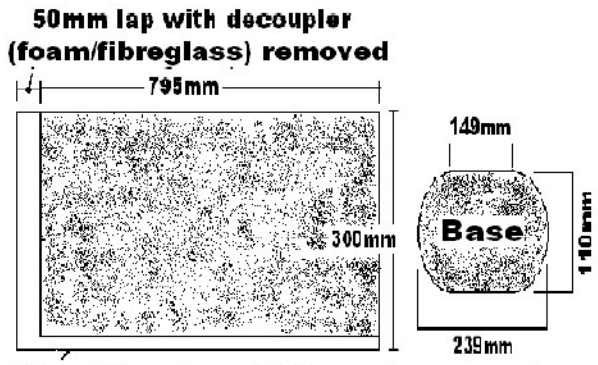
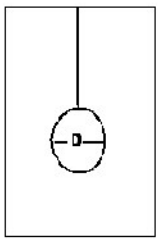
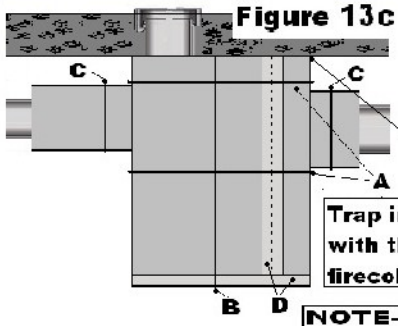


Figure 13b



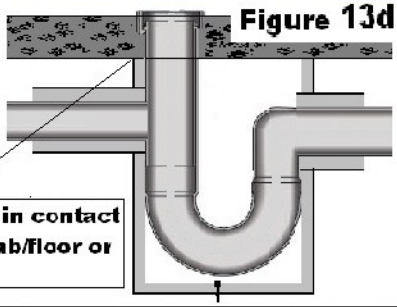
D=pipe diameter + 2 thicknesses of insulation minus 4mm
Example -:
Pipe diameter = 50mm
Insulation thickness = 25mm
Therefore hole in trap insulation
= 50mm + ((25mm x 2)- 4mm)
= 96mm

Figure 13c



Trap insulation must be in contact with the underside of slab/floor or firecollar.

Figure 13d



NOTE-:Decoupler must not be compressed by the ties or when in contact with the trap. It is ideal if a gap is left between the bottom of the trap and the decoupler.