Bradford™ enviroduct™

Bradford™ designsmart ★★★★★

BRADFORD ENVIRODUCT

BCA 2008 Revision

CSR

MAKING THE NEW BCA DUCT INSULATION REGULATIONS AS EASY AS ABC

Designing and selecting the right materials to meet building code and end user requirements can be difficult. Bradford Insulation promotes Smarter Design solutions for our customers by simplifying codes and standards so your smart design is simple to complete and you know it meets all the right requirements.

With the introduction of the Building Code of Australia 2008 Energy Efficiency provisions for Class 5-9 commercial buildings (BCA), it is time to update our Enviroduct offer to include new products and systems to meet the BCA and beyond.

For HVAC applications outside Australia and not covered by these energy efficiency building regulations, they provide an excellent guide to the minimum levels of insulation for good energy efficiency and performance of airconditioning systems.

Increasing duct insulation R-Values can reduce the size of plant needed, thus reducing project capital cost.

This brochure provides information on:

- The new building code energy provisions for ductwork insulation
- How to meet and exceed these BCA requirements with CSR Bradford Insulation
- New R-rated products –AS/NZS4859.1 compliant
- Facing options for internal and external duct lagging

Note: In some climates and air conditioning applications the minimum BCA duct work insulation requirements for energy efficiency may be insufficient for either the optimum energy efficiency performance of the system or for control of condensation. CSR Bradford Insulation recommends that a qualified mechanical services engineer be consulted when specifying duct insulation work for your project.

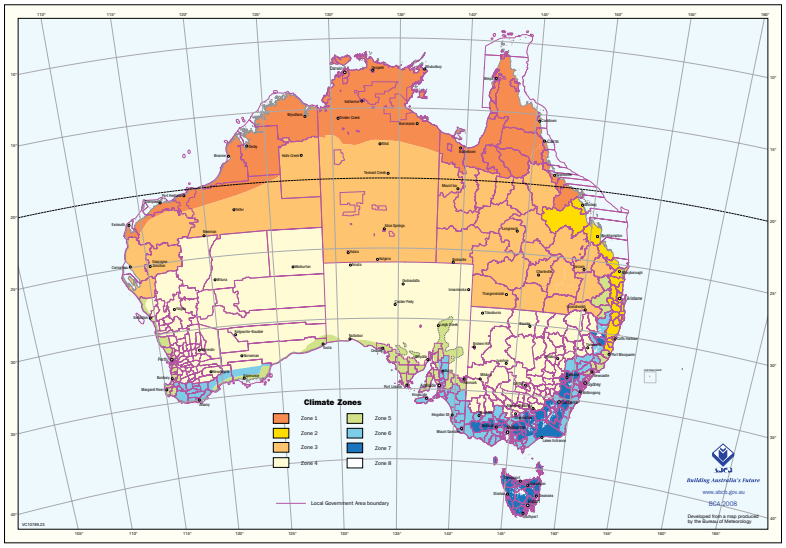
3 EASY STEPS TO SPECIFYING THE RIGHT INSULATION FOR YOUR PROJECT

Step A.

Determine which climate zone your project is in from the map to the right.

Step B.

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



DUCTWORK - MINIMUM INSULATION (For systems of no more than 65kWr and 65kW heating capacity)

Location and element	Minimum Total R-Value for ductwork							
	Climate Zone							
	1	2	3	4	5	6	7	8
	Evaporative cooler							
All locations	R0.6	R0.6	R0.6	R0.6	R0.6	R0.6	R0.6	R0.6
	Heating-only or refigerated cooling-only system							
All locations	R1.0	R1.0	R1.0	R1.0	R1.0	R1.0	R1.0	R1.5
	Combined Heating and refigerated cooling system							
1. In a roof space with insulation installed directly beneath roofing 2. Under and enclosed suspended floor 3. In a plant room	R1.0	R1.0	R1.0	R1.0	R1.0	R1.0	R1.0	R1.5
All other locations including:								
1. External to the building 2. Under and unenclosed suspended floor 3. In a roof space with insulation installed directly beneath ceiling	R1.5	R1.0	R1.5	R1.5	R1.0	R1.5	R1.5	R1.5

DUCTWORK - MINIMUM INSULATION (For systems greater than 65kWr and 65kW heating capacity)

Location and element	Minimum Total R-Value for ductwork								
	Evaporative cooler	Heating system or refrigerated cooling system							
Climate Zones	All climate zones	1	2	3	4	5	6	7	8
Within a conditioned space other than where the space is the only or last space served	Nil	R1.0	R1.0	R1.0	R1.0	R1.0	R1.3	R1.3	R1.5
1. In a roof space with insulation installed directly beneath the roofing 2. Under an enclosed suspended floor 3. In a plant room	R0.9	R1.3	R1.5	R1.3	R1.3	R1.5	R1.8	R1.8	R2.0
All other locations including:									
1. External to the building 2. Under an unenclosed suspended floor 3. In a roof space with insulation installed at the ceiling level	R0.9	R1.8	R1.5	R1.8	R1.8	R1.5	R1.8	R1.8	R2.0

Step C.

Specify the minimum recommended Bradford products to meet the BCA duct work requirements from the table below.

Recommended minimum insulation

BCA minimum total R-Value	Minimum recommended Bradford Enviroduct insulation product					
	External Ductwrap	**R**	**Internal Ductliner**	**R**	**Flexible duct**	**R**
R0.6	Multitel 25mm	0.7	Supertel 25mm	0.8	R1.0 Specitel 40mm	1.0
R0.9	Multitel 38mm	1.0	Supertel 38mm	1.1	R1.0 Specitel 40mm	1.0
R1.0	Multitel 38mm	1.0	Supertel 38mm	1.1	R1.0 Specitel 40mm	1.0
R1.3	Multitel 50mm	1.3	Supertel 50mm	1.5	R1.5 Specitel 60mm	1.5
R1.5	Multitel 55mm	1.5	Supertel 50mm/Multitel 55	1.5	R1.5 Specitel 60mm	1.5
R1.8	Multitel 75mm	2.0	Supertel 75mm	2.2	R1.8 Building Blanket 80mm	1.8
R2.0	Multitel 75mm	2.0	Supertel 75mm	2.2	R2.3 Building Blanket 100mm	2.3

The total ducted system may deliver around R0.2 above the bulk insulation R-Value due to the contribution of reflective air spaces and surface air films. This figure will vary from installation to installation based on:

- the emissivity of the external surface (foil facing or galvanised sheeting)
- the presence and size of an air gap around the duct
- the ventilation rates in the plenum or the external location (return air systems, for example, will typically be <R0.1)
- likely dust accumulation over time (reducing the emissivity and the R-Value) and ageing of the facing surface
- the temperature difference between the inside and outside of the duct
- the cross-sectional surface profile of the duct work
- the proportion of internally insulated vs externally insulated ductwork

Whilst this can be calculated for each project and deducted off the bulk R-Value required, these calculations need to be endorsed by a qualified thermal engineer and submitted for approval to the building inspector. CSR Bradford Insulation has recommended bulk insulation products for each climate zone and HVAC installation that avoid the need to submit these calculations in most cases. They also provide a level of comfort above the minimum BCA requirement to allow for variations in system installations and to ensure efficient ducted air-conditioning performance with lower energy usage. A better design option overall and as simple as ABC.

Building Services – Pipework

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

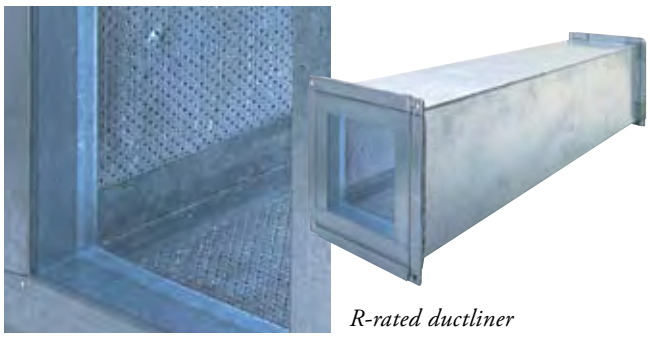
	PIPING - Minimum Total R-Value											
	Heating Water Piping						Cooling Water Piping					
	Up to 65kW Capacity			More than 65k capacity			65kW to 250kW Capacity			More than 250kW capacity		
Climate Zones	1, 2, 3, 5	4, 6, 7	8	1, 2, 3, 5	4, 6, 7	8	1, 2, 3, 5	4, 6, 7	8	1, 2, 3, 5	4, 6, 7	8
Located internally	R0.2	R0.2	R0.2	R0.5	R0.6	R0.8	R1.0	R0.9	R0.8	R1.5	R1.2	R1.0
Located within a wall space, an enclosed sub-floor area or an enclosed roof space	R0.3	R0.45	R0.6	R0.6	R0.7	R0.9	R1.1	R1.0	R0.9	R1.6	R1.3	R1.1
Located outside the building or in an unenclosed sub-floor area or an unenclosed roof space	R0.3	R0.6	R0.6	R0.7	R0.8	R1.0	R1.2	R1.1	R1.0	R1.8	R1.4	R1.3

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.

R-Values of pipe insulation options

Insulation thickness				
	25mm	38mm	50mm	75mm
Glasswool SPI	R0.8	R1.2	R1.5	R2.3
Polystyrene SL	R0.6	R0.9	R1.2	
	9mm	13mm	19mm	25mm
Armacell	R0.2	R0.3	R0.5	R0.6

INTERNAL DUCTLINERS



R-rated ductliner

Ducts are primarily insulated internally for noise absorption. Internal insulation is usually more cost effective than noise control via additional silencers or attenuators.

In addition to noise absorption, internal insulation will assist in compliance with the BCA insulation provisions. If there is no internal insulation then the duct must be lagged externally to comply with the BCA and achieve the required energy savings.

Bradford Supertel Ductliner

For economical performance, Bradford Supertel provides the perfect combination of thermal and acoustic insulation to meet all your ductlining needs. It is available in a full range of R-Values to meet the BCA requirements.

Bradford Ultratel Ductliner

The extra density of Bradford Ultratel further enhances the thermal and acoustic performance to provide a premium solution. Ultratel 25mm and Ultratel 50mm are recommended.

Bradford Fibertex

Bradford Fibertex Rockwool Ductliners offer a totally non-combustible (AS1530.1) industrial grade ductliner when combined with Ultraphon facing. Ideal for high temperature applications.

Indoor Air Quality

Overseas testing has shown the use of glasswool ductliners does not contribute any detectible increase in airborne particles in room spaces. There is no OH&S or environmental advantage to lining ducts with polyester or polyethylene insulation. However duct cleanability is an important issue.

Bradford Insulation's Enviroduct range will not support bacterial growth. In addition Bradford can also provide the latest USA and European product solutions with anti-fungal and anti-bacterial coatings for maximum Indoor Air Quality (IAQ).

All Bradford Glasswool and Rockwool HVAC products are made with FBS-1 Biosoluble fibres. They are safe to install and use for the life of the airconditiong system and provide excellent fire resistant properties.

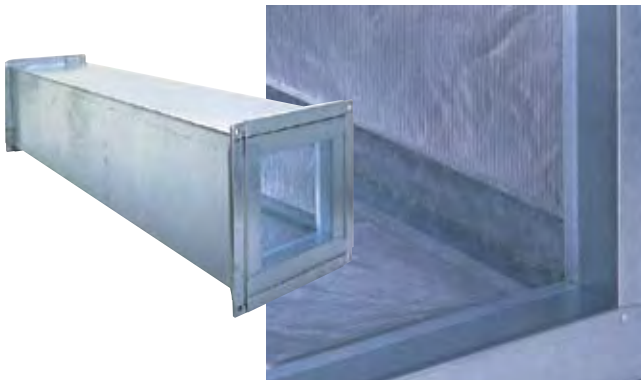
ENVIRODUCT LINING OPTIONS

The market for internal lining of airconditioning systems to reduce annoying fan noise, has changed over the years.

Standard heavy duty perforated foil (HD Perf) facings or black glass tissues (BMF) have proven the most popular linings for noise absorption but issues of duct cleaning and indoor air quality have seen many specifiers searching for alternatives.

Bradford Insulation has developed a range of linings for internal duct insulation to meet these new market demands.

Acoustituff



A tough lightweight foil vapour barrier, Acoustituff offers an excellent economical solution for foil lining of internal ducting insulation. Ideal for applications where a fully contained surface finish is required.

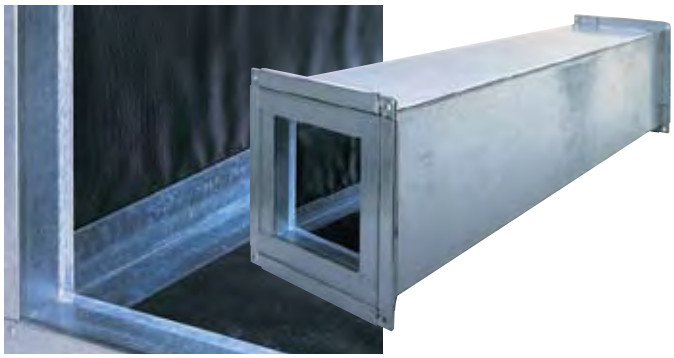
Acoustituff also eliminates the need to use expensive microfilms with perforated foil.

Bradford Acoustituff Ductliner achieved the best possible 0.0.0.0 fire rating when tested to AS1530.3 and passed UL181.

Ultraphon

A superb non-reflective acoustic lining offering superior broad band sound absorption. Ultraphon is strong, durable and also offers good cleanabillity.

Bradford Ultraphon Ductliner achieved 0.0.0.2 fire rating when tested to AS1530.3 and passed UL181.



Widely specified in Europe for clean room applications such as hospitals and food preparation areas, Ultraphon is available in black and white. A black Ultraphon Light alternative is also now available to provide a lighter weight economical solution. Ultraphon is also ideal for use in silencers and other acoustic applications.

Maximum design velocity

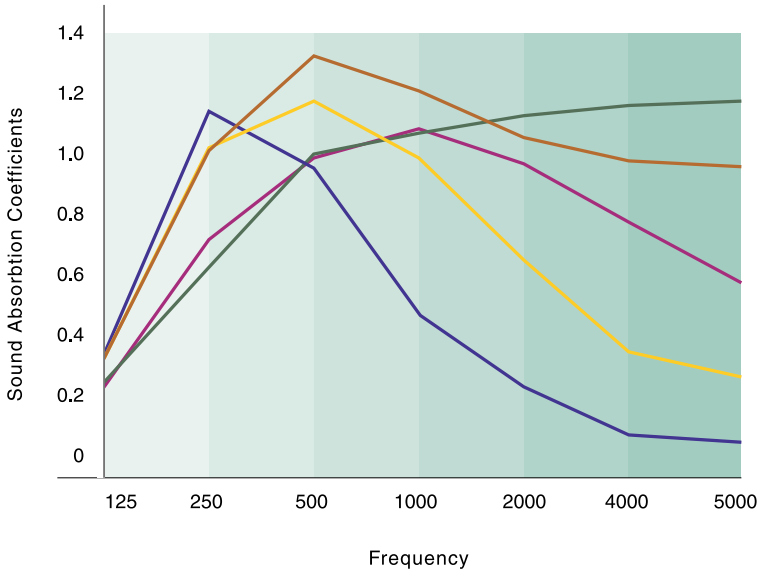
Recommended maximum design velocities for duct linings are determined by testing straight duct with laminar air flows for nil surface erosion at extreme velocities of 36-40m/s (140km/hr) and then applying a safety factor of 0.4 bringing velocity to a base 16m/s. A correction factor is then applied to this for the facing type based on ASHRAE Air Friction Charts which brings maximum recommended design back up to the following:

Heavy Duty Perforated Foil	18m/s
Black Matt Tissue	22m/s
Perforated Metal	23m/s
Ultraphon	26m/s
Acoustituff	30m/s

Maximum design velocities above are valid for ductliner insulation faced by CSR Bradford Insulation and installed according to AS4254 and CSR Bradford Insulation recommendations contained in our Air Conditioning Design Guide.

Sound Absorption Sound Absorption (AS1045:1988) Frequency (Hz)

Product	Thickness (mm)	125	250	500	1000	2000	4000	5000	NRC
Supertel 25mm R0.8 Ductliner									
• Thermofoil HD Perf	25	0.12	0.28	0.68	0.94	1.09	0.85	0.75	**0.75**
• BMF	25	0.07	0.26	0.65	0.93	1.04	1.03	1.00	**0.72**
• Acoustituff	25	0.14	0.45	0.99	0.97	0.55	0.29	0.25	**0.75**
• Ultraphon	25	0.10	0.39	0.79	1.00	1.05	1.00	0.95	**0.81**
Supertel 38mm R1.1 Ductliner									
• Thermofoil HD perf	38	0.13	0.43	0.89	1.02	0.89	0.82	0.82	**0.80**
• Ultraphon	38	0.14	0.45	0.96	1.00	0.96	0.93	0.94	**0.85**
• Acoustituff	38	0.28	0.53	1.08	0.88	0.47	0.25	0.19	**0.75**
Supertel 50mm R1.5 Ductliner									
• Thermofoil HD Perf	50	0.23	0.71	0.99	1.09	0.97	0.78	0.59	**0.94**
• BMF	50	0.24	0.62	1.00	1.07	1.12	1.15	1.17	**0.95**
• HD Perf & Microfilm	50	0.32	1.14	0.94	0.48	0.22	0.06	0.03	**0.70**
• Acoustituff	50	0.33	1.01	1.17	0.99	0.64	0.34	0.28	**0.95**
• Ultraphon	50	0.30	1.01	1.31	1.20	1.05	0.97	0.95	**1.14**
Supertel 75mm R2.2 Ductliner									
• Thermofoil HD Perf	75	0.52	1.02	1.15	1.07	1.02	0.90	0.83	**1.06**
Ultratel 25mm R0.8 Premium Ductliner									
• Thermofoil HD Perf	25	0.12	0.31	0.81	1.09	1.09	0.91	0.89	**0.83**
• BMF	25	0.08	0.30	0.71	0.99	1.07	1.08	1.16	**0.77**
• Acoustituff	25	0.05	0.55	0.65	0.90	0.70	0.50	0.50	**0.70**
Ultratel 50mm R1.5 Premium Ductliner									
• BMF	50	0.25	0.70	1.13	1.13	1.12	1.12	1.12	**1.01**
• Acoustituff	50	0.30	0.75	0.90	0.85	0.65	0.50	0.60	**0.79**
Ultratel 75mm R2.3 Premium Ductliner									
• Thermofoil HD Perf	75	0.69	1.19	1.15	1.09	1.03	0.92	0.90	**1.12**
Fibertex Rockwool 25mm R0.7 Non-Combustible R4 Ductliner									
• Thermofoil HD Perf	25	0.14	0.38	0.87	1.07	1.06	0.90	0.79	**0.85**
• BMF	25	0.15	0.33	0.74	0.94	1.03	1.04	0.98	**0.76**
Fibertex Rockwool 50mm R1.5 Non-Combustible R4 Ductliner									
• Thermofoil HD Perf	50	0.31	0.83	1.16	0.99	0.90	0.78	0.73	**0.97**
• BMF	50	0.36	0.76	1.19	1.09	1.03	1.04	0.90	**1.01**



* Noise Reduction Coefficient NRC = Arithmetic mean of absorption coefficients at frequencies 250Hz,500Hz,1000Hz and 2000Hz.

Note: More comprehensive data for the HVAC specialist including Static Insertion Loss AS1277:1983 is available in the Bradford Insulation Air Conditioning Design Guide or from our website www.bradfordinsulation.com.au

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EXTERNAL DUCT INSULATION

For the external insulation of metal ducts to comply with the BCA requirements, Bradford has developed a range of ductwrap solutions.

Bradford Multitel

An economical solution, Multitel is available in a range of R-Values to suit the requirements of the BCA for different applications and climate zones.

Bradford Flexitel

For a premium finish, the added density of Flexitel produces a more resilient duct wrap. Ideally suited to areas where the duct work may be visible.

Ductwrap Facings

In addition to high strength Bradford Thermofoil Heavy Duty, a range of other facings are available including Medium Duty Thermofoil, Thermogold and Acoustituff.

Flexible duct

For the insulation of flexible duct, Bradford Insulation has developed Specitel to provide the optimum combination of thermal performance and thickness that results in a smaller, economical and lighter duct with excellent fire properties compared to polyester. Insist on Bradford Glasswool in your flexible duct for best performance.

Bradford™ for smarter environments

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