THE LITTLE RED BOOK

CONTRACTORS' GUIDE

H&V

ROCKWOOL

FIRESAFE INSULATION

NATURAL VOLCANIC ROCK INSULATION

CONTENTS

THERMAL FIRE ACOUSTIC

ROCKWOOL

A triple combination of benefits

Rockwool Ltd, based near Bridgend, South Wales is the UK's leading manufacturer of stone wool insulation for thermal, fire and acoustic protection. Only Rockwool is authentic and wholly natural, recreated from natural processes that exist only in nature.

The natural characteristics of Rockwool stone wool provide a triple combination of advantages – it is energy saving which reduces fuel bills, it is firesafe†† which protects buildings and it offers acoustic improvement to reduce noise nuisance.

WHY INSULATE?

There are numerous reasons why insulation may be required on pipework and equipment, some are detailed below.

- ✔ **Cost Saving**
  huge savings can be made by installing insulation (see page 11)
- ✔ **Environmental**
  reduction in CO_2 emissions
- ✔ **Process control**
  maintaining temperatures to meet process demands
- ✔ **Frost Protection**
  prevent external pipes from freezing
- ✔ **Condensation control**
  prevent condensation forming on cold pipes etc.
- ✔ **Acoustic control**
  reduction in sound break out from pipes and equipment
- ✔ **Fire protection**
  protection of pipes and equipment against fire

ROCKWOOL
FIRESAFE INSULATION

QUALIFY FOR ECAs WITH ROCKWOOL

ENHANCED CAPITAL ALLOWANCES

When used to thermally insulate pipes, Rockwool insulation is eligible to qualify for the Enhanced Capital Allowances Scheme.

Eligibility is dependent upon use of the appropriate thickness of insulation for a given application and upon other requirements detailed on the ECA website (www.eca.gov.uk).

WHICH ROCKWOOL PRODUCTS QUALIFY?

Rockwool insulation products typically used to thermally insulate pipes are shown below. Other Rockwool products may also be suitable to insulate pipes in certain circumstances and may, therefore, also be eligible to qualify for ECAs.

- RockLap H&V pipe sections
- Process Pipe Sections
- Pipe Section Mat
- Wired Mat
- Matched-half Bends and Pipe Bend Segments

FULL TECHNICAL ADVICE SERVICE

FREE LITERATURE

Rockwool offer a full technical advice service to assist the appropriate selection of products, their correct application and to discuss any special considerations necessary at the design stage to ensure trouble free installation and use. Rockwool produce a full range of FREE technical literature to help.

Technical Services: 0871 222 1780

ROCKWOOL
FIRESAFE INSULATION

• A1 CLASSIFICATION

ROCKWOOL INSULATION IS TOTALLY FIRESAFE††.

As part of the European harmonisation process, a new reaction-to-fire classification system has been ratified for construction products.

Construction products will be placed into one of seven Euroclasses – A1, A2, B, C, D, E or F according to their performance in fire tests.

The safest products will be in Classes A1, A2 or B and the more fire hazardous in C, D or E. Class F is used where no data is available. A1 represents virtual non-combustibility and E represents the poorest fire performance.

AVOIDING FLASHOVER

Products in Classes A1, A2 and B do not reach 'flashover', whereas products in Classes C, D and E do. Flashover can be explained as the spontaneous ignition of hot smoke and gases and is described by the Swedish Test Institute SP as "the crucial point of hazard where the death toll increases by a sudden factor of 300 per cent".

BSEN ISO 1182

†† Rockwool base product is non-combustible in accordance with BSEN ISO 1182.

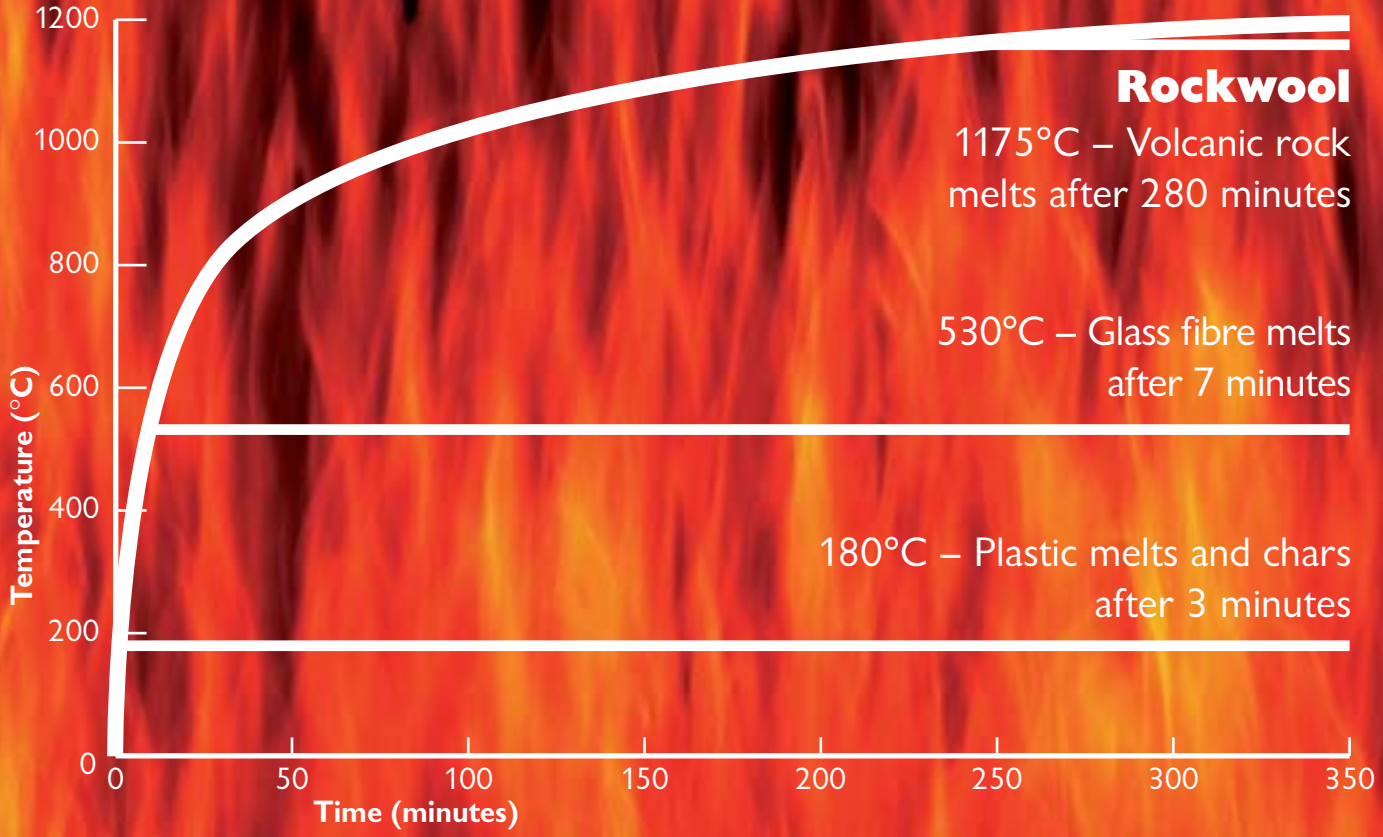
ROCKWOOL™ FIRE PRO

• FLASHOVER DEMONSTRATED IN TEST

• THE FIREFIGHTERS' CHOICE

FIRESAFE ROCKWOOL††

The graph shows the temperatures at which various insulation materials begin to disintegrate in a fire



• NO CFCs, HCFCs, HFCs OR OTHER CHEMICALS WITH GLOBAL WARMING POTENTIAL

THERMAL AGEING?

Plastic foam insulation is manufactured using a 'blowing agent' that expands to form the cells in the finished product.

Types of foam insulation that rely on an entrapped blowing agent for their thermal properties include phenolic foam (PF), polyurethane (PUR), polyisocyanurate (PIR) and extruded polystyrene (XPS).

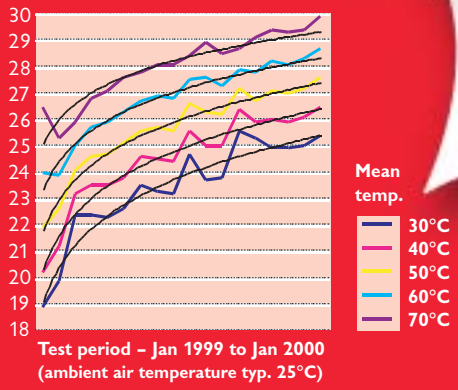
The graph above shows the results of in-house tests conducted by Rockwool on foil faced phenolic foam pipe sections between January 1999 and January 2000.

To represent product usage, the steel test pipes were heated to temperatures between 35°C and 125°C, resulting in mean insulation temperatures of 30°C, 40°C, 50°C, 60°C and 70°C (shown by the graph). At the end of each week's heating cycle, the steel pipes were cooled to ambient air temperature and then heated to 125°C for one week to condition the insulation samples. The 125°C conditioning cycle allowed for only a 5°C surge above the maximum service temperature recommended for the phenolic pipe insulation, 120°C.

Although measurements were discontinued after one year, the thermal ageing process showed no signs of having ended at this time. These ad-hoc tests demonstrate the principle of thermal ageing - further tests are proposed to determine whether the results are typical of foam insulation products currently supplied in the UK.

It should be noted that the proposed European product standards (ENs) for foam insulation do not require the test samples to be conditioned at temperatures greater than 70°C, regardless of whether the product is intended for use at temperatures exceeding 70°C.

AGEING OF THERMAL CONDUCTIVITY TO ISO 8497



Air is used in Rockwool insulation

Unlike many 'blown gas' foam insulation products, Rockwool does not use, and has never used, harmful gases such as CFCs, HCFCs, HFCs, pentane or any 'blowing agents' that have Global Warming or Ozone Depleting Potential.

Specifiers can have confidence that Rockwool insulation can be relied upon not to thermally age or to damage the environment due to loss of a blowing agent.

CORROSION

Corrosion of pipework and equipment costs British Industry tens of £millions per annum. Surely specifying materials which do not contribute towards corrosion is a must.

NO SPECIAL COATINGS REQUIRED

Rockwool insulation is compatible with copper and steel pipes, equipment and fittings – it does not require any special coatings to prevent chemical attack of metal.

Rockwool insulation is chemically inert and contains low levels of chlorides and high levels of stress corrosion inhibitors in the form of sodium and silicate ions. An aqueous extract of Rockwool insulation is neutral (pH 7) or slightly alkaline.

ROCKWOOL
FIRESAFE INSULATION

PIPEWORK DATA

The heat transfer data used below has been calculated in accordance with BS EN ISO 12241

Pipework Data	
Operating Temperature (°C)	150 MTHW
Ambient Still Air Temperature (°C)	20
Pipe Material	Black Steel
Pipe Emissivity (uninsulated)	0.9
Pipe Orientation	Horizontal
Rockwool Insulation Type	RockLap H & V
Cladding Type	Aluminium
Fuel Type	Gas
Gross Fuel Cost (pence per kWh)	1
Plant Efficiency (%)	85
Net Fuel Cost (pence per useful kWh)	1.176
Plant Utilisation (hours per day)	24
Plant Utilisation (days per year)	365
Plant Utilisation (hours per year)	8760
Net Fuel Cost (pence per W per year)	10.31

Take a look at the charts above for an indication of the considerable savings that can be achieved through the correct installation of insulation.

ANNUAL SAVING PER METRE LENGTH OF PIPE

- **SAVE £££s PER METRE PER YEAR**

Pipe OD (mm)	Rockwool thickness (mm)	Heat loss (W/m) Bare surface	Heat loss (W/m) Insulated surface	Heat saving W	Cost saving per metre of pipe per year
21	40	178.17	16.86	161	**£16.62**
27	40	221.63	18.87	203	**£20.90**
34	45	270.99	19.68	251	**£25.90**
42	45	326.08	21.83	304	**£31.36**
48	50	366.66	23.38	343	**£35.38**
60	50	446.33	26.40	420	**£43.28**
89	60	632.96	30.92	602	**£62.05**
114	60	789.17	36.09	753	**£77.61**
140	60	948.36	41.33	907	**£93.48**
169	60	1122.92	43.63	1079	**£111.23**
219	60	1418.20	52.45	1366	**£140.75**
273	60	1731.01	61.83	1669	**£172.02**

ROCKWOOL
FIRESAFE INSULATION

IMPROVED ACOUSTIC CONTROL

THE ACOUSTIC BENEFITS OF ROCKWOOL

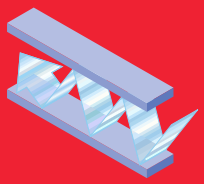
Rockwool products are manufactured to a higher density than other stone wool slabs and provide improved acoustic control across a wide range of frequencies.

Effective sound insulation is an essential requirement for modern life styles. Excessive noise can increase stress, hinder speech and can cause its own form of environmental pollution.

Rockwool has been proven over many years to be the ideal insulation material for all applications where noise attenuation or noise absorption is needed – in domestic, commercial, manufacturing, industrial and environmental situations.

NOISE TRANSMITTED ALONG DUCTS

Reduction of transmitted noise through pipes and air conditioning ductwork is achieved by the use of acoustic linings or claddings. Products such as Rockwool Ductslab, Ductwrap and Techwrap provide both acoustic and thermal protection.

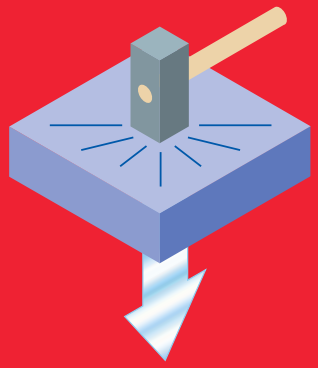


Noise transmitted along an air duct

ROOM TO ROOM NOISE VIA SERVICE PENETRATIONS

Airborne and structure borne noise from adjacent rooms via pipes, ducts and services can be reduced by the installation of acoustic sleeves at wall penetration points. Rockwool stone wool slab, pipe sections, mat or loose fill are ideal for this purpose.

Noise transmitted via a service penetration



• ROCKWOOL: THE "SOUND BARRIER"

REDUCING NOISE FROM PLANT AND EQUIPMENT

A number of practical steps can be taken to reduce noise levels, but it is always advisable to seek expert technical opinion before undertaking any acoustic measures.

- Whenever practicable, choose quieter machines and processes. Ask for an assessment of plant and equipment, bearing in mind the acoustic environment in which they will be operating.

- Surround noisy machines individually, eg heavy motors, high speed fans, with an insulated enclosure, as in **figure 1**. Such enclosures can typically achieve about 30 dB reduction. Ideally, the design should incorporate an impervious enclosure of high mass and with an absorbent lining to prevent reflected noise build-up within the enclosure. Ventilation should be provided and any openings acoustically lined.

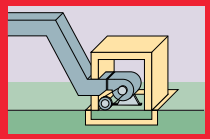


Fig.1
Isolation of plant noise source by individual enclosure and acoustic treatment of base. Enclosure formed by steel faced partition with perforated inner sheet and incorporating Rockwool Rigid Slab (typically RW3).

- Machines which produce vibration noise, eg ball mills, diesel engines, centrifuges, should be positioned on resilient isolation mounts, which may include rubber pads and/or Rockwool slabs. The design must take into account the loading of the machine and the vibration frequencies.

THE SOLUTION TO NOISE POLLUTION

- Where there are a number of machines, treat all the interior surfaces of the room or enclosure with noise absorbing panels, as in **figure 2**.

  It should be borne in mind, however, that the maximum reduction normally achievable by lining the room is 10 dB, and in cases where only the ceiling is treated, about 5 dB.

  As an alternative, quiet rooms can be constructed for personnel, using the same techniques.

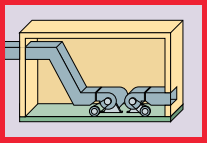


Fig.2
Acoustic lining to plant room where individual enclosure is impracticable.
Lining formed using Rockwool Acoustic Elements

- When very noisy equipment is mounted directly on an intermediate floor, the floor itself may be subject to very high sound pressure levels, causing noise problems in the room below.

  Installing a concrete inertia base on resilient mounts can act as an effective barrier.

- Noisy pipes, ducts, and gas or liquid handling plant can be individually sound proofed by enclosing them in dense Rockwool. The bases of plant, such as pumps or fans should be acoustically treated.

  In special cases, eg to reduce noise levels from turbine systems in power stations, the wrapping is made up of layers of stone wool and is faced with steel sheet or similar.

ROCKWOOL
FIRESAFE INSULATION

Product Range

ROCKWOOL
FIRESAFE INSULATION

- FIRESAFE††
- NON-CORROSIVE
- STABLE THERMAL PERFORMANCE

ROCKLAP H&V PIPE SECTIONS

RockLap H&V pipe sections are strong lengths of pre-formed insulation with a onepiece, factory applied foil facing with integral self-adhesive lap.

The integral lap ensures fast and easy installation: just snap the sections onto the pipe, peel off the backing tape and smooth down for a completely sealed joint.

Size range 17mm OD to 273mm OD, 20mm to 60mm thick.

TYPICAL SPECIFICATION

Pipes to be insulated with .....*mm thick Rockwool RockLap H&V pipe sections, having a nominal density not less than 120 kg/m^2, with a factory applied facing of reinforced aluminium foil incorporating integral lap for fixing.

The whole to comply with the Building Regulations Class 'O' definition.

Fixing to be in accordance with manufacturer's instructions, by peeling protective tape from self-adhesive lap and pressing lap smoothly over joint.

Where adjacent Sections abut, approved 75mm wide aluminium tape to be used to maintain integrity of the vapour barrier.

*Insert required thickness

For details of other specification clauses please consult the data sheet.

ROCKWOOL
FIRESAFE INSULATION

- FIRESAFE††
- HIGH DENSITY

ROCKWOOL DUCTSLAB AND DUCTWRAP

Rockwool Ductslab and Ductwrap provide thermal insulation for air conditioning, warm air and extract ducts used in the internal and external environment generally within plant rooms and boiler houses. Rockwool Ductslab is also used for the thermal insulation of cold water storage, feed and expansion tanks.

TYPICAL SPECIFICATION CLAUSE

The following specification are for guidance purposes only and should be read in conjunction with recommendations given in BS 5970.

Horizontal ducts – concealed from view

The duct insulation is to be Rockwool Ductwrap.
All joints are to be securely taped with 75mm wide plain soft aluminium self-adhesive tape (Idenden type T303 or similar and approved). Self-adhesive stick pins* are to be used to support the insulation on the underside of ducting. The whole is to be further supported by means of 19–22 swg × 50mm mesh galvanised wire netting. Where a vapour barrier is required, care is to be taken when applying wire mesh, to avoid damage to aluminium foil.

For details of other specification clauses please consult the data sheet.

***NOTE** *The pins and washers are necessary, to avoid sagging of the insulation, particularly on larger size ducts and on the undersides of ducts. Fixing centres will depend on the size of the duct and the weight of the insulating material. The excess projection of the pins above the washers should be cut off and the washer sealed using the soft aluminium self-adhesive tape to maintain the integrity of the vapour barrier.*

ROCKWOOL
FIRESAFE INSULATION

- FIRESAFE††
- COMPRESSION RESISTANT

LAMELLA MAT

Rockwool Lamella Mat is formed from strips of Rockwool stone wool bonded on edge to a flexible outer facing.

The method of construction provides a strong and resilient mat which will resist flattening at bends and corners.

Lamella Mat is particularly suitable for the insulation of heating and ventilation pipework and ductwork and as an overlay to upgrade existing insulation.

TYPICAL SPECIFICATION

1 Lamella Mat to be secured to heating pipe with lacing wire tied at 200mm centres.
Joints to be securely taped with 75mm wide self adhesive foil tape.

2 Lamella Mat to be securely fixed to duct with self adhesive 'stick pins' applied in accordance with manufacturer's instructions.
Where pins protrude through facings, the pins are to be cropped flush with the facing washers and covered with 75mm foil tape.

For details of other specification clauses please consult the data sheet.

ROCKWOOL
FIRESAFE INSULATION

TECHWRAP2 AND TECHTUBE

Techwrap2 and Techtube form part of a range of high performance Rockwool acoustic insulation products. Techwrap2 and Techtube are pre-covered with a flexible polymeric acoustic mass layer, engineered to provide the highest standard of noise control to circular and rectangular ductwork, rainwater, soil-vent, service and process pipes.

TYPICAL SPECIFICATIONS

The polymeric mass layer should be positioned outermost from the sound source and overlapped at all joints.

Techwrap2

Techwrap2 should be cut 25mm oversize and a 25mm strip of Rockwool removed to create an overlap. All cutting operations can be completed using a sharp knife. 75mm wide plain aluminium foil self-adhesive tape should be used to seal the joints. Welded or mechanically attached steel pins should be used to fix Techwrap2 to the duct. However, subject to the manufacturer's approval, adhesive applied insulation hangers may be used in place of welded pins. Particular attention should be paid to support of the Techwrap2 at joint locations and where sagging may occur, eg in 'soffit' areas. The number of pins required will depend upon size and orientation of the duct. However, where pins are employed at Techwrap2 edges, 4 number are recommended at 1000mm edges and 7 number at 2000mm edges. Additional 'lines' of pins should be at nominal 300mm spacings.

Techtube

All joints should be taped with self-adhesive aluminium foil tape. Techtube is generally secured with aluminium bands at approximately 200mm maximum centres.

For details of other specification clauses please consult the data sheet.

ROCKWOOL
FIRESAFE INSULATION

• SINGLE LAYER FIRE PROTECTION

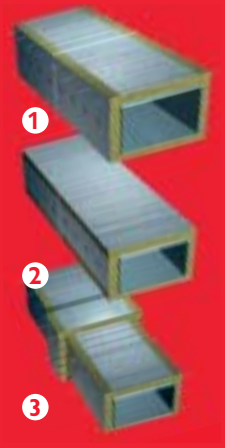
FIREPRO FIRE DUCT

Manufactured from Rockwool stone wool, Firepro Fire Duct products provide fire protection and thermal and acoustic insulation for circular and rectangular steel ductwork.

The simplicity and flexibility of fixing options ensure rapid and reliable installation to both vertical and horizontal duct systems.

The option to use mitre-joints at slab corners allows installation in situations where welding may not be practicable.

Nails are generally spaced at 500mm maximum centres.



1 Welded pin method 1
Longitudinal corner joints fixed with pigtail screws.

2 Welded pin method 2
All joints bonded with Firepro Glue.

3 Welded pin method 3
Longitudinal corner joints fixed with pigtail screws. Cross joints protected with centrally positioned 100mm wide Fire Duct cover strips.

4 Mitre-joint method
All joints bonded with Firepro Glue.

For details of other specification clauses please consult the data sheet.

WELDED PIN FIXING

METHOD 1

1 All ductwork is to be insulated with .....*mm Rockwool Firepro Fire Duct Slab, having a factory applied reinforced aluminium foil to one face and complying with Building Regulations Class 'O ' requirements.

2 The Firepro Fire Duct Slab is to be affixed to the duct using 2.5mm diameter welded steel pins and 38mm. spring steel washers in accordance with the Rockwool manual 'Firepro Fire Duct System'.

3 The foil facing is to be removed from any surfaces to which Firepro Glue is to be applied.

4 All corner joints are to be fixed with pigtail screws at 250mm maximum centres. Screw length is to be 2 × slab thickness.

5 All cross joints are to be filled with Firepro Glue and held tightly closed.

6 Drop rods and bearers are to be at 1500mm maximum centres and to be M10 steel rod and 30 × 30 × 3mm steel angle respectively. Ductwork is to be generally in accordance with HVCA Specification DW/144 .

7 Drop rods and exposed bearers are to be insulated with .....*mm Firepro Fire Duct Slab or .....† × .....*mm Firepro Fire Duct Section, as appropriate. Rebates or cover pieces are to be used at duct flange and bearer locations according to site conditions and subject to Rockwool approval.

8 Where a vapour barrier is required, all exposed Fire Duct edges and penetrations through the foil should be sealed using soft self-adhesive aluminium foil tape.

*Insert Firepro Fire Duct Slab insulation thickness required.

†Insert appropriate overall diameter.

For details of other specification clauses please consult the data sheet.

WELDED PIN FIXING

METHOD 2

1 All ductwork is to be insulated with .....*mm Rockwool Firepro Fire Duct Slab, having a factory applied reinforced aluminium foil to one face and complying with Building Regulations Class 'O ' requirements.

2 The Firepro Fire Duct Slab is to be affixed to the duct using 2.5mm diameter welded steel pins and 38mm. spring steel washers in accordance with the Rockwool manual 'Firepro Fire Duct System'.

3 All corner joints are to be fixed with pigtail screws at 250mm maximum centres. Screw length is to be 2 × slab thickness.

4 All joints are to be filled with Firepro Glue and held tightly closed. If necessary, nails may be used at corner joints to aid this process.

5 Drop rods and bearers are to be at 1500mm maximum centres and to be M10 steel rod and 30 × 30 × 3mm steel angle respectively. Ductwork is to be generally in accordance with HVCA Specification DW/144 .

6 Drop rods and exposed bearers are to be insulated with .....*mm Firepro Fire Duct Slab or .....† × .....*mm Firepro Fire Duct Section, as appropriate. Rebates or cover pieces are to be used at duct flange and bearer locations according to site conditions and subject to Rockwool approval.

7 Where a vapour barrier is required, all exposed Fire Duct edges and penetrations through the foil should be sealed using soft self-adhesive aluminium foil tape.

*Insert Firepro Fire Duct Slab insulation thickness required.

†Insert appropriate overall diameter.

For details of other specification clauses please consult the data sheet.

FIRE DUCT SYSTEMS

WELDED PIN FIXING

METHOD 3

1 All ductwork is to be insulated with .....*mm Rockwool Firepro Fire Duct Slab, having a factory applied reinforced aluminium foil to one face and complying with Building Regulations Class 'O ' requirements.

2 The Firepro Fire Duct Slab is to be affixed to the duct using 2.5mm diameter welded steel pins and 38mm. spring steel washers in accordance with the Rockwool manual 'Firepro Fire Duct System'.

3 All corner joints are to be fixed with pigtail screws at 250mm maximum centres. Screw length is to be 2 × slab thickness.

4 All cross joints are to be covered with centrally positioned 10mm wide strips of Firepro Fire Duct Slab of the same thickness as the insulation. The cover strips are to be fixed along both edges using pigtail screws, as described above.

5 Drop rods and bearers are to be at 1500mm maximum centres and to be M10 steel rod and 30 × 30 × 3mm steel angle respectively. Ductwork is to be generally in accordance with HVCA Specification DW/144 .

6 Drop rods and exposed bearers are to be insulated with .....*mm Firepro Fire Duct Slab or .....† × .....*mm Firepro Fire Duct Section, as appropriate. Rebates or cover pieces are to be used at duct flange and bearer locations according to site conditions and subject to Rockwool approval.

7 Where a vapour barrier is required, all exposed Fire Duct edges and penetrations through the foil should be sealed using soft self-adhesive aluminium foil tape.

*Insert Firepro Fire Duct Slab insulation thickness required.

†Insert appropriate overall diameter.

For details of other specification clauses please consult the data sheet.

MITRE-JOINT FIXING METHOD

1. All ductwork is to be insulated with .....*mm Rockwool Firepro Fire Duct Slab, having a factory applied reinforced aluminium foil to one face and complying with Building Regulations Class 'O 'requirements.
2. The Fire Duct joints at ductwork corners are to be 45° mitred. Square butt joints to be used elsewhere.
3. The foil facing is to be removed from any surfaces to which Firepro Glue is to be applied.
4. All joints are to be filled with Firepro Glue and held tightly closed.
5. All mitred joints are to be held tightly closed with nails (length = approx. 2 × Firepro Fire Duct Slab thickness) until the glue has fully cured. 2 nails juxtaposed at 90° are to be located at 3 points per 1200mm length of mitred joint and at 4 points per 1800mm length.
6. Drop rods and bearers are to be at 1500mm maximum centres and to be M 10 steel rod and 30 × 30 × 3mm steel angle respectively, Ductwork is to be generally in accordance with HVCA Specification DW/144.
7. All drop rods and exposed bearers are to be insulated with .....*mm Firepro Fire Duct Slab or .....† × .....*mm Firepro Fire Duct Section, as appropriate. Rebates or cover pieces are to be used at duct flange and bearer locations according to site conditions and subject to Rockwool approval.
8. Where a vapour barrier is required, all exposed Fire Duct edges and penetrations through the foil should be sealed using soft self-adhesive aluminium foil tape.

*Insert Firepro Fire Duct Slab insulation thickness required.

†Insert appropriate overall diameter.

For details of other specification clauses please consult the data sheet.

PERSONNEL PROTECTION

Minimum insulation thickness for personnel protection from a metallic surface with a surface emissivity of 5.05 (bright aluminium foil) and a design cold face temperature of 55°C.

Outside diameter of steel pipe on which insulation has been based (mm)	Temperature of Contents (°C)		
	100	200	300
	Thickness of RockLap H&V pipe section (mm)		
17.2	20	20	35
21.3			40
26.9		25	
33.7			50
42.4			
48.3			
60.3		30	
76.1	25		60
88.9			
101.6		35	
114.3			
139.7			70
168.3		40	
219.1			80
244.5			
273.0		50	
323.9			90
355.6			
406.4			
457.0			
508.0			
610.0			
Flat			100

ROCKWOOL FIRESAFE INSULATION

CONDENSATION CONTROL FOR PIPES

TABLE 8 (BS5422:2001)

Minimum insulation thickness for chilled and cold water supplies to prevent condensation on a low emissivity outer surface (0.05) with an ambient temperature of +25°C and a relative humidity of 80%

Outside diameter of steel pipe on which insulation has been based (mm)	TEMPERATURE OF CONTENTS (°C)		
	+ 10	+ 5	0
	Thickness of ROCKWOOL RockLap H&V pipe section (mm)		
17.2	20	25	30
21.3			
26.9		30	35
33.7			
42.4	25		40
48.3		35	
60.3			45
76.1	30		
88.9		40	50
101.6			
114.3			
139.7		45	60
168.3	35		
219.1		50	
244.5			70
273.0	40		
323.9		60	
355.6			
406.4			80
457.0	45		
508.0			
610.0		70	
Flat	50		

ROCKWOOL
FIRESAFE INSULATION

CONDENSATION CONTROL FOR DUCTS

TABLE 10 (BS5422:2001)

Minimum insulation thickness for condensation control on ductwork carrying chilled air in ambient conditions: indoor still air temperature +25°C, relative humidity 80%, dew point temperature 21.3°C

Minimum temperature inside duct (°C)	EXTERNAL SURFACE EMISSIVITY		
	0.05 (eg bright aluminium foil)	0.44 (eg dusty galvanised steel)	0.90 (eg black paint)
	Minimum thickness of ROCKWOOL Ductwrap (mm)		
15	25	25	25
10	50		
5	65	40	
0	90	50	30

NOTE *Thicknesses given are calculated specifically against the criteria noted in the tables. Adopting these thicknesses may not necessarily satisfy other design requirements.*

ROCKWOOL
FIRESAFE INSULATION

CHILLED WATER

TABLE 9 (BS5422:2001)

Environmental insulation thickness for chilled water supplies to control heat gain

Outside diameter of steel pipe on which insulation has been based (mm)	TEMPERATURE OF CONTENTS (°C)			
	+5		+0	
	Thickness of ROCKWOOL RockLap H&V pipe section (mm)	Heat gain (W/m)	Thickness of ROCKWOOL RockLap H&V pipe section (mm)	Heat gain (W/m)
21.3	25	2.9	30	3.4
33.7	30	3.5	35	4.0
60.3	35	4.5	45	5.0
114.3	45	6.1	60	6.5
168.3	60	7.2	70	7.9
273.0		9.9	80	10.6
508.0	70	15.8		16.5
610.0 and above, including flat surfaces	75	16.2	100	17.2

NOTE 1 *Thicknesses given are calculated specifically against the criteria noted in the table. Adopting these thicknesses may not necessarily satisfy other design requirements.*

NOTE 2 *This table should be used only if the control of heat gain already provided by the insulation of chilled pipework for the purposes of condensation control as indicated in Tables 7 and 8 of BS5422:2001does not limit the distribution heat gain to a maximum of 5% of the system load. The method for calculating the system load for chilled pipework is given in annex E of BS5422:2001. Distribution pipework heat gains should be calculated using the formulae given in BS EN ISO 12241 if outside the scope of this Table 9.*

ROCKWOOL
FIRESAFE INSULATION

VENTILATION DUCTWORK

TABLE 11 (BS5422:2001)

Environmental insulation thickness on ductwork carrying warm air

Temperature difference between air inside ductwork and ambient air		
10°C	25°C	50°C
Environmental thickness of ROCKWOOL Ductwrap and corresponding heat loss		
40mm	50mm	60mm
7.2 W/m²	15.3 W/m²	26.0 W/m²

NOTE *Thicknesses given are calculated specifically against the criteria noted in the table. Adopting these thicknesses may not necessarily satisfy other design requirements.*

ROCKWOOL
FIRESAFE INSULATION

HEATING INSTALLATIONS

TABLE 12 (BS5422:2001)

Environmental insulation thickness for non-domestic heating installations to control heat loss

Outside diameter of steel pipe on which insulation thickness has been based (mm)	HOT FACE TEMPERATURE (°C)					
	75		100		150	
	Thickness of ROCKWOOL RockLap H&V pipe section (mm)	Heat loss (W/m)	Thickness of ROCKWOOL RockLap H&V pipe section (mm)	Heat loss (W/m)	Thickness of ROCKWOOL RockLap H&V pipe section (mm)	Heat loss (W/m)
17.2	30	7.7	35	10.8	60	16.4
21.3		8.4	40	11.7		17.6
26.9	35	9.2		12.9		19.2
33.7		10.1	45	14.0	70	20.9
42.4		11.4		15.5		23.2
48.3	40	12.1	50	16.4		24.5
60.3		13.5		18.3		27.2
76.1		15.5		20.7	80	30.2
88.9		17.0	60	22.6		32.7
114.3	45	19.7		26.2		37.5
139.7		22.5		29.6		42.2
168.3		25.5		33.5	90	46.8
219.1	50	30.9		40.0		55.4
273.0		36.3		46.6		64.2
Above 323.9 and including flat surfaces		39.6	70	50.9		71.5

HOT WATER SERVICES

TABLE 13 (BS5422:2001)

Environmental insulation thickness for non-domestic hot water service areas to control heat loss

Outside diameter of steel pipe on which insulation thickness has been based (mm)	Water temperature of 60°C	
	Thickness of ROCKWOOL RockLap H&V pipe section (mm)	Heat loss (W/m)
17.2	30	5.6
21.3		6.1
26.9		6.7
33.7	35	7.4
42.4		8.2
48.3		8.7
60.3	40	9.7
76.1		11.0
88.9		12.1
114.3	45	14.0
139.7		16.0
168.3		18.1
219.1	50	21.6
273.0		25.1
Above 323.9 and including flat surfaces		28.5

NOTE *Thicknesses given are calculated specifically against the criteria noted in the table. Adopting these thicknesses may not necessarily satisfy other design requirements.*

FROST PROTECTION
INDUSTRIAL PROCESS CONDITIONS

TABLE 22 (BS5422:2001)

Minimum insulation thickness to protect steel pipes against freezing under selected industrial process conditions

Outside diameter of pipe (mm)	Inside diameter [bore] (mm)	Initial water temperature: +5°C Minimum ambient air temperature: -10°C Evaluation period: 12h Permitted ice formation: nil	Initial water temperature: +5°C Minimum ambient air temperature: -10°C Evaluation period: 12h Permitted ice formation: 10%
		Thickness of ROCKWOOL Pipe Section [H&V or Process] (mm)	
21.3	16.0	-	-
26.9	21.6	-	873
33.7	27.2	-	222
42.4	35.9	863	82
48.3	41.8	398	60
60.3	53.0	158	35
76.1	68.8	85	25
88.9	80.8	60	
114.3	105.3	40	
168.3	158.6	25	
219.1	207.9		

Reference notes for both tables

NOTE 1 *Thicknesses given are calculated specifically against the criteria noted in the table. Adopting these thicknesses may not satisfy other design requirements.*

NOTE 2 *Some of the insulation thicknesses given are too large to be applied in practice but are included to highlight the difficulty in protecting small diameter pipes against freezing. To provide the appropriate degree of frost protection to certain sizes of pipes, it may be necessary to provide additional heat to the system, for example by circulating the water or heat tracing.*

ROCKWOOL
FIRESAFE INSULATION

FROST PROTECTION
COMMERCIAL & INSTITUTIONAL CONDITIONS

TABLE 23 (BS5422:2001)

Minimum insulation thickness required to give protection against freezing under specified commercial and institutional conditions

Outside diameter of pipe (mm)	Inside diameter [bore] (mm)	Initial water temperature: +2°C Min ambient temp: -6°C (Indoor unheated) Evaluation period: 12h Permitted ice formation: 50%	Initial water temperature: +2°C Min ambient temp: -10°C (Outdoor) Evaluation period: 12h Permitted ice formation: 50%
		Thickness of ROCKWOOL Pipe Section [H&V or Process] (mm)	
Copper pipes			
15.0	13.6	59 (size not available)	269 (size not available)
22.0	20.2	20	50
28.0	26.2		25
35.0	32.6		20
42.0	39.6		
54.0	51.6		
76.1	73.1	25	25
108.0	105.0		
Steel pipes			
21.3	16.0	40	-
26.9	21.6	20	45
33.7	27.2		25
42.4	35.9		20
48.3	41.8		
60.3	53.0		
76.1	68.8	25	25
88.9	80.8		

ROCKWOOL
FIRESAFE INSULATION

STANDARD SCHEDULE PIPES

Nominal pipe size (inches)	OD (mm)	Wall thickness (mm)	Bore (mm)
3/8	17.1	2.3	12.5
_	21.3	2.8	15.7
_	26.7	2.9	20.9
1	33.4	3.4	26.6
1_	42.2	3.6	35.0
1_	48.3	3.7	40.9
2	60.3	3.9	52.5
2_	73.0	5.2	62.6
3	88.9	5.5	77.9
3_	101.6	5.7	90.2
4	114.3	6.0	102.3
5	141.3	6.6	128.1
6	168.3	7.1	154.1
8	219.1	8.2	202.7
10	273.0	9.3	254.4
12	323.9	9.5	304.9
14	355.6	9.5	336.6
16	406.4	9.5	387.4
18	457.2	9.5	438.2
20	508.0	9.5	489.0
22	558.8	9.5	539.8
24	609.6	9.5	590.6

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ROCKWOOL
FIRESAFE INSULATION

UK AND NORTHERN IRELAND
Rockwool Limited, Pencoed, Bridgend CF35 6NY
Tel: 01656 862621 Fax: 0871 222 1784
Email: info@rockwool.co.uk

REPUBLIC OF IRELAND
Rockwool Limited, 3015 Lake Drive, Citywest, Dublin 24
Tel: 01 403 8456 Fax: 01 403 8457
Email: info@rockwool.ie