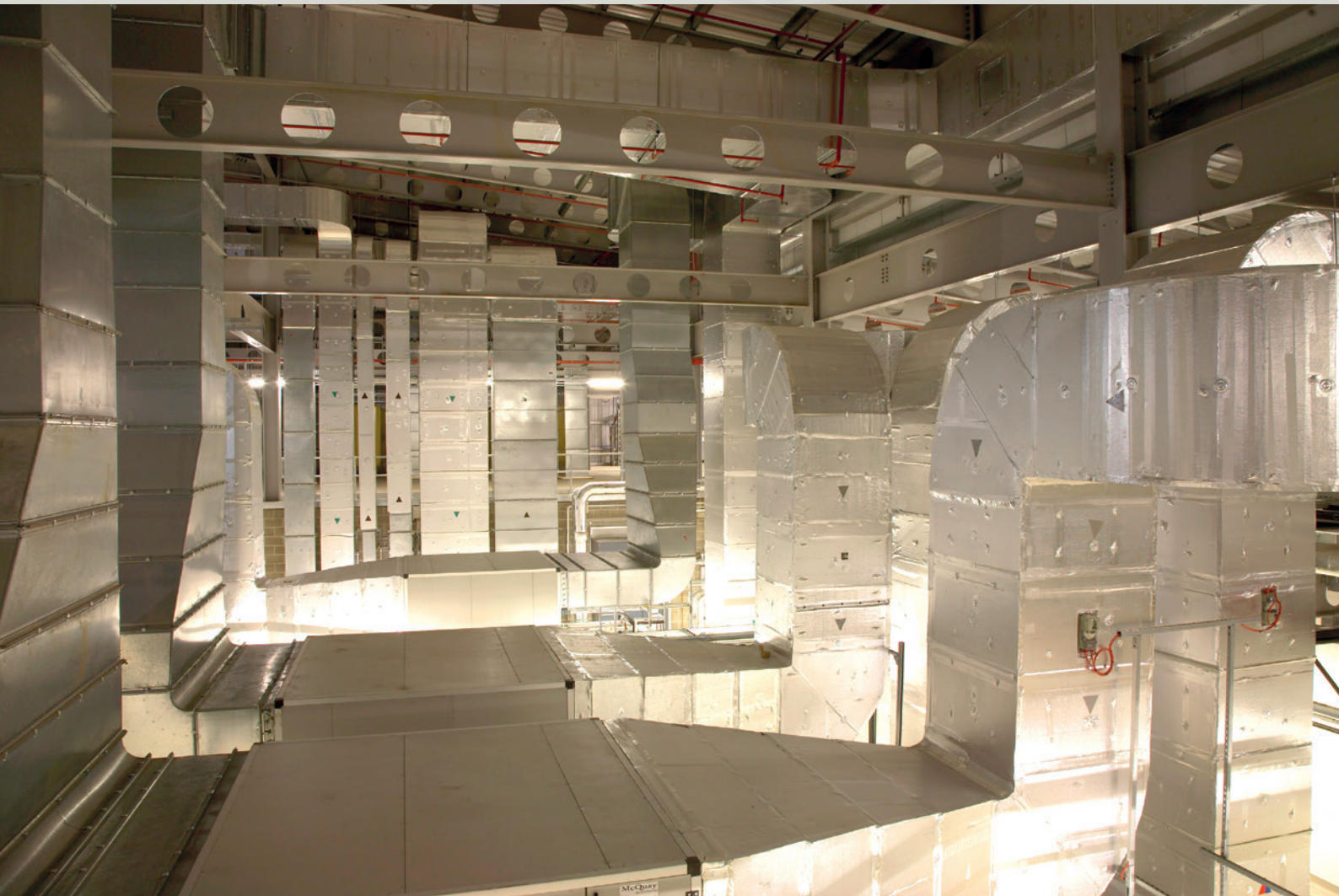




Kingspan **Kooltherm**® FM Duct Insulation

DUCT INSULATION FOR RECTANGULAR, CIRCULAR AND
FLAT OVAL / BUILDING SERVICES DUCTWORK



Fibre-free
Core


Kingspan®

Low Energy –
Low Carbon Buildings

Kingspan **Kooltherm**® FM Duct Insulation

Overview

Kingspan **Kooltherm**® FM Duct Insulation is a premium performance thermal insulation designed for use on rectangular, circular and flat oval ductwork in HVAC / building services applications. It can be used to insulate ductwork, plenums and associated equipment, installed both indoors and outdoors, operating within the temperature range of -20°C to +80°C.

Kingspan **Kooltherm**® FM Duct Insulation is suitable for both new build and refurbishment projects in the residential, commercial, institutional, light industrial and leisure sectors.

Moreover, it is especially suitable for high specification projects where non-fibrous insulants may be preferred, for example: in the food, beverage and pharmaceutical industries; communication / server rooms in data centres; high relative humidity environments such as swimming pools; and clean air and hygiene controlled environments such as sterile areas of hospitals or laboratories.

Kingspan **Kooltherm**® FM Duct Insulation has been developed to provide premium performance with regards to insulation efficiency, fire resistance, smoke emissions, compressive strength and cost.

Kingspan **Kooltherm**® FM Duct Insulation is CE marked in conformance with BS EN 14314 and a Declaration of Performance is available to download from www.kingspaninsulation.co.uk.



Kingspan **Kooltherm**® FM Duct Insulation

Kingspan **Kooltherm**® FM Duct Insulation comprises a fibre-free rigid thermoset phenolic insulation core, faced on one side (external face) with a 25.4 micron aluminium vapour barrier foil, and faced on the other side (internal face) with a glass tissue based facing. Both facings are autohesively bonded to the insulation core during manufacture.



The insulation core is manufactured with a blowing agent that has zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP).

Kingspan **Kooltherm**® FM Duct Insulation has a 90% (or greater) closed cell structure and a compressive strength that typically exceeds 100 kPa at 10% compression. The product can be V-grooved through its internal face to accommodate the surface curvature of circular and flat oval ductwork with an outside diameter (O.D.) of 80 mm or greater*.

The rigid nature of Kingspan **Kooltherm**® FM Duct Insulation enables the specified thickness of insulation to be maintained at the corners of ductwork, and at locations where HVAC / building services equipment is specified. Non-rigid glass and rock mineral fibre duct wrap products, on the other hand, risk being overstretched and compressed in these locations, potentially leading to a reduction in thermal performance.

Its rigidity also enables the straightforward application of vapour barrier tape and finishing materials which, in turn, facilitates the creation of a continuous and fully sealed vapour barrier.

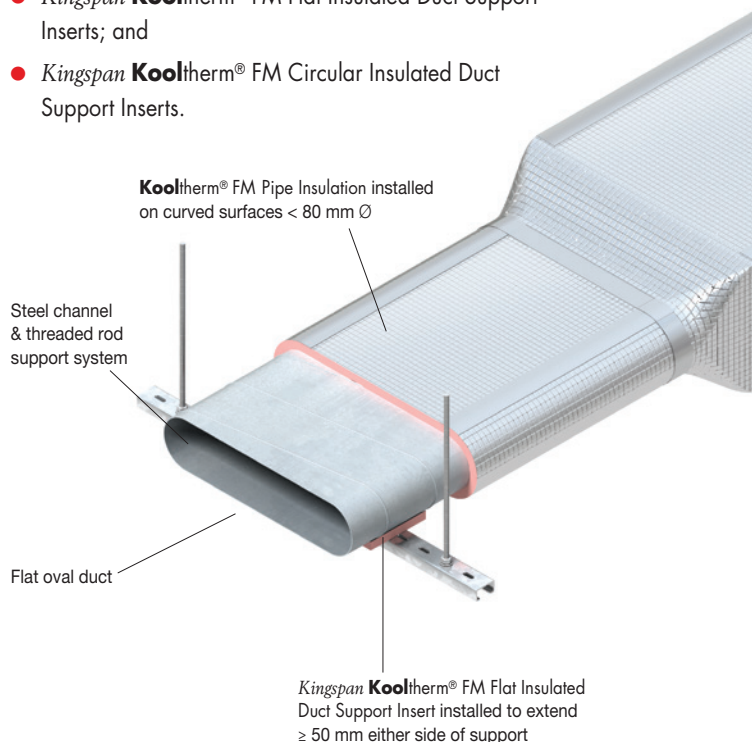
This can provide a neater, cleaner, closer fitting and more aesthetically pleasing finish than that achievable with non-rigid glass or rock mineral fibre duct wrap products.

Kingspan **Kooltherm**® FM Insulated Duct Support Inserts

Kingspan **Kooltherm**® FM Insulated Duct Support Inserts can be fabricated on site from Kingspan **Kooltherm**® FM Duct Insulation. They can withstand the loads imposed by HVAC / building services ductwork at locations where ductwork supports and hangers are installed.

Kingspan **Kooltherm**® FM Duct Insulation can be fabricated on site to create two different types of Insulated Duct Support Inserts:

- Kingspan **Kooltherm**® FM Flat Insulated Duct Support Inserts; and
- Kingspan **Kooltherm**® FM Circular Insulated Duct Support Inserts.



Kingspan **Kooltherm**® FM Flat Insulated Duct Support Inserts are flat rectangular strips of Kingspan **Kooltherm**® FM Duct Insulation. They are used with rectangular and flat oval ductwork.

Kingspan **Kooltherm**® FM Circular Insulated Duct Support Inserts are V-grooved strips of Kingspan **Kooltherm**® FM Duct Insulation. They can be used with circular ductwork that has an outside diameter (O.D.) of 80 mm or greater*. They can not, however, be used to support the compressive loads imposed by pipework carrying water or other liquids and should not be used in such applications.

Kingspan **Kooltherm**® FM Insulated Duct Support Inserts enable a more consistent run of ductwork insulation, by allowing specified insulation levels to be maintained at ductwork support and hanger locations.

Interruptions in insulation continuity, by materials with significantly worse thermal conductivities, or no insulation at all, can result in thermal bridging (sometimes referred to as cold bridging). This can reduce the efficacy of the insulation through consequential heat losses / gains. The use of non-insulated duct support inserts can result in up to 5% of the total area of a ductwork system being seriously under-insulated.

Kingspan **Kooltherm**® FM Duct Insulation and Kingspan **Kooltherm**® FM Insulated Duct Support Inserts, where appropriately taped and sealed, can facilitate the creation of a continuous and fully sealed vapour barrier. This is particularly important for ductwork operating at below ambient temperatures, or in high relative humidity environments and could be considered good practice.

*For curved surfaces with an O.D. less than 80 mm, it is recommended that **Kooltherm**® FM Pipe Insulation and **Kooltherm**® Insulated Pipe Support Inserts are used. It must be noted, however, that these products are not part of Kingspan **Kooltherm**® FM Duct Insulation, or its FM Approval.

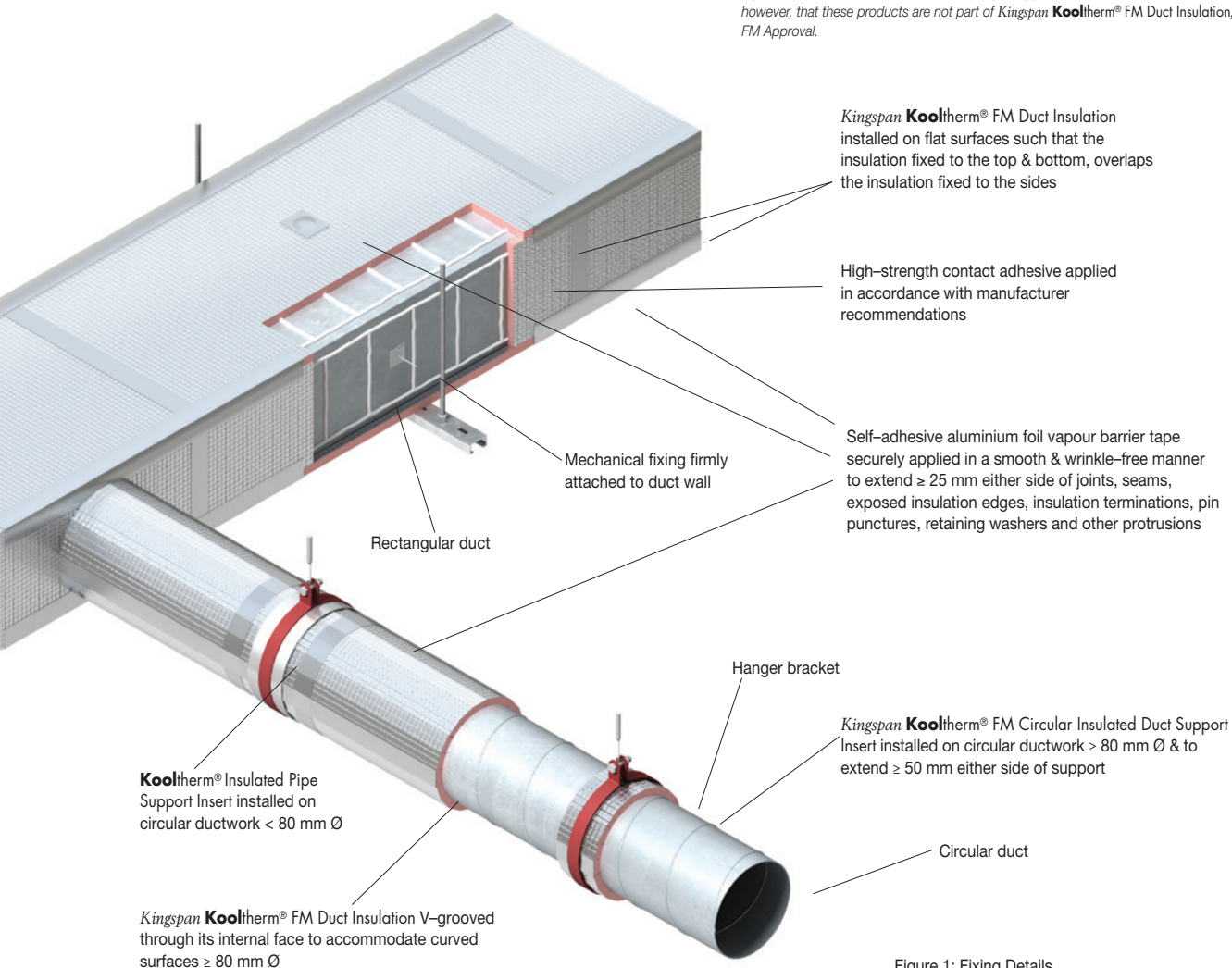


Figure 1: Fixing Details

Design Considerations

Environmental Impact & Responsible Sourcing

Green Guide Rating

An Ecoprofile, certified by BRE (Building Research Establishment) Certification to the 2008 BRE Environmental Profiles Methodology, has been created for **Kingspan Kooltherm® FM Duct Insulation** produced at Kingspan Insulation's Pembridge, UK, manufacturing facility. BRE has assigned the product a 2008 Green Guide Summary Rating of A+, the best possible rating.

Responsible Sourcing

Kingspan Kooltherm® FM Duct Insulation produced at Kingspan Insulation's Pembridge and Selby manufacturing facilities, is certified to BES 6001 'Very Good'.

NB The above information is correct at the time of writing. Please confirm at the point of need by contacting the Kingspan Insulation Technical Service Department (see rear cover), from which copies of Kingspan Insulation's and its suppliers' BES 6001 certificates can be obtained, along with confirmation of Kingspan Insulation's products' Green Guide Ratings.

Sustainability & Responsibility

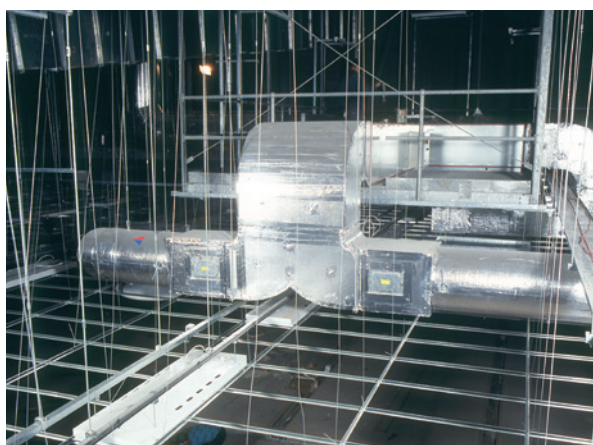
Kingspan Insulation has a long-term commitment to sustainability and responsibility: as a manufacturer and supplier of insulation products; as an employer; as a substantial landholder; and as a key member of its neighbouring communities.

Further information can be found at:

www.kingspaninsulation.co.uk/sustainabilityandresponsibility.

Standards & Approvals

Kingspan Kooltherm® FM Duct Insulation is manufactured under a management system certified to BS EN ISO 9001: 2008 (Quality management systems. Requirements), BS EN ISO 14001: 2004 (Environmental Management Systems. Requirements) and BS OHSAS 18001: 2007 (Health and Safety Management Systems. Requirements).



Fire Performance

Properties

Kingspan Kooltherm® FM Duct Insulation is characterised, by FM Approvals, member of the FM Global Group, as a low fire hazard, which does not require automatic sprinkler protection.

The insulation core of **Kingspan Kooltherm® FM Duct Insulation** is a rigid thermoset material and, unlike thermoplastic materials, it does not melt, drip or produce flaming droplets. Its intricately cross-linked structure makes it difficult to ignite and, when subjected to fire, its outer surface forms a strong carbonaceous layer that limits heat generation and retards further flame spread. Furthermore, there is an almost complete absence of smoke when subjected to a flame source.

In addition, the insulation core has a resistance to burning and spread of flame far superior to that of flexible elastomeric foam (FEF), rigid polyurethane (PUR) and rigid polyisocyanurate (PIR) insulants.

Kingspan Kooltherm® FM Duct Insulation, when subjected to the fire and smoke tests of the standards specified in Table 2, has achieved the results shown.

Standard	Result
ASTM E 84: 2008 (Test for Surface Burning Characteristics of Building Materials)	Flame spread / smoke developed indices: < 25/50
EN ISO 5659-2: 2006 (Plastics – Smoke generation – Part 2: Determination of optical density by a single-Chamber test)	Maximum specific optical density of smoke (mean): In presence of pilot flame: 0 (25 kW/m²) 6 (50 kW/m²) In absence of pilot flame: 0 (25 kW/m²) 9 (50 kW/m²)
UBC 26-3: 1997 (Uniform Building Code Standard: Room Fire Test Method for Interior of Foam Plastic Systems)	Pass

Table 1: Results of Fire & Smoke Test Standards Achieved by **Kingspan Kooltherm® FM Duct Insulation**

Classification

Kingspan Kooltherm® FM Duct Insulation, and its rigid thermoset insulation core, are Class 0, as defined by the Building Regulations.

FM Certification

Kingspan Kooltherm® FM Duct Insulation is certified, by FM Approvals, to Factory Mutual Research Approval Standard – Pipe Insulation Class Number 4924 – March 1973, when manufactured and installed in accordance with the conditions defined by the approval.



This certification is valid for thermal insulation produced at Kingspan Insulation's Pembridge, UK, manufacturing facility. It allows *Kingspan Kooltherm*® FM Duct Insulation to be installed in single or multiple arrays, in thicknesses up to 90 mm, on rectangular, circular and flat oval ductwork, operating at temperatures not exceeding 104°C*, in HVAC / building services applications.

Further details of the FM Approval listing for *Kingspan Kooltherm*® FM Duct Insulation are published on the FM Global website at: www.approvalguide.com under the 'Building Materials' division. To view the listing, click on the category 'Pipe and Duct Insulation (FM Approval Class Number 4924)' and select 'Pipe and Duct Insulation'.

*Although the approval allows *Kingspan Kooltherm*® FM Duct Insulation to be used on ductwork operating at temperatures up to 104°C, the upper limit should not exceed 80°C.



Thermal Properties

The thermal conductivities (λ -values) detailed below are quoted in accordance with BS EN 14314:2009+A1:2013 – Thermal insulation products for building equipment and industrial installations. Factory made phenolic foam (PF) products.

Temperature (°C)	Thermal Conductivity (W/m-K)
– 20°C	0.025
+ 10°C	0.022
+ 19°C	0.022
+ 25°C	0.023
+ 50°C	0.026
+ 80°C	0.030

Table 2: Thermal conductivity of *Kingspan Kooltherm*® FM Duct Insulation

Space Saving

The low thermal conductivity of *Kingspan Kooltherm*® FM Duct Insulation makes it the most thermally efficient, and hence the thinnest, insulation product commonly used to insulate ductwork in HVAC / building services applications.

Thin insulation can contribute towards space savings. This can be particularly useful where space is often at a premium, e.g. service runs, raised floors and pre-fabricated modules. Increased space can facilitate installation, cleaning and maintenance operations in confined areas. Furthermore, thinner insulation can result in a reduction in surface area and therefore savings in finishing materials.

Compliance

Kingspan Kooltherm® FM Duct Insulation is available in thicknesses that meet or exceed the maximum permissible heat transfer requirements, for insulated heating, cooling and dual purpose ductwork, as defined by the Non-Domestic Building Services Compliance Guide (NDBSCG).

Ductwork Type	Heat Transfer Requirement	Thickness
Cooling and Dual Purpose	–6.45 W/m²	30 mm*
Heating	16.34 W/m²	20 mm

Table 3: Thickness of *Kingspan Kooltherm*™ FM Duct Insulation that meet the Heat transfer requirements detailed in NDBSCG

* 30 mm of *Kingspan Kooltherm*™ FM Duct Insulation can meet the requirements for insulated cooling and dual purpose ductwork, assuming an ambient still air temperature of 24.8°C rather than 25°C, and the standard internal air temperature of 13°C.

Sitework

Introduction

In addition to the information given in this section, it is recommended that reference is also made to BS 5970: 2012 (Thermal insulation of pipework, ductwork, associated equipment and other industrial installations in the temperature range of -100°C to $+870^{\circ}\text{C}$ – Code of practice).

Installation

- Care should be taken when handling and transporting insulation products to prevent physical damage.
- The insulation should only be installed after all testing of the ductwork system has been completed.
- In addition to the surfaces of ductwork, plenums and associated HVAC equipment – flanged joints, stiffeners, fasteners and connections must also be effectively insulated in order to reduce heat loss, heat gain and / or to control condensation.
- To facilitate inspection, testing, adjustment, balancing, maintenance and cleaning, a removable and fully vapour sealed piece of insulation, of sufficient size, must be provided at access door locations, if the door is not already pre-insulated.
- Insulation must not be installed at locations where the ductwork penetrates fire resistance rated walls, partitions, floors and ceiling-floor assemblies. Consideration should be given to current Buildings Regulations / Standards with regard to the requirements for, and provision of, fire stops.
- Before being insulated, surfaces must be made clean, dry and free from grease, dust, dirt, loose rust, scale and all other foreign matter.
- The insulation should be installed to achieve a close fit between the insulation and substrate, as well as between insulation joints.
- The ingress of moisture, or other foreign matter, either into the insulation or between the insulation and substrate, should be prevented during installation.
- When insulating rectangular ductwork, the thickness of insulation that has been specified should be maintained at all four corners of the duct.
- On horizontally orientated ducts, the insulation fixed to the top and bottom should overlap the insulation that is fixed to the sides (see Figure 1 on pages 2–3 of this document).
- Insulated duct support inserts should be of the same thickness as that of the adjacent duct insulation. In order to facilitate the straightforward application of self-adhesive vapour barrier tape, they should be installed to extend no less than 50 mm either side of the support.
- The insulation must be securely fixed to the substrate by means of adhesive, by mechanical fixings or by a combination of both.
- A compatible high-strength contact adhesive, must be applied in accordance with the manufacturer's recommendations. For suitable adhesives, please contact the Kingspan Insulation Technical Service Department (see rear cover).

- Insulation fixed to circular ductwork must be additionally supported with banding (preferably aluminium) and matching seals. The banding must be no less than 15 mm wide and should be applied circumferentially at 350 mm centres.
- On rectangular ductwork the selection of compatible mechanical fixings will be dependent upon: the substrate material; operating temperatures, size and orientation of the duct and the duct wall; and the degree of vibration to which the duct is subjected during operation.
- Mechanical fixings, if used, must be corrosion resistant, capable of sustaining the calculated tensile dead load perpendicular to the duct wall, and securely fixed so that they do not detach from the duct during its service life.
- Mechanical fixings should be positioned so that they are neatly and evenly distributed under each piece of insulation. They should be located no less than 50 mm, and no greater than 150 mm, from insulation edges and corners.

Vapour Barrier

- The vapour barrier over the insulation should be continuous and fully sealed.
- A high strength self-adhesive aluminium foil vapour barrier tape should be applied to all discontinuities in the vapour barrier. This includes those between insulated duct support inserts and abutting duct insulation, joints, seams, exposed insulation edges, insulation terminations, pin punctures, retaining washers and other protrusions.
- The self-adhesive vapour barrier tape should be applied in a smooth and wrinkle-free manner. It should extend no less than 25 mm either side of joints, seams, insulation edges and terminations, as well as in all directions of pin punctures, retaining washers and other protrusions.
- To ensure successful adhesion, all surfaces to receive self-adhesive vapour barrier tape should be made clean, dry and free from grease, dust, dirt and all other foreign matter prior to application. If required, surfaces may be primed with a thin coat of compatible high-strength contact adhesive. A gentle pressure may also be exerted using a soft spatula tool, whilst applying the tape.

Protection & Finishes

- The factory-applied aluminium foil vapour barrier facing is normally the standard finish for concealed indoor areas, e.g. ceiling voids, floor voids, modules and risers.
- Although the factory-applied aluminium foil vapour barrier facing is normally the standard finish for open-to-view indoor applications, an additional cosmetic finish, e.g. paint may be provided. Consideration should, however, be given to any effect that it might have on the thermal and fire performance of the finish ductwork.

- If located indoors 2 m above finished floor level, or at risk of being subjected to mechanical or physical abuse, e.g. in plant rooms, boiler houses, service areas or publicly accessible areas, an additional protective finish should be applied over the insulation. Suitable finishes include: aluminium or stainless steel sheet; aluminium–zinc alloy coated steel sheet; heavy-duty, self-adhesive laminate; synthetic elastomeric jacketing, systems; reinforcing glass / synthetic cloth embedded between two coats of appropriate coating; or glass reinforced polyester / epoxy (GRP / GRE) cladding systems, (all applied in accordance with the manufacturer's recommendations and the project's specification requirements).
- If located outdoors, the insulation must be adequately protected with an additional weatherproof and water / vapour tight finish that shields against the effects of wind, sunlight and birds. The finish must also be capable of providing suitable protection if at risk of being subjected to mechanical or physical abuse. Suitable finishes include: aluminium or stainless steel sheet; aluminium–zinc alloy coated steel sheet; heavy-duty, self-adhesive laminate; synthetic elastomeric jacketing, systems; reinforcing glass / synthetic cloth embedded, between two coats of appropriate coating; or UV resistant glass reinforced polyester / epoxy (GRP / GRE) cladding systems (all applied in accordance with the manufacturer's recommendations and the project's specification requirements).
- If installing an additional finish over the standard factory-applied aluminium foil vapour barrier facing, extreme care must be taken to preserve the integrity of the vapour barrier at all times.

Identification of Services

- Both insulated and non-insulated services should be clearly identifiable.
- The identification system should preferably be in accordance with the requirements of BS 1710: 1984 (Specification for identification of pipelines and services), but should always be approved by the engineer.
- The identification system and its method of application should be compatible with the finish. They should also be suitable for the operating and ambient conditions.

General

Cutting

- Manual cutting of the insulation boards should be carried out either by using a fine toothed saw, or by scoring with a sharp knife, snapping the board over a straight edge and then cutting the facing on the other side.
- Ensure accurate trimming to achieve close-butting joints and continuity of insulation.
- Automated computer aided cutting may be carried out using CNC blade / router machinery.

Availability

- **Kingspan Kooltherm®** FM Duct Insulation is available through specialist insulation distributors and selected Delivery Partners throughout the UK and Ireland.

Packaging & Storage

- The polyethylene packaging of Kingspan Insulation products, which is recyclable, should not be considered adequate for outdoor protection.
- Insulation products should be maintained in good condition throughout the duration of the works and should not be unpacked onsite until required for immediate use. They should be returned to storage at the end of each workday.
- Insulation materials should be adequately protected from the weather, humidity, abrasive matter, contaminants and all other foreign matter.
- Ideally, products should be stored inside a building. If, however, outside storage cannot be avoided, they should be stored in a dry atmosphere, clear of the ground, out of direct sunlight and covered with an opaque and weatherproof material. Products that have been allowed to get wet should not be used.

Health & Safety

- **Kingspan Kooltherm®** FM Duct Insulation is chemically inert and safe to use.
- A Safety Information Data Sheet is available from the Kingspan Insulation website www.kingspaninsulation.co.uk/safety.

NB The reflective surfaces on this product are designed to enhance the thermal performance. As such, they will reflect light as well as heat, including ultraviolet (UV) light. Therefore, if this product is being installed during very bright or sunny weather, it is advisable to wear UV protective sunglasses or goggles, and if the skin is exposed for a significant period of time, to protect the bare skin with a UV block sun cream. The reflective facing used on this product can be slippery underfoot when wet. Therefore, it is recommended that any excess material should be contained to avoid a slip hazard. Warning – do not stand on or otherwise support your weight on this product.

Contact Details

Customer Service

For quotations, order placement and details of despatches, please contact the Kingspan Insulation Customer Service Department:

- UK – Tel: +44 (0) 1544 388 601
 – Fax: +44 (0) 1544 388 888
 – email: customerservice@kingspaninsulation.co.uk
- Ireland – Tel: +353 (0) 42 979 5000
 – Fax: +353 (0) 42 975 4299
 – email: info@kingspaninsulation.ie

Literature & Samples

Kingspan Insulation produces a comprehensive range of technical literature for designers, specifiers, fabricators, installers, building services managers and facilities managers. The literature contains clear 'user friendly' advice on design, design considerations, specification, fabrication, installation, maintenance and product data.

Available as individual brochures, Kingspan Insulation technical literature is an essential specification tool. For copies please contact the Kingspan Insulation Marketing Department, or visit the Kingspan Insulation website:

- UK – Tel: +44 (0) 1544 387 384
 – Fax: +44 (0) 1544 387 484
 – email: info@kingspaninsulation.co.uk
- Ireland – Tel: +353 (0) 42 979 5000
 – Fax: +353 (0) 42 975 4299
 – email: info@kingspaninsulation.ie

Technical Advisory Service

Kingspan Kooltherm® FM Duct Insulation is supported by a complementary and comprehensive technical advisory service for designers, specifiers, fabricators, installers, building services managers and facilities managers. Expert guidance is provided to make specification, installation and maintenance of **Kingspan Kooltherm® FM Duct Insulation**, as straightforward as possible. Project specific advice and solutions for non-standard applications and complex technical issues are also offered.

Amongst other services, heat loss / gain, condensation / dew point risk and required insulation thickness can be calculated.

Kingspan Insulation also provides a series of technical presentations specifically tailored for designers, specifiers, local authorities and developers. Additionally, site surveys and visits can also be undertaken, if required.

- UK – Tel: +44 (0) 1544 387 382
 – Fax: +44 (0) 1544 387 482
 – email: hvactechnical@kingspaninsulation.co.uk
- Ireland – Tel: +353 (0) 42 979 4297
 – Fax: +353 (0) 42 975 4296
 – email: technical@kingspaninsulation.ie

General Enquiries

For all other enquiries:

- UK – Tel: +44 (0) 1544 388 601
 – Fax: +44 (0) 1544 388 888
 – email: info@kingspaninsulation.co.uk
- Ireland – Tel: +353 (0) 42 979 5000
 – Fax: +353 (0) 42 975 4299
 – email: info@kingspaninsulation.ie

Kingspan Insulation Ltd reserves the right to amend product specifications without prior notice. Product thicknesses shown in this document should not be taken as being available ex-stock and reference should be made to the current Kingspan Insulation Ltd price list or advice sought directly from Kingspan Insulation Ltd. The information, technical details and fixing instructions etc. included in this literature are given in good faith and apply to uses described herein. Recommendations for use should be verified as to the suitability and compliance with actual requirements, specifications and any applicable codes, laws and regulations. For other applications or conditions of use, Kingspan Insulation Ltd offers a Technical Advisory Service, the advice of which should be sought for uses of Kingspan Insulation Ltd products that are not specifically described herein. The fire tests referenced in this literature and the assigned results are not intended to reflect hazards presented by the materials and products described herein under actual fire conditions. Please check that your copy of the literature is current by visiting www.kingspaninsulation.co.uk.



Kingspan Insulation Ltd

Pembridge, Leominster, Herefordshire HR6 9LA, UK
Castleblayney, County Monaghan, Ireland

www.kingspaninsulation.co.uk www.kingspaninsulation.ie