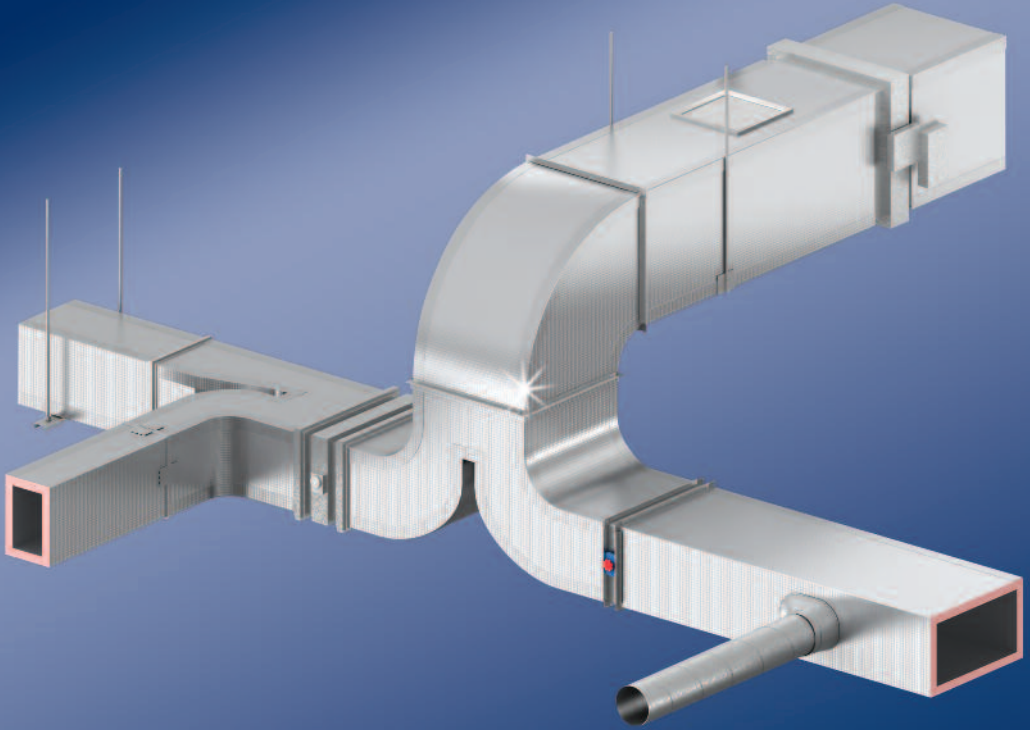


# The Kingspan **KoolDuct**<sup>®</sup> System

## AN INTRODUCTION



# Introduction

## Overview

The **Kingspan KoolDuct®** System of pre-insulated ductwork is like no other insulated ductwork system. It is the most advanced and innovative system of air-distribution ductwork available worldwide. Ductwork is fabricated using rigid insulation panels in sections up to 4 m / 13' and can provide the optimum energy saving and environmental solution in comparison with other types of ductwork.

The **Kingspan KoolDuct®** System comprises premium performance **Kingspan KoolDuct®** panels, fabrication methods, jointing systems and a complete line of accessories to produce a System where air leakage can be reduced to a fraction of that typical of sheet metal ductwork. The components and techniques that are associated with the fabrication of ductwork from the System have been established in the European marketplace since the mid-1960s.

Several factors have introduced the need to revolutionise air distribution ductwork. Energy use has continued to escalate whilst the demand for energy reducing solutions intensifies. Requirements for clean air are becoming increasingly prevalent. Speed of construction has become a valuable asset. Floor space and headroom are under constant pressure. Building materials and insulating products have dramatically improved.

This cutting edge System eliminates virtually all of the problems associated with both traditional steel and rigid polyisocyanurate (PIR) pre-insulated ductwork, whilst at the same time offering additional advantages to the specifying engineer, the M&E contractor, the fabricator / installer, the facilities manager, the building owner and the building occupant.

The **Kingspan KoolDuct®** System is the clear leader in new generation pre-insulated ductwork. It offers the triple benefits of cutting energy, cutting carbon and cutting cost whilst already having proved itself in its highly competitive marketplace.

*NB This document provides a summary of the **Kingspan KoolDuct®** System and should not be used as the sole basis of an actual specification. Reference must be made to 'The **Kingspan KoolDuct®** System Global Specification Manual' (latest edition) for specification details. Please contact the Kingspan Insulation Marketing Department (see rear cover) for a copy.*



# Applications

## Application Versatility

The **Kingspan KoolDuct® System** is designed for use in Building Services / HVAC applications and is suitable for both new build and refurbishment projects in the residential, commercial, institutional and industrial sectors.

Ductwork fabricated from the **Kingspan KoolDuct® System** is particularly suitable for use on high specification projects in the food, beverage and pharmaceutical industries, clean air, hygiene controlled environments, high humidity environments, swimming pools and sterile areas of hospitals and communication / server rooms in data centres where non-fibrous insulants may be preferred.

**Kingspan KoolDuct® System** ductwork can be installed internally, externally, concealed above a false ceiling or visibly mounted. Furthermore, its versatility enables individual system components such as plenums, risers and straight sections to be integrated with traditional sheet steel ductwork and can also provide an ideal value engineered solution.

## Application Recommendations

It is recommended that **Kingspan KoolDuct® System** ductwork be used as supply, return and fresh air ductwork for heating, ventilation and air-conditioning systems within the following limits:

Mean Air Velocity (Maximum)	20 m/s / 4000 fpm
Design Pressure (Maximum)	Positive: 1000 Pa / 4 in.w.g. Negative: 750 Pa / 3 in.w.g.
Temperature	Internal air temperature of -20°C to +80°C / -4°F to +176°F during continuous operation
Size	Unlimited (provided that recommended <b>Kingspan KoolDuct® System</b> fabrication techniques and installation procedures are strictly observed)

*NB 'Mean Air Velocity' refers to the design air flow rate related to the cross sectional area of the ductwork. 'Design Pressure' relates to the actual total pressure of the relevant section of ductwork and not the fan static pressure. 'Total Pressure' is a combination of both static and dynamic pressure.*



# System Benefits

## Air Leakage / Energy / Running Costs

The air leakage rate of *Kingspan KoolDuct® System* ductwork can be a fraction of that typical of insulated sheet metal ductwork and can easily meet the requirements of BS EN 13403: 2003 – Class C, HVCA DW 144 – Class C and SMACNA – Class 3.

This can yield significant electrical consumption savings because of reduced heating and cooling loads – saving up to 30% on the annual cost of running a fan<sup>1</sup>. Furthermore, over a 30 year life it can also make a saving of over 20% on operating costs<sup>2</sup>.

## Embodied Energy

The embodied energy of a ductwork section fabricated from the *Kingspan KoolDuct® System* can be up to 30% less than that for galvanised sheet steel insulated with mineral fibre.

## Installed Cost Savings

The installed cost of ductwork fabricated from the *Kingspan KoolDuct® System* can be up to 19% cheaper<sup>3</sup> than that for insulated sheet steel as a result of reduced material and labour costs.

## Installation Speed

The ability to fabricate ductwork in up to 4 m / 13' long sections means fewer sections and less handling. This combined with the requirement for fewer supports and its single fix installation results in a fast track installation – up to three times faster. Faster installation obviously means lower costs and less disruption for other trades on site.

## Space Saving

*Kingspan KoolDuct® System* ductwork can be installed flush to the ceiling eliminating the space required for the manual process of applying the insulation above the ductwork as a second fix. This can save up to 150-200 mm / 6"-8" of valuable space.



<sup>1</sup> Figure based on research conducted in the UK by independent consultants Rider Levett Bucknall 2005

<sup>2</sup> Figure based on research conducted in the UK by independent consultants Cyril Sweett 2007

<sup>3</sup> Figure based on research conducted in the UK by independent consultants Rider Levett Bucknall April 2007

## Lightweight

The exceptional strength to weight ratio of ductwork fabricated from the System results in ductwork that is easier to handle and install. Weighing up to 85% less than sheet metal ductwork, it can overcome severe constraints on structural loadings in older buildings that cannot support additional weight.

## Moisture Resistance

*Kingspan KoolDuct*<sup>®</sup> panels used in the fabrication of ductwork from the *Kingspan KoolDuct*<sup>®</sup> System, are non-wicking and highly resistant to moisture penetration. The risk of moisture penetration as a result of damage to the aluminium foil vapour barrier jacket is considerably reduced as the panels have a 90% (or greater) closed cell structure.

## Air Quality

Distributed air flows over sealed aluminium surfaces, minimising any risk of loose fibres entering the air handling system. In addition, *Kingspan KoolDuct*<sup>®</sup> panels are resistant to fungal and mould growth, will not sustain vermin, are odourless, non-tainting and have a non-fibrous insulation core.

## UL Listing

When fabricated using the aluminium grip flange and / or tiger jointing systems, *Kingspan KoolDuct*<sup>®</sup> System ductwork is the only rigid phenolic pre-insulated ductwork in the world to be UL Listed as a Class 1 Air Duct to Standard for Safety UL 181.

To meet Class 1 Air Duct requirements, ductwork must withstand rigorous physical tests e.g. surface burning characteristics; burning; flame penetration; mould growth and humidity; puncture; pressure; corrosion; erosion; static load; impact; collapse; air leakage; low and high temperatures.



# Product Data

## Description

The panels from which *Kingspan KoolDuct*<sup>®</sup> System ductwork is fabricated, comprise a rigid thermoset phenolic insulation core faced on both sides with an extremely durable and protective low vapour permeability 25 micron / 1 mil aluminium foil reinforced with a 5 mm / 0.2" glass scrim. Both facings are autohesively bonded to the insulation core during manufacture.

*Kingspan KoolDuct*<sup>®</sup> panels are CFC/HCFC-free and are manufactured with a blowing agent that has zero Ozone Depletion Potential (ODP).



## Thermal Performance

The thermal conductivity of *Kingspan KoolDuct*<sup>®</sup> panels is 0.021 W/m·K / 0.146 Btu-in/hr-ft<sup>2</sup>·°F, the lowest of any commonly used insulation material. A low thermal conductivity allows thinner insulation to achieve the required thermal performance.

The thermal resistances (R-values) for the range of panel thicknesses are shown in the table below:

Thickness	R-value
22 mm / 7/8"	1.047 m <sup>2</sup> ·K/W / 6.0 ft <sup>2</sup> ·hr·°F/Btu
30 mm / 1 <sup>3</sup> / <sub>16</sub> "	1.428 m <sup>2</sup> ·K/W / 8.1 ft <sup>2</sup> ·hr·°F/Btu
33 mm / 1 <sup>5</sup> / <sub>16</sub> "	1.571 m <sup>2</sup> ·K/W / 8.8 ft <sup>2</sup> ·hr·°F/Btu

## Standards & Approvals

*Kingspan KoolDuct*<sup>®</sup> panels are manufactured to the highest standards under a management system certified to BS EN ISO 9001: 2000 (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 & Smoke Performance

*Kingspan KoolDuct*<sup>®</sup> panels have a resistance to burning and spread of flame far superior to that of rigid polyurethane (PUR) or rigid polyisocyanurate (PIR). In addition, there is an almost complete absence of smoke when the panels are subjected to a flame source.

The insulation core of the panels is thermoset and unlike thermoplastic materials it does not melt, drip or produce flaming droplets.

*Kingspan KoolDuct*<sup>®</sup> panels have been tested by independent laboratories. The tests shown in the table below have been successfully passed.

Standard	Description	Result
BS 476-6: 1989	Fire Propagation	Index of performance not exceeding 12 and subindex (i <sub>f</sub> ) not exceeding 6
BS 476-7: 1997	Surface Spread of Flame	Class 1
BS 6401: 1983	Specific Optical Density of Smoke	With Pilot Flame: 22.7 Without Pilot Flame: 15
BS EN 13501-2: 2003	Reaction to Fire	B <sub>s1d0</sub>
ASTM E 662: 2006	Specific Optical Density of Smoke	Flaming: 46.4 Non-flaming: 48.0
ASTM E 84: 2008a	Surface Burning Characteristics	< 25/50
UL 723	Surface Burning Characteristics	< 25/50
UL 181	Burning	Pass
AS/NZS 1530-3: 1999	Early Fire Hazard Rating	Ignitability Index: 0 Flame Spread Index: 0 Heat Developed Index: 0 Smoke Developed Index: 0-1
Defence Standard 02-713: 2006	Toxicity Index	4.93

Based on the results of the tests described above, *Kingspan KoolDuct*<sup>®</sup> panels:

- are classified as Class 0 to the Building Regulations in England & Wales, Northern Ireland and the Republic of Ireland, and Low Risk to the Building Standards in Scotland;
- meet the requirements of the fire hazard properties as set out in AS 4254: 2002 to comply with the Building Code of Australia (BCA) 2009 Specification C1.10-9;
- are approved by the UAE Ministry of Interior Dubai Civil Defense and State of Qatar Ministry of Interior General Admin of Civil Defense, for use in the fabrication of pre-insulated air distribution ductwork;
- ensure that ductwork fabricated from the *Kingspan KoolDuct*<sup>®</sup> System complies with the requirements of NFPA (National Fire Protection Association) Standards 90A & 90B; and
- enable (as part of a comprehensive test program) *Kingspan KoolDuct*<sup>®</sup> System ductwork, when fabricated using the aluminium grip flange and / or tiger jointing systems, to be UL Listed as a Class 1 Air Duct to Standard UL 181.

*NB The tests referenced above and the assigned results are not intended to reflect hazards presented by the materials and products described herein under actual fire conditions. For detailed information please contact the Kingspan Insulation Marketing Department (see rear cover) for a copy of 'The Kingspan KoolDuct<sup>®</sup> System Global Specification Manual' (latest edition).*

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