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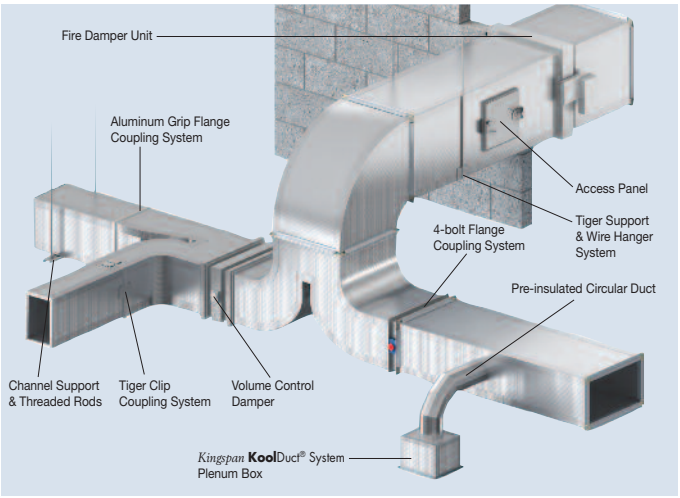
The Kingspan KoolDuct® System

SUBMITTAL SHEET

Introduction

The *Kingspan* **Kool**Duct® System is an advanced and innovative pre-insulated rectangular HVAC ductwork system. It comprises premium performance *Kingspan* **Kool**Duct® panels, fabrication methods, coupling systems and a complete line of accessories to produce pre-insulated rectangular ductwork in sections up to 13 ft / 3.93 m long.

Ductwork fabricated from The *Kingspan* **Kool**Duct® System can reduce air–leakage rates to a fraction of those typical of rectangular sheet metal ductwork. This cutting edge System thus offers the triple benefits of cutting energy use, cutting operational carbon dioxide (CO_2) emissions and cutting costs.



Application Suitability

The *Kingspan* **Kool**Duct® System is designed for use in building services / HVAC applications. It is suitable for both new build and retrofit projects in the residential, commercial, public, light industrial and leisure sectors. It is especially suitable for use in non–ferrous applications and on high specification projects where non–fibrous insulants may be preferred, for instance: the food, beverage and pharmaceutical industries; clean air and hygiene controlled environments; high relative humidity environments; swimming pools; pools; and sterile areas of hospitals and communication / server rooms in data centers.

Ductwork fabricated from The *Kingspan* **Kool**Duct® System can be installed internally, externally, visibly mounted and concealed above false ceilings, below raised floors or within confined enclosures such as pre-fabricated modules.

Ductwork Design & Sizing

The design of ductwork, including fittings, fabricated from The *Kingspan* **Kool**Duct® System, follows the same calculation principles and duct sizing methods as are used for rectangular ductwork constructed from galvanized sheet steel.

Frictional Resistance

The frictional resistance of ductwork fabricated from The *Kingspan* **Kool**Duct® System is comparable with that of galvanized sheet steel ductwork. As a result, frictional pressure drop data for galvanized sheet steel ductwork may also be used when designing ductwork systems fabricated from The *Kingspan* **Kool**Duct® System.

Operating Recommendations & Limitations

It is recommended that ductwork fabricated from The *Kingspan* **Kool**Duct® System is used for operation as supply, return, fresh and exhaust air ductwork for heating, ventilation and air-conditioning systems within the following limits:

Mean Air Velocity (Max.)	5000 fpm / 25.4 m/s
Design Pressure (Max.)*	Positive: 4 in·w.g. / 1000 Pa Negative: 3 in·w.g. / 750 Pa
Temperature	Internal air temperature of -15°F to +185°F / -26°C to 85 °C during continuous operation.
Size	Unlimited (provided that recommended *Kingspan* **Kool**Duct® System fabrication techniques and installation procedures are strictly observed).

These are maximum values and vary depending upon both the coupling system and the size of the ductwork. Refer to The Kingspan* **KoolDuct® System *Fabrication Manual series of publications for details (see rear cover).*

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 pressures.

Ductwork fabricated from The *Kingspan* **Kool**Duct® System should not be used in the following applications:

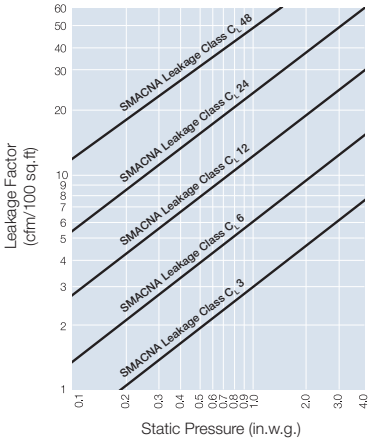
- conveyance of solids;
- fire resistant ductwork;
- kitchen / grease hood exhaust systems;
- chemical, fume or smoke exhaust systems;
- where combustible matter readily collects inside the ductwork;
- adjacent to any mechanical / electrical sources of extreme heat;
- outdoor / underground use without mechanical and / or weather protection;
- where the failure of automatic control equipment may give rise to extreme temperatures; and
- with equipment of any type that does not include automatic maximum temperature controls.

Pressure & Air-leakage

Air-leakage Classes & Limits

Ductwork fabricated from The *Kingspan* **Kool**Duct® System is designed to withstand a maximum static pressure of 4 in·w.g. / 1000 Pa, and can easily achieve SMACNA Air-leakage Class 3 with the 4-bolt, the aluminum grip and Tiger Clip coupling systems.

The graph shows the air-leakage limits for SMACNA Air-leakage Classes 3 to 48, over the range of pressures from 0 to 4 in·w.g. / 0 to 1000 Pa.



(Based on SMACNA HVAC Air Duct Leakage Test Manual, 1985 Edition, Figure 4-1 'Duct Leakage Classification')

Commissioning

The test pressure should not exceed the design pressure to which ductwork from The *Kingspan* **Kool**Duct® System has been fabricated. When pressure or air-leakage testing is known to be necessary, ductwork should be fabricated to withstand the test pressure, if greater than the design pressure.

Fabrication & Installation

Ductwork from The *Kingspan* **Kool**Duct® System should only be fabricated by specially trained fabricators who have completed The *Kingspan* **Kool**Duct® System Training Course. It is recommended that ductwork is fabricated in accordance with the methods detailed in The *Kingspan* **Kool**Duct® System Fabrication Manual series of publications. Ductwork should be installed using best practice methods in accordance with industry accepted standards.

Suitable Finishes

Standard

Factory-applied aluminum foil vapor barrier facing.

Cosmetic

Paint (consideration should be given to any effect that it might have on the thermal and fire performance of the finished ductwork).

Mechanical & Weather Protection

Aluminum sheet; aluminum-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 manufacturer recommendations and project specification requirements).

Maintenance & Cleaning

Ductwork fabricated from The *Kingspan* **Kool**Duct® System can be cleaned to industry standards, as required by NADCA ACR: 2006 (National Air Duct Cleaners Association: Assessment, Cleaning & Restoration of HVAC Systems), using many of the dry and non–abrasive cleaning methods offered through professional HVAC ductwork cleaning specialists. For suitable methods, refer to The *Kingspan* **Kool**Duct® System – A Specifier's Guide or Fabrication Manual series of publications.

Kingspan **Kool**Duct® Panels

Description

Kingspan **Kool**Duct® panels comprise a fiber-free rigid thermoset phenolic insulation core, faced on both sides with a protective and durable 1 mil / 25.4 micron aluminum foil that is reinforced with a 0.2" / 5 mm glass scrim.

Fiber-free Core

Kingspan **Kool**Duct® panels are available with branded silver aluminum foil on one side and plain silver aluminum foil on the other. Both facings are autohesively bonded to the core during manufacture.

The core is manufactured with a CFC/HCFC-free blowing agent that has zero Ozone Depletion Potential (ODP) and low Global Warming Potential (GWP).

General Properties

Property	Typical Value
Standard Dimensions	Length: 12.89 ft / 3930 mm Width: 3.94 ft / 1200 mm Thickness: 7/8" & 1 3/16" / 22 mm & 30 mm
Nominal Density Range of Insulation	3.43-3.75 pcf / 55-60 kg/m³
Closed Cell Content	> 90%
Specific Heat Capacity of Insulation	0.45 Btu/lb·ºF / 1.88 kJ/kg·ºC
Minimum Compressive Strength at 10% Compression (BS EN 826: 1996)	29 psi / 200 kPa
Thermal Conductivity (k-value / λ-value) at 50-74°F / 10-23ºC Mean (ASTM C 518)	0.146 Btu·in/ft²·hr·ºF / 0.021 W/m·K
Thermal Resistance (Material R-value: Installed & Out of Package) (ASTM C 518)	7/8": 6.0 ft²·hr·°F/Btu / 22 mm: 1.047 m²·K/W 1 3/16": 8.1 ft²·hr·°F/Btu / 30 mm: 1.428 m²·K/W
Operating Temperature Limits	-4°F to +176°F / -20ºC to +80ºC

Fire & Smoke Performance

When subjected to the Underwriters Laboratories Fire Test Standards specified in the table, *Kingspan* **Kool**Duct® panels, faced with branded silver aluminum foil on one side and plain silver aluminum foil on the other, have achieved the results shown.

Standard	Result
UL 723 (Test for Surface Burning Characteristics of Building Materials)	Flame spread / smoke developed indices: < 25/50
UL 181 (Factory Made Air Ducts & Air Connectors)	Burning (as part of fabricated duct section): Pass
	Flame penetration: 30 Minutes

Management Systems' Standards

Kingspan **Kool**Duct® panels are manufactured to the highest standards under a management system certified to ISO 9001: 2008, ISO 14001: 2004 and BS OHSAS 18001: 2007 and ISO 50001: 2011.

LEED®

Ductwork fabricated from The *Kingspan* **Kool**Duct® System can contribute points towards achieving credits, including pilot credits, in many of the LEED® (Leadership in Energy & Environmental Design) rating systems, developed by the USGBC (United States Green Building Council).

Compliance

UL (Underwriters Laboratories)

Ductwork fabricated from The *Kingspan* **Kool**Duct® System is UL Listed as a Class 1 Air Duct, to Standard for Safety UL 181 (Factory Made Air Ducts & Air Connectors), when fabricated to a specification clearly defined by UL. The UL Listing requires that ductwork is fabricated using:

- 25/32"-1 19/64" / 20-33 mm *Kingspan* **Kool**Duct® panels, produced at Kingspan Insulation's Pembridge, UK, manufacturing facility, faced with branded silver aluminum foil on one side and plain silver aluminum foil on the other, which are autohesively bonded to the insulation core during their manufacture;
- the 4-bolt, aluminum grip flange and / or Tiger Clip coupling systems;
- a 2 1/2" / 63 mm wide (minimum) aluminum foil vapor barrier tape that is UL Listed A-P to Standard for Safety UL 181 A (Standard for Closure Systems for Use With Rigid Air Ducts); and
- Kingspan High Performance Silicone Sealant / Caulk.

NFPA (National Fire Protection Assembly)

UL Listed ductwork fabricated from The *Kingspan* **Kool**Duct® System meets the requirements of Class 1 Rigid Air Ducts, as defined by:

- 90A (Standard for the Installation of Air-Conditioning & Ventilating Systems); and
- 90B (Standard for Warm Air Heating & Air-Conditioning Systems).

ANSI / ASHRAE / IESNA (American National Standards Institute (ANSI) American Society of Heating, Refrigerating & Air-Conditioning Engineers (ASHRAE) Illuminating Engineering Society of North America (IESNA) Standards)

- 7/8" & 1 3/16" / 22 mm & 30 mm *Kingspan* **Kool**Duct® panels meet or exceed the minimum duct insulation R-value requirements of 90.1: 2004, 2007 & 2010 (Energy Standard for Buildings except Low-Rise Residential Buildings), for heating and cooling supply and return ducts.

ICC (International Code Council)

- IECC (International Energy Conservation Codes): 7/8" & 1 3/16" / 22 mm & 30 mm *Kingspan* **Kool**Duct® panels meet the minimum duct insulation R-value requirements for supply and return air ducts and plenums.
- IMC (International Mechanical Codes): UL Listed ductwork fabricated from The *Kingspan* **Kool**Duct® System satisfies the requirements for non-metallic ducts constructed with Class 1 duct material, whilst *Kingspan* **Kool**Duct® panels exceed the flame spread & smoke developed requirements for foam plastic insulation used as interior trim in plenums.
- IBC (International Building Codes): UL Listed ductwork fabricated from The *Kingspan* **Kool**Duct® System satisfies the requirements for factory-made air ducts, constructed with Class 1 duct material.

Health & Safety

Kingspan **Kool**Duct® panels have a fiber-free insulation core and are odorless, non-tainting, non-deleterious, and chemically inert and safe to use. Further information is contained in the *Kingspan* **Kool**Duct® Panel Product Safety Information Sheet.

NB The reflective surface on this product (Kingspan **Kool**Duct® *panels and ductwork fabricated from the Kingspan* **Kool**Duct® *System) is designed to enhance its thermal performance. As such, it 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.*

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Kingspan Insulation LLC
2100 RiverEdge Parkway, Suite 175, Atlanta, Georgia 30328
info@kingspaninsulation.us
1800-241-4402
www.kingspaninsulation.us
www.kingspaninsulation.ca