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# The **KoolDuct**<sup>®</sup> System

## PRE-INSULATED DUCTING

### The KoolDuct System Benefits & Advantages

- Installed cost can be up to 10% cheaper than sheet metal ducting:
  - 15% of the weight of sheet metal ducting;
  - can be installed quickly by two people;
  - single fix fast track installation;
  - no lagging required;
  - 3m long segments rather than 1.2/1.5m;
  - fewer sections and less handling;
  - can be installed twice as fast as unlagged sheet metal ducting.
- Can yield electrical consumption savings of up to 20%:
  - air leakage is a fraction of sheet metal's;
  - best available thermal insulation;
  - provides the optimum energy saving and environmental solution.
- Space saving – can be installed flush to the ceiling.
- Fibre-free – suitable for food processing, pharmaceutical, medical and other clean air environments.
- Aesthetically pleasing appearance – suitable for open-to-view applications.
- Excellent strength-to-weight ratio and impressive moisture resistance – suitable for rooftop installations.
- Installed only by specially trained fabricators.
- Class O fire rating and negligible smoke emission.



## *The KoolDuct System*

### **KOOLDUCT COMPLETE SYSTEM TECHNOLOGY**

The Heating, Ventilation, and Air Conditioning (HVAC) industry is in the midst of a dynamic era. However, air ducting, a critical component of HVAC systems, has remained virtually unchanged since the early 1900's. Several factors and recent innovations have introduced the need to revolutionise air ducting. Building materials and insulating products have dramatically improved. Requirements for clean air are becoming increasingly stringent. Energy costs have continued to escalate. Changing fire and smoke regulations have raised the standards for compliance.

Kingspan Industrial Insulation is pleased to present a revolutionary approach to insulated ductwork. The KoolDuct System is like no other insulated ducting. It is the most advanced and innovative System of pre-insulated air distribution ductwork available in the UK and Ireland. The KoolDuct System of pre-insulated ducting is a proven, easy, innovative product providing a new perspective in the field of air distribution.



(Installed flush to the ceiling to overcome space limitations.)

William Hartley, Library, Caledonian University, Glasgow

(Plant room application.)





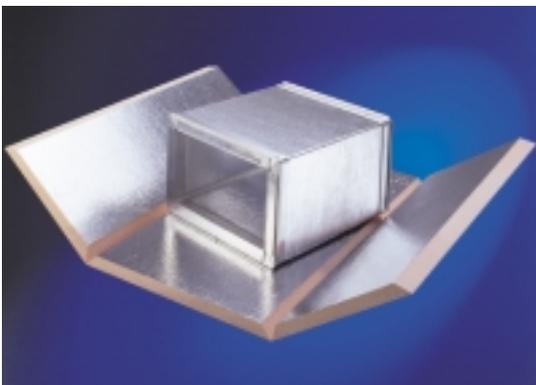
Rolls Royce, Derby  
(Installed close to the ceiling to overcome space limitations.)



Leriches Foods, Jersey  
(Exterior application – finished with Kingspan Childers KP55 painted magnolia.)



Thistle Marches Shopping Centre, Stirling  
(Exterior application – finished with Kingspan Childers Encacel T.)



This third generation System virtually eliminates all the problems of traditional metal ductwork while at the same time offering extra advantages to both the consulting engineer and the fabricator/installer. The System is the clear leader in the new generation of insulated prefabricated ducting and has already proved itself in the highly competitive global marketplace.

What's different about the KoolDuct System. Traditionally, ducting is made of sheet metal which is installed first and then lagged with insulation as a second operation. The KoolDuct System comprises pre-insulated ducting with aluminium surfaces in a single fix.

The KoolDuct System comprises duct sections fabricated from phenolic insulation panels and joined together with proprietary jointing systems.

## The KoolDuct System

### BENEFITS OF THE KOOLDUCT SYSTEM

#### INSTALLED COST

The installed cost of the KoolDuct System can be up to 10% cheaper than sheet metal ducting.

#### WEIGHT

The exceptional strength to weight ratio of KoolDuct ducting results in a duct that is lightweight and easy to handle and install. The KoolDuct System weighs about 1.4 kg/m<sup>2</sup> compared to over 10kg/m<sup>2</sup> for sheet metal ducting (about 15% of the weight). This results in much lower handling costs because fewer people are required to install a duct section and easier installation. Two people can quickly and easily install substantial sizes of prefabricated ducting.

Most older buildings involved in refurbishment projects are not designed to support the additional weight of insulated sheet metal ductwork. The KoolDuct System generally alleviates the requirement for additional structural support.

#### SPEED

The KoolDuct System has a single fix installation, by virtue of the elimination of the lagging operation, reducing site time and contractor management. The ability to manufacture 3m long segments rather than 1.2/1.5m long segments in the case of sheet metal ducting means fewer sections and less handling. This coupled with increased support centres and ease of handling results in a fast track installation. The KoolDuct System can be installed twice as fast as sheet metal ducting – not even taking lagging into account. Faster installation obviously means lower costs and no work disruption for other trades.

#### ENERGY EFFICIENCY & SYSTEM, RUNNING COSTS

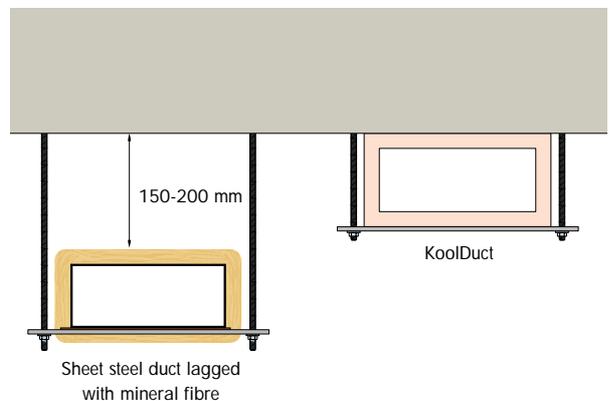
The superior insulation properties of the KoolDuct phenolic insulation panel, combined with minimal air leakage of the KoolDuct System yield significant electrical consumption savings of up to 20% because of reduced heating and cooling loads. The KoolDuct System provides the optimum energy saving and environmental solution in comparison with other ductwork systems.

#### AIR LEAKAGE

The KoolDuct System technology, the fabrication methodology combined with the patented jointing system and the complete line of bespoke accessories produce a System where the air leakage is reduced to a fraction of that found with sheet metal ducting. The KoolDuct System easily meets the air leakage requirements of HVAC DW 144 – Class C (high pressure). Sheet metal ducts leak air – most meet the air leakage requirements of Class A. It is difficult to get sheet metal ducts to achieve the air leakage requirements of Class C.

#### SPACE

The KoolDuct System is space saving by virtue of the elimination of space for the lagging or the lagging operation above the duct. KoolDuct ducting can be installed flush to the ceiling. This can typically save 150-200mm of valuable space above a false ceiling. Thinner insulation, because of the incomparable insulating efficiency of the KoolDuct phenolic insulation panel, further contributes to increased space savings.



### AIR QUALITY

The airstream through the hermetically sealed Koolduct System flows on only aluminium and does not have any contact with a material that produces loose fibres which could be harmful making it ideally suited for high specification projects. If the sheet metal ducting leaks, fibres can get blown off the duct and into the general environment then into recirculation systems and back into air handling system.

### VERSATILITY

The KoolDuct System can be installed internally, externally, concealed above a false ceiling or visibly mounted. It can be installed in very high temperature and relative humidity ambient operating conditions. The KoolDuct System can be installed in residential commercial and industrial applications and also for special applications such as food industries, pharmaceutical, special clean air applications and hospitals.

### AESTHETICS

The KoolDuct System is aesthetically acceptable in open to view applications.

### STRENGTH

KoolDuct ducting is very strong, does not require bracing for any size and is self supporting. KoolDuct phenolic insulation panels are capable of being permanently formed to the required shape and have sufficient strength to maintain their shape and duct integrity under operating conditions and limits covered by 'The KoolDuct System Design Guide'. Ducts of larger sizes and ducts subjected to high pressures may require additional stiffening as specified within 'The KoolDuct System Design Guide' to avoid deflection.



### INSTALLED BY TRAINED FABRICATORS

The KoolDuct System is installed only by specially trained fabricators. Comprehensive training guarantees uniform excellence. All registered contractors attend a specialised training course to ensure that uniform quality standards are maintained. An official certificate of competency is awarded to all trainees who successfully complete this training program. The course combines both theoretical and practical concepts:

- air flow dynamics, pressure and velocity;
- basic techniques in cutting and duct design;
- construction of a wide range of sizes and shapes;
- utilisation of aluminium profiles for duct reinforcement, duct jointing and connection to sheet metal ductwork components and plant; and
- an introduction to project cost estimation.

## The KoolDuct System

### PRODUCT DATA

#### KOOLDUCT PHENOLIC INSULATION PANEL SPECIFICATION

KoolDuct phenolic insulation panels are rigid flat boards manufactured from phenolic insulation laminated on both sides to protective low vapour permeability 25 micron aluminium foil reinforced with a 5 mm glass tissue mesh.

#### ENVIRONMENTAL PROPERTIES

In addition to its contributions to energy efficiency, KoolDuct phenolic insulation panels are entirely CFC-free. They provide designers and specifiers with an optimum solution towards compliance with international environmental agreements.

In terms of overall environmental efficiency on a cradle to grave analysis, Kooltherm can provide a very significant environmental advantage compared to all other insulation materials when specified to BS 5422: 1990 (Method for specifying thermal insulating materials on pipes, ductwork and equipment in the temperature range  $-40^{\circ}\text{C}$  to  $+700^{\circ}\text{C}$ ).

#### MOISTURE RESISTANCE

KoolDuct phenolic insulation panels have a >90% closed cell structure which makes them highly resistant to moisture penetration and also non wicking.

#### HEAT RESISTANCE

The KoolDuct System is suitable for use in peak temperatures as high as  $80^{\circ}\text{C}$  and continuous operating temperatures up to  $70^{\circ}\text{C}$ .

#### THERMAL PERFORMANCE

The thermal conductivity of KoolDuct phenolic insulation panels is  $0.018\text{ W/mK}$  at  $10^{\circ}\text{C}$ , the lowest of any commonly available insulation material, which allows the thinnest possible insulation to achieve the required thermal performance.

#### FIRE & SMOKE PERFORMANCE

The KoolDuct phenolic insulation panel's resistance to burning and spread of flame is far superior to that of any other cellular plastic insulation, regardless of facing type. In addition, there is an almost complete absence of smoke when subjected to a flame source. The KoolDuct phenolic insulation panel has been extensively tested by independent laboratories. The following tests have been successfully passed.

The KoolDuct phenolic insulation panel achieves a Class O rating to the Building Regulations based on the results of the following tests: BS 476: Part 6: 1989 (Method of test for fire propagation for products); and BS 476: Part 7: 1997 (Method of test to determine the classification of the surface spread of flame of products).

The KoolDuct phenolic insulation panel achieves a mean maximum obscuration not exceeding 5% when tested to BS 5111: Part 1 : 1974 (Laboratory methods of test for determination of smoke generation characteristics of cellular plastics and cellular rubber materials).

The KoolDuct phenolic insulation panel achieves the following results when tested to BS 6401: 1983 (Method for measurement, in the laboratory, of the specific optical density of smoke generated by materials): the avg. specific optical density (non-flaming mode) = 8; and the avg. specific optical density (flaming mode) = 5.

The KoolDuct phenolic insulation panel achieves a toxicity index not exceeding 6.9 when tested to NES 713 (Smoke Toxicity).

#### QUALITY ASSURANCE

KoolDuct phenolic insulation panels are manufactured to ISO 9002 : 1994 (Quality systems. Model for quality assurance in production, installation and servicing).

#### STANDARDS

Kooltherm phenolic conforms to the specification and dimensional tolerances laid down in BS 3927: 1986 (1996) (Specification for rigid phenolic foam for thermal insulation in the form of slabs and profiled sections), Table 1 (Type A).

It may be used to satisfy the requirements of BS 5422: 1990 and other major national specifications including, NHS CO2, NES Y50, M&E 100.

**TYPICAL PROPERTIES OF KOOLDUCT PHENOLIC INSULATION PANELS**

MOISTURE RESISTANCE Moisture Vapour Transmission of Foil Facing	1.21x10 <sup>-6</sup> g/MNs
NOMINAL DENSITY	55-60 kg/m <sup>3</sup>
DIMENSIONS Panel Length Panel Width Panel Thickness	2,950 mm 1,250 mm 22 mm ± 2 mm
AVERAGE COMPRESSIVE STRENGTH	249 kPa
AVERAGE FLEXURAL STRENGTH when tested to BS 2972: 1989 (Methods of test for inorganic thermal insulating materials)	1,200 kPa

**OTHER SYSTEM COMPONENTS**

To simplify duct jointing the System comes with a patented range of aluminium grip flanges – which also facilitate fast connection to generic ducting components such as fire dampers, VCDs, attenuators, flex duct and even conventional sheet metal ductwork.

A thermal break flange is available for high humidity or tropical environments.

And to facilitate greater efficiency and ease-of-working the KoolDuct System has been evolved to include standard accessories such as glue, tape, silicone sealant and gaskets – all highly specialised and manufactured specifically for the KoolDuct System.

All accessories have been rigorously tested in the laboratory and the field.

**FRictional RESISTANCE**

The basic principals of duct design and friction loss for smooth sheet metal ducting apply equally to the KoolDuct System. The pressure losses due to elbows, divergence, take-offs, contractions, expansions, etc. should be computed as for sheet metal ducting. Specifically, the designer should apply the same pressure drop factors for sheet metal duct fittings as defined in the current issue of the CIBSE Guide to Current Practice.

**HANDLING AND STORAGE**

Care should be exercised in handling Koolduct System components and duct sections. Storage should be under cover and all materials should be protected from the environment. In all cases where the materials are stored for prolonged periods, all open ends of ducts should be sealed with polythene sheet or other suitable materials to prevent the ingress of foreign matter.

**CLEANING**

The KoolDuct system can be cleaned with compressed air and vacuum, as in the High Jetting System.

**EASE OF USE**

The KoolDuct System is easy to manufacture and assemble in the workshop or on site requiring only hand tools.

**EASE OF MODIFICATION**

KoolDuct ducting is easily modified or repaired. Doors and hatches for cleaning and access can be readily added even post installation.

**TRACK RECORD**

The KoolDuct System concept started in Italy some 35 years ago as a solution to the problems presented by traditional sheet metal ducting.

So effective is the solution that as much as 35% of all ducting used in Italy is pre-insulated.

**TECHNICAL & SUPPORT SERVICES**

Application and installation advice, including customer and site visits where appropriate, is available from Kingspan's Technical Services Department.

Full design and specification literature for the KoolDuct System is available direct from Kingspan's Marketing or Technical Services Departments.

Health and Safety information and other data can be obtained direct through Kingspan's Customer Services.