

Issues to Consider

7 Ageing / Long Term Degradation

7.1 Mineral fibre insulants are not generally considered to be subject to degradation of their thermal performance. However research has shown that where a combination of moisture within the insulant and a heat source are present, permanent long term degradation of the matrix and fibres can occur.

Research by Low et al. (ASTM STP 922) into the material degradation of mineral fibre, revealed that significant changes can occur to the physical structure of the material under the combined influence of heat and moisture.

7.2 Measurements of the actual increase in thermal conductivity of the test material showed that degradation could vary between 15 and 20%, depending upon the density of the material and the level of heat input when the insulant was wet.

Permanent long term degradation of mineral fibre can occur due to the combined action of moisture and heat with a resulting **15-20%** degradation in thermal conductivity.

7.3 *Kingspan Kooltherm*[®] Duct Insulation consists of a densely cross linked structure which does not readily break down. Independent testing of *Kingspan Kooltherm*[®] rigid phenolic insulation (Thermal Measurement Laboratory, University of Salford) has shown that its thermal performance is not prone to long term degradation.

7.4 If moisture is able to penetrate the outer damaged cells of phenolic insulation, it will increase the overall thermal conductivity of the product slightly. However, it will not lead to any long term degradation of the product and will fully dry out once favourable environmental conditions exist.

7.5 Immediately after manufacture, *Kingspan Kooltherm*[®] Duct Insulation has a thermal conductivity (k-value) of approximately 0.017 W/m·K at 10 °C which increases to 0.021 W/m·K at 10°C during the first few months of the materials life. The thermal conductivity then remains stable for the service life of the product. An aged thermal conductivity of 0.021 W/m·K at 10°C is the value that should be used in all thermal calculations.

7.6 BS 5422: 2001 (Method for specifying thermal Insulating materials for pipes, tanks, vessels, ductwork and equipment operating within the temperature range -40°C to +700°C) subsection 5.1c specifies that “the materials (insulation) do not suffer permanent structural or physical deterioration as a result of contact with moisture.”

7.7 *Kingspan Kooltherm*[®] Duct Insulation is closed cell which considerably slows down any moisture absorption. It is not therefore subject to wetting, subsequent structural deterioration or any permanent long term reduction in their thermal performance. *Kingspan Kooltherm*[®] Duct Insulation therefore complies fully with the requirements of subsection 5.1c of BS 5422:2001 and can provide a more reliable long term thermal performance than mineral fibre materials.

Independent testing of *Kingspan Kooltherm*[®] Duct Insulation has shown that its thermal performance is not prone to long term degradation.

