Reflecting advantage

The radiant heat is invisible and has no temperature, but just energy. When this energy strikes another surface, it is absorbed and thereby increases the temperature of that surface. In summer, radiation from the sun strikes the outer surface of walls and ceilings and is absorbed causing the surface to heat up. This heat flows from the outer wall to the inner wall through conduction which is then radiated again, through air spaces in the building, to other surfaces within the building. Radiation between surfaces is through invisible, infra-red heat rays. Different types of insulation products reduce the heat transferred by conduction, convection and radiation to varying degrees. As a result, each of such materials provides different thermal performance and corresponding 'R' values. The primary function of reflective insulation is to reduce radiant heat transfer across open spaces, which is a significant contributor to heat gain in summer and heat loss in winter.

There are many types of materials that reduce heat gain and heat loss. Some materials provide greater resistance than others, depending on the mode of heat transfer: convection, conduction or radiation. Most insulation materials work on the principle of trapped air gas being a good insulator. Mass insulation like, 'INSUshield'- closed cell and FR cross-linked polyethylene foam use cellular walls of plastics; fibre glass wool uses glass fibers to reduce convection thereby decreasing the transfer of heat. These materials also reduce heat transfer by conduction due to the presence of trapped air. However, these products, like most building materials, have very high radiant transfer rates. Most building materials, including fiber glass, foam and cellulose have emittance values (E-values) in excess of 0.70. Reflective insulation typically has 'E' values of 0.03 (the lower the better). Owing to these features, reflective insulation is superior to other types of insulating materials in reducing heat flow by radiation. When reflective insulation is installed in building cavities, it traps air (like other insulation materials) and reduces heat flow by convection thus addressing all three modes of heat transfer. In all cases, the reflective material must be adjacent to an air space. Aluminium, when sandwiched between two pieces of plywood or between two concrete layers, for example, will conduct heat at a high rate. The conductive insulation material should always be in contact with the substrate for better insulation.

The Concept:

A reflective insulation system (RIS) is typically formed by layers of aluminium or a material with low emissions and has enclosed air spaces which in turn provides highly reflective or low emitting cavities (air bubble film) adjacent to a heated region. The performance of the system is determined as per the emission nature of the material(s) and the size of the enclosed air spaces. The smaller the air space, lower will be the heat transferred by convection. Hence, to minimise the heat flow by convection, a RIS with multiple layers of aluminium and enclosed air space(INSUreflector), is positioned in a building cavity (stud wall, furred-out masonry wall, floor joist, ceiling joist, etc.) to divide the larger cavity (3/4" furring, 2" x 4", 2" x 6", etc.) into smaller air spaces. These smaller trapped air spaces reduce convective heat flow.

DRIS vs Conventional Mass Insulation:

- Reflective insulation has very low E-values (typically 0.03 compared to 0.90 for most insulation) which significantly reduces heat transfer by radiation
- A reflective insulation does not have significant mass to absorb and retain heat
- Reflective insulation has low moisture transfer and absorption rates, in most cases
- Reflective insulation traps air with layers of aluminium and air-bubble film plastic as opposed to mass insulation which uses fibers of glass, particles of foam, or ground up paper
- Reflective insulation does not irritate the skin, eyes, or throat and contain no substances which will out-gas
- The change in thermal performance due to compaction or moisture absorption, a common concern with mass insulation, is not an issue with reflective insulation

Shield of perfection

'INSUreflector' offered by Supreme is made of polyethylene Air Bubble Film (ABF) laminated with aluminium foil on one or both sides. The bright surface of the aluminium foil reflects 96 to 99 per cent infra-red radiation received by the surface of a heated slate roof. It protects the building from undesirable heat gain. The thin reflective foil having low emissivity and high reflectivity when installed with an air space restricts the transfer of far-infrared radiation making it an ideal material to be used for under-deck application.

'INSUshield' is a non-fibrous, fire retardant, closed cell, tri-dimensional chemically cross-linked polyethylene foam XLPE. The product is regarded as an ideal eco-friendly material offering a perfect solution to meet insulation needs for ducts, roofs, pipes, vessels etc. The various advantages of 'INSUshield' are ease of installation, low thermal conductivity and good moisture and vapour resistance preventing microbial growth and optimum condensation protection.

SUPREME SOLUTIONS

- Ducting insulation – hospitals, shopping malls, airports, PEBS, IT, BPO etc
- Pipe insulation – Split AC tubings, chiller and drain pipes, chilled water lines etc
- Floor insulation – server room, data centre, medical and diagnostics centre and control room for petrochemicals
- Underdeck insulation – PEBs, textile unit, malls, airports etc
- Overdeck and wall insulation – Commercial and residential buildings, cold storages etc.

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