

# T-FIT<sup>®</sup> Process

Impact of insulation cladding on personal protection performance

# T-FIT<sup>®</sup>

INSULATION

Fit to perform. Fit to last



Traditional insulation systems are often clad with an outer layer to protect the insulation from physical and environmental damage, such as the absorption of moisture, as well as providing uniform aesthetics across the system.

Metallic cladding, such as aluminium foil, is an efficient conductor of thermal energy and thus when heated to high temperatures can transfer this heat quickly to skin when touched, causing burns. Given the wide use of metallic cladding in insulation applications, specifications tend to limit the outer surface temperature of the insulation to around 60°C to prevent burn injuries sustained by touching the insulation. Zotefoams have developed a different approach with their T-FIT Process product range, where an aluminium based

composite coated with a PET film is used as outer cladding, replacing traditional metallic foils. See fig.1 below. PET films are plastic materials and thus are much poorer conductors of heat compared to metallic foils. In practice, this means that the outer surface temperature of products clad with aluminium/PET composite films can be higher than 60°C without causing human injury. It is the contact temperature that is important, rather than the surface temperature.

Contact temperature is measured using a thermesthesiometer probe (according to ASTM C 1057), which imitates the finger's thermal response when pressed against a heated surface over a certain time period. This is the temperature we 'feel'.

Surface temperature is measured using devices such as thermocouples, which are electrical conductors fixed to the surface. This is the actual temperature of the surface.

| Product            | Pipe temperature | Maximum 5 s contact temperature recorded (°C) | Measured surface temperature (°C) |
|--------------------|------------------|---|-----------------------------------|
| T-FIT Process clad | 189              | 40  | 78                                |



**Figure 1**

- PET 23µm
- 9µm aluminium
- Glass scrim 2x2
- 20g/m<sup>2</sup> LDPE coating

On test equipment, Zotefoams can demonstrate that an operator can safely touch the surface of a T-FIT Process tube with 6.35 mm wall thickness and clad with aluminium/PET film composite on a pipe with process temperatures of 200°C, even though the measured surface temperature can be as high as 90°C. Injury is not sustained, despite the high surface temperature, because the PET film is an extremely poor conductor. The maximum skin contact temperature measured is only around 40°C after 5 seconds contact (standard reaction time in an industrial

environment). These contact temperatures are deemed safe as they are below the threshold temperature for burn injuries over this time frame.

The widespread use of metallic cladding systems may have given rise to an acceptance that 60°C is the upper surface temperature limit with regards to personal protection, but substitution of this cladding with the composite described above allows operators to be protected even when temperatures exceed this so-called limit.

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