

Thermal Defence Products Energy and SMR



The Supplier of Choice in Modular Microporous Thermal Insulation for Energy Infrastructure

Thermal Solutions for the Energy Sector – SMRs, AMRs & Nuclear Applications

MTE's advanced thermal insulation systems are engineered for high-performance energy applications, with a particular focus on Small Modular Reactors (SMRs), Advanced Modular Reactors (AMRs), and broader nuclear power systems. These solutions are designed to operate in extreme environments, meeting the demanding thermal and mechanical requirements of modern energy infrastructure.

Utilising innovative microporous insulation materials, our non-metallic systems deliver exceptional thermal efficiency, especially where space and weight constraints are critical. This makes them ideal for specialist energy applications requiring reliable, compact, and lightweight insulation.

Developed for high-specification energy environments, MTE's systems not only safeguard industrial assets and personnel but also enhance process efficiency and contribute to energy conservation.

Backed by extensive industry experience and specialist design and engineering capabilities, MTE provides a full turnkey service—from concept to delivery—offering custom-made solutions.

Industries

MTE's thermal insulation solutions are designed for demanding energy and industrial applications, with a particular focus on Small Modular Reactors (SMRs), Advanced Modular Reactors (AMRs), and broader nuclear power systems. These products are engineered to perform in high-temperature environments where space and weight constraints are critical:

Our systems are suitable for a wide range of sectors, including:

- **Nuclear Energy** – SMRs, AMRs, and conventional nuclear infrastructure
- **Energy Systems & Industrial Infrastructure** – including high-temperature processing and thermal containment
- **Carbon Capture & Storage (CCS)** – where thermal management is essential for process efficiency
- **Renewable Energy** – such as concentrated solar power (CSP) and hydrogen production systems
- **Advanced Manufacturing & Defence** – where robust, lightweight insulation is required for extreme conditions

These industries benefit from MTE's non-metallic, microporous insulation technologies that deliver exceptional thermal performance, durability, and compliance with stringent environmental and safety standards.

In addition to energy sector use, MTE's Modular Microporous Thermal Defence Insulation systems are ideally suited for a range of naval, marine, and defence applications. These include:

- Large and small marine vessels
- Large and small-bore pipework
- Compact and complex components
- Defence vehicles – including land-based, naval, and airborne platforms

These applications benefit from MTE's lightweight, non-metallic insulation systems that offer high thermal performance, durability, and ease of installation in demanding operational environments.

The complete solution

Our Thermal Defence products are engineered to meet the highest standards of quality, thermal and mechanical performance, while optimising weight and cost efficiency. They are fully compliant with stringent environmental regulations and legislative requirements.

- Professional end-to-end project managed service
- Design, fabrication, delivery and installation
- Quality Accreditation to ISO 9001: 2015
- Health and Safety Accreditation to OHSAS 18001
- Water ingress testing in accordance with BS EN 60529:1992+A2:2013 Levels IPX3, IPX4, IPX5, IPX6

Design and Testing

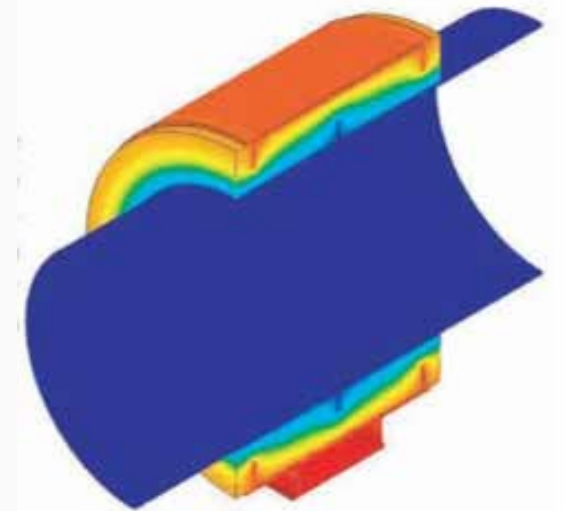
MTE's advanced thermal insulation systems are The MTD team comprises experienced in-house design engineers with the expertise to fully develop, test, and qualify high-performance thermal insulation systems tailored for demanding energy applications, including Small Modular Reactors (SMRs).

Our capabilities include detailed thermal calculations to support the reduction of surface heat loss and temperature levels, aligned with client specifications. We also provide qualification support to ensure structural integrity and long-term resistance to shock and vibration—critical factors in SMR environments where reliability and safety are paramount.

These insulation systems have been rigorously validated to meet stringent thermal and structural performance criteria. Additionally, they are engineered to protect complex geometries using strictly controlled materials with minimal levels of Fluorine, Chlorine, and Sulphur—ensuring compliance with nuclear industry standards and environmental safety requirements.

The product is thermally conditioned prior to delivery to ensure safe in-service performance, preventing the release of toxic gases or Volatile Organic Compounds (VOCs).

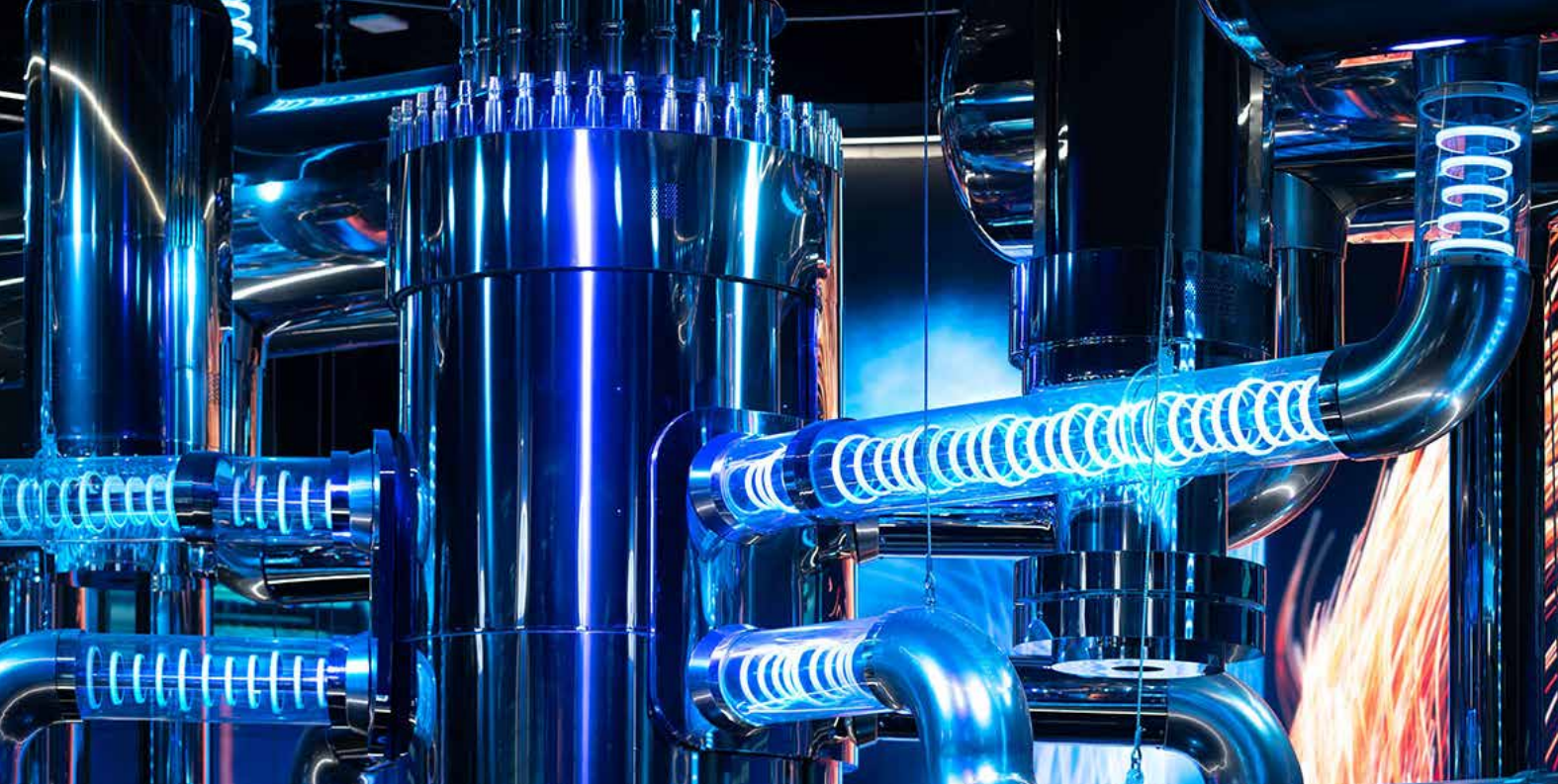
The MT-TD design team utilises both proprietary and industry-standard software—such as Autodesk Inventor and Nastran—for advanced thermal and structural analysis. Strong links with independent testing facilities also support future qualification needs.



Extensively Tested

To meet the rigorous performance and safety requirements of our existing clients—particularly within nuclear and energy sectors—our Thermal Defence products have successfully undergone and passed the following validation tests:

- System Thermal Conductivity Validation
- Fluid Resistance / Water-Proof – IPX6
- Shock & Vibration
- Foot Traffic & Impact
- Environmental (Humidity & Mould Growth)
- Fire – Propagation BS476 Part 6:1989 + A1:2009
- Fire – Spread of Flame BS476 Part 7:
- Fire – Toxicity / Smoke Density & Oxygen Index



Industry Experience

MTE collaborates with key stakeholders across the nuclear and defence sectors, contributing to the development of advanced reactor systems and propulsion technologies. These partnerships include involvement in next-generation Small Modular Reactor (SMR) programmes, where MTE provides high-performance thermal insulation solutions for critical components exposed to extreme thermal and environmental conditions.

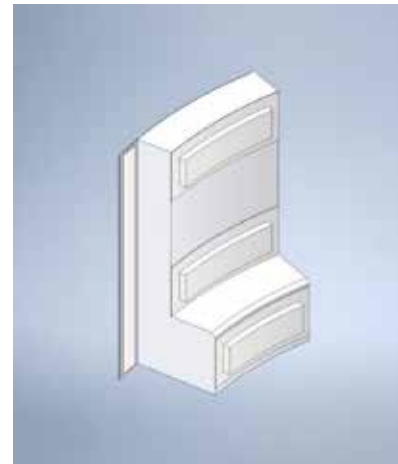
Our systems are integrated into projects requiring compact, lightweight, and highly efficient insulation—essential for modular reactor designs that prioritise scalability, safety, and long-term operational reliability. MTE's contributions support the broader goals of clean energy innovation and strategic infrastructure development.

These collaborations reflect MTE's commitment to technical excellence, quality assurance, and innovation in supporting both national energy strategies and defence capabilities.

Engineering Capabilities

The MTD team includes experienced in-house design engineers with extensive product knowledge, enabling the delivery of tailored thermal defence solutions—from complex bespoke components to standard off-the-shelf parts.

Utilising industry-standard design software such as Autodesk Inventor, our engineers produce detailed 3D models that integrate directly with CNC and laser machining systems at MTD's production facility. This seamless workflow ensures precision manufacturing and efficient turnaround for both custom and repeatable insulation components.



Above: 3-D model (top) and 3-D panel (bottom)

Fully Qualified

The Thermal Defence product range is fully verified and qualified for deployment in highly demanding environments. Beyond rigorous testing, these systems also meet a comprehensive set of performance and compliance criteria, including:

- **Design Life (+30 Years)**
- **Extreme Thermal Efficiency – saving 50% on weight ***
- **Extreme Thermal Efficiency – saving 50% on space ***
- **Every Part – Fully Traceable back to Datasheets & MSDS**
- **Easily Demountable – for inspection purposes.**
- **Ergonomic Panel Sizes – easy to install & remove**
- **Non-metallic, robust and easily cleaned outer surface**

*when compared against traditional insulation materials.





The Thermal Defence Facility

Operating from a newly commissioned facility purpose-built for the manufacture of Thermal Defence products, we utilise precision machinery to ensure consistent quality and performance.



Manufacturing Equipment

Using a combination of laser cutting and CNC routing, board materials are precisely machined, and encapsulation components are accurately shaped to specification.





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