

Microporous Insulation, and Design and Build Solutions

[ThermoDyne](#)

Thermal solutions provider ThermoDyne produces microporous insulation materials and designs high performance insulation systems. The company offers a fully in-house design engineering capability, total in-house production and technical service support

ThermoDyne, which fabricates everything needed for a thermal solution, believes it produces the most efficient types of insulation systems available on the market today. The company's microporous insulation systems possess a thermal conductivity lower than that of still air and minimise all modes of heat transfer simultaneously within minimum space and weight requirements. The thermal solution is dictated by the application: whether the final insulation sub-assembly is a soft flexible part, a semi-flexible stainless foil metal blanket, or a more rigid, heavier gauge stainless structure.

ThermoDyne has the capability to produce everything needed in house, ensuring rapid design and build of the parts required whether they are produced on a sample, prototype, preproduction or production basis. Designs may include other types of materials besides microporous insulation, such as felts, mats, fabrics, coated fabrics, silicon, Teflon, plastics, stainless steels (321, 304, 316, 309, or others), Inconel, aluminum, titanium or Hastelloy - whatever may be appropriate for the application. Mostly customers just present the problem and leave ThermoDyne to design a solution. The customer's goal is typically to move on his next problem. ThermoDyne's goal is to get the problem solved, design the solution and start producing production components.



Mail Defender

Physical characteristics

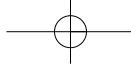
Microporous insulation is essentially a combination of fine ceramic and metallic oxide powders and fibres. These materials, along with other additives that vary depending upon the application, combine to form a high temperature material that provides excellent thermal stability, extremely low thermal diffusivity and a thermal conductivity that is lower than still air.

Often, the microporous material is encased in a fabric or metal shell for ease of handling and added strength, but it can also be quilted (for improved flexibility), moulded, machined or fabricated to meet intricate part requirements. The material can also be pressed into metal castings or casings and then machined out to provide insulation for piping, electronics equipment and power units.

Microporous insulation is ideal for any high temperature environment (up to its continuous service temperature of 1,800°F), and has been used historically in the aerospace, automotive, industrial and commercial markets where, without compromising thermal performance, space and weight are critical considerations. Recently the extremely low thermal diffusivity has been of great importance in applications that are very energy intensive and run continuously for long periods.

Compression resistance

In general, the compression resistance of microporous material is good. As the density of the product increases, the compression resistance increases as well. As a result, high density board products offer excellent compression resistance for applications where large weight bearing



Corporate Feature

loads are employed or expected. There is enough compression resistance to allow vacuum bagging applications to be performed on the low density 8lb/ft³ flexible materials.

The performance of microporous materials increase as the pressure goes down. This is true even at altitudes as great as 35,000ft.

Product application

The MailDefender project provides an example of the special problems that ThermoDyne has been ask to solve. This application required a solution that ensured a special security device was able to provide a uniform temperature throughout its volume and low thermal mass for rapid heating and cooling. Besides thermal insulation, the application called for a detailed stainless steel fabrication.

The resulting custom unit performs a vital role in eradicating any smallpox, anthrax, plague, e.coli, ricin, ebola, botulism, avian flu, Hantavirus or tuberculosis bacilli, etc,

that may be contained within the customer organisation's mail. The smallest incursion of anthrax into a building could shut a building and the work being carried on there down for months.

Benefits

In summary, the benefits of microporous insulation are:

- **Space and weight saving**
Although this is most readily appreciated in the aerospace industry, there are also many tangible benefits to saving space and/or weight in industrial and commercial applications
- **Energy saving**
Far less energy is consumed in applications where microporous insulation involved compared traditional materials

ThermoDyne microporous insulation applications include:

Aerospace

- Engine nacelles
- Thrust reversers

- Fire protection
- Flight data recorders
- Auxiliary power units

Naval

- Fire protection
- Nuclear powerplants and shielding
- Auxiliary power units

Army/Ground


- Repair technician protective clothing
- Chemical/biological "Sniffer" units
- Engine heat shielding
- Firewall and fire protection
- Auxiliary power units

Munitions


- Thermal batteries
- Avionics housings
- Data recording equipment
- Firewall and fire protection (eg, ammo boxes)
- General insulation for KEM and high velocity smart-rounds
- General insulation between boiler/engine and guiding electronics for KEM (high velocity), torpedo, general "smart" munitions, and launching systems. ■

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