



FeatherFlex™ Microporous Insulation

FeatherFlex Insulation Systems

FeatherFlex™ Insulation systems are the flexible version of Thermo Dyne's Microporous insulation product line. The superior thermal performance of FeatherFlex insulation allows the maximum amount of thermal protection to be provided within space and weight requirements. FeatherFlex Microporous insulation is a blend of ceramic powders and fibers combined to produce a high temperature material that provides excellent thermal stability, low thermal diffusivity and the lowest thermal conductivity.

FeatherFlex is specially formulated to block all three forms of heat transfer. Conduction is minimized through the use of a ceramic powder, which has intrinsically low thermal conductivity. In addition, the powder is formed to create a porous structure, minimizing the energy conducted through the solid material. Convection is minimized by using a powder with an extremely fine particle size, which forms void spaces, which are on the order of magnitude of the mean free path of the air molecules. The radiation portion of the heat transfer increasingly becomes the dominant mode as application temperature increases. The infrared heat transmission through the insulation is reduced to the lowest levels possible by the addition of special opacifiers with in the Excelflex formulation.

Materials of Construction

FeatherFlex Insulation Systems are composed of a high temperature core material, which is encapsulated between two layers of high temperature cloth. This assembly is then compressed into a uniform thickness and density and then sewn to form the finished composite. The stitching provides structure, strength, and consistent distribution of the core material, while allowing the insulation to be flexible enough to be wrapped around irregular shapes.

The FeatherFlex core has a 1800°F continuous use rating, and is capable of withstanding a 2000°F fire test for 15 minutes. FeatherFlex insulation systems are supplied with our standard E-Glass fabric covering, which provide the thermal stability necessary for most applications. Other fabrics are available upon request, which provide protection up to 2300°F. Thread material selection is based upon the application's temperature requirements, and is typically E-glass or quartz. FeatherFlex is available in standard (16pcf) and lightweight (8 or 10pcf) densities and thickness from 1/8" to 1/2".

FeatherFlex Insulation Systems Advantages

With a Microporous core and versatile composite options, FeatherFlex offers several major advantages over other insulation materials in high performance applications.

Lowest Thermal Conductivity

Microporous ceramic powders and fibers work together to form a material with the lowest possible thermal conductivity, thermal diffusivity and heat storage. This enables FeatherFlex to provide the maximum thermal protection utilizing the least amount of weight and space.

Lightweight and Saves Space

Low core densities result in mass savings for weight sensitive applications commonly encountered in the Aerospace industry. In applications where space is a problem, low thermal conductivity means less material thickness is required to achieve the desired thermal energy flux reduction.

High Temperature Capability

FeatherFlex can be manufactured to meet high temperature requirements including intermittent exposure up to 2300°F.

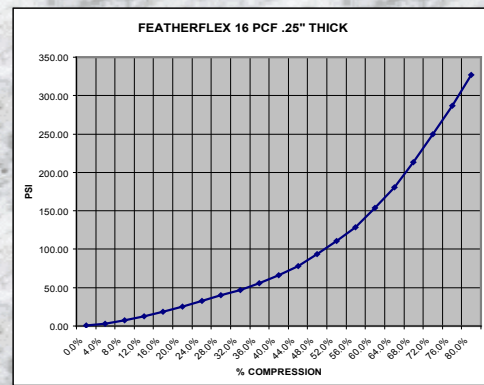
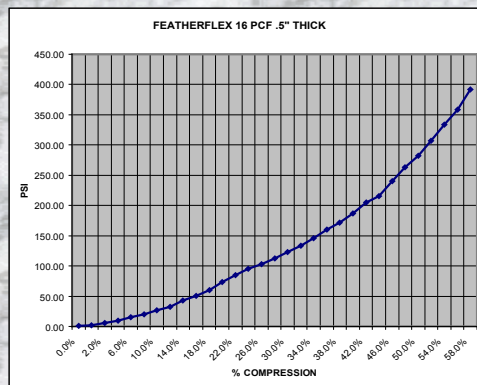
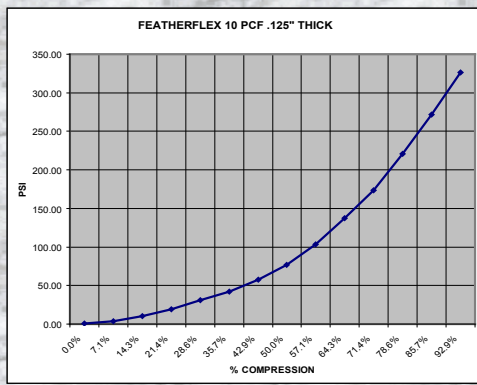
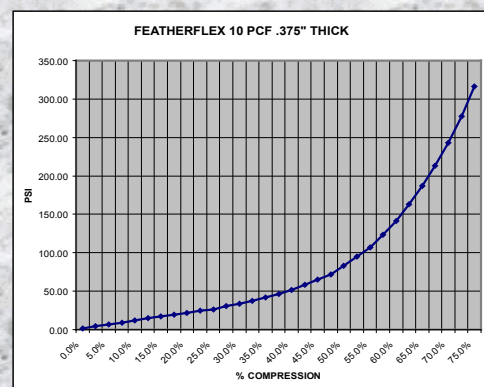
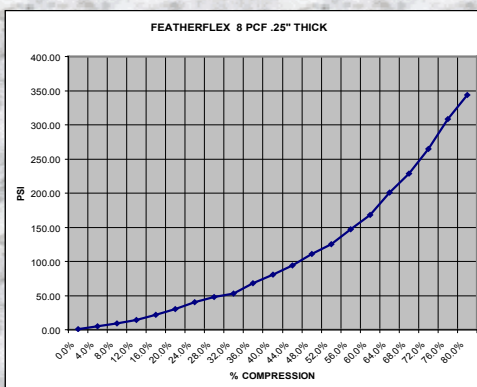
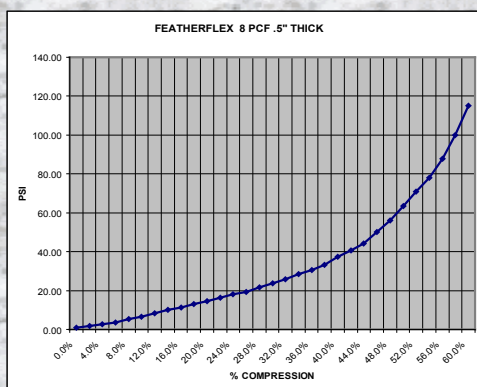
Flexible

The quilted stitch pattern provides strength, yet allows the composite to remain flexible enough to insulate irregular shapes and survive in service for long periods of time.

Easy Fabrication

Complex shapes can be easily made by cutting FeatherFlex with a sharp razor knife, die or laser. Edges can be sealed by sewing closed with a strip of similar fabric used on the composite.

FeatherFlex™ Compression Data for different densities and thicknesses.



FeatherFlex™ Materials Technical Data

Thermal Conductivity For Material in Btu-in/hr-sqft-°F / (W/m²K)*

Mean Temp °F (°C)	8 PCF Core Density	10 PCF Core Density	16 PCF Core Density
200°F (93°C)	.14 (.020)	.13 (.019)	.12 (.017)
400°F (204°C)	.15 (.022)	.14 (.020)	.13 (.019)
600°F (315°C)	.17 (.025)	.15 (.022)	.14 (.020)
800°F (426°C)	.19 (.027)	.17 (.025)	.15 (.022)
1000°F (537°C)	.22 (.032)	.19 (.027)	.16 (.023)
1200°F (648°C)	.24 (.035)	.22 (.032)	.18 (.026)
Specific Heat Btu/lb - °F	.25	.25	.25
Emissivity	.85	.85	.85

Typical Size (standard) (in) 36x36 and 36x72, (mm) 915x915 and 915x1830**

FeatherFlex™ Systems offer a variety of solutions for the following types of applications:

Thermal battery systems	Aircraft galley equipment	Engine nacelles	Chemical boilers
Weapons avionics housings	Nuclear vitrification	Struts and cowlings	Bleed air ducts
Data recorder systems	Explosives detection devices	Fire Walls	Auxiliary power plants (APU)
Missile engine firewalls	Aircraft avionics & electronics	Nuclear powerplants	Turbine engine exhaust ducts
High performance ovens	Hazardous waste disposal	Fuel cells & reformers	Diesel engine exhausts

* All thermal conductivity values have been measured in accordance with ASTM Test Procedure C-177. When comparing similar data, it is advisable to check the validity of all thermal conductivity values to ensure the resulting heat flow calculations are based on the same condition factors. Variations in any of these factors will result in significant differences in the calculated data.

** Additional sizes, thicknesses and densities are available upon request. It is very common to have different sizes for specific programs that are produced continuously.

Note: Additional information on FeatherFlex is available from Thermo Dyne upon request. For questions regarding the performance and application possibilities of any of these materials, please contact Thermo Dyne's Engineering Department at 574.522.3606 or Fax 574.293.0047.



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