Esterline
Engineered Materials

28065 Franklin Parkway / Valencia, CA 91355-4117 / ph 661-775-1100 / fax 661-775-1155

Bulletin 7210: Fire Barriers

DESCRIPTION

Whether you need a firewall penetration or pass-through, bulb seal, air duct, shroud, or panel, Kirkhill-TA makes an elastomer-based fire barrier to meet your need. Kirkhill-TA's fire barrier product line includes paint, adhesive, paste, chemical-resistant and EMI coatings, and other compatible elements that can be combined to optimize cost, weight, and performance. Most of the products meet FAA aircraft interior requirements for heat release, optical smoke density, and toxicity. All products, when correctly specified, block the ISO (1100°C, 116 kW/m^2) and FAA (2000°F, 10 BTU/ft^2•s) standard fire test flame over a minimum 322 cm^2 (50 in^2) test area for 15 minutes without burnthrough or backside ignition.

BENEFITS

- Reduces weight, installation time, and foreign object damage risk and increases maintainability through single or minimal piece constructions
- Eliminates sealant and potting since elastomer fire barriers can be designed to provide corrosion-proof, fuel-resistant, hermetic sealing
- Reduces vibration and noise and compensates for assembly tolerance stackup with elastomeric material system
- Prevents structural damage and heat-induced fires behind firewall since the fire barriers are good thermal insulators
- Tailorable system approach offers an optimized solution to any application design requirements

USES

The world's leading aerospace companies are using Kirkhill-TA elastomer-based fire barriers in a wide range of applications including: (1) Engine core exit seals, (2) Auxiliary power unit (APU), engine nacelle, and other firewall tube and wire pass-throughs, (3) Nacelle fire seals, (4) Nacelle air ducts, (5) Engine and nacelle component shrouds.

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Lightweight thermal fire barrier composites (TFBC) are being used as a thermal insulating, fireproof skin in the conversion of expensive titanium and heavy steel components to lower weight and cost aluminum and composites. Most non-metallic fire barrier materials are parasitic, i.e. they are attached to other supporting material such as steel or titanium panels. In many cases, TFBC can be used in place of metal panel firewalls.

New ideas and concepts, initiated in coordination with our customers, are continually being developed to replace divergent material systems with Kirkhill-TA fire barrier products.

CONFIGURATIONS

Kirkhill-TA can produce an elastomer fire barrier for any application, including complex molded shapes of lightweight, composite sheet for fireproofing and heat protecting large surfaces. Call for details.

SPECIFICATIONS

Kirkhill-TA elastomer fire barriers are based on common silicone chemistry and thus have performance properties typical of silicone chemistry and thus have performance properties typical of silicones. Special formulations are available to withstand service temperatures in the 260°C to 316°C (500°F to 600°F) range (EXTREME•HEAT™ 650) with excursions to 371°C (700°F). Kirkhill-TA also produces fluorosilicone compounds and fluorocarbon coatings for better chemical resistance. Silicone-based metallic coatings are available for EMI protection and silicone-based paste and paint are used for repair of elastomer fire barriers and coating metals, respectively.

Most elastomer fire barrier designs use ceramic or fiberglass fabric reinforcement for added strength and fire resistance. Many large designs use closed cell silicone sponge, ceramic wool or other light-weight, insulating materials as cores. For added strength and rigidity, honeycomb core material can be incorporated into these fire and thermal barriers. Kirkhill-TA elastomer fire barrier products are tested in accordance with generally accepted industry fireproof standards including ISO 2685 and FAA AC 20-135. Complete material specifications and test reports are available for all material systems.

HEAT PROTECTION

A successfully extinguished aircraft fire can still result in heat damage to aircraft structure, wiring, and support systems. The graph below compares the backside temperature of 1mm (.040 inch) titanium plate (arial density .45 g/cm^2 (.0064 lb/in^2)) and a 6mm (.25 inch) thick elastomer TFBC (arial density .39 g/cm^2 (.0055 lb/in^2)) during a burn test with a kerosene flame (1100°C, 116 kW/m^2 (2000°F, 10 BTU/ft^2•s) flame over a 322 cm^2 (50 in^2) test area). Within one minute, the titanium reaches a backside temperature that is hot enough to damage or ignite many common aircraft materials. The TFBC remains cool enough to avert damage.