Multilayer Heat Shield

Integrated Thermal Protection and Calorie Containment

The iso flux$_{TM}$ product in the Lydall flux$_{TM}$ product family is a thermal encapsulation that serves to protect sensitive components from heat radiated by the exhaust line and maintains thermal calories in the exhaust line to facilitate catalyzation and filtration processes. A low thermal conductivity fiber is placed in direct contact with the exhaust line component and is covered with thin metal layer.

Metallic Layers

(i) Stainless Steel

- Austenitic and Ferritic grades based on temperature, environmental and economic constraints.
- Flat or embossed
- Shield T_{max} < 1000 °C

(s) Aluminized Steel

- Various aluminized coating weights as a function of environmental/corrosion resistance requirements
- Flat or embossed
- Shield T_{max} < 500 °C

(a) Aluminum

- Flat or embossed
- Shield T_{max} < 300 °C

Insulation Layer

(n) Fiber

- Thickness can be varied based on packaging space through the use of a 3D formed fiber
- 2D mat thickness ranges from 1 mm to 25 mm
- Low thermal conductivity
- Low shot content – excellent mechanical durability
- High Operating temperature ~1100 °C

Thermal Performance

- Low emissivity surfaces for high IR environments + low thermal conductivity
- Combined functions: thermal shielding and isolation
- Homogenous temperature distribution in exhaust component

Acoustical Performance

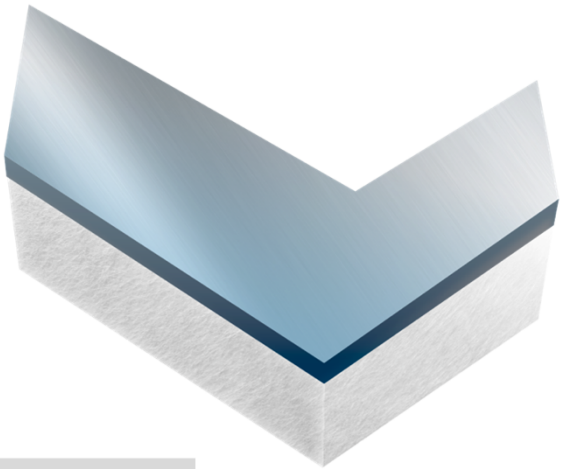
- Decoupling of exhaust component with the engine compartment
- Marked noise absorption on fiber side
- Option to pierce/perforate the metallic layer to increase noise absorption

Assembly

- In-house: hemming, spot welding or mechanical fasteners
- Delivered ready to assemble – through similar or customer specific methods

Applications

- Turbochargers – Improved operation through homogenized temperatures
- Catalytic Converters – Improved oxidation at start-up
- Manifolds for improved scavenging
- No_x Filters – More efficient regeneration cycles



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V3.2015

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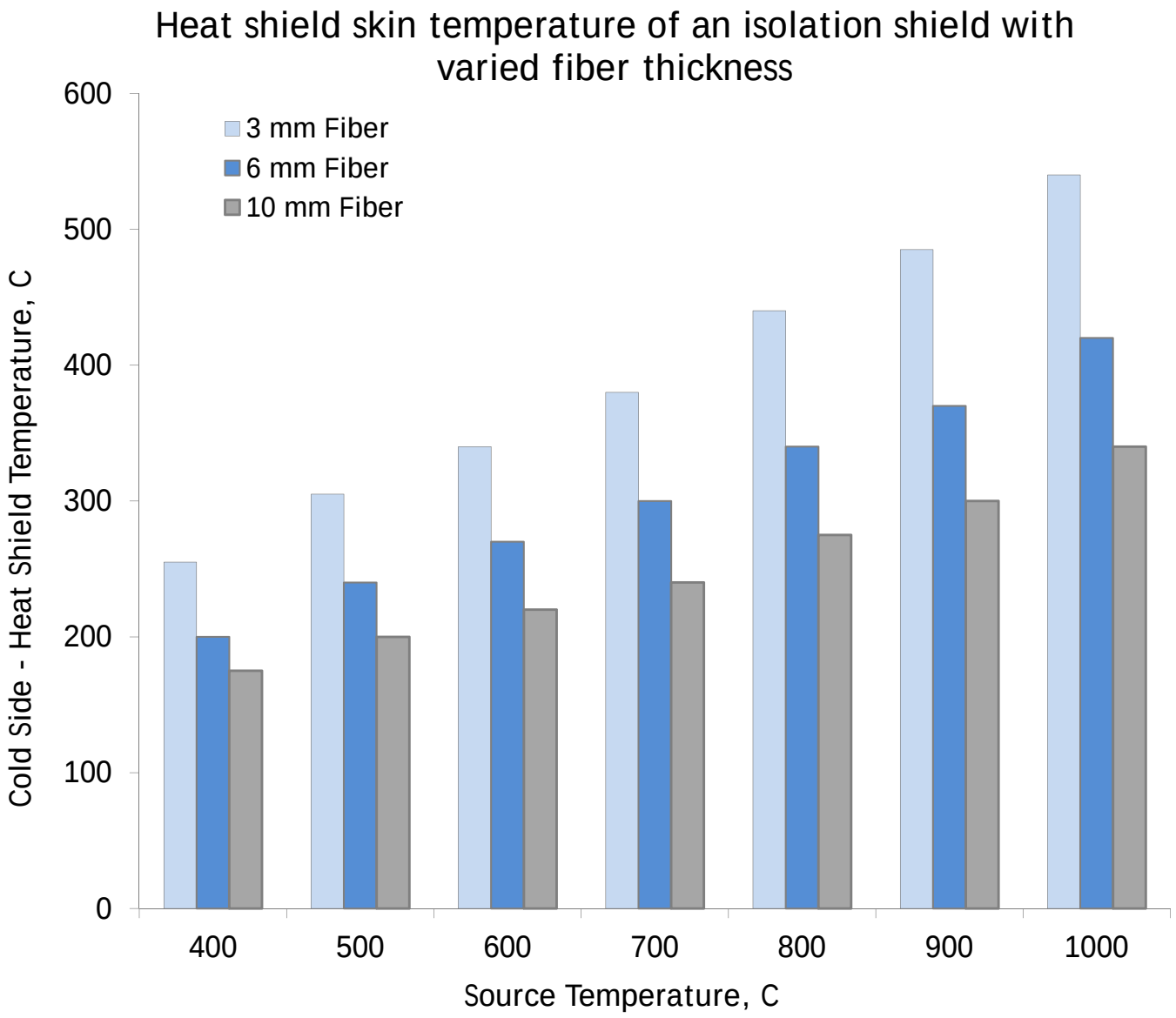

Design Considerations

- Metal gauge will not impact thermal performance and should only be considered for durability and assembly
- Embossing facilitates the metal forming process and rigidifies the parent materials, but does not affect thermal performance
- The shell assembly can be completed through hemming, spot welding or through the use of mechanical fasteners
- Ambient air temperature and convection effects play a large role in component and shield temperatures
- Consider the application area and distinguish between Underbody and Underhood applications
- Distance plays a fair role in determining thermal responses, but influences temperatures only across large incremental changes
- The mechanical integrity of the single layer shield is highly coupled to the location of lower order vibration modes and their amplification relative to vibration input levels and frequencies
- Contact us for applications support; we are quietly keeping it cool

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