# Multilayer Heat Shield

## Engineered Performance and Value

The k flux$_{TM}$ product in the Lydall flux$_{TM}$ product family is designed for high temperature applications where superior and more thermally efficient materials are required. Through the combination of low emissivity metals and a high temperature low thermal conductivity insulating media, k flux$_{TM}$ provides marked thermal isolation for sensitive components even when exhaust temperatures exceed 900 °C.

### Metallic Layers

**(a) Aluminum**

- 0.1 to 2.5 mm
- Flat or Embossed
- 1000, 3000 and 5000 Series Alloys
- Lightweight / Excellent formability
- Operating temperature < 300 °C

**(i) Stainless Steel**

- 0.1 to 2.5 mm
- Flat or Embossed
- Ferritic and Austenitic grades selected as a f(environment)
- Operating Temperature < 1000 °C

**(s) Aluminized Steel**

- 0.25 to 1.0 mm
- Flat or Embossed
- Various coating weights and draw quality steels
- Operating Temperature < 500 °C

### Insulation Layer

**(n) Lydall lambda**

- Thickness: 1.0 mm to 9.0 mm
- High temperature chopped strand glass fiber
- No shot content
- Low organic content
- Low thermal conductivity
- Large diameter non-breathable fiber
- Non-hazardous material 1999/45/EC compliant
- Non-flammable

### Thermal Performance

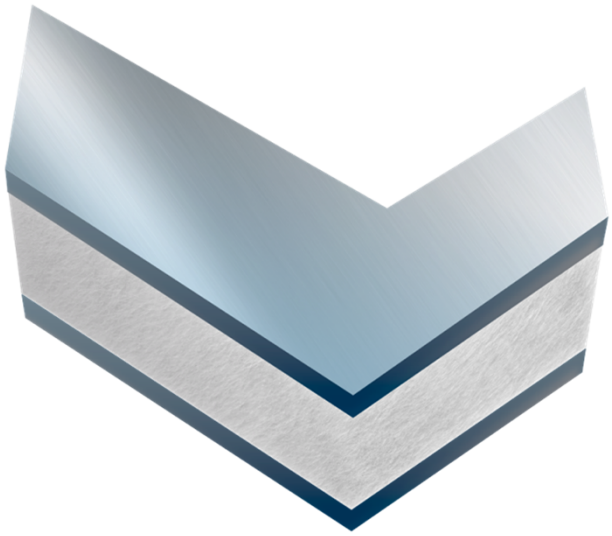
- Low emissivity surfaces for high infrared radiation environments
- High lateral thermal conductivity to spread heat
- Low vertical thermal conductivity to increase the temperature drop

### Acoustical Performance

- High transmission loss for better acoustic isolation
- Low vibration amplification for reduced noise contribution

| Validation Test Results | | |
|---|---|---|
| **Test Method** | **Composite** | **Fiber** |
| FMVSS 302 | DNI | DNI |
| ASTM E136 | - | DNI |
| LTM T105 | DNI | DNI |
| DHR Emissivity | Per Report | - |
| Corrosion | Per Report | - |

| Thermal Conductivity | |
|---|---|
| **lambda fiber** | |
| T.°C | k, Wm/K |
| 204 | 0.048 |
| 427 | 0.085 |
| 650 | 0.150 |
| 788 | 0.210 |





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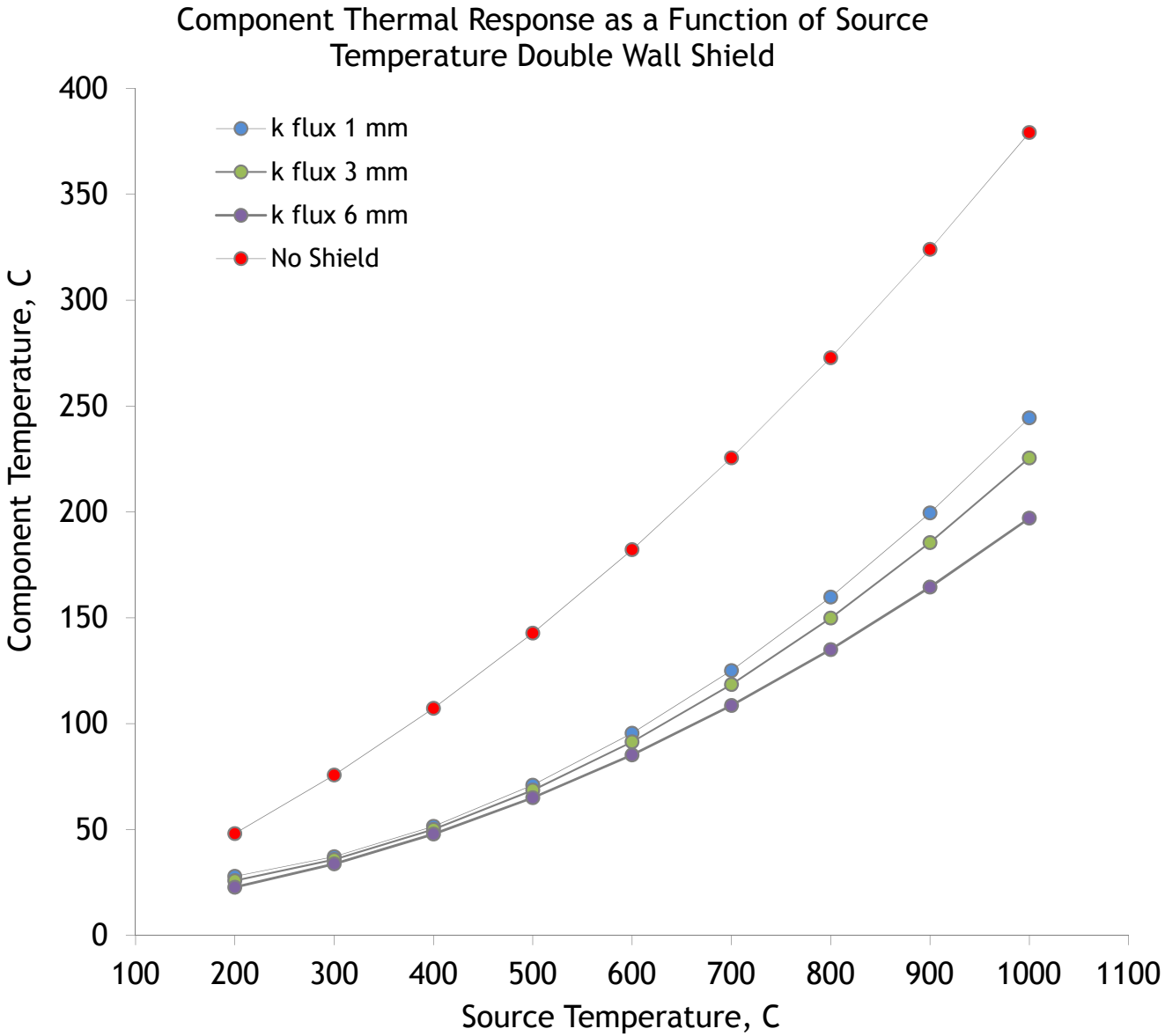


## Lydall lambda™ Fiber Value Proposition

- Vertically Integrated – Fabricated in France by Lydall
- Peak operating temperature
  - 850 °C – lambda 850
  - 650 °C – lambda 650
- Non-breathable fiber that is not carcinogenic
- No ceramic fibers
- Clear legislation, no lobby effort, no protective equipment, poses no health risk to Lydall's employees and poses no health risk to our customer's employees.
- Low Organic Content Low Caloric Content Low Off-Gassing
  - LOI≤ 4%
  - Proprietary PVOH Binder
- Does Not Burn / Flame
  - Application of hyper strict flammability test methods

## k flux naming convention - $k_{xyn}$

- The agility of the k flux product lends itself to be finely optimized through the combination of various materials for any thermal or mechanical environment
- A series of subscripts denote the metallic layers used as well as the insulation thickness.
- The first denotes Hot Side Layer metal, the second denotes the Cold Side Layer metal and the final represents the in-situ isolation thickness in millimeters.
  - The x and y are replaced by: a-Aluminum, s-Aluminized Steel, i-Stainless Steel
  - The insulation thickness can exceed 20 mm, but generally less then 10 mm



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