

HELPING ENGINES AND DRIVERS KEEP THEIR COOL.

- ▶ **Protect your drivers and engine components from extreme heat.**

TUFshield™ Thermal Management Solutions

When it comes to transportation, vehicles are designed to get you from point A to point B in the most efficient way possible. But even as we push the limits of design to improve efficiency, engines are pushed to their limits, operating at extremely high temperatures – making for an uncomfortable and potentially dangerous environment.

That's why Aearo Technologies LLC has created innovative new materials for thermal management. Rigorously tested and specially engineered, TUFshield™ Materials are a line of thermal shielding and barrier products designed to help protect both components and people from potentially dangerous heat sources.

Did you know

- Internal temperatures in engine turbos can now exceed 1000°F
- Batteries discharge and recharge optimally below 120°F
- The “safe touch temperature” is <130°F



Introducing TUFshield™ Materials for Thermal Management

These lightweight and formable TUFshield thermal materials are the latest defense in thermal management. The newest additions to our thermal shielding portfolio, TUFshield thermal management materials are designed to provide reliable protection and comfort in hot-running engine environments – even in tight spaces.

Low-Cost Tooling Method

Aearo Technologies LLC uses a proprietary, low-cost tooling method with TUFshield materials to help reduce the overall cost of the thermal acoustic solution. In addition, our tooling capabilities enable:

- ▶ Quick prototypes
- ▶ Easy tooling changes
- ▶ Optimal geometry
- ▶ Short tooling lead time

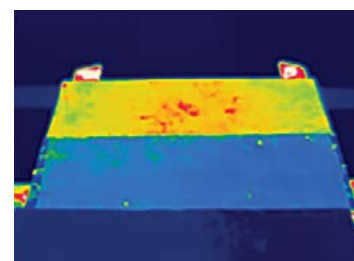
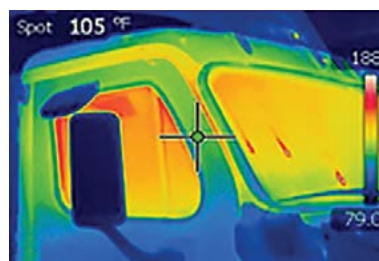


Features and Benefits

- ▶ Lightweight and highly conformable
- ▶ Resilient for use in interior and exterior conditions
- ▶ Thermal protection for machinery and interiors
- ▶ Easy attachment via adhesive or mechanical fasteners

Technical Expertise

At Aearo Technologies LLC, we use advanced thermal testing techniques to develop the best solution for your unique thermal management problems. In our state-of-the-art technology center, engineers test and analyze materials in different, real-world situations to determine economical and effective treatment options for each specific application. Our complete testing and validation methods have been fine-tuned to ensure our solutions offer the performance you need for your specific application.



TESTING OF TUFSHIELD IN AEARO TECHNOLOGIES LLC ACOUSTIC TECHNOLOGY CENTER.

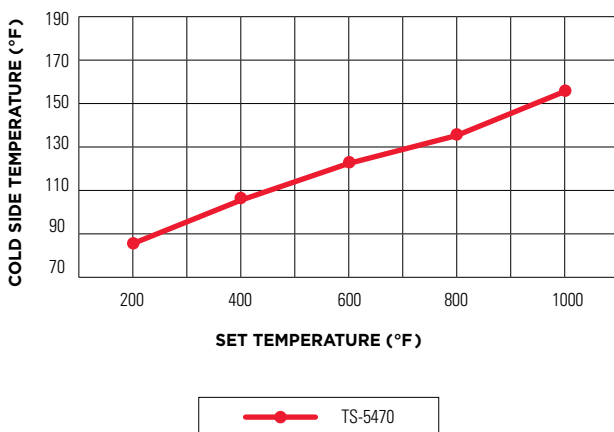
TUFshield™ Material Portfolio

Adhesive Mounted Materials

Our aluminum/foam/PSA products are designed to be adhered directly to the component that needs protection from the heat source.

- ▶ Easily die-cut
- ▶ Fit into unusually shaped application areas and tight spaces
- ▶ Extremely durable material
- ▶ Resistant to potentially damaging situations

HIGH TEMPERATURE TEST RIG: TESTED ON 16 GA STEEL

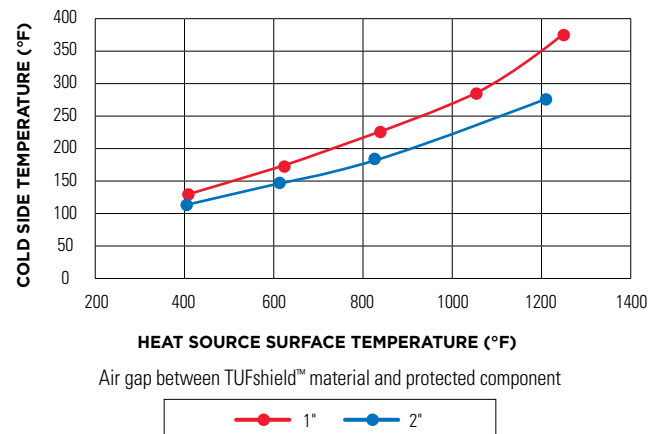


Rigid Mounted Materials

Tough aluminum/foam/aluminum materials that can easily replace the metal shielding in your system and streamline your application by allowing for the removal of a secondary heat shield material.

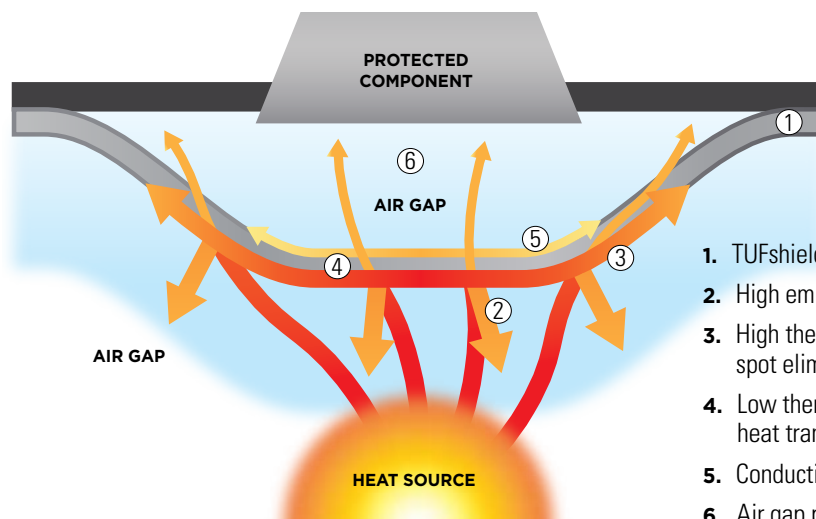
- ▶ For use with the most severe heat issues
- ▶ Easily formed into 3D shapes with air gap by using our proprietary, low-cost, tooling method
- ▶ Innovative part design helps fit into unusually shaped application areas and tight spaces
- ▶ Lab tested – extremely durable material

TS-5475 COLD SIDE TEMPERATURE AS A FUNCTION OF HEAT SOURCE TEMPERATURE AT VARIOUS AIR GAPS



How does it work?

Air gaps use moving air with the air convection effect to substantially decrease the temperature surrounding the heat sensitive components by decoupling the heat source from the component. By reducing the amount of radiant heat, TUFshield™ materials help protect against thermal damage to improve both reliability and length of use.



1. TUFshield thermal protection
2. High emissivity surface for "IR" rejection
3. High thermal conductivity layer for hot spot elimination
4. Low thermal conductivity core to reduce heat transmission
5. Conductive back layer for heat diffusion
6. Air gap provides additional insulation value

**FOR FURTHER
APPLICATION
ASSISTANCE**

**Please contact our engineering specialists
at solutions@earglobal.com**

The data listed in this data sheet are typical or average values based on tests conducted by independent laboratories or by the manufacturer. They are indicative only of the results obtained in such tests and should not be considered as guaranteed maximums or minimums.

Materials must be tested under actual service to determine their suitability for a particular purpose.

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