

# Thermal Insulation White Paper

## Removable Insulation Blankets vs. Permanent Composite Insulation – CHOICES FOR ENGINE POWERED VEHICLES AND EQUIPMENT



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Firwin Hard Coat™ Insulation  
on Manifold and Turbo - Mining  
Vehicle

## Choosing between removable thermal insulation blankets and Hard Coat™ permanent insulation depends on the application.

Insulating hot surfaces on engines and exhaust systems remains a key operating and safety issue for engine powered vehicles and equipment. Among the benefits of applying thermal insulation covering to engine manifolds, turbochargers, and other hot exhaust components are:

- shielding hoses, wiring, and electronic components from malfunctioning due to excess heat
- protecting personnel from burns
- maintaining exhaust heat at level required for optimal catalyst performance
- sound attenuation

While **removable** thermal insulation blankets have typically been the insulation of choice, recent advances in **rigid** insulation have given equipment designers and packagers more variety as to what medium to use when insulating their engine and exhaust components.

Firwin Corp's Hard Coat™ insulation is one such example of the new generation of rigid insulation. The product features a durable, lightweight exterior, and is typically applied to components such as exhaust manifolds, turbochargers, elbows, and exhaust piping. Unlike removable insulation blankets, which are wrapped around an engine or exhaust component and fastened with a fastening system (typically stainless steel lacing wire), Hard Coat™ insulation is a permanent insulation applied directly to the component being insulated. This results in the insulation material being completely enclosed and shielded from exterior elements. As such, the danger of equipment oil and fluid leaks that might otherwise seep into the insulation material and cause a potential fire hazard is eliminated.

Among the industries that have taken to Hard Coat™ type insulation over removable insulation blankets are marine, defense, and especially underground mining, where shielding the insulation material from leaked engine oil or hydraulic fluid is a top priority.

According to Firwin President Paul Herman, "For certain high-temperature applications where safeguarding for oil leaks is a priority, space is at a premium, and an insulation product is required, Hard Coat™ insulation is a definite option, and may be more economical in the long run."

So how does one go about determining which insulation technology is right for him? Brett Herman, Firwin's vice president of engineering and customer service, relates



**Top Photo: Removable Insulation Blankets on Vehicle Exhaust Piping**



**Bottom Photo: MineWrap™ Removable Insulation Blankets Covering Exhaust and Catalyst of Mining Truck**

that there are a number of factors to take into consideration when deciding between Hard Coat™ insulation and removable insulation blankets. “Does the customer require removable insulation? Are there space constraints? Is the application such that there is the potential of fluid seeping into the insulation material, thereby posing a fire hazard?”

Each of the technologies has its own particular advantages and drawbacks. The rigid outer surface of Hard Coat™ insulation makes it less prone to tears or punctures than standard silicone-impregnated insulation blankets, and more resistant to damage from fluid leaks. It also makes Hard Coat™ insulation more durable than blankets. In addition, Hard Coat™ insulation is typically more compact than insulation blankets, as the insulation is formed directly on the component to be insulated. The disassembled, non-insulated part is shipped to Firwin, where the Hard Coat™ insulation is applied via a proprietary process. The insulated part is then shipped back to the customer. The resulting compactness can be critically important in engine compartments where space is often at a premium.

“While permanent insulation such as Firwin Hard Coat™ has its advantages, there are drawbacks as well”, notes Paul Herman. “It cannot be removed should a part require servicing. The coating must be applied at our factory. It is also more expensive up front than traditional insulation blankets.”

Removable insulation blankets do have significant advantages for a number of applications. They are designed to be easily installed, requiring no special tools or training for installation. Importantly, they can also be easily removed, a key benefit where equipment may require periodic maintenance and inspection. Unlike Hard Coat™ which requires parts to be shipped to a factory, removable insulation blankets are typically designed remotely using measurements, drawings, and digital photos. The resultant blanket design is saved as a pattern, which can be referenced at a later date should the same part need an insulation blanket. Firwin Corp maintains an extensive library of patterns covering a wide range of engines and exhaust system components. Thus redesign is minimized, and replacement sections can be easily manufactured should any part of the insulation blanket become damaged.

Although removable insulation blankets can be susceptible to absorption of leaked flammable fluids into the insulation material, careful design and material selection can minimize this issue – Firwin’s MineWrap™ blankets designed for underground mining are a case in point. Finally, insulation blankets typically offer greater sound absorption than Hard Coat™ materials, and also tend to be more vibration resistant.

The chart below outlines the various advantages and disadvantages of Hard Coat™ vs. removable insulation blankets. As with most technologies, the choice as to which material to use comes down to the specific application. Firwin in-house and field personnel are trained to assist clients in choosing the most suitable insulation system for their particular situation.

## Hard Coat™ vs. Removable Insulation Blankets



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Permanently applied to the component – cannot be removed and re-used.	Blankets can be removed and re-used – ideal for equipment that requires periodic maintenance.
Solid outer surface – not prone to tearing, ideal for applications under rugged conditions.	Standard removable insulation blankets have silicone impregnated outer surface – may tear or puncture.
Components must be disassembled and shipped to Firwin for coating to be applied.	Removable insulation blankets are designed remotely from measurements, drawings, and photos. Components remain with customer.
Conforms tightly to part – ideal for limited space applications.	Limited space applications can pose a challenge to blanket installation and proper fastening.
Completely encapsulates the part – preventing fluids from igniting on hot engine and exhaust parts.	Blankets can act as a shield to prevent fluids from reaching engine and exhaust components, but some seepage under the blanket can occur.
No risk of fluid reaching insulation material and igniting.	Can be designed with stainless steel inner liner to prevent fluids from seeping into the insulation material.
Non flammable.	Fire retardant.
Lead time of 3 weeks.	Typical lead time of 2 to 3 weeks; can usually be expedited if necessary.
Higher cost (6 to 12 times) than standard removable insulation blankets, but longer life span.	Cost can vary according to material make-up of blanket, but more economical than Hard Coat™. Blanket life depends on application and frequency of removal.