

Introduction:

Shannon Thermal Blankets are a CAD designed, CNC produced, high quality pre-engineered insulation system designed to save energy, retain radiant heat, minimize insulation maintenance and improve the surrounding work environment. INSULTECH® is weather resistant and chemical resistant. INSULTECH® is flexible and easy to install, remove and reinstall allowing quick access and easy equipment serviceability. The key benefit is "Re-Usability".

Applications: Gas Turbines, Catalytic Converters, Turbine Exhaust Duct, Engine Exhaust Manifolds, Reducer Cones, Mufflers, Expansion Joints, Piping, Fittings, By-Pass Piping and Turbo Charger Casings.

Markets: Private/Public Utilities, Oil & Gas Industry, CHP, Marine Industry.

Service Temperature:

Engine & Turbine Systems - This design is to act as a Thermal Barrier with a maximum service temperature of 1500°F (815°C).

Product Components: The Outer Jacketing consists of a layer of Stainless Steel Type 304 Knitted Wire Mesh 0.11" Dia. @ 16ft²/lb (0.28 mm Dia. @ 3.3 m²/kg) and 577g/m² (17.0oz/yd²) Silicone Impregnated Fiberglass Cloth. The inner jacket consists of a layer of 610g/m² (18.0oz/yd²) Ceramic Silica Cloth with an outer layer of Stainless Steel Type 304 Knitted Wire Mesh (0.28 mm Dia. @ 3.3 m²/kg). The Insulation Material is a 128 kg/m³ (8lb/ft³) Ceramic Needled Fiber Mat. The Mat is encapsulated by the Stainless Mesh, Silicone Fiberglass Cloth, 610g/m² (18.0oz/yd²) Ceramic Silica Cloth and Stainless Mesh, then stapled together, producing a "Self-Contained System". The Blanket includes Integral Fasteners.

Blanket Construction: Blanket construction shall be a "Stapled Construction". Outer jacket materials will be drawn down, to match at the inner or outer jacket edge. Jacketing will be folded under and stapled with 3/8" (0.95cm) Monel bevel point staples at the outer edge seam. Staples are to follow the inner or outer jacket edge with at most 1" (2.5 cm) spacing between staples. No "On-Site Fabrication" to assure high quality.

Blanket Overlap: To minimize heat loss, the thermal blanket will extend beyond mating flanges unto existing insulation for a minimum of 2" (5 cm). Where blanket cannot fit over existing oversized insulation, blanket will butt up to existing insulation with a friction fit seam. All surfaces will be insulated, open gaps are not acceptable. Blanket diameters which are 1" (2.5 cm) or larger than existing insulation must be end capped to eliminate open air void.

Leak Accommodations:

To accommodate a leak and detect its origin, blankets will have a low point stainless steel drain grommet or the design will incorporate a mating seam at the lowest point of the blanket.



Blanket Insulation Weight:

When designing blanket insulation for large equipment where a multi-piece construction is necessary, the total number of pieces will be minimized. Any one piece will not exceed 40lbs (18 kg) in weight.

I.D. Plate:

For easy identification and location, a stainless steel or aluminum I.D. Plate tag is riveted to each blanket piece. 1/8" (0.32 cm) embossed lettering shows location, description, size, pressure rating, Work Order, Manufacturing Date and Tag Number Sequence. Each blanket will include an ID Plate.

Quilting Pins:

To enhance blanket quality and to maintain uniform thickness, stainless steel quilting pins @ 14 Gauge (2.5 mm²) will be placed at random locations no greater than 12" (30 cm) apart. Quilting Pins will prevent shifting of the insulation core. Stainless speed washers will secure the quilting pin stem.

Minimized Air Void:

Some equipment and equipment heads are a multi-piece design and are installed in tag number sequence. Turbo-Charger Housings, Mufflers, Silencers & Expansion Joints will be designed in sections. Blanket design will conform to the surface with minimized air void.

STANDARD FASTENER: "WIRETWIST": A stainless steel wire (0.50 mm²) 20 Gauge, will be doubled up and twisted in a spiral fashion, with a minimum of 5-7 twists/inch (2-3 twists/CM). Wiretwist length will be 16" (40CM) or longer. The Wiretwist will be secured to the lacing pin at the pin stem. Pin stems will be 2.5 mm² (14 gauge). Wiretwists will be spaced 6" (15CM) on center along closing seams with matching lacing pins.

OPTIONAL FASTENER: Metal Spring Tensioner – 5/16" Dia. (7.94mm) - 3.8 lb/in (0.07 kg/mm) Rating – 2 1/2" (6.35cm) Length, combined with 2 each 1 1/4" (3.2cm) Diameter stainless steel split rings, fastened to the blanket edge, 2" (5cm) from the blanket edge. The spring tensioner will be secured to the lacing pin at the spring ring edge. Pin stems will be 14 gauge (2.5 mm²). The Metal Spring Tensioner will be spaced at most 6" (15 CM) on center along closing seams with matching lacing pins for securing. The Metal Spring Tensioner will be positioned between the outer jacketing & outer layer of the insulation.

Drawing Requirements: Each blanket insulation project will include an instruction package shipped with the blanket material. This package will include Assembly Drawings identifying piece location, a Material List of all pieces and Instructions for Installation on how INSULTECH® will be installed. All blankets are to be CAD designed / CNC produced to assure the highest quality and precise fit.

Drawing Record Keeping: The correlating Project Production Drawings must be kept on file with the blanket manufacturer. The latest revisions, if any after installation, will be recorded on the CAD file drawing system. This file will be kept for a minimum of ten years to assure accuracy in the ordering of replacement parts.

Project Qualifications: All items insulated will require a site visit prior to bid submittal. Upon receipt of project contract, each item must be field measured for "Custom Fitting" to existing field conditions. Each item must be tagged and or marked for installation reference. At the time of installation, blankets must have a corresponding tag on the blanket and must match to an existing tag on the fitting. No generic standard blanket designs will be accepted. This will assure a "Custom Fit" design with maximum thermal efficiency.

Warranty:

We guarantee that all custom manufactured blankets will accommodate vibration probes, gauges, tubing, piping, brackets, etc. and fit correctly for optimum performance as per the design specification provided in the quotation process. In addition, for 18 months we will cover the cost of replacing the blanket should the failure be due to premature degradation of any component utilized in the blanket construction, as well as any defects due to poor workmanship.

Sample Submittal:

Upon bid submittal a blanket design sample must be presented for review and product approval. A 7"x9" (18CMx23CM) Sample will be required and must identify all characteristics mentioned in the above fabrication requirements. Any deviations from the above stated requirements may result in a bid rejection.

Installation Guidelines:

INSULTECH® will follow these simple guidelines:

- Once material is received, open boxes with care. DO NOT "cut" deep into container to avoid damaging blankets.
- Locate the Instructions for Installation.
- Follow the Material List to determine blanket part number.
- Refer to the Assembly Drawing for orientation of each blanket part number and installation details of each part.
- Locate the Identification Tag on each blanket, for correct description and sequence of blankets.
- Material is installed in tag number sequence.
- Use leather gloves to install material.
- A physical effort is required for proper placement and fit.

Storage:

Once shipment is received, protect INSULTECH® Blanket Insulation from water damage and/or other abuses prior to installation. INSULTECH® Blanket Insulation will be shipped in cardboard boxes or crated for export shipping. Packaging is not designed for outdoor storage, thus a tarp or covering of some type is necessary if stored outdoors until installation is completed.

Site Preparation:

Apply Shannon-INSULTECH® Blanket Insulation on clean, dry surfaces and avoid trapping oils, greases or combustible materials. Surfaces must be stripped of existing materials.

| Blanket Thickness Surface Temperature Reference: | | | | | | |
|--|-------------|--------------------|--------------|--------------------|--------------|--------------------|
| Operating Temp | Thickness | Surface Temp | Thickness | Surface Temp | Thickness | Surface Temp |
| 538° C (1000° F) | 50 mm (2") | 87.4° C (189.4° F) | 65 mm (2.5") | 77.3° C (171.2° F) | 80 mm (3.0") | 70.1° C (158.1° F) |
| 482° C (1100° F) | 65 mm(2.5") | 76.1° C (169° F) | 80 mm (3.0") | 68.9° C (156.0° F) | 88 mm (3.5") | 61.1° C (142.0° F) |
| 538° C (1200° F) | 50 mm(2") | 88° C (191° F) | 80 mm (3.0") | 72.0° C (161.0° F) | 88 mm (4.0") | 62° C (144.0° F) |
| 760° C (1400° F) | 50 mm(2") | 107° C (225° F) | 80 mm (3.0") | 86° C (187° F) | 102mm(4.0") | 74° C (165.0° F) |
| 871° C (1600° F) | 50 mm(2") | 128° C (262° F) | 80 mm (3.0") | 102° C (216° F) | 102mm(4.0") | 87° C (189.0° F) |

- * The above referenced Cold Face Surface Temperatures should be used as guidelines for blanket insulation thickness design.
- * The Cold Face Surface Temperature of the blanket should approach surrounding ambient temperature conditions.
- * The economic thickness of the blanket should consider blanket cost, thermal performance and blanket design constraints.
- * Heat Loss Calculations are based on a 21.1° C (70° F) ambient temperature using a flat surface condition.

Properties Specifications:

Insulation Core

Outer Layer: Fiberglass Needled Fiber Felt Thermal Insulation -11 lb/ft³ (176.2 kg/m³)

ASTM C 1086-88 Maximum Service Temperature Up to 649°C (1200°F)

Inner (Hot) Layer: Ceramic Needled Fiber Mat 128 kg/m³ (8 lb/ ft³)

Maximum Service Temperature Up to 1260°C (2300°F)

Jacketing Materials:

Outer Layer: Stainless Steel Type 304 Knitted Wire Mesh

0.11" Dia.@16ft²/lb (.28 mm Dia. @ 3.3 m²/kg)

(Installed on the inner Jacket on the outer layer and on the outer Jacket outer layer)

Outer Layer: Silicone Fiberglass Cloth Material weight 577g/m² (17.0 oz/yd²)

Inner (Hot) Layer: 427g/m² (18.0 oz/ yd²) Ceramic Silica Cloth

Continuous Service Temperature 1800°F (1000°C)

Inner (Hot) Layer: Stainless Steel Type 304 Knitted Wire Mesh

.011" Dia. @16ft²/lb (25mm Dia.@3.3m²/kg)

Shannon-INSULTECH® Product Design Specific - Testing:

ASTM C 335

Standard Test Method for Steady-State Heat Transfer Properties of Pipe Insulation.

ASTM E 1222 – 90

Standard Test Method for the Laboratory Measurement of the Insertion Loss of Pipe Insulation - USA

ISO 15665

Standard Test Method for the Laboratory Measurement of the Insertion Loss of Pipe Insulation – Int'l

ASTM C 1045 – 07

Standard Practice for Calculating Thermal Transmission Properties under steady state conditions

UL 1709

Standard Fire Test of Protection Materials for MOV / Structural Steel

ASTM E-84-17

Surface Burning Characteristics of Building Materials (Flame Spread & Smoke)

ASTM E-136

Combustion Characteristics of Building Materials / Fire Test Response

ASTM D3787

Burst Strength Evaluation for ASTM F1138 – Spray Shield Compliance

Caution: Typical industry handling practices should be exercised for the protection of the worker. Worker should wear long-sleeved, loose-fitted clothing, head covering, leather gloves, eye protection and appropriate respiratory protection (as required) when handling and applying INSULTECH® material. Wash with soap and cold water after handling INSULTECH® material. Wash work clothes separately and rinse washer. For specific handling practices, refer to the product MSDS sheets for the Thermal Blanket System.

Notes: The chemical and physical properties of Shannon-INSULTECH® Thermal Blanket represent typical average values determined in accordance with accepted test methods. The data is subject to normal manufacturing variations and is supplied as a technical service subject to change without notice. In addition, test data are average results of tests conducted under standard procedures and are subject to variation. Results should not be used for specification purposes. Design Guidelines are as follows: to access the true limitations of this recommended design, refer to the technical data for each product component. Following these guidelines will produce the highest achievable service life. Blanket design quality can be reduced or enhanced by changing any one component. If a question arises regarding deviations from those stated guidelines, or to insure the information is most current please contact your regional representative or call Shannon. Enterprises direct.