

Introduction:

Shannon Thermal Heat Shield Insulation is a “Self-Contained”, CAD designed, CNC produced, high quality engineered insulation system designed to save energy, retain radiant heat, minimize insulation maintenance and improve the surrounding work environment. Shannon Thermal Heat Shield Insulation is “Non-Porous”, weather and chemical resistant. Shannon Heat Shield is flexible, easy to install, remove and reinstall allowing easy service. The key benefit is “Re-Usability”.

Applications and Markets:

Gas Transmission / Power Generation: Shannon Heat Shield Insulation Applications include; Engine Exhaust, Ducting, Plenum Exhaust Transitions, Expansion Joints, Gas Turbine Housings.

Service Temperature:

This design is to act as a Thermal Barrier with a maximum service temperature of 1200°F (649°C).

Heat Shield Components: The Outer Jacketing consists of a layer of Stainless Steel Type 304 Sheet Foil .002” (.05mm) thickness. The inner jacket consists of a layer of Stainless Steel Type 304 Sheet Foil .002” (.05mm) thickness. The Insulation Material is an 11 lb/ft³ (176.2 kg/m³) Fiberglass Needled Mat – Type “E” Fiber and or a 7.5 lb/ft³ (120.1 kg/m³) density, Non-Woven Manniglass® fiberglass. The insulation filler is encapsulated by inner and outer stainless steel sheet foil, “Stapled” together, producing a self-contained blanket system. The Shannon Thermal Heat Shield Insulation will include an integral fastener for easy install and removal.

Heat Shield Construction: Shannon Heat Shield Insulation 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” (2.5CM) spacing between staples. No “On-Site Fabrication” to assure high quality.

Heat Shield Overlap: To minimize heat loss, the Heat Shield will extend beyond mating flanges unto existing insulation for a minimum of 2” (5cm). Where Heat Shield cannot fit over existing oversized insulation, Heat Shield will butt up to existing insulation with a friction fit closing seam. All sections of pipes will be insulated and open gaps are not acceptable. Heat Shield diameters which are 1.5” (2.5cm) or larger than existing insulation must be end capped to eliminate open air void.

Leak Accommodations: To accommodate a leak and detect its origin, Heat Shield will have a low point stainless steel/brass drain grommet or the design will incorporate a mating seam at the lowest point of the Heat Shield.



Gas Turbine Housing & Exhaust Ducting

Heat Shield Weight: When designing Heat Shield insulation 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.

ID Plate: For easy identification and location, a stainless steel or aluminum name plate tag is riveted to each Heat Shield piece. 1/8” (0.32CM) embossed lettering shows location, description, size, pressure rating and tag number sequence. Each Heat Shield will include an I.D. Plate.

Quilting Pins: To enhance Heat Shield 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. Stainless Steel speed washers will secure the quilting pin stem in place.

Minimized Air Void: Equipment and equipment heads are typically a multi-piece design and are installed in tag number sequence. Heat exchanger heads, large vessel flanges and pump housings will be designed in two half sections. Heat Shield design will conform to the equipment with minimized air void. All valve covers will be a two piece design with a separate body and bonnet.

Design Construction Sample:

Upon bid submittal a Heat Shield Sample must be presented for review and product approval. A 7”x9” (18 cm x 23 cm) 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.

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 to lace and secure to.

FASTENING OPTIONS

Metal Spring Tensioner – 5/16" Dia.(7.94mm) - 3.8lb/in (0.07kg/mm) Rating – 2 ½" (6.35cm) Length, combined with 2 each 1 ¼" (3.2cm) Diameter stainless steel split rings, fastened to the Heat Shield edge, 2" (5cm) from the Heat Shield 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.

Assembly Drawing Requirements

Each Heat Shield insulation project will include an instruction package shipped with the Heat Shield material. This package will include Assembly Drawings identifying piece location, a Material List of all pieces and Instructions for Installation on how Heat Shield will be installed. Accurate CAD files & project records must be kept by the manufacturer. For a minimum of ten years these records will assure accuracy in re-ordering and part replacement. All Heat Shields are to be CAD designed / CNC produced to assure the highest quality and precise fit.

Manufacture Origin: Heat Shield & components must be U.S.A. made.

Spring Tensioner Fastener:



Project Accuracy & Effectiveness:

Demonstrate the efficacy of precision, through the use of State-Of-The Art CAD Design. The efficacy of precision markings with the ability to maintain a high degree of repetitiveness and control of manufacturing tolerances for locations of I.D. tags, stitch lines, cut lines for stuffing, cutting of jacketing materials and cutting of insulation through the use of State-Of-The-Art CNC cutting systems & software.

Production Drawing Record Keeping

The correlating Project Production Drawings will also be kept on file with the Heat Shield manufacturer. The latest revisions, if any after installation, will be recorded and filed on the CAD drawing system. This file will also be kept for a minimum of ten years to assure accuracy in re-orders of replacement parts.

Project Qualifications:

All items insulated will require a site visit prior to bid submittal. 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, Heat Shield must have a corresponding tag on the Heat Shield and must match to an existing tag on the fitting. No standard generic Heat Shield designs will be accepted. This will assure a "Custom Fit" design for maximum thermal efficiency.

Warranty: Guarantee that all custom manufactured Heat Shield 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, cover the cost of replacing the Heat Shield should the failure be due to premature degradation of any component utilized in the Heat Shield construction, as well as any defects due to poor workmanship.

Installation Guidelines:

Shannon Heat Shield 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 Heat Shield part #.
- Refer to the Assembly Drawing for orientation of each Heat Shield Part # and installation details of each part.
- Locate the Identification Tag on each Heat Shield, for correct description and sequence of Heat Shield.
- 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 Shannon Thermal Heat Shield Insulation from water damage and/or other abuses prior to installation. Shannon Thermal Blankets 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.

Preparation

Apply Shannon Thermal Heat Shield Insulation on clean, dry surfaces and avoid trapping oils, greases or combustible materials.

Operating Temp	Thickness	Surface Temp	Thickness	Surface Temp	Thickness	Surface Temp
260° C (500° F)	25 mm (1")	62.5° C (144.5° F)	40 mm (1.5")	51.7° C (125.1° F)	50 mm (2")	45.5° C (113.9° F)
315.6° C (600° F)	25 mm (1")	69.2° C (156.5° F)	50 mm (2")	59.8° C (139.6° F)	65 mm (2.5")	53.6° C (128.4° F)
371° C (700° F)	40 mm (1.5")	72.5° C (162.5° F)	40 mm (1.5")	59.7° C (139.5° F)	50 mm (2")	52.2° C (126.0° F)
427° C (800° F)	40 mm (1.5")	79.2° C (174.6° F)	50 mm (2")	68.1° C (154.5° F)	65 mm (2.5")	60.7° C (141.2° F)
482° C (900° F)	40 mm (1.5")	90.3° C (194.5° F)	50 mm (2")	77.2° C (171.0° F)	65 mm (2.5")	68.6° C (155.4° F)
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")	70.1° C (158.1° F)
593° C (1100° F)	50 mm (2")	98.7° C (209.7° F)	65 mm (2.5")	87.1° C (188.8° F)	80 mm (3")	78.7° C (173.7° F)
649° C (1200° F)	50 mm (2")	114.4° C (237.9° F)	65 mm (2.5")	103.3° C (217.9° F)	80 mm (3")	92.1° C (197.8° F)

* The above referenced Cold Face Surface Temperatures should be used as guidelines for Blanket/Heat Shield insulation thickness design.

* The Cold Face Surface Temperature of the Blanket/Heat Shield should approach surrounding ambient temperature conditions.

* The economic thickness of the Blanket/Heat Shield should consider Blanket/Heat Shield cost, thermal performance and Blanket/Heat Shield design constraints.

Product Properties Specifications

Insulation Core: Standard Specification for Fiberglass Needled Fiber Felt Thermal Insulation
 ASTM C 1086-88 Maximum Service Temperature Up to 649°C (1200°F)

Jacketing Materials: **Outer Layer:** The inner jacket consists of a layer of Stainless Steel Type 304 Sheet Foil .002" (.05mm) thick
Inner Layer: The inner jacket consists of a layer of Stainless Steel Type 304 Sheet Foil .002" (.05mm) thick

Shannon - INSULTECH® Blanket/Heat Shield.....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 Shannon / INSULTECH® material. Wash with soap and cold water after handling Shannon / 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® products 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.