SHANNON ENTERPRISES OF W.N.Y. INC.

INSULTECH® BLANKET INSULATION

Manufacturers of…….. INSULTECH® Blanket Insulation
Manufacturers of…….. INSULTECH® Heat Shield Insulation

Submittal Specification "Metric"

Blanket Design: HT815C-MSSM "High Temp Power Generation"

Introduction
INSULTECH® 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 also capable of withstanding weather conditions and chemical environments. INSULTECH® is flexible and easy to install, remove and reinstall allowing quick access for equipment service.

Common Applications and Markets served
INSULTECH® Thermal Blanket Applications include; Engine Manifolds, Exhaust Reducer Cones, Mufflers, Expansion Joints, Exhaust piping, Fittings, By-Pass Piping and Turbo Charger Casings. INSULTECH® Thermal Blanket Markets include; Gas Transmission Stations and Cogeneration Power Plants.

Maximum Service Temperature
This design is to act as a Thermal Barrier with a maximum service temperature of **815.5˚C (1500˚F)**.

Product Components
The Outer Jacketing consists of a layer of **Stainless Steel Type 304 Knitted Wire Mesh** (0.28 mm Dia. @ 3.3 m2/KG) and 601g/m² (17.7 oz/yd²) **Silicone Impregnated Fiberglass Cloth**. The inner jacket consists of a layer of 427g/m² (18.0 oz/SY) 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 an 128 kg/m^3 (8 lb/CF) **Ceramic Needled Fiber Mat**. The Mat is encapsulated by the Stainless Mesh, Silicone Fiberglass Cloth, Stainless Sheet Foil and Stainless Mesh, then stapled together, producing a "Self Contained System". The Blanket System includes Integral Fasteners for install & removal.

Blanket Construction
Blanket construction shall be a "**Stapled Construction"**. Inner jacket materials will be drawn up, to match at the outer jacket edge. Jacketing will be folded under and stapled with 0.63 CM Monel bevel point staples at the seam. Staples are to follow the outer jacket edge with at most 1.6 CM spacing between staples.

Blanket Overlap
To minimize heat loss, the blanket will extend beyond mating flanges unto existing insulation for a minimum of 3 CM. Where blanket cannot fit over existing oversized insulation, blanket 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. Blanket diameters which are 3 CM or larger than existing insulation must be end capped to eliminate open air void.

Gas Turbine Exhaust Housing

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 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. 0.21 CM embossed lettering shows location, description, size, pressure rating and tag number sequence. Each blanket will include an I.D. Plate.

Quilting Pins
To enhance blanket quality and to maintain uniform thickness, stainless steel quilting pins @ 2.5 mm2 (14 Gauge) will be placed at random locations no greater than 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. Blanket 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.

STANDARD "WIRETWIST" FASTENER
A stainless steel wire (0.50 mm2) 20 Gauge, will be doubled up and twisted in a spiral fashion, with a minimum of 3-5 twists per CM. Wiretwist length will be 27 CM 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 10 CM on center along closing seams with matching lacing pins to lace and secure to.

Assembly 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. Accurate CAD files & project records must be kept by the manufacturer, for a minimum of ten years. **All blankets are to be CAD designed / CNC produced** to assure the highest quality and precise fit.

Production 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 standard blanket designs will be accepted. This will assure a "Custom Fit" design with maximum thermal efficiency.

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.

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.

Design Construction Sample
Upon bid submittal a blanket design sample must be presented for review and product approval. A 13 CM x 17 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.

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.

Preparation
Apply INSULTECH® Blanket Insulation on clean, dry surfaces and avoid trapping oils, greases or combustible materials.

Shannon Enterprises of WNY Inc.
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Blanket Thickness Surface Temperature Reference:

Operating Temperature	Thickness	Surface Temperature	Thickness	Surface Temperature	Thickness	Surface Temperature
427° C (800° F)	40 mm(1.5")	79.2° C (174.6° F)	50 mm (2.0")	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 (2.0")	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 (3.0")	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 for (Surface Temps 800° F -1100° F).**
- **Heat Loss Calculations are based on a 27° C (80° F) ambient temperature for (Surface Temps 1200° F -1600° F).**

Product Properties Specifications:

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

Jacketing Materials — Stainless Steel Type 304 Knitted Wire Mesh (.28 mm Dia. @ 3.3 m2/KG)
(Installed on the inner Jacket on the outer layer and on the outer Jacket outer layer)
PTFE Teflon® & Fiberglass Respective Continuous Service Temperature 316°C (600°F)
538°C (1000°F) - Tensile Strength of PTFE Teflon® Fiberglass Jacketing:
Warp: 3664 N/50 mm (410 lbs/in) / Fill: 3137 N/mm (355 lbs/in)
Inner layer: Plain Fiberglass Cloth weight 601g/m² (17.7 oz/yd²)
Stainless Steel Type 304 Sheet Foil - 0.03 mm Thickness (0.002")

INSULTECH® Blanket Design 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.
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

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 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. The 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.

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