

#### **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. Shannon Thermal Blankets are weather and chemical resistant. Shannon Thermal Blankets are flexible, easy to install, remove and reinstall allowing quick and easy serviceability. The key benefit is "Re-Usability".

**Common Applications and Markets:** Shannon Thermal Blanket Applications include; Gate Valves, Small Steam Turbines, Globe Valves, Flanges, Expansion Joints, Feed Water Pumps and Pressure Reducing Stations, Boiler Components. Shannon Thermal Blanket Markets; Steam, District Heating, Boiler Rooms, Power Plants.

**Service Temperature:** Steam Systems above 550F (288°C). This design is to act as a Thermal Barrier with a maximum service temperature of 800°F (427°C).

**Blanket Components:** The Outer Jacket is a 17.0 oz/yd<sup>2</sup> (577g/m<sup>2</sup>) Silicone Impregnated Fiberglass Cloth. The inner jacket consists of a layer of Stainless Steel Knitted Wire Mesh on the outside, encasing a layer of 18.0 oz/yd<sup>2</sup> (611g/m<sup>2</sup>) Plain Fiberglass Cloth. The Insulation Core Material is an 11 lb/ft<sup>3</sup> (176.2 kg/m<sup>3</sup>) Fiberglass Needled Mat-Type "E" Fiber. The Fiberglass Mat is encapsulated by the outer Silicone Fiberglass Cloth, inner Plain Fiberglass Cloth and Stainless Steel Knitted Wire Mesh, sewn together, producing a "Self-Contained Blanket System". The Shannon Thermal Blanket System includes Integral Fasteners for install & removal.

**Blanket Construction:** Blanket construction shall be a "Double Sewn" lock stitch with a minimum 7 stitches/inch (2.8 stitches per CM). Raw jacket edges will have a tri-fold Silicone Fiberglass Cloth binding. No raw cut jacket edge will be exposed. Stitching will be pure PTFE, Nylon and or Stainless Steel thread. Monel metal bevel point staples 3/8" (0.95CM) wide, must follow the outer jacket edge for re-enforcement and to be spaced no greater than 1" (2.5 CM) apart on center. Staples will penetrate the binding edge. No "On-Site Fabrication" to assure high quality.

**Blanket Design Overlap:** To minimize heat loss, the blanket will extend beyond mating flanges unto existing insulation for a minimum of 2" (5CM). 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 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, blankets will have a low point stainless steel/brass drain grommet or the design will incorporate a mating seam at the lowest point of the blanket.



**High Pressure Steam Header - Pulp & Paper Mill**

**Blanket Insulation Weight:** When designing blanket 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 blanket piece. 1/8" (0.32CM) 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 @ 14 Gauge (2.5 mm<sup>2</sup>) 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. 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.

#### **Design Construction Sample:**

Upon bid submittal a blanket design 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.

**Blanket Design: MT800SGM (MT427C-SGM)**  
**"Mid Temperature Thermal Steam Process"**

**STANDARD FASTENER "WIRETWISTS":** A stainless steel wire 20 Gauge (0.5 mm<sup>2</sup>) will be doubled up and twisted in a spiral fashion, with a minimum of 5-7 twists/Inch (3-5 twists/CM). Wiretwist length will be 16" (40 CM). The Wiretwist will be secured to the lacing pin at the pin stem. Pin stems will be 14 gauge (2.5 mm<sup>2</sup>). Wiretwists will be spaced at most 6" (15 CM) on center along closing seams with matching lacing pins for securing.

**FASTENER OPTIONS:**

**1.) Metal "D" Ring Strap with Velcro Tab:** A three layer fabric strap is double sewn. One strap is a 12" (30CM) long pull-down strap, the other is a 3" (8CM) long stationary strap. Both straps are stitched to the outer jacketing of the blanket. The stationary strap includes a metal "D" Ring measuring 1"-1.5" wide (2.5-3.8CM). This is placed ½" (1CM) from the closing seam edge. The pull-down strap is placed 2" (5CM) in from the closing seam edge. Both matching straps are spaced along the closing seam edge no greater than 6" (15CM) apart. The pull-down strap includes hook-and-loop Velcro®, measuring at least 1" (2.5CM) wide by 5" (12.7CM) long, and is perimeter stitched to the strap surface. All closing seams have a 1.5" (3.8CM) extended fabric flap, which is placed along the stationary strap side of the closing seam.

**2.) Side Release Buckles:** The blanket fasteners will be 1" or 1.5" (2.5-3.8CM) Polypropylene Side Release Buckles with 1"-1.5" (2.5-3.8CM) wide fabric straps. A tri-fold 1'-1.5" (2.5-3.8CM) wide belt will be sewn together utilizing PTFE 3 ply thread. A row of stitching, along each side of the belt will be parallel for the entire length. The Buckle strap will be a minimum of 5" (12.7CM) long and will be box stitched to the outer surface for a minimum of 3" (8CM) in length. A matching pull strap will be box stitched on the outer jacket surface and will match up to the Buckle Strap. The pull strap will be a minimum of 12" (30 CM) long.

**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 these records will assure accuracy in re-ordering and part replacement. All blankets are to be CAD designed / CNC produced to assure the highest quality and precise fit.

**Manufacture Origin:** Blanket & components must be made U.S.A.

**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 blanket 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. 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.

**Installation Guidelines**

Shannon Thermal Blankets 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.

### Storage

Once shipment is received, protect Shannon Thermal Blankets 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 Blankets on clean, dry surfaces and avoid trapping oils, greases or combustible materials.

### Blanket Thickness Surface Temperature Reference:

Operating Temp	Thickness	Surface Temp	Thickness	Surface Temp	Thickness	Surface Temp
232° C (450° F)	25 mm ( 1")	57.2° C (135.1° F)	40 mm (1.5")	47.8° C (118.0° F)	50 mm (2")	42.3° C (108.2° F)
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)
287.8° C (550° F)	25 mm ( 1")	67.9° C (154.2° F)	40 mm (1.5")	55.8° C (132.4° F)	50 mm (2")	48.9° C (119.9° F)
315.6° C (600° F)	25 mm ( 1")	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)
343.3° C (650° F)	25 mm ( 1")	79.4° C (175.0° F)	40 mm (1.5")	64.4° C (148.0° F)	50 mm (2")	56.1° C (133.0° F)
371° C (700° F)	40 mm (1.5")	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)
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)

- \* 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.

### 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:** Silicone Fiberglass Composite Material weight 577g/m<sup>2</sup> (17.0 oz/yd<sup>2</sup>)  
 Silicone & Fiberglass Respective Continuous Service Temperature 249° C (480° F)  
 Tensile Strength of Jacketing: Warp: 3128 N/50 mm (350 lbs/in) / Fill: 2681 N/mm (300 lbs/in)  
**Inner Layer:** Plain Fiberglass Fabric – Material Weight 18.0 oz/yd<sup>2</sup> (611g/m<sup>2</sup>)  
 Continuous Service Temperature 1000° F (538° C)  
 Stainless Steel Type 304 Knitted Wire Mesh - .011" Dia. @16 ft<sup>2</sup>/lb (0.28mm Dia. @3.3m<sup>2</sup>/kg)

**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 - 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 Thermal Blanket material. Wash with soap and cold water after handling Shannon Thermal Blanket material. Wash work clothes separately and rinse washer. For specific handling practices, refer to the blanket component MSDS sheets.

**Notes:** The chemical and physical properties of Shannon Thermal Blankets 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.