

SECTION XXX
REMOVABLE INSULATION JACKETS for HOT WATER & STEAM

1.1 WARRANTY

A. Warranty all materials and labor for a period of Five Years

1.2 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with minimum Five years of documented experience with audited quality standards certified ISO 9001:2015 or greater.

B. Made in USA

1.3 PREFORMED THERMAL JACKETS (MAXIMUM TEMPERATURE 475°F)

A. Manufacturers:

1. Thermaxx Jackets. 14 Farwell Street, Bldg. 2B West Haven CT 06516.

B. Materials:

1. All insulation materials shall be non-asbestos.
2. Material layers shall be selected based on location profile (Dry, Wet/Damp, Steam Pit/Vault) and operating temperature per sections 1.3(C), 1.3(D), 1.3(E) from the "Jacket Material Selections" table:

Layer	Name	Description
Jacket	EJ	PTFE Fiberglass Composite, 16.5 oz/yd ² , rated to 550°F
Jacket	Crossfilm	Laminated PTFE (Pure PTFE) , 13.5 oz/yd ² , rated to 600°F
Jacket	Silicone	Silicone Fiberglass Composite Jacketing, 17 oz/yd ² , rated to 500°F
Thread	Kevlar Thread	Kevlar, 0.114" diameter, 35lb breakpoint, rated to 800°F
Thread	Fiberglass Thread	Fiberglass, 0.023" diameter, 29lb breakpoint, rated to 1400°F
Thread	Inconel Thread	Fiberglass & Inconel, 0.019" diameter, 25lb breakpoint, rated to 2000°F
Insulation	Utilicore	Needled fiberglass, 5 lb/ft ³ , rated to 1100°F
Insulation	Tempmat	Needled fiberglass, 9-11 lb/ft ³ , rated to 1200°F
Insulation	Pyrogel	Pyrogel XT-E
Insulation	CP	Ceramic Paper
Fasteners	Nylon Straps	Nylon with D-Rings, Velcro
Fasteners	PTFE Straps	Laminated PTFE with D-Rings, Velcro
Fasteners	EJ Straps	PTFE Fiberglass Composite with D-Rings, Velcro
Seal Flaps	Hybrid 7.0	Hybrid 7.0 (rated to 600°F) with Kevlar cord (rated to 900°F)

Table 1: Jacket Material Selections

C. Jacket Materials per Operating Temperature for Dry Locations:

	100-349°F	350-424°F	425-475°F
<i>Jacket - Hot Side</i>	Silicone	Silicone	Silicone or EJ
<i>Thread</i>	Kevlar Thread	Kevlar Thread	Kevlar Thread
<i>Insulation Layer 1</i>	1" Tempmat	1" Utilicore	1" Utilicore
<i>Insulation Layer 2</i>	-	0.25" CP or 5mm Pyrogel	0.5" CP or 10mm Pyrogel
<i>Jacket - Cold Side</i>	Silicone	Silicone	Silicone or EJ
<i>Fasteners</i>	Nylon Straps	Nylon Straps	EJ Straps
<i>Seal Flaps</i>	Hybrid 7.0	Hybrid 7.0	Hybrid 7.0

D. Jacket Materials per Operating Temperature for Wet or Damp Locations:

	100-299°F	300-374°F	375-450°F
<i>Jacket - Hot Side</i>	Silicone	Silicone	Silicone or EJ
<i>Thread</i>	Kevlar Thread	Kevlar Thread	Kevlar Thread
<i>Insulation Layer 1</i>	10mm Pyrogel	15mm Pyrogel	20mm Pyrogel
<i>Jacket - Cold Side</i>	Silicone	Silicone	Silicone or EJ
<i>Fasteners</i>	Nylon Straps	Nylon Straps	EJ Straps
<i>Seal Flaps</i>	Hybrid 7.0	Hybrid 7.0	Hybrid 7.0

E. Jacket Materials per Operating Temperature for Steam Pits and Vaults:

	100-299°F	300-374°F	375-450°F
<i>Jacket - Hot Side</i>	PTFE	PTFE	PTFE
<i>Thread</i>	Kevlar Thread	Kevlar Thread	Kevlar Thread
<i>Insulation Layer 1</i>	10mm Pyrogel	15mm Pyrogel	20mm Pyrogel
<i>Jacket - Cold Side</i>	PTFE	PTFE	PTFE
<i>Fasteners</i>	PTFE Straps	PTFE Straps	PTFE Straps
<i>Seal Flaps</i>	Hybrid 7.0	Hybrid 7.0	Hybrid 7.0

F. Construction:

1. Sewn with lock stitch at a minimum of 4 to 6 stitches per inch. Jackets shall be sewn using specified thread in section 1.3D. The thread must be able to withstand the skin temperatures without degradation.
2. Hog rings, staples and wire are not acceptable methods of closure.
3. No raw cut jacket edges shall be exposed after install.
4. Jackets shall be fastened using a combination of hook and loop (i.e., Velcro®), straps, and D-rings depending on application temperature.
5. The insulation shall be designed to minimize the convection current in the space between the hot metal surface and the inner layer of insulation.

6. All jacket pieces which match mating seams must include an extended 2" flap constructed from the exterior fabric (or equivalent) and shall be secured using hook & loop closure (i.e., Velcro®) parallel to the seam or straps and/or D-Rings depending on application temperature.
7. Insulation shall be sewn as integral part of the jacket to prevent shifting of the insulation. Insulation pins are NOT an allowable method of preventing the insulation from shifting and shall NOT be used.
8. Steam Trap Jackets must be constructed in a box shape for removal and replacement inspection ease.

G. Identification, Labelling, and Management:

1. Provide a permanently attached Laser Etched Anodized Aluminum nameplate (2" x 3.5") SLATE tag on each jacket to identify its location and item number. Each nameplate must have a Laser Etched QR code linking to a website that contains the following information about each individual jacket:
 - Item Number
 - Location Details
 - Application Type
 - Operating Pressure
 - Component Type
 - Component Size
 - Jacket Min and Max Temp
 - Insulation Thickness
 - ANSI Class or NPT
 - Install Date
 - Install Photo
 - Component Maintenance History
 - Jacket O&M History
2. A Smartphone App (iOS or Android) must be submitted, and training provided, upon project completion to display the website and items listed in section 5 above.
3. O&M: A Smartphone App (iOS or Android) must be used to perform required O&M maintenance tasks. Items listed in section 1 above must be displayed when the QR code on the jacket is scanned. In addition, the date of the O&M inspection along with a new photo must be displayed.

H. Measurement and Verification (M&V):

1. Provide Measurement and Verification for Pipe insulation and Removable Jacket insulation using Smart Sensors manufactured by THERMAXX, 14 Farwell Street, Bldg. 2B, West Haven, CT 06516. Sensors will be placed on insulation, with predetermined quantities and locations, providing a sampling of the insulated components. One sensor on each process type (steam, hot water, condensate, etc.) is required in each area. Sensors will be removed after 12 months.

2. Sensors shall include:

- IP67 Rated Enclosure (dust tight & water resistant)
- Battery powered operation
- Wireless communication to Gateway
- Minimum of two independent temperature probes capable of reading temperatures up to 250°F
- Minimum of one independent temperature probe capable of reading temperatures up to 475°F
- Temperature readings obtained minimum of once per hour

3. Gateways shall include:

- NEMA Type 4 or better enclosure (weather rated)
- 120VAC power input (hardwired operation)
- Onboard cellular modem
- Onboard radio for communication with Sensors

4. Data Reporting shall include:

- Cloud hosted web-based "Monitoring Portal"
- No software or server installation required
- Data accessible with browser & internet connection
- Secure login
- Display average supply(pipe) temperatures
- Display average insulation touch temperatures
- Display average ambient temperatures
- Cumulative insulation savings per component
- Project Summary – Cumulative insulation savings for project

1.4 JACKET PERFORMANCE & INSULATION THICKNESS

A. Insulation thickness: Incorporate thickness as required for Touch Temperature

1. Touch Temperature (Exterior) of all jackets < 120°F

1.5 COMPONENTS TO BE JACKETED INCLUDING BUT NOT LIMITED TO:

A. GATE, GLOBE, TRIPLE DUTY, BALL VALVE, BUTTERFLY VALVE, CHECK VALVE Type and Insulation Thickness Schedule

- Crane
- Nibco
- Velan
- Hammond
- Stockham
- Sharpe
- Powell
- Fairbanks

- Orbit
- Bell and Gossett
- Taco
- Pentair
- Milwaukee
- Belimo
- Other Valves

B. WYE STRAINERS to be Jacketed

- Keckley
- Hoffman
- Mueller
- Nibco
- Sarco
- Powell
- Victaulic
- Grinnell
- Gruvlok
- Other Wye Strainers

C. STEAM TRAPS to be Jacketed-Box Type Jacket

1. Inverted Bucket

- Armstrong
 - Series 800-813
 - Series 814
 - Series 880
- Spirax Sarco
 - Series B
 - Series 200
- Hoffman
 - Series B0, B1, B2, B3, and B4
- Other Inverted Bucket Steam Traps

2. Float and Thermostatic-Box Type Jacket

- Armstrong
 - Series A&B
- Spirax Sarco
 - Series FT
 - Series B
 - Series
- Hoffman
 - Series H&I
- Barnes & Jones
 - VAC
- Other Float & Thermostatic Steam Traps

D. PRV Types and Insulation Thickness Schedule

- Armstrong
Series 2000
- Spence
Series E
- Sarco
Series P
- Hoffman
Series 2000
- Leslie
Series G
- Other PRV's

E. CONTROL and BALANCING Valves

- Fisher
- VOGT
- Limitorque
- Watts
- Johnson Controls
- Bellimo
- Leslie
- Other Control and Balancing Valves

F. Other Flanges, Unions, ETC

- As required

END OF SECTION

THERMAXX MECHANICAL STEAM PIPING

SECTION – PIPE INSULATION- STEAM

SCOPE:

The work involved in this specification and the accompanying SCOPE OF WORK consists of performing all labor and furnishing of all labor, materials, fixtures, and equipment necessary to install complete piping insulation as described herein and/or as provided in the Scope. This includes all equipment and materials necessary for complete systems though not specifically mentioned or shown.

MATERIALS AND WORKMANSHIP:

All covering and insulating materials used on this project must contain the manufacturer's name on the containers. All materials must be dry and in good condition, free of defects, mildew, rough ends, etc. Insulation materials shall be Certainteed, Owens-Corning, Johns Manville, Lewco, Armstrong, Knauf or equal.

All pipe covering shall have a density of not less than 3-1/2 pounds per cubic foot.

All materials shall have composite fire and smoke hazard ratings as tested by procedures ASTM 84, NFPA 255, AND U.L. 723 not to exceed 25 Flame Spread and 50 Smoke Developed.

PIPING INSULATION:

All insulation installations shall conform to ASHRAE Standard 90A-1980.

FITTING AND EQUIPMENT INSULATION:

Insulate all fittings and with pre-cut segments of pipe insulation or premolded PVC plastic covers. Plastic covers shall be Zeston or equal.

INSULATION THICKNESS

Match existing onsite

END OF SECTION