

INSULTECH

**GAS TRANSMISSION
ENGINE EXHAUST
BLANKET INSULATION**

SHANNON ENTERPRISES OF W.N.Y., INC.

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Website: www.shannonent.com

Rev: 01/09

INSULTECH

Thermal and Acoustic Blanket Systems

Serving these Fine Markets:

Gas Transmission

O.E.M.

Gas Turbine

Reciprocating Engine Exhaust

Power Generation

Marine Engine Exhaust

Stationary Engine Exhaust

Genset Market

Distributed Power

Manufactured By:



75 MainSt., P.O. Box 199 / North Tonawanda, New York 14120
[716] 693-7954 / www.shannonent.com

Providing Industrial Applications for the Following Users:

Gas Pipeline Companies

Colorado Interstate Gas
Columbia Gas Transmission
Consolidated Natural Gas
East Ohio Gas
ERON Pipeline
Williams Gas Transmission
Northwest Pipeline
National Fuel Gas Corporation
Long Island Light & Power
Tennessee Gas Pipeline
Williston Basin Interstate Gas
Algonquin Gas Transmission
Texas Eastern Gas Transmission
Boston Gas
Panhandle Eastern
Nicor

Cogeneration & Steam Utilities

Trenton District Heating
City of Akron, Akron OH
Long Island Light & Power
City of St. George, St. George, UT
Trigen - Philadelphia Thermal
Con Edison - NYC
Syracuse University
Cornell University
G.S.A. - Washington, D.C.
Ansaldo North America
Georgetown University
Frasier Papers - Canada

INSULTECH

Page

2-0 This Index

2-1 Design Specification: LT45OSS

Service	Temperature		Exposure		Inner Jacket		Outer Jacket		Flammability	Suitability	Comments
	F°	C°	Indoor/Outdoor		Pervious / Impervious		Pervious / Impervious				
Steam Process	450	232	✓	✓		✓		✓	NON	Low Pressure Steam	Non-Wicking

2-2 Design Specification: MT800SGM

Service	Temperature		Exposure		Inner Jacket		Outer Jacket		Flammability	Suitability	Comments
	F°	C°	Indoor/Outdoor		Pervious / Impervious		Pervious / Impervious				
Steam Process	800	427	✓	✓	✓			✓	NON	Mid Temp. Steam	Wicking

2-3 Design Specification: HT1100MSGM

Service	Temperature		Exposure		Inner Jacket		Outer Jacket		Flammability	Suitability	Comments
	F°	C°	Indoor/Outdoor		Pervious / Impervious		Pervious / Impervious				
Piping & Equipment	1100	538	✓	✓	✓			✓	NON	Engine Exhaust	Non-wicking

2-4 Design Specification: HT1500MSM

Service	Temperature		Exposure		Inner Jacket		Outer Jacket		Flammability	Suitability	Comments
	F°	C°	Indoor/Outdoor		Pervious / Impervious		Pervious / Impervious				
Piping & Equipment	1500	816	✓	✓	✓			✓	NON	Engine Exhaust	Wicking

2-5 Design Specification: MT850AGM

Service	Temperature		Exposure		Inner Jacket		Outer Jacket		Flammability	Suitability	Comments
	F°	C°	Indoor/Outdoor		Pervious / Impervious		Pervious / Impervious				
Piping & Equipment	450	232	✓	✓	✓			✓	NON	Low Temp. Process	Engine Exhaust

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2-6 Design Specification: HT 1 300MA GM

Service	Temperature		Exposure		Inner Jacket		Outer Jacket		Flammability	Suitability	Comments
	F°	C°	Indoor/Outdoor		Pervious / Impervious		Pervious / Impervious				
Piping & Equipment	1300	704	✓	✓	✓			✓	NON	Engine Exhaust	Wicking

2-7 Design Specification: HT 1 100MS M

Service	Temperature		Exposure		Inner Jacket		Outer Jacket		Flammability	Suitability	Comments
	F°	C°	Indoor/Outdoor		Pervious / Impervious		Pervious / Impervious				
Piping & Equipment	1100	538	✓	✓	✓			✓	NON	Engine Exhaust	Non-wicking

2-8 Design Specification: LT 250A -VP

Service	Temperature		Permeability		Outdoor Use	Chemical Resist	Abrasion Resist	Fire Rating
	F°	C°	Pervious	Impervious				
Equipment	250			✓	Good	Good	Good	Nonflammable

2-9 Design Specification: LT 450A -TT

Service	Temperature		Permeability		Outdoor Use	Chemical Resist	Abrasion Resist	Fire Rating
	F°	C°	Pervious	Impervious				
Equipment & Piping	450	232		✓	Excellent	Excellent	Good	Non-Flammable

2-10 Design Specification: HT 1 100A -MSGM

Service	Temperature		Permeability		Outdoor Use	Chemical Resist	Abrasion Resist	Fire Rating
	F°	C°	Pervious	Impervious				
Equipment & Piping	1100	593		✓	Good	Good	Excellent	Self-Extinguishing

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Design Specification:										LT 450SS	
Service	Temperature		Exposure		Inner Jacket		Outer Jacket		Flammability	Suitability	Comments
	F°	C°	Indoor/Outdoor		Pervious / Impervious		Pervious / Impervious				
Steam Process	450	232	✓	✓		✓		✓	NON	Low Pressure Steam	Non-Wicking

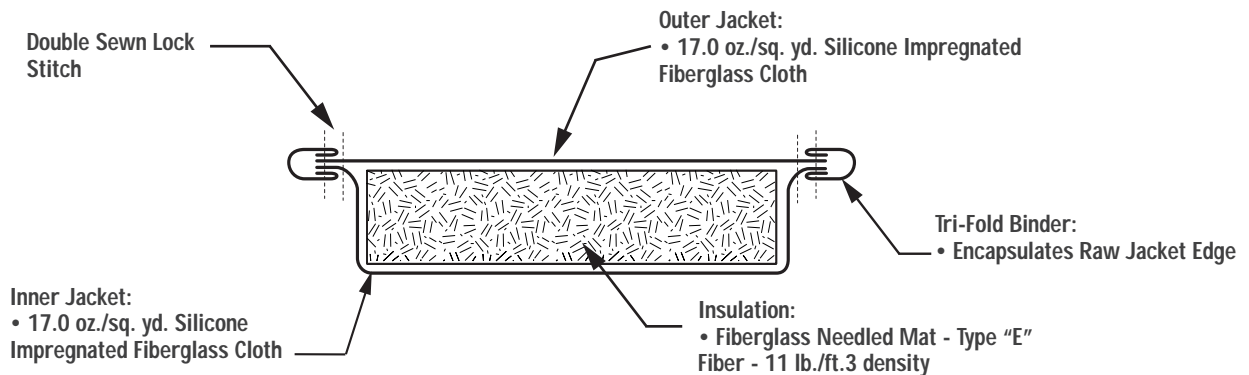
Application

- Gate Valves • Ball Valves • Centrifugal Pumps • Globe V alves • Condensate Pumps • Expansion Joints • Steam Traps • PRV'S • Heat Exchangers • Strainers • Contr ol Valves • Steam-Mud Drums • Boiler Heads

Market

- Institutional and Industrial Boiler Rooms • District Heating and Cogeneration Power Plants

Design Components:



Blanket Thickness Surface Temperature Reference:						
Operating Temperature	Thickness / Surface Temperature		Thickness / Surface Temperature		Thickness / Surface Temperature	
250°F (121°C)	1"	100.2°F	1.5"	92.0°F	2"	87.4°F
300°F (149°C)	1"	108.6°F	1.5"	98.2°F	2"	92.3°F
350°F (177°C)	1"	117.2°F	1.5"	104.6°F	2"	97.4°F
400°F (204°C)	1"	126.0°F	1.5"	111.2°F	2"	102.7°F
450°F (232°C)	1"	135.1°F	1.5"	118.0°F	2"	108.2°F

- * The above reference cold face surface temperatures should be used as guidelines for blanket thickness design.
- * The cold face surface temperature of the blanket should achieve ambient temperature conditions.
- * The economic thickness of the blanket should consider blanket cost to thermal performance.
- * Heat loss calculations are based on a 70°F ambient using a flat surface condition.

Fabrication Requirements

Blanket Construction

Blanket construction shall be a double sewn lock stitch with a minimum of 7 stitches per inch. All raw jacket edges will have a tri-fold Silicone cloth binding. No raw cut jacket edge will be exposed. Stitching will be done with Teflon coated fiberglass thread.

Blanket Overlap

Blanket will overlap mating flanges as well as existing insulation with a minimum of 2" overlap. Where blanket cannot overlap existing oversized insulation, blanket will butt up to existing insulation with a friction closing seam. Open gaps are not acceptable. Blanket diameters which are 2" larger than existing insulation must be capped to eliminate open air void.

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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 low point.

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 50 lbs. 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" Embossed lettering shows location, description, size, pressure rating and tag number sequence.

Quilting Pins

To enhance blanket quality and to maintain uniform thickness, stainless steel tufts or pins will be placed at random locations no greater than 18" inches apart. This 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 that separate body and bonnet.

Standard Fastener

Blanket insulation will accommodate the following fastening option. A 20 gauge stainless steel wire will be doubled up and twisted in a spiral fashion with a minimum of 5 twists per inch. Wiretwist length will be 16" or longer. The Wiretwist will be secured to the lacing pin at the pin stem. Lacing pin stems will be 14 gauge. Wiretwists will be spaced 6" O.C. along closing seams with matching lacing pins to secure to.

Fastening Options

1) Lacing Pins

Stainless Steel Type 304 lacing pins. These pins can either be 12 or 14 gauge. Location of pins on the blanket will be 2" or more from blanket edge and 8" or less from centerline to centerline.

2) Stainless Steel "D" Ring Strap with Velcro Tab

A three layer fabric strap is double sewn. One strap is a 16" long pulldown strap, the other is a 6" long stationary strap. Both straps are

stitched to the outer jacketing of the blanket. The stationary strap includes a 304 stainless steel "D" Ring measuring 1.125" to 1.25" in width. This is placed 1/2" from the closing seam edge. The pulldown strap is placed 3" in from the closing seam edge. Both matching straps are spaced along the closing seam edge no greater than 8" apart. The pulldown strap includes hook-and-loop velcro, measuring at least 1" wide by 6" long, and is perimeter stitched to the strap surface. All closing seams have a 1.5" extended fabric flap, which is placed along the stationary strap side of the closing seam.

3) Velcro Flaps

Velcro hook & loop fastener sewn to an outer jacketing flap. A 2" wide hook will be stitched to the blanket and a 2" wide loop will be stitched to an extended outer jacketing flap. Velcro is rated for temperatures up to 350°F.

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 blanket insulation will be installed. The latest and most accurate records must be kept by the supplier on a CAD file for a minimum of ten years to assure re-orders and replacement.

Project Qualifications

All items to be insulated will require a field takeoff prior to bid submittal, and must be reviewed for proper cost estimation. Upon receipt of project contract, each and every item must be accurately measured for retrofitting to existing field conditions and tagged with an aluminum or stainless steel identification tag showing an item number for installation reference. At the time of installation, blankets must have a corresponding item number shown on the blanket tag and must match to existing tagging on fitting. No standard blanket designs will be accepted. This will assure good thermal performance.

Warranties

All blankets will carry an 18 month warranty covering the replacement cost of the blanket. This warranty will cover blanket failure due to premature degradation from either blanket components used in the blanket, the blanket design construction or workmanship.

Design Construction Sample

Upon bid submittal a blanket design construction sample must be presented for review and product approval. A 2 piece 4" Gate Valve 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 rejection.

INSULTECH

Design Specification:								MT800SGM			
Service	Temperature		Exposure		Inner Jacket		Outer Jacket		Flammability	Suitability	Comments
	F°	C°	Indoor/Outdoor		Pervious / Impervious		Pervious / Impervious				
Steam Process	800	427	✓	✓	✓			✓	NON	Mid Temp.	Wicking

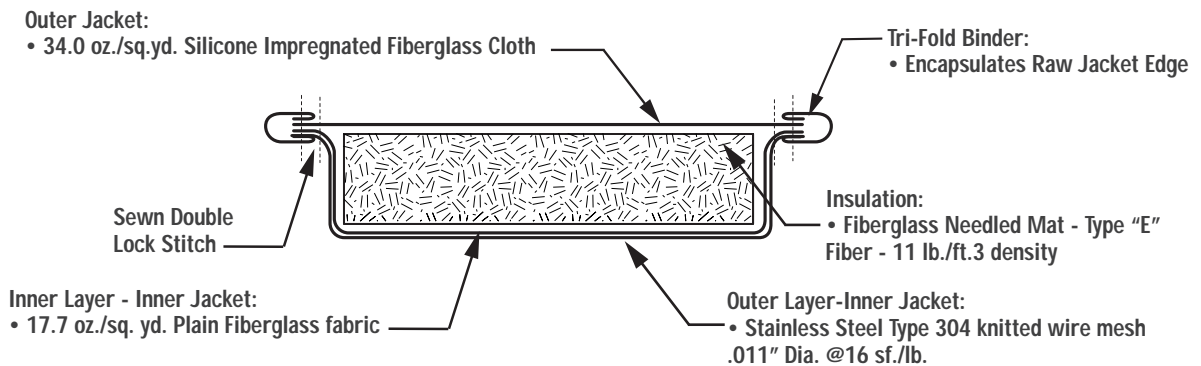
Application

- Gate Valves • Single Stage Steam Turbines • Globe Valves • Small Multi-Stage Steam Turbines • Orifice Flanges • Expansion Joints • Feedwater Pumps
- Pressure Reducing Valves

Market

- District Heating Plants • Industrial Boiler Rooms • Utility Power Plants • Cogeneration Power Plants

Design Components:



Blanket Thickness Surface Temperature Reference:

Operating Temperature	Thickness / Surface Temperature		Thickness / Surface Temperature		Thickness / Surface Temperature	
	Thickness	Surface Temperature	Thickness	Surface Temperature	Thickness	Surface Temperature
450F (232°C)	1"	135F	1.5"	118F	2"	108F
550F (288°C)	1"	154F	1.5"	132F	2"	120F
650F (343°C)	1"	175F	1.5"	148F	2"	133F
750F (399°C)	1"	197F	1.5"	165F	2"	147F
800F (454°C)	1"	208F	1.5"	174F	2"	154F

- * The above reference cold face surface temperatures should be used as guidelines for blanket thickness design.
- * The cold face surface temperature of the blanket should achieve ambient temperature conditions.
- * The economic thickness of the blanket should consider blanket cost to thermal performance.
- * Heat loss calculations are based on a 70F ambient using a flat surface condition.

Fabrication Requirements

Blanket Construction

Blanket construction shall be a single sewn lock stitch with a minimum of 7 stitches per inch. All raw jacket edges will have a folded Silicone Fiberglass cloth binding. No raw cut jacket edge will be exposed. Stitching will be done with a stainless steel thread. To enhance the sewn quality and to reinforce the finished fabric edge, Monel staples will be placed 1" on center along the binded edge.

Blanket Overlap

Blanket will overlap mating flanges as well as existing insulation with a minimum of 2" overlap. Where blanket cannot overlap existing oversized insulation, blanket will butt up to existing insulation with a friction closing seam. Open gaps are not acceptable. Blanket diameters which are 2" larger than existing insulation must capped to eliminate open air void.

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Leak Accommodations

To accommodate a leak and detect its origin, blanket pieces will either have a low point drain grommet or the design will incorporate a mating seam at the low point.

ID Plate

For easy identification and location, a stainless steel or aluminum name plate tag is riveted to each blanket piece. 1/8" Embossed lettering shows location, description, size, pressure rating and tag number sequence.

Quilting Pins

To enhance blanket quality and maintain uniform thickness, stainless steel quilting pins will be placed at random locations no greater than 18" apart. This will prevent shifting of the insulation filler.

Blanket Insulation Design

When designing blanket insulation for large equipment where a multi-piece construction is necessary, the total number of pieces is minimized. Any one piece will not exceed 50 lbs. in weight.

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.

Standard Fastener

Blanket insulation will accommodate any of the fastening option. A 20 gauge stainless steel wire will be doubled up and twisted in a spiral fashion with a minimum of 4 twists per inch. Wiretwist length will be 16" or greater. The Wiretwist will be secured to the lacing pin at the pin stem. Lacing pin stems will be 14 gauge. Lacing head will be a Type 93A, with a parallel hook and tapered throat.

Fastening Option

Stainless Steel "D" Ring Strap with Velcro Tab

A three layer fabric strap is double sewn. One strap is a 16" long pulldown strap, the other is a 6" long stationary strap. Both straps are stitched to the outer jacketing of the blanket. The stationary strap includes a 304 stainless steel "D" Ring measuring 1.125" to 1.25" in width. This is placed 1/2" from the closing seam edge. The pulldown strap is placed 3" in from the closing seam edge. Both matching straps are spaced along the closing seam edge no greater than 8" apart. The pulldown strap includes hook-and-loop velcro, measuring at least 1"

wide by 6" long, and is perimeter stitched to the strap surface. All closing seams have a 1.5" extended fabric flap, which is placed along the stationary strap side of the closing seam.

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 blanket insulation will be installed. The latest and most accurate records must be kept by the supplier on a CAD file for a minimum of ten years to assure re-orders and replacement.

Project Qualifications

All items to be insulated will require a field takeoff prior to bid submittal, and must be reviewed for proper cost estimation. Upon receipt of project contract, each and every item must be accurately measured for retrofitting to existing field conditions and tagged with an aluminum or stainless steel identification tag showing an item number for installation reference. At the time of installation, blankets must have a corresponding item number shown on the blanket tag and must match to existing tagging on fitting. No standard blanket designs will be accepted. This will assure good thermal performance.

Warranties

All blankets will carry an 18 month warranty covering the replacement cost of the blanket. This warranty will cover blanket failure due to premature degradation from either blanket components used in the blanket, the blanket design construction or workmanship.

Design Construction Sample

Upon bid submittal a blanket design construction sample must be presented for review and product approval. A 2 piece 4" Gate Valve 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 rejection.

Design Guidelines

To access the true limitations of this recommended design, refer to the technical data sheets on 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, please contact your regional representative or call Shannon direct.

INSULTECH

Design Specification:							HT 1 1 OOMSGM				
Service	Temperature F° C°		Exposure Indoor/Outdoor		Inner Jacket Pervious / Impervious		Outer Jacket Pervious / Impervious		Flammability	Suitability	Comments
Piping & Equipment	1100	538	✓	✓	✓			✓	NON	Engine Exhaust	Non-wicking

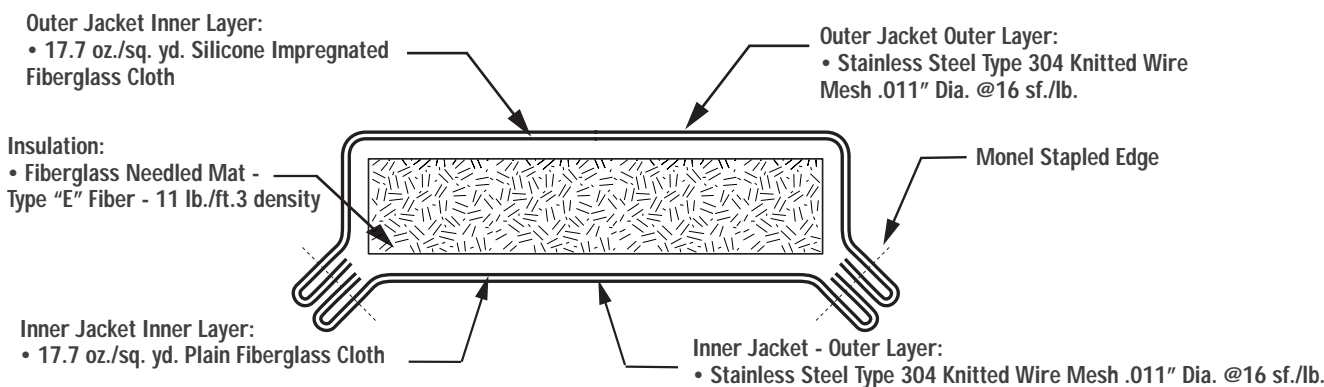
Application: **Reciprocating Engine Exhaust**

- Engine Manifolds • Exhaust Reducer Cones • Mufflers • Expansion Joints • Exhaust Piping • Fittings • By-Pass Piping • Turbo Charger Casings

Market

- Gas Transmission Stations • Cogeneration Power Plants

Design Components:



Blanket Thickness Surface Temperature Reference:

Operating Temperature	Thickness / Surface Temperature		Thickness / Surface Temperature		Thickness / Surface Temperature	
700°F (371°C)	1.5"	156.5°F	2"	139.6°F	2.5"	128.4°F
800°F (427°C)	1.5"	174.6°F	2"	154.5°F	2.5"	141.2°F
900°F (482°C)	1.5"	194.5°F	2"	171.0°F	2.5"	155.4°F
1000°F (538°C)	2"	189.4°F	2.5"	171.2°F	3"	158.1°F
1100°F (593°C)	2"	209.7°F	2.5"	188.8°F	3"	173.7°F

- * The above reference cold face surface temperatures should be used as guidelines for blanket 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 to thermal performance.
- * Heat loss calculations are based on a 70°F ambient using a flat surface condition.

Fabrication Requirements

Blanket Construction

Blanket construction shall be a stapled construction. Outer jacket materials will be drawn down, to match at the inner jacket edge. Jacketing will be folded under and stapled with 3/8" Monel bevel point staples at the seam. Staples are to follow the inner jacket edge with at most 1" spacing between staples.

Blanket Overlap

Blanket design will encase the unit to be insulated and if possible a minimum 4" overlap will extend beyond mating flanges. Where feasible, insulation will overlap mating flanges. If overlapping is not possible, blanket insulation will butt up to the adjoining surface.

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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 blanket insulation will be installed. The latest and most accurate records must be kept by the supplier on a CAD file for a minimum of ten years to assure re-orders and replacement.

ID Plates

For easy identification and location, a stainless steel or aluminum name plate tag is riveted to each blanket piece. 1/8" Embossed lettering shows location, description, size, pressure rating and tag number sequence.

Quilting Pins

To enhance blanket quality and maintain uniform thickness, stainless steel tufts or pins will be placed at random locations no greater than 18" apart. This will prevent shifting of the insulation filler.

Minimized Air Void

Blanket design will conform to the equipment surface with minimized air void. The total number of pieces will be minimized. Any one piece will not exceed 50 lbs. in weight. Designs will minimize installation time as well as removal time.

Standard Fastener

Blanket insulation will accommodate the following fastening option. A 20 gauge stainless steel wire will be doubled up and twisted in a spiral fashion with a minimum of 4 twists per inch. Wiretwist length will be 16" or greater. The Wiretwist will be secured to the lacing pin at the pin stem. Lacing pin stems will be 14 gauge.

Fastening Option

1) Lacing Pins

Stainless Steel Type 304 lacing pins. These pins can either be 12 or 14 gauge. Location of pins on the blanket will be 2" or more from blanket edge and 8" or less from centerline to centerline.

Project Qualifications

All items to be insulated will require a field takeoff prior to bid submittal, and must be reviewed for proper cost estimation. Upon receipt of project contract, each and every item must be accurately measured for retrofitting to existing field conditions and tagged with an aluminum or stainless steel identification tag showing an item number for installation reference. At the time of installation, blankets must have a corresponding item number shown on the blanket tag and must match to existing tagging on fitting. No standard blanket designs will be accepted. This will assure good thermal performance.

Warranties

All blankets will carry an 18 month warranty covering the replacement cost of the blanket. This warranty will cover blanket failure due to premature degradation from either blanket components used in the blanket, the blanket design construction or workmanship.

Design Guidelines

To access the true limitations of this recommended design, refer to the technical data sheets on each product component. This recommended design is intended to follow those guidelines and produce the highest achievable service life possible. Blanket design quality can be reduced or enhanced by changing any one component. If a question arises regarding deviations from the stated guidelines, please consult your regional representative or call Shannon direct.

Design Construction Sample

Upon bid submittal a blanket design construction sample must be presented for review and product approval. A 12" by 18" 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 rejection.

INSULTECH

Specification
HT 1 500MSSM

Design Specification:							HT 1 500MSSM	
Service	Temperature F° C°		Exposure Indoor/Outdoor	Inner Jacket Pervious / Impervious	Outer Jacket Pervious / Impervious	Flammability	Suitability	Comments
Piping & Equipment	1500	816	✓ ✓	✓		NON	Engine Exhaust	Wicking

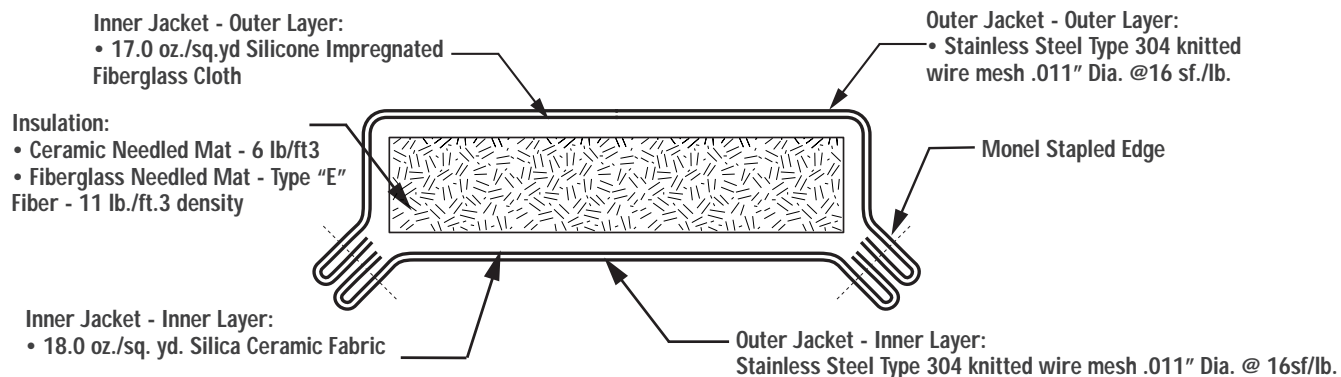
Application: **Reciprocating Engine Exhaust & Gas Turbine Engine Exhaust**

- Exhaust Manifolds • Exhaust Cones • Mufflers • Expansion Joints • Exhaust Piping • Fittings • By- Pass Piping • TurboCharger Casings

Market

- Gas Transmission Stations • Cogeneration Power Plants

Design Components:



Blanket Thickness Surface Temperature Reference:

Temperature Range	Thickness
451°F (239°C) to 600°F (316°C)	1.5"
601°F (317°C) to 750°F (399°C)	2"
751°F (400°C) to 900°F (482°C)	2.5"
901°F (483°C) to 1500°F (816°C)	3"

Fabrication Requirements

Blanket Construction

Blanket construction shall be a stapled construction. Outer jacket materials will be drawn down, to match at the inner jacket edge. Jacketing will be folded under and stapled with 3/8" Monel bevel point staples at the seam. Staples are to follow the inner jacket edge with at most 1" spacing between staples.

Blanket Overlap

Blanket will overlap mating flanges as well as existing insulation with a minimum of 2" overlap. Where blanketing cannot overlap existing oversized

insulation, blanket will butt up to existing insulation with a friction closing seam. Open gaps are not acceptable. Blanket diameters which are 2" larger than existing insulation must capped to eliminate open air void.

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 blanket insulation will be installed. The latest and most accurate records must be kept by the supplier on a CAD file for a minimum of ten years to assure re-orders and replacement.

INSULTECH

ID Plates

For easy identification and location, a stainless steel or aluminum name plate tag is riveted to each blanket piece. 1/8" Embossed lettering shows location, description, size, pressure rating and tag number sequence.

Quilting Pins

To enhance blanket quality and maintain uniform thickness, stainless steel tufts or pins will be placed at random locations no greater than 18" apart. This will prevent shifting of the insulation filler.

Minimized Air Void

Blanket design will conform to the equipment surface with minimized air void. The total number of pieces will be minimized. Any one piece will not exceed 50 lbs. in weight. Designs will minimize installation time as well as removal time.

Standard Fastener

Blanket insulation will accommodate the following fastening option: A 20 gauge stainless steel wire will be doubled up and twisted in a spiral fashion with a minimum of 4 twists per inch. Wiretwist length will be 16" or greater. The Wiretwist will be secured to the lacing pin at the pin stem. Lacing pin stems will be 14 gauge.

Fastening Option

1) Lacing Pins

Stainless Steel Type 304 lacing pins. These pins can either be 12 or 14 gauge. Location of pins on the blanket will be 2" or more from blanket edge and 8" or less from centerline to centerline.

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 blanket insulation will be installed. The latest and most accurate records must be kept by the supplier on a CAD file for a minimum of ten years to assure re-orders and replacement.

Project Qualifications

All items to be insulated will require a field takeoff prior to bid submittal, and must be reviewed for proper cost estimation. Upon receipt of project contract, each and every item must be accurately measured for retrofitting to existing field conditions and tagged with an aluminum or stainless steel identification tag showing an item number for installation reference. At the time of installation, blankets must have a corresponding item number shown on the blanket tag and must match to existing tagging on fitting. No standard blanket designs will be accepted. This will assure good thermal performance.

Warranties

All blankets will carry an 18 month warranty covering the replacement cost of the blanket. This warranty will cover blanket failure due to premature degradation from either blanket components used in the blanket, the blanket design construction or workmanship.

Design Construction Sample

Upon bid submittal a blanket design construction sample must be presented for review and product approval. A 12" by 18" 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 rejection.

Design Guidelines

To access the true limitations of this recommended design, refer to the technical data sheets on each product component. This recommended design is intended to follow those guidelines and produce the highest achievable service life possible. Blanket design quality can be reduced or enhanced by changing any one component. If a question arises regarding deviations from the stated guidelines, please consult your regional representative or call Shannon direct.

INSULTECH

Design Specification:								MT850A GM			
Service	Temperature F° C°		Exposure Indoor/Outdoor		Inner Jacket Pervious / Impervious		Outer Jacket Pervious / Impervious		Flammability	Suitability	Comments
Piping & Equipment	450	232	✓	✓	✓			✓	NON	Low temp. process	Engine Exhaust

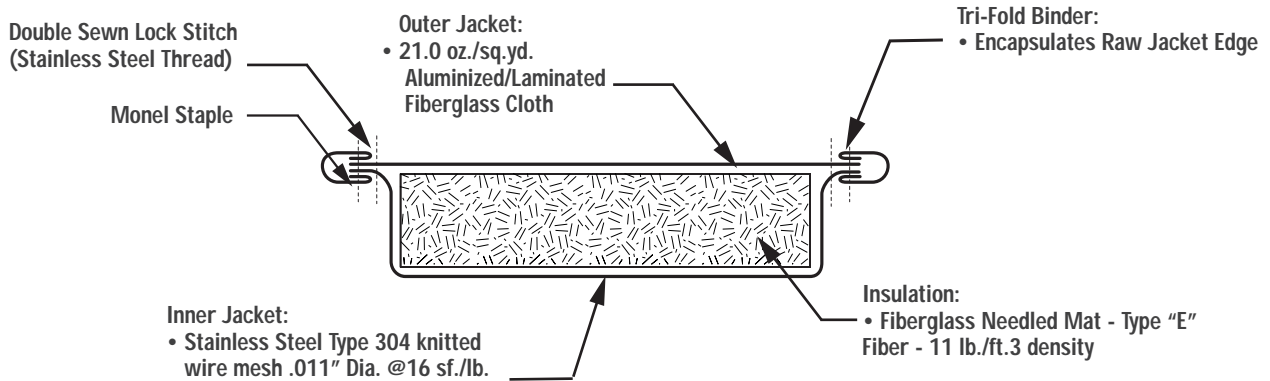
Application

- Piping • Ducting • Flanges • Manifolds • Fittings • Expansion Joints • Silencers • Rotation Machinery • Mufflers

Market

- Original Equipment Manufacturers

Design Components:



Blanket Thickness Surface Temperature Reference:

Operating Temperature	Thickness / Surface Temperature		Thickness / Surface Temperature		Thickness / Surface Temperature	
450°F (232°C)	1"	135°F	1.5"	118°F	2"	108°F
550°F (288°C)	1"	154°F	1.5"	132°F	2"	120°F
650°F (343°C)	1"	175°F	1.5"	148°F	2"	133°F
750°F (399°C)	1"	197°F	1.5"	165°F	2"	147°F
850°F (454°C)	1"	221°F	1.5"	184°F	2"	163°F

- * The above reference cold face surface temperatures should be used as guidelines for blanket thickness design.
- * The cold face surface temperature of the blanket should achieve ambient temperature conditions.
- * The economic thickness of the blanket should consider blanket cost to thermal performance.
- * Heat loss calculations are based on a 70°F ambient using a flat surface condition.

Fabrication Requirements

Blanket Construction

Blanket construction shall be a single sewn lock stitch with a minimum of 7 stitches per inch. All raw jacket edges will have a folded Aluminized Glasscloth binding. No raw cut jacket edge will be exposed. Stitching will be done with a stainless steel thread. To enhance the sewn quality and to reinforce the finished fabric edge, Monel staples will be placed 1" on center along the folded edge.

Blanket Overlap

Blanket design will encase the unit to be insulated and if possible a minimum 4" overlap will extend beyond mating flanges. Where feasible, insulation will overlap mating flanges. If overlapping is not possible, blanket insulation will butt up to the adjoining surface.

INSULTECH

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 low point.

Blanket Insulation Design

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 50 lbs. 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" Embossed lettering shows location, description, size, pressure rating and tag number sequence.

Quilting Pins

To enhance blanket quality and to maintain uniform thickness, stainless steel tufts or pins will be placed at random locations no greater than 18" inches apart. This 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 will a separate body and bonnet.

Standard Fasteners

Wiretwists - blanket insulation will accommodate the following fastening option. A 20 gauge stainless steel wire will be doubled up and twisted in a spiral fashion, with a minimum of 5 twists per inch. Wiretwist length will be 16" or longer. The Wiretwist will be secured to the lacing pin at the pin stem. Lacing pin stems will be 14 gauge. Wiretwists will be spaced 6" O.C. along closing seams with matching lacing pins to secure to.

Fastening Option

1) Stainless Steel "D" Ring Strap with Velcro Tab

A three layer fabric strap is double sewn. One strap is a 16" long pulldown strap, the other is a 6" long stationary strap. Both straps are stitched to the outer jacketing of the blanket. The stationary strap includes a 304 stainless steel "D" Ring measuring 1.125" to 1.25" in

width. This is placed 1/2" from the closing seam edge. The pulldown strap is placed 3" in from the closing seam edge. Both matching straps are spaced along the closing seam edge no greater than 8" apart. The pulldown strap includes hook-and-loop velcro, measuring at least 1" wide by 6" long, and is perimeter stitched to the strap surface. All closing seams have a 1.5" extended fabric flap, which is placed along the stationary strap side of the closing seam.

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 blanket insulation will be installed. The latest and most accurate records must be kept by the supplier on a CAD file for a minimum of ten years to assure re-orders and replacement.

Project Qualifications

All items to be insulated will require a field takeoff prior to bid submittal, and must be reviewed for proper cost estimation. Upon receipt of project contract, each and every item must be accurately measured for retrofitting to existing field conditions and tagged with an aluminum or stainless steel identification tag showing an item number for installation reference. At the time of installation, blankets must have a corresponding item number shown on the blanket tag and must match to existing tagging on fitting. No standard blanket designs will be accepted. This will assure good thermal performance.

Warranties

All blankets will carry an 18 month warranty covering the replacement cost of the blanket. This warranty will cover blanket failure due to premature degradation from either blanket components used in the blanket, the blanket design construction or workmanship.

Design Construction Sample

Upon bid submittal a blanket design construction sample must be presented for review and product approval. A 2 piece 2" Gate Valve Sample will be required and must identify all characteristics mentioned in the above fabrication requirements. Any deviation from the above stated requirements may result in rejection.

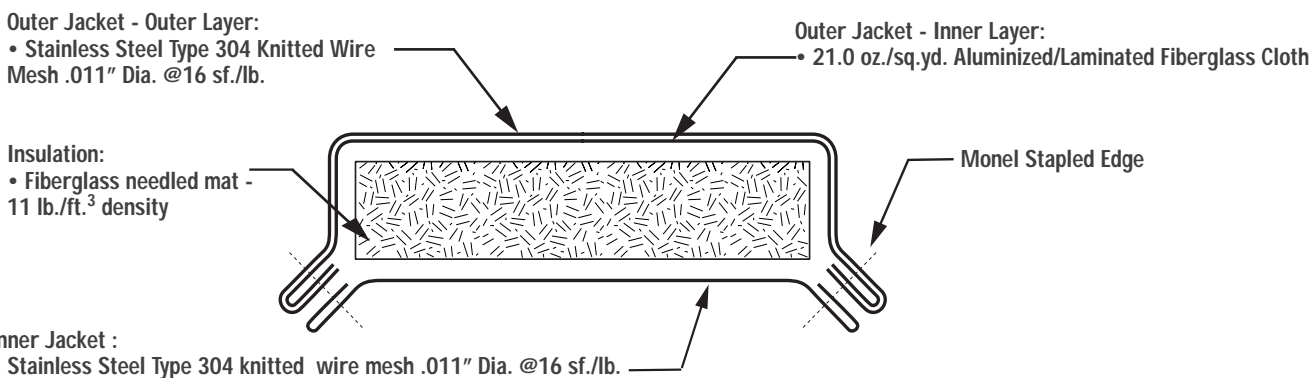
INSULTECH

Design Specification:							HT 1 300MAGM				
Service	Temperature F° C°		Exposure Indoor/Outdoor		Inner Jacket Pervious / Impervious		Outer Jacket Pervious / Impervious		Flammability	Suitability	Comments
Piping & Equipment	1300	704	✓	✓	✓			✓	NON	Engine Exhaust	Wicking

Application
 • Exhaust Manifolds • Exhaust Cones • Mufflers • Expansion Joints • Exhaust Piping • Fittings • By- Pass Piping • Turbo Charger • Casings

Market:
 For use in O.E.M. Engine Exhaust Applications

Design Components:



Blanket Thickness Surface Temperature Reference:

Temperature Range	Thickness
601°F (317°C) to 750°F (399°C)	1.5 "
751°F (400°C) to 900°F (482°C)	2"
901°F (483°C) to 1100°F (593°C)	2.5"
1101°F (594°C) to 1300°F (704°C)	3"

Fabrication Requirements

Blanket Construction

Blanket construction shall be a stapled construction. Outer jacket materials will be drawn down, to match at the inner jacket edge. Jacketing will be folded under and stapled with 3/8" Monel bevel point staples at the seam. Staples are to follow the inner jacket edge with at most 1" spacing between staples.

Blanket Overlap

Blanket design will encase the unit to be insulated and if possible a minimum 4" overlap will extend beyond mating flanges. Where feasible, insulation will overlap mating flanges. If overlapping is not possible, blanket insulation will butt up to the adjoining surface.

INSULTECH

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 blanket insulation will be installed. The latest and most accurate records must be kept by the supplier on a CAD file for a minimum of ten years to assure reorders and replacement.

ID Plates

For easy identification and location, a stainless steel or aluminum name plate tag is riveted to each blanket piece. 1/8" Embossed lettering shows location, description, size, pressure rating and tag number sequence.

Quilting Pins

To enhance blanket quality and maintain uniform thickness, stainless steel tufts or pins will be placed at random locations no greater than 18" apart. This will prevent shifting of the insulation filler.

Minimized Air Void

Blanket design will conform to the equipment surface with minimized air void. The total number of pieces will be minimized. Any one piece will not exceed 50 lbs. in weight. Designs will minimize installation time as well as removal time.

Standard Fastener

Wiretwists - the blanket insulation will accommodate the following fastening option. A 20 gauge stainless steel wire will be doubled up and twisted in a spiral fashion with a minimum of 4 twists per inch. Wiretwist length will be 16" or greater. The Wiretwist will be secured to the lacing pin at the pin stem. Lacing pin stems will be 12 gauge or 14 gauge.

Fastening Option

1) Lacing Pins

Stainless Steel Type 304 lacing pins. These pins can either be 12 or 14 gauge. Location of pins on the blanket will be 2 1/2" or more from blanket edge and 8" or less from centerline to centerline.

Project Qualifications

All items to be insulated will require a field takeoff prior to bid submittal, and must be reviewed for proper cost estimation. Upon receipt of project contract, each and every item must be accurately measured for retrofitting to existing field conditions and tagged with an aluminum or stainless steel identification tag showing an item number for installation reference. At the time of installation, blankets must have a corresponding item number shown on the blanket tag and must match to existing tagging on fitting. No standard blanket designs will be accepted. This will assure good thermal performance.

Warranties

All blankets will carry an 18 month warranty covering the replacement cost of the blanket. This warranty will cover blanket failure due to premature degradation from either blanket components used in the blanket, the blanket design construction or workmanship.

Design Guidelines

To access the true limitations of this recommended design, refer to the technical data sheets on each product component. This recommended design is intended to follow those guidelines and produce the highest achievable service life possible. Blanket design quality can be reduced or enhanced by changing any one component. If a question arises regarding deviations from the stated guidelines, please consult your regional representative or call Shannon direct.

Design Construction Sample

Upon bid submittal a blanket design construction sample must be presented for review and product approval. A 12" by 18" 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 rejection.

INSULTECH

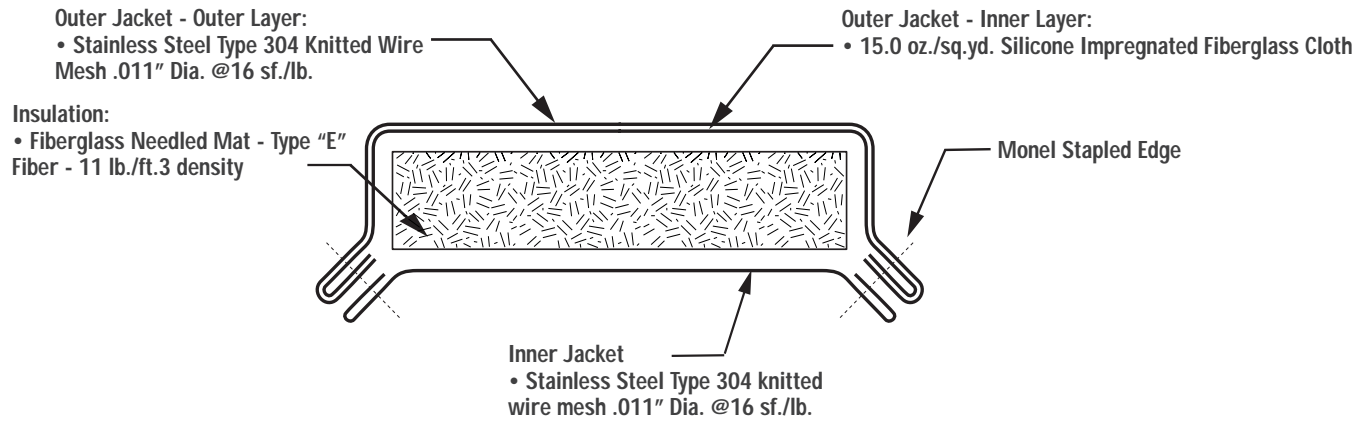
Specification
HT 1 1 OOMS M
 For use in Contractor field installed
 blanket systems.

Design Specification:							HT 1 1 OOMS M				
Service	Temperature F° C°		Exposure Indoor/Outdoor		Inner Jacket Pervious / Impervious		Outer Jacket Pervious / Impervious		Flammability	Suitability	Comments
Piping & Equipment	1100	704	✓	✓	✓			✓	NON	Engine Exhaust	Wicking

Application
 Exhaust Manifolds • Exhaust Cones • Mufflers • Expansion Joints • Exhaust Piping • Fittings • By- Pass Piping • Turbo Charger • Casings

Market:
 Gas transmission stations • Cogeneration power plants

Design Components:



Blanket Thickness Surface Temperature Reference:	
Temperature Range	Thickness
451°F (239°C) to 110°F (593°C)	2"

Fabrication Requirements

Blanket Construction

Blanket construction shall be a stapled construction. Outer jacket materials will be drawn down, to match at the inner jacket edge. Jacketing will be folded under and stapled with 3/8" Monel bevel point staples at the seam. Staples are to follow the inner jacket edge with at most 1" spacing between staples.

Blanket Overlap

Blanket design will encase the unit to be insulated and if possible a minimum 4" overlap will extend beyond mating flanges. Where feasible, insulation will overlap mating flanges. If overlapping is not possible, blanket insulation will butt up to the adjoining surface.

INSULTECH

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 blanket insulation will be installed. The latest and most accurate records must be kept by the supplier on a CAD file for a minimum of ten years to assure reorders and replacement.

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Quilting Pins

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Standard Fastener

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Fastening Option

1) Lacing Pins

Stainless Steel Type 304 lacing pins. These pins can either be 12 or 14 gauge. Location of pins on the blanket will be 2 1/2" or more from blanket edge and 8" or less from centerline to centerline.

Project Qualifications

All items to be insulated will require a field takeoff prior to bid submittal, and must be reviewed for proper cost estimation. Upon receipt of project contract, each and every item must be accurately measured for retrofitting to existing field conditions and tagged with an aluminum or stainless steel identification tag showing an item number for installation reference. At the time of installation, blankets must have a corresponding item number shown on the blanket tag and must match to existing tagging on fitting. No standard blanket designs will be accepted. This will assure good thermal performance.

Warranties

All blankets will carry an 18 month warranty covering the replacement cost of the blanket. This warranty will cover blanket failure due to premature degradation from either blanket components used in the blanket, the blanket design construction or workmanship.

Design Guidelines

To access the true limitations of this recommended design, refer to the technical data sheets on each product component. This recommended design is intended to follow those guidelines and produce the highest achievable service life possible. Blanket design quality can be reduced or enhanced by changing any one component. If a question arises regarding deviations from the stated guidelines, please consult your regional representative or call Shannon direct.

Design Construction Sample

Upon bid submittal a blanket design construction sample must be presented for review and product approval. A 12" by 18" 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 rejection.

INSULTECH

Design Specification:							LT250A-VP	
Service	Temperature		Permeability Pervious / Impervious		Outdoor Use	Chemical Resist	Abrasion Resist	Fire Rating
Equipment	250			✓	Good	Good	Good	Nonflammable

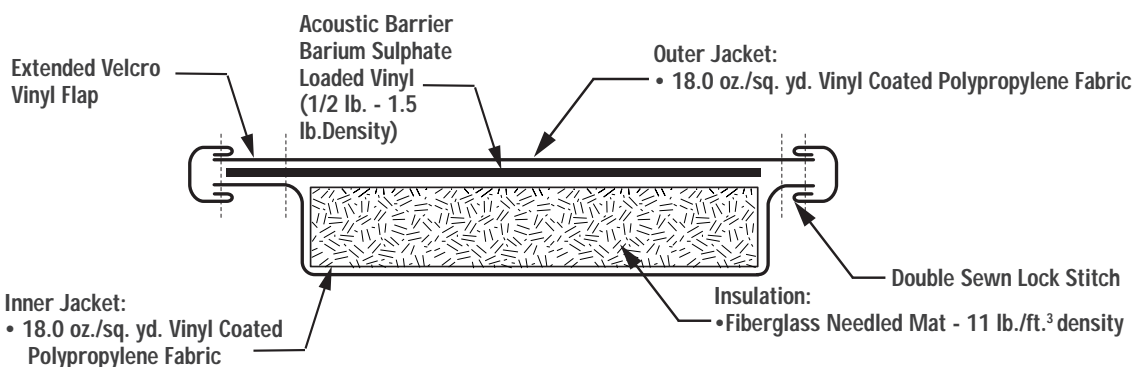
Application

- Process Piping • Pump Housings • Valves • Chiller Heads • Back Flow Preventers • Fittings • Compressor Housings • Fan Housings
- Piping/Ducting • Regulator Valves • Blower Housings • Curtains • Motor Housings • Flow Meters • Enclosure

Market

Commercial HVAC • Equipment Operating Above OSHA Required Sound Limits

Design Components:



Blanket Thickness Surface Temperature Reference:

Operating Temperature	Thickness / Surface Temperature		Thickness / Surface Temperature		Thickness / Surface Temperature	
250°F (121°C)	1"	100.2°F	1.5"	92.0°F	2"	87.4°F

- * The above reference cold face surface temperatures should be used as guidelines for blanket thickness design.
- * The cold face surface temperature of the blanket should achieve ambient temperature conditions.
- * The economic thickness of the blanket should consider blanket cost to thermal performance.
- * Heat loss calculations are based on a 70°F ambient using a flat surface condition.

Blanket Thickness to Acoustic Performance:

DBA Reduction Range	Thickness	Surface Mass
2 - 5 DBA	1"	1.38 - 2.38 lb/SF
6 - 10 DBA	1.5"	1.82 - 3.10 lb/SF
11 - 15 DBA	2"	2.5 - 3.51 lb/SF

- * The above DBA reductions are approximations. These figures are only guidelines of performance.
- * True estimates should include field verification of DBA levels and frequency concentrations.

INSULTECH

Fabrication Requirements

Design Requirements

The INSULTECH Thermal Blanket System will be custom fitted to the treated surface. This will ensure maximum thermal performance and will allow quick and easy installation and removal. Blanket pieces will match and account for all surface protrusions (Ex. Tubing, Brackets). All blanket pieces will include necessary fastening hardware of both Stainless Steel Wiretwists and extended Hook & Loop Velcro™ Flaps. There will be no open gaps on any closing seams.

Blanket Construction

Blanket construction shall be a double sewn lock stitch with a minimum of 7 stitches per inch. All raw jacket edges will have a tri fold Teflon cloth binding. No raw cut jacket edge will be exposed. Stitching will be done with Teflon coated fiberglass thread.

Blanket Overlap

To avoid penetrating cold at closing seams, blanket pieces will include an extended 2" wide fabric flap. This flap will cover the exposed seam and will minimize any potential air movement.

ID Plates

For easy identification and location, a stainless steel or aluminum name plate tag is riveted to each blanket piece. 1/8" Embossed lettering shows location, description, size, pressure rating and tag number sequence.

Quality Pins

To enhance blanket quality and to maintain uniform thickness, stainless steel quilting pins will be placed at random locations no greater than 18" apart. This will prevent shifting of the insulation filler.

Minimized Air Void

Blanket design will conform to the equipment surface with minimized air void. The total number of pieces will be minimized. Any one piece will not exceed 50 lbs. in weight. Designs will minimize installation time as well as removal time.

Assembly Drawing Requirements

For multi-piece designs, an installation assembly drawing is required. The assembly drawing will reference tag number sequence for installation. Each blanket piece will have an I.D. tag corresponding to the assembly drawing. Instructions for install and a Material List will also be included. Copies will be submitted for future reference and files.

Design Requirements

All blanket designs will accommodate vibration probes, gauges, tubing, piping, brackets, etc. All blanket pieces will be guaranteed to fit.

Standard Fastener

A 20 gauge stainless steel wire is doubled up and twisted in a spiral fashion with a minimum of 4 twists per inch. Wiretwist length will be 16" or longer. The Wiretwist will be secured to the lacing pin at the pin stem. Lacing pin stems will be 14 gauge.

Fastening Option

1) Velcro

Velcro hook & loop fastener sewn to an outer jacketing flap. 1" wide "D" Ring fastener sewn onto the belt. A minimum 3" of belting will be secured to the outer jacket fabric. Belting will be spaced apart a maximum of 6" at centerline between belts or blanket edge.

Design Guidelines

To access the true limitations of this recommended design, refer to the technical data sheets on 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, please contact your regional representative or call Shannon direct.

Project Qualifications

All items to be insulated will require a field takeoff prior to bid submittal, and must be reviewed for proper cost estimation. Upon receipt of project contract, each and every item must be accurately measured for retrofitting to existing field conditions and tagged with an aluminum or stainless steel identification tag showing an item number for installation reference. At the time of installation, blankets must have a corresponding item number shown on the blanket tag and must match to existing tagging on fitting. No standard blanket designs will be accepted. This will assure good thermal performance.

Warranties

All blankets will carry an 18 month warranty covering the replacement cost of the blanket. This warranty will cover blanket failure due to premature degradation from either blanket components used in the blanket, the blanket design construction or workmanship.

INSULTECH

Design Specification:							LT 450A -TT	
Service	Temperature		Permeability		Outdoor Use	Chemical Resist	Abrasion Resist	Fire Rating
			Pervious	Impervious				
Process	450	232		✓	Excellent	Excellent	Good	Non-Flammable

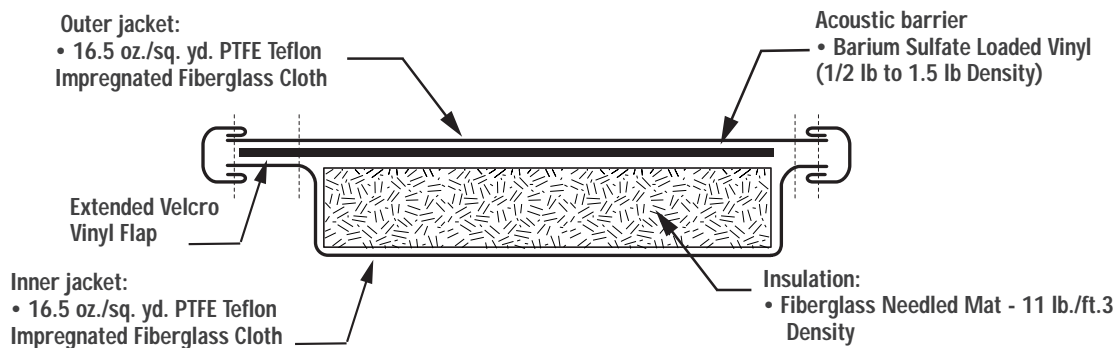
Application

- Motor Housing • Blowers • Rotary Chillers • Compressors • Gear Boxes • Compressor Housings • Piping & Fittings • Pump Housings • Fan Housings

Market

- Equipment operating above OSHA required sound limits • Commercial Industrial OEM

Design Components:



Blanket Thickness Surface Temperature Reference:

Operating Temperature	Thickness / Surface Temperature		Thickness / Surface Temperature		Thickness / Surface Temperature	
250°F (121°C)	1"	100.2°F	1.5"	92.0°F	2"	87.4°F
300°F (149°C)	1"	108.6°F	1.5"	98.2°F	2"	92.3°F
350°F (177°C)	1"	117.2°F	1.5"	104.6°F	2"	97.4°F
400°F (204°C)	1"	126.0°F	1.5"	111.2°F	2"	102.7°F
450°F (232°C)	1"	135.1°F	1.5"	118.0°F	2"	108.2°F

- * The above reference cold face surface temperatures should be used as guidelines for blanket thickness design.
- * The cold face surface temperature of the blanket should achieve ambient temperature conditions.
- * The economic thickness of the blanket should consider blanket cost to thermal performance.
- * Heat loss calculations are based on a 70°F ambient using a flat surface condition.

Blanket Thickness to Acoustic Performance:

DBA Reduction Range	Thickness	Surface Mass
2 - 5 DBA	1"	1.38 - 2.38 lb/SF
6 - 10 DBA	1.5"	1.82 - 3.10 lb/SF
11 - 15 DBA	2"	2.5 - 3.51 lb/SF

- * The above DBA reductions are approximations. These figures are only guidelines of performance.
- * True estimates should include field verification of DBA levels and frequency concentrations.

INSULTECH

Fabrication Requirements

Blanket Construction

Blanket construction is a double sewn lock stitch with a 7 stitches per inch minimum. All raw jacket edges have a tri-fold Teflon cloth binding stitched with Teflon coated fiberglass thread. No raw cut jacket edge will be exposed.

Resistant Flap

To avoid penetrating noise at mating seams, blanket pieces will include an extended 2" wide fabric vinyl flap. This flap will cover the exposed seam and will minimize any potential noise leaks.

ID Plates

For easy identification and location, a stainless steel or aluminum name plate tag is riveted to each blanket piece. 1/8" Embossed lettering shows location, description, size, pressure rating and tag number sequence.

Quality Pins

To enhance blanket quality and to maintain uniform thickness, stainless steel quilting pins will be placed at random locations no greater than 18" apart. This will prevent shifting of the insulation filler.

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 50 lbs. in weight.

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 blanket insulation will be installed. The latest and most accurate records must be kept *by the supplier* on a CAD file for a minimum of ten years to assure re-orders and replacement.

Guaranteed Fit

All blanket designs will accommodate vibration probes, gauges, tubing, piping, brackets, etc. All blanket pieces are guaranteed to fit for optimum acoustic performance.

Standard Fastener

A 20 gauge stainless steel wire is doubled up and twisted in a spiral fashion with a minimum of 4 twists per inch. Wiretwist length will be 16" or longer. The Wiretwist will be secured to the lacing pin at the pin stem. Lacing pin stems will be 14 gauge.

Fastening Options

1) Velcro Flaps

A 2" wide hook will be stitched to the blanket and a 2" wide loop will be stitched to an extended outer jacketing flap. Velcro is rated for temperatures up to 350°F.

2) Stainless Steel "D" Ring Strap with Velcro Tab

A three layer fabric strap is double sewn. One strap is a 16" long pulldown strap, the other is a 6" long stationary strap. Both straps are stitched to the outer jacketing of the blanket. The stationary strap includes a 304 stainless steel "D" Ring measuring 1.125" to 1.25" in width. This is placed 1/2" from the closing seam edge. The pulldown strap is placed 3" in from the closing seam edge. Both matching straps are spaced along the closing seam edge no greater than 8" apart. The pulldown strap includes hook-and-loop velcro, measuring at least 1" wide by 6" long, and is perimeter stitched to the strap surface. All closing seams have a 1.5" extended fabric flap, which is placed along the stationary strap side of the closing seam.

Design Guidelines

To access the true limitations of this recommended design, refer to the technical data sheets on 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, please contact your regional representative or call Shannon direct.

Project Qualifications

All items to be insulated will require a field takeoff prior to bid submittal, and must be reviewed for proper cost estimation. Upon receipt of project contract, each and every item must be accurately measured for retrofitting to existing field conditions and tagged with an aluminum or stainless steel identification tag showing an item number for installation reference. At the time of installation, blankets must have a corresponding item number shown on the blanket tag and must match to existing tagging on fitting. No standard blanket designs will be accepted. This will assure good thermal performance.

Warranties

All blankets will carry an 18 month warranty covering the replacement cost of the blanket. This warranty will cover blanket failure due to premature degradation from either blanket components used in the blanket, the blanket design construction or workmanship.

INSULTECH

Design Specification: HT 1 1 OOA -MSGM

Service	Temperature		Permeability		Outdoor Use	Chemical Resist	Abrasion Resist	Fire Rating
			Pervious	Impervious				
Exhaust Gas	1100	593		✓	Good	Good	Excellent	Self-Extinguishing

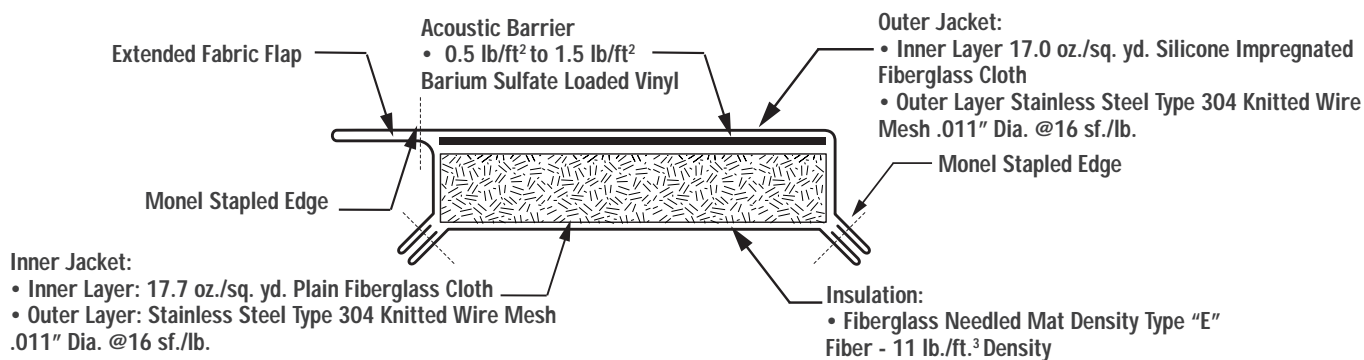
Application

- Exhaust Piping • Exp. Joints • Turbocharger Cases • Exhaust Plenums • Exhaust Ducting • Silencer Housings • Exhaust Manifolds • Exhaust Cones
- By-pass Piping • Mufflers • Fittings

Market

- Gas Transmission Stations • Cogeneration Power Plants

Design Components:



Blanket Thickness Surface Temperature Reference:

Operating Temperature	Thickness / Surface Temperature		Thickness / Surface Temperature		Thickness / Surface Temperature	
700°F (371°C)	1.5"	156.5°F	2"	139.6°F	2.5"	128.4°F
800°F (427°C)	1.5"	174.6°F	2"	154.5°F	2.5"	141.2°F
900°F (482°C)	1.5"	194.5°F	2"	171.0°F	2.5"	155.4°F
1000°F (538°C)	2"	189.4°F	2.5"	171.2°F	3"	158.1°F
1100°F (593°C)	2"	209.7°F	2.5"	188.8°F	3"	173.7°F

- * The above reference cold face surface temperatures should be used as guidelines for blanket 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 to thermal performance.
- * Heat loss calculations are based on a 70°F ambient using a flat surface condition.

Blanket Thickness to Acoustic Performance:

Thickness	Surface Mass	Estimated Reduction
1.5"	1.82 - 2.82 lb/SF	3 - 6 DBA
2"	2.26 - 3.26 lb/SF	7 - 9 DBA
2.5"	3.14 - 3.70 lb/SF	10 - 13 DBA

- * The above DBA reductions are approximations. These figures are only guidelines of performance.
- * True estimates should include field verification of DBA levels and frequency concentrations.

Fabrication Requirements

Blanket Construction

Blanket construction shall be a stapled construction. Outer jacket materials will be drawn down, to match at the inner jacket edge. Jacketing will be folded under and stapled with 3/8" Monel bevel point staples at the seam. Staples are to follow the inner jacket edge with at most 1" spacing between staples. Hogrings are not acceptable.

Blanket Overlap

Blanket design will encase the unit to be insulated and if possible a minimum 4" overlap will extend beyond mating flanges. Where feasible, insulation will overlap mating flanges. If overlapping is not possible, blanket insulation will butt up to the adjoining surface.

Assembly Drawing Requirements

For multi-piece designs, an installation assembly drawing is required. The assembly drawing will reference tag number sequence for installation. Each blanket piece will have an I.D. tag corresponding to the assembly drawing. Instructions for install and a Material List will also be included. Copies will be submitted for future reference and files.

ID Plates

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Quality Pins

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Minimized Air Void

Blanket design will conform to the equipment surface with minimized air void. The total number of pieces will be minimized. Any one piece will not exceed 50 lbs. in weight. Designs will minimize installation time as well as removal time.

Standard Fastener

A 20 gauge stainless steel wire is doubled up and twisted in a spiral fashion with a minimum of 4 twists per inch. Wiretwist length will be 16" or longer. The Wiretwist will be secured to the lacing pin at the pin stem. Lacing pin stems will be 14 gauge.

Design Guidelines

To access the true limitations of this recommended design, refer to the technical data sheets on 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, please contact your regional representative or call Shannon direct.

Project Qualifications

All items to be insulated will require a field takeoff prior to bid submittal, and must be reviewed for proper cost estimation. Upon receipt of project contract, each and every item must be accurately measured for retrofitting to existing field conditions and tagged with an aluminum or stainless steel identification tag showing an item number for installation reference. At the time of installation, blankets must have a corresponding item number shown on the blanket tag and must match to existing tagging on fitting. No standard blanket designs will be accepted. This will assure good thermal performance.

Warranties

All blankets will carry an 18 month warranty covering the replacement cost of the blanket. This warranty will cover blanket failure due to premature degradation from either blanket components used in the blanket, the blanket design construction or workmanship.

INSULTECH

Silicone Impregnated Fiberglass Cloth 17.0 oz. /sq yd.

This jacket material is an impregnated fiberglass fabric using flame retardant silicone. Because Silicone is resistant to most chemical attack, this product is widely accepted in most power plants, boiler rooms, steam utility power plants, cogeneration facilities and gas transmission stations. It offers a cost effective jacking material, allowing good protection qualities to the insulation filler being used. This fabric is oil and water resistant and is ideal for outdoor use.

Weight	Thickness	Max Fab. Width	Color	Temperature Rating Continuous / Intermittent	Tensile Strength Warp / Fill
17.0 oz./sq.	0.018"	60"	standard light gray	450°F (232°C) Continuous 500°F (260°C) Intermittent	350 lbs./in. avg. Warp 300 lbs./in. avg. Fill



PTFE Teflon Impregnated Fiberglass Cloth 16.5 oz. / sq. yd.

This jacket material is a PTFE Teflon impregnated fiberglass fabric engineered for industrial conditions. Applications involve acidic and basic processes. The chemical resistant quality of PTFE Teflon allows a protective coating onto fiberglass cloth creating a chemically resistant, weather resistant jacketing ideal for outdoor use. The coating is applied to both sides of the cloth producing greater protection. Market applications include chemical plants, petrochemical plants and food processing plants. It is nonflammable and has a V-O rating of UL94 vertical burn test.

Weight	Thickness	Max Fab. Width	Color	Temperature Rating Continuous / Intermittent	Tensile Strength Warp / Fill
16.5 oz./sq.	0.016"	60"	standard dark gray	450°F (232°C) Continuous 500°F (260°C) Intermittent	410 lbs./in. avg. Warp 355 lbs./in. avg. Fill



Plain Fiberglass Cloth 17.7 oz. / sq. yd.

This jacket material is an untreated fiberglass lagging jacketing used for high temperature above 450°F (232°C). This jacketing material works well as a barrier to protect the inner surface of insulation filler and prevent free floating fibers. It is pervious to liquids and should not be used where potential wicking is a problem. Wicking will occur if the fabric saturates and is non-combustible. The material is de Fiberglass Fiber.

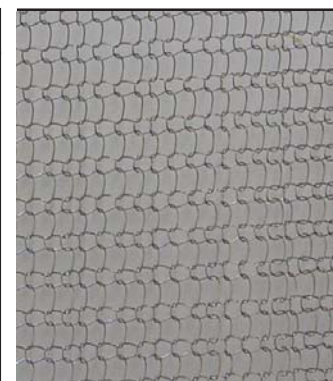
Weight	Thickness	Max Fab. Width	Color	Temperature Rating Continuous / Intermittent	Tensile Strength Warp / Fill
17.7 oz./sq.	0.030"	60"	off white	700°F (371°C) Continuous 1000°F (538°C) Intermittent	200 lbs./in. avg. Warp 150 lbs./in. avg. Fill



Stainless Steel Type 304 Knitted Wire Mesh

This jacket material uses type 304 stainless steel which is knitted into a tubular fabric. Temperature limitations of this material allow blanket design construction to achieve elevated operating temperatures in excess of 1100°F (593°C). Used in conjunction with other fabrics, Stainless Mesh offers a mechanical protective metal barrier which is vibration resistant and quite durable. By protecting the inner jacketing material placed under the mesh, blanket design construction becomes highly durable and long lasting. In addition an air film is created allowing additional thermal protection for the inner fabric.

Weight	Thickness	Max Fab. Width	Color	Temperature Rating Continuous / Intermittent	Coverage
11.0 oz./sq.	0.011	30" tubular 60" open width	N.A.	1200°F (649°C) Continuous	16 sf./lb.



INSULTECH

PTFE Teflon Impregnated Nomex Cloth

TCI - ST16

This jacket material is a PTFE Teflon impregnated Nomex fabric engineered for District Heating Steam Distribution piping systems. Using both PTFE Teflon as well as Nomex Aramid fabric, both the jacketing and insulation filler will provide a lengthy service life. The chemical resistance of both materials will withstand the high chloride acidic environment typical in most manholes and steam vaults. This jacketing material is oil and water resistant and is not recommended for outdoor use due to low UV rating.

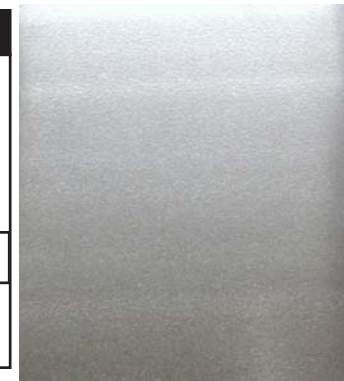
Weight	Thickness	Max Fab. Width	Color	Temperature Rating Continuous / Intermittent	Tensile Strength Warp / Fill
16.0 oz./sq.	0.016"	60"	standard black	450°F (232°C) Continuous 500°F (260°C) Intermittent	180 lbs./in. avg. Warp 155 lbs./in. avg. Fill



Stainless Steel Foil

This jacketing material is type 304 stainless steel rolled foil. It is a deal for applications requiring an impervious jacketing material on service temperatures exceeding 500°F (260°C). The primary purpose of this material is to protect the insulation filler from saturation which could result in "wicking". At elevated temperatures, the stainless steel reflective qualities are a positive attribute to the overall performance of the acoustic blanket.

Thickness	Width	Temperature Rating	Coverage
0.002' dia.	24" typ.	1400°F (760°C)	12 sf./lb.



Fiberglass Needled Mat Insulation

Standard Insulation Filler

A high temperature, high density, flexible material composed of 100% selected type "E" grade fibers needled into mat form. The mat fiber construction offers high strength and uniform thickness. Insulation is asbestos free with no organic or resinous binders. The average fiber diameter is 0.00035". It has excellent vibratory resistance.

Thickness	Density	Temp. Rating	Tensile Strength	Specification Compliance	Thermal Conductivity
1" thick	11 lb./ft. ³ - 15 oz./ft. ²	1300°F (704°C)	1" thickness Parallel to roll 7lb./sq. in. Across roll 12 lb./sq. in.	MIL-I-16411E Type II MIL-I-24244A	300°F - 0.33BTU-in./hr.-ft. ² 400°F - 0.38BTU-in./hr.-ft. ² 500°F - 0.45BTU-in./hr.-ft. ² 600°F - 0.52BTU-in./hr.-ft. ²

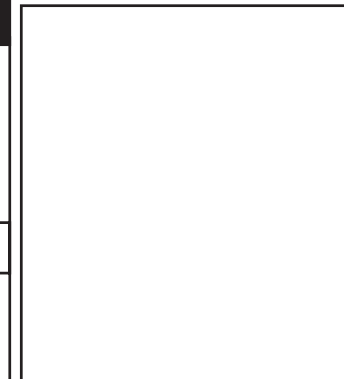


Ceramic Needled Mat Insulation

High Temp. Insulation Filler

A high temperature, mid density, flexible material made of a composite Silica and Alumina blend. This material includes ceramic fibers which are cross-locked and needled into mat form. The needled construction offers good durability and good strength. With a high temperature rating, this material is recommended for extreme temperature conditions. It is recommended that this insulation be fully encapsulated with jacketing to prevent free floating fibers. It is noncombustible (will not burn), and also has good vibration resistance.

Temp. Rating	Fusion Temp.	Density	Alkalinity	Fineness of Fiber	Thermal Conductivity (based on 6lb./ft. ³ density)
2300°F Continuous	2300°F	6 lb./ft. ³ : 5.5lb./in. ² 8 lb./ft. ³ : 12.5lb./in. ²	0.3%	2-3 Microns (mean)	600°F (316°C)- 0.50BTU-in./hr.-ft. ² 800°F (427°C)- 0.70BTU-in./hr.-ft. ² 1000°F (538°C)- 0.90BTU-in./hr.-ft. ² 1200°F (649°C)- 1.25BTU-in./hr.-ft. ²



INSULTECH

Item Pricing Index

Manufacturer	Description	Page
This Index		4-0
Generic	Linear (Straight) Pipe Runs	4-1
Generic	Flange Covers, Flange Caps	4-2
Generic	Pipe Elbows - Welded or Flanged	4-3
Generic	Bellows Expansion Joints	4-4
Dresser Clark	Turbocharger Exhaust - Models TLA-6 & TLA-8	4-5.1
Dresser Clark	Manifold Turbocharger - Models TCV-8 & TCV-10	4-5.2
Dresser Clark	Manifold Turbocharger - Models TCV-12 & TCV-16	4-5.3
Dresser Clark	Manifold Turbocharger - Models HBA-6	4-5.4
Dresser Clark	Turbocharger Exhaust - Models TRA-6	4-5.5
Dresser Clark	Manifold Turbocharger - Models TLAD-6	4-5.6
Dresser Clark	Manifold Turbocharger - Models TLAD-10 & TLA-10	4-5.7
Ingersoll Rand	Sectional Manifold - Model 412-KVSE-101EP	4-6
Cooper	Manifold Exhaust - Models W330 & LSVB	4-7.1
Cooper	Manifold Exhaust - Models GMVH & GMPR	4-7.2
Cooper	Manifold Exhaust - Models GMVH-10	4-7.3
Miratech®	Equi NOx - Catalytic Converter Housing	4-8.1
Miratech®	Mira NOx - Small Unit Housing	4-8.2
Solar®	Turbine - All Models	4-9
Catapillar	Sample Drawing / Exhaust 3616	4-10
Dresser Clark	Sample Drawing / Model TLA-6	4-11.1
Dresser Clark	Take-Off Drawing / Model TLA-6	4-11.2
Generic	Sample Drawing / Engine Exhaust	4-12

Terms: Net 30 Days • Typical Lead Time: 4-6 Weeks • FOB : N. Tonawanda, NY • Quick Ship: (2-3 Weeks) Add 7% • Export Crating: Available on Request

INSULTECH

Engine Exhaust Piping

Generic

Design Specification No.:		HT 1 1 OOMSGM
Features:	2" Blanket Thickness Standard Fastener: Stainless Steel Wiretwist Stapled Construction	



Engine Exhaust Piping Price Sheet				HT 1 1 OOMSGM			
Item	Description	Quantity	Unit Cost	Item	Description	Quantity	Unit Cost
1	6.5" Dia. Pipe	1 LF	\$ 81.60	12	28" Dia. Pipe	1 LF	\$ 247.20
2	8.5" Dia. Pipe	1 LF	\$ 97.20	13	30" Dia. Pipe	1 LF	\$ 262.80
3	10.5" Dia. Pipe	1 LF	\$ 111.60	14	32" Dia. Pipe	1 LF	\$ 278.40
4	12.5" Dia. Pipe	1 LF	\$ 127.20	15	34" Dia. Pipe	1 LF	\$ 294.00
5	14" Dia. Pipe	1 LF	\$ 139.20	16	36" Dia. Pipe	1 LF	\$ 309.60
6	16" Dia. Pipe	1 LF	\$ 153.60	17	38" Dia. Pipe	1 LF	\$ 325.20
7	18" Dia. Pipe	1 LF	\$ 170.40	18	40" Dia. Pipe	1 LF	\$ 339.60
8	20" Dia. Pipe	1 LF	\$ 186.00	19	42" Dia. Pipe	1 LF	\$ 355.20
9	22" Dia. Pipe	1 LF	\$ 201.60	20	44" Dia. Pipe	1 LF	\$ 370.80
10	24" Dia. Pipe	1 LF	\$ 217.20	22	46" Dia. Pipe	1 LF	\$ 386.40
11	26" Dia. Pipe	1 LF	\$ 231.60	23	48" Dia. Pipe	1 LF	\$ 402.00

Above Pricing Reflects a Cost per Linear Foot

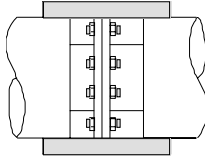
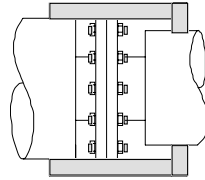
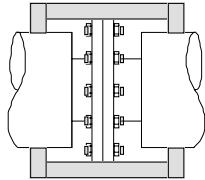
Terms: Net 30 Days • Typical Lead Time: 4-6 Weeks • FOB : N. Tonawanda, NY • Quick Ship: (2-3 Weeks) Add 7% • Export Crating: Available on Request

INSULTECH

Exhaust Pipe Flanges
Generic

Design Specification No. : HT 1 000MS GM

Features: 2" Blanket Thickness
Standard Fastener: Stainless Steel Wiretwist
Stapled Construction

	In-line Flanges (No Endcaps)	In-line Flanges (1 each Endcap)	Flange Cap (2 each Endcaps)
Size	 1/2" - 6" (Maximum 9" OAL) 8" - 18" (Maximum 14" OAL) 20" - 42" (Maximum 18")	 1/2" - 6" (Maximum 9" OAL) 8" - 18" (Maximum 14" OAL) 20" - 42" (Maximum 18")	 1/2" - 6" (Max 9" Deep) 8" - 18" (Max 14" Deep) 20" - 42" (Maximum 18")

Engine Exhaust Flange Price Sheet: HT 1 000MS GM

3"	\$ 92.40	\$ 121.20	\$ 150.00
4"	\$ 105.60	\$ 141.60	\$ 177.60
5"	\$ 111.60	\$ 153.60	\$ 183.60
6"	\$ 132.00	\$ 180.00	\$ 228.00
8"	\$ 160.80	\$ 225.60	\$ 290.40
10"	\$ 192.00	\$ 277.20	\$ 362.40
12"	\$ 220.80	\$ 332.40	\$ 444.00
14"	\$ 259.20	\$ 391.20	\$ 523.20
16"	\$ 284.40	\$ 444.00	\$ 603.60
18"	\$ 324.00	\$ 501.60	\$ 679.20
20"	\$ 351.60	\$ 561.60	\$ 771.60
22"	\$ 373.20	\$ 610.80	\$ 848.40
24"	\$ 402.00	\$ 675.60	\$ 949.20
26"	\$ 429.60	\$ 742.80	\$ 1,056.00
28"	\$ 452.40	\$ 799.20	\$ 1,146.00
30"	\$ 474.00	\$ 855.60	\$ 1,237.20
32"	\$ 511.20	\$ 958.80	\$ 1,406.40
34"	\$ 530.40	\$ 1,017.60	\$ 1,504.80
36"	\$ 597.60	\$ 1,126.80	\$ 1,656.00
42"	\$ 680.40	\$ 1,366.80	\$ 2,053.20

Terms: Net 30 Days • Typical Lead Time: 4-6 Weeks • FOB : N. Tonawanda, NY • Quick Ship: (2-3 Weeks) Add 7% • Export Crating: Available on Request

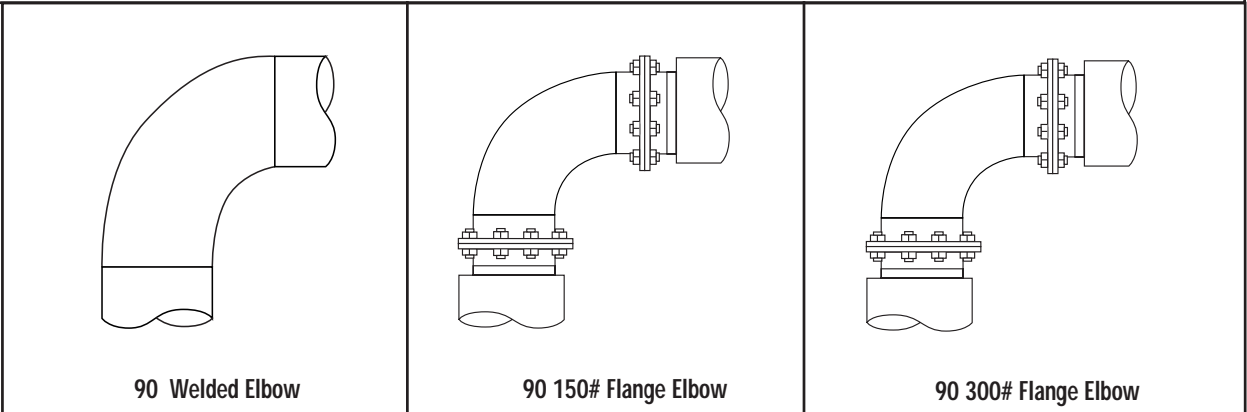


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INSULTECH

Exhaust Pipe Elbows
Generic

Design Specification No.:	HT1 000MS GM
Features:	2" Blanket Thickness Standard Fastener: Stainless Steel Wiretwist Stapled Construction



Exhaust Pipe Elbows Price Sheet:	HT1 000MS GM
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Size	90 Welded Elbow	90 150# Flange Elbow	90 300# Flange Elbow
3"	\$ 94.20	\$ 172.20	\$ 201.60
4"	\$ 130.80	\$ 219.60	\$ 262.80
5"	\$ 150.60	\$ 262.80	\$ 309.60
6"	\$ 192.00	\$ 290.40	\$ 363.60
8"	\$ 271.20	\$ 402.00	\$ 484.80
10"	\$ 328.80	\$ 525.60	\$ 618.00
12"	\$ 380.40	\$ 667.20	\$ 765.60
14"	\$ 493.20	\$ 800.40	\$ 948.00
16"	\$ 621.60	\$ 986.40	\$ 1,148.40
18"	\$ 723.60		
20"	\$ 864.00		
24"	\$ 1,183.20		
26"	\$ 1,423.20		
28"	\$ 1,650.00		
30"	\$ 1,886.40		
32"	\$ 2,136.00		
34"	\$ 2,378.40		
36"	\$ 2,659.20		
42"	\$ 3,505.20		

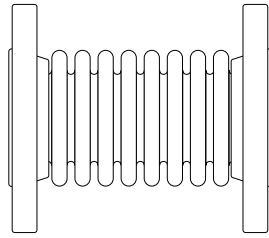
Terms: Net 30 Days • Typical Lead Time: 4-6 Weeks • FOB : N. Tonawanda, NY • Quick Ship: (2-3 Weeks) Add 7% • Export Crating: Available on Request

INSULTECH

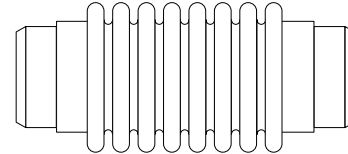
Bellows Expansion Joints
Generic

Design Specification No.: HT1 000MS GM

Features: 2" Blanket Thickness
Standard Fastener: Stainless Steel Wiretwist
Stapled Construction



**Flanged
Bellows Expansion Joint**



**In-Line Weld
Bellows Expansion Joint**

Bellows Expansion Joint Price Sheet HT1 000MS GM

Size	Flanged	List Price	Size	Welded	List Price
3"	150# Flgd	\$ 211.20	3"	In-Line Weld	\$ 188.40
4"	150# Flgd	\$ 265.20	4"	In-Line Weld	\$ 223.20
5"	150# Flgd	\$ 306.00	5"	In-Line Weld	\$ 266.40
6"	150# Flgd	\$ 349.20	6"	In-Line Weld	\$ 301.20
8"	150# Flgd	\$ 447.60	8"	In-Line Weld	\$ 352.80
10"	150# Flgd	\$ 538.80	10"	In-Line Weld	\$ 408.00
12"	150# Flgd	\$ 628.80	12"	In-Line Weld	\$ 476.40
14"	150# Flgd	\$ 722.40	14"	In-Line Weld	\$ 537.60
16"	150# Flgd	\$ 834.00	16"	In-Line Weld	\$ 607.20
18"	150# Flgd	\$ 939.60	18"	In-Line Weld	\$ 678.00
20"	150# Flgd	\$1,072.80	20"	In-Line Weld	\$ 819.60
22"	150# Flgd	\$1,192.80	22"	In-Line Weld	\$ 883.20
24"	150# Flgd	\$1,290.00	24"	In-Line Weld	\$1,066.80
30"	150# Flgd	\$1,491.60	30"	In-Line Weld	\$1,300.80
36"	150# Flgd	\$2,001.60	36"	In-Line Weld	\$1,668.00
42"	150# Flgd	\$2,563.20	42"	In-Line Weld	\$2,116.80
48"	150# Flgd	\$3,194.40	48"	In-Line Weld	\$2,554.80

Terms: Net 30 Days • Typical Lead Time: 4-6 Weeks • FOB : N. Tonawanda, NY • Quick Ship: (2-3 Weeks) Add 7% • Export Crating: Available on Request

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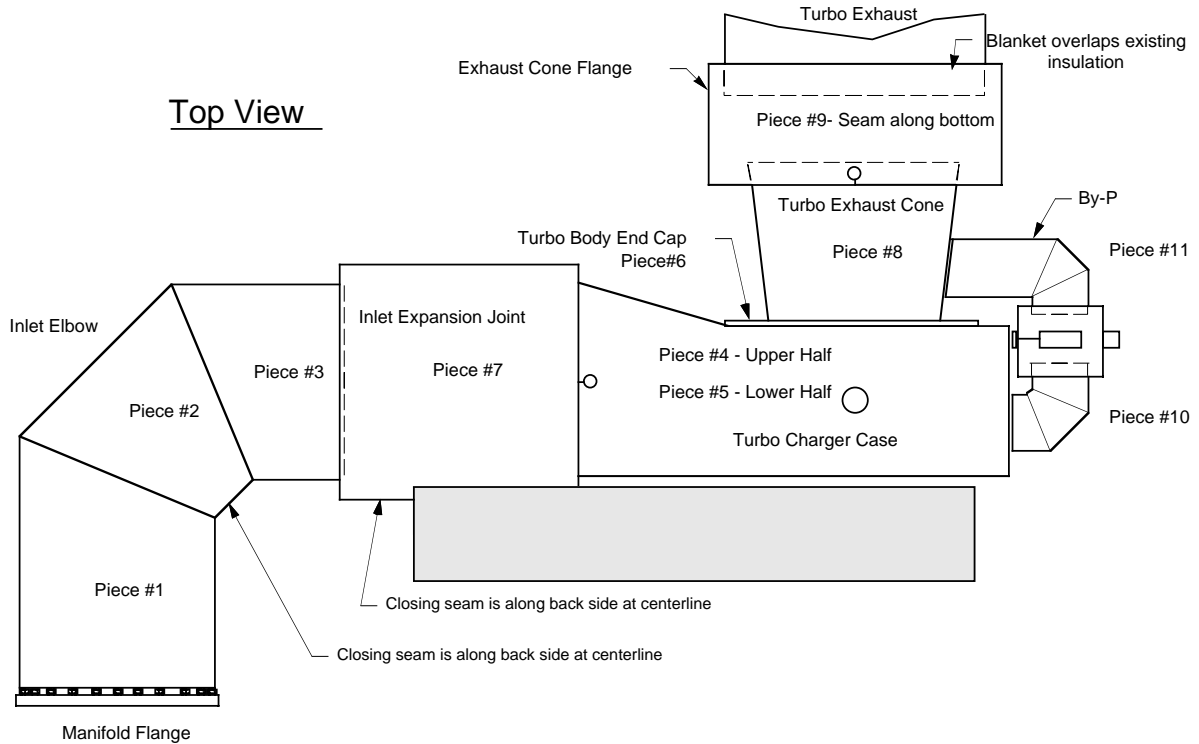
Turbocharger Exhaust Assemblies

Dresser Clark TLA-6

Dresser Clark TLA-8

Design Specification No. : HT 1 000MSGM

Features: 2" Blanket Thickness
Standard Fastener: Stainless Steel Wiretwist
Stapled Construction



Turbocharger Exhaust Assemblies Price List:			HT 1 000MSGM		
Item	Description	Unit Cost	Item	Description	Unit Cost
Dresser Clark Model: TLA-6			Dresser Clark Model: TLA-8		
1	Turbocharger Inlet Elbow	\$ 1,154.40	1	Turbocharger Inlet Elbow	\$ 1,352.40
2	Turbocharger Inlet Exp.Jt.	\$ 939.60	2	Turbocharger Inlet Exp.Jt.	\$ 1,087.20
3	Turbocharger Case	\$ 1,521.60	3	Turbocharger Case	\$ 1,875.60
4	Turbocharger By-Pass	\$ 396.00	4	Turbocharger By-Pass	\$ 547.20
5	Turbocharger Exhaust Red.Cone	\$ 510.00	5	Turbocharger Exhaust Red.Cone	\$ 564.00
6	Turbocharger Exhaust Cone Connect.Flg.	\$ 783.60	6	Turbocharger Exhaust Cone Connect.Flg.	\$ 913.20

Terms: Net 30 Days • Typical Lead Time: 4-6 Weeks • FOB : N. Tonawanda, NY • Quick Ship: (2-3 Weeks) Add 7% • Export Crating: Available on Request

INSULTECH

Manifold Turbocharger Assemblies

Dresser Clark TCV8

Dresser Clark TCV10

Design Specification No.:

HT1100MSGM

Features: 2" Blanket Thickness
Standard Fastener: Stainless Steel Wiretwist
Stapled Construction

Engine Exhaust Price Sheet:

HT1100MSGM

Item	Description	Quantity	Total Cost
Model: TCV-8 - Sectional Manifold-D/R P/N: H57616KT			
1	Sectional Manifold - H57616KT6-Exp. Joint	3 each	\$ 465.60
2	Sectional Manifold - H57616KT5-Outlet Spool	1 each	\$ 506.40
3	Sectional Manifold - H57616KT4-Center Spool	1 each	\$ 488.40
4	Sectional Manifold - H57616KT3-Center Spool	1 each	\$ 506.40
5	Sectional Manifold - H57616KT2-End Spool	1 each	\$ 631.20
6	Sectional Manifold - H57616KT1-Transition	4 each	\$ 1,868.40
Model: TCV-10 - Turbocharger Exhaust Assembly			
1	20" Inlet Piping	\$ / LF	\$ 186.00/LF
2	20" 150# - Inlet Expansion Joint	1 each	\$ 1,072.80
3	20" In-Line Weld - Inlet Elbow	1 each	\$ 864.00
4	TCV-10 - Turbocharger Case - Body	1 each	\$ 1,474.80
5	Turbocharger - Inlet Flange Cap	1 each	\$ 676.80
6	Turbocharger - Outlet Flange Cap	1 each	\$ 304.80
7	Turbocharger Exhaust Cone - Body / Flange Cap	1 each	\$ 876.00
8	# 1 - By-Pass Piping Assembly	1 each	\$ 476.40
9	# 2 - By-Pass Piping Assembly (Optional)	1 each	\$ 476.40
10	24" 150# - Outlet Expansion Joint	1 each	\$ 1,290.00
Model: TCV-10 - Sectional Manifold-D/R P/N: H57616AT			
1	Sectional Manifold - H57616AT8-Connector Spool	2 each	\$ 1,082.40
2	Sectional Manifold - H57616AT7-Exp. Joint	2 each	\$ 728.40
3	Sectional Manifold - H57616AT6-Exp. Joint	4 each	\$ 1,456.80
4	Sectional Manifold - H57616AT5-Exp. Joint	2 each	\$ 728.40
5	Sectional Manifold - H57616AT4-End Spool	2 each	\$ 1,879.20
6	Sectional Manifold - H57616AT3-Center Spool	6 each	\$ 2,769.60
7	Sectional Manifold - H57616AT2-End Spool	2 each	\$ 1,879.20
8	Sectional Manifold - H57616AT1-Transition	10 each	\$ 4,530.00

Terms: Net 30 Days • Typical Lead Time: 4-6 Weeks • FOB : N. Tonawanda, NY • Quick Ship: (2-3 Weeks) Add 7% • Export Crating: Available on Request



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INSULTECH

Manifold Turbocharger Assemblies

Dresser Clark TCV 12

Dresser Clark TCV16

Design Specification No. :

HT1100MSGM

Features: 2" Blanket Thickness
Standard Fastener: Stainless Steel Wiretwist
Stapled Construction

Manifold Turbocharger Assembly Price Sheet:

HT1100MSGM

Item	Description	Quantity	Total Cost
Model: TCVD-12 - Sectional Manifold-D/R P/N: H57616MT			
1	Sectional Manifold - H57616MT6-Exp. Joint	5 each	\$ 960.00
2	Sectional Manifold - H57616MT5-End Spool	1 each	\$ 576.00
3	Sectional Manifold - H57616MT4-Center Spool	3 each	\$ 1,792.80
4	Sectional Manifold - H57616MT3-Center Spool	1 each	\$ 597.60
5	Sectional Manifold - H57616MT2-End Spool	1 each	\$ 742.80
6	Sectional Manifold - H57616MT1-Transition	6 each	\$ 3,256.80
Model: TCV-12 - Turbocharger Exhaust Assembly			
1	24" Inlet Piping	\$ / LF	\$ 186.00/LF
2	24" 150# - Inlet Expansion Joint	1 each	\$ 1,290.00
3	24" In-Line Weld - Inlet Elbow	1 each	\$ 1,183.20
4	TCV-12 - Turbocharger Case - Body	1 each	\$ 2,025.60
5	Turbocharger - Inlet Flange Cap	1 each	\$ 835.20
6	Turbocharger - Body - Flange Cap	1 each	\$ 326.40
7	Turbocharger Exhaust Cone - Body / Flange Cap	1 each	\$ 1,285.20
8	# 1 - 4" By-Pass Piping Assembly	1 each	\$ 673.20
9	# 2 - 4" By-Pass Piping Assembly (Optional)	1 each	\$ 673.20
10	30" 150# - Outlet Expansion Joint	1 each	\$ 1,300.80
Model: TCV-16 - Turbocharger Exhaust Assembly			
1	24" Inlet Piping	\$ / LF	\$ 186.00/LF
2	24" 150# - Inlet Expansion Joint	1 each	\$ 1,290.00
3	24" In-Line Weld - Inlet Elbow	1 each	\$ 1,183.20
4	TCV-16 - Turbocharger Case - Body	1 each	\$ 2,025.60
5	Turbocharger - Inlet Flange Cap	1 each	\$ 835.20
6	Turbocharger - Body - Flange Cap	1 each	\$ 326.40
7	Turbocharger Exhaust Cone - 36" Body / Flange Cap	1 each	\$ 1,552.80
8	# 1 - 5" By-Pass Piping Assembly	1 each	\$ 856.80
9	# 2 - 5" By-Pass Piping Assembly (Optional)	1 each	\$ 856.80
10	36" 150# Flanged - Outlet Expansion Joint	1 each	\$ 1,668.00

Terms: Net 30 Days • Typical Lead Time: 4-6 Weeks • FOB : N. Tonawanda, NY • Quick Ship: (2-3 Weeks) Add 7% • Export Crating: Available on Request



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INSULTECH

Turbocharger Assemblies
 Manifold Assemblies
 Dresser Clark HBA-6

Turbocharger and Manifold Assembly Price Sheet:

HT 1 1 OOMSGM

Features: 2" Blanket Thickness
 Standard Fastener: Stainless Steel Wiretwist
 Stapled Construction

Design Specification No.:

HT 1 1 OOMSGM

Item	Description	Quantity	List Price
Model: HBA-6 - Longneck-Turbocharger Exhaust Assembly			
1	HBA-6 Long Neck Turbocharger	1 each	\$ 1,908.00
2	HBA-6 Turbo By-Pass Assembly	1 each	\$ 447.60
3	Exhaust Flange Reducer Cone Cap	1 each	\$ 544.80
4	Exhaust Reducer Cone - Body	1 each	\$ 415.20
5	Turbo Inlet Expansion Joint	1 each	\$ 540.00
Model: HBA-6 - Shortneck-Turbocharger Exhaust Assembly			
6	HBA-6 Short Neck Turbocharger	1 each	\$ 1,804.80
7	HBA-6 Turbo By-Pass Assembly	1 each	\$ 544.80
8	Exhaust Flange Reducer Cone Cap	1 each	\$ 544.80
9	Exhaust Reducer Cone - Body	1 each	\$ 415.20
10	Turbo Inlet Expansion Joint	1 each	\$ 540.00
Model: HBA-6 - Sectional Manifold Exhaust Assembly			
(Design includes covering the cylinder head to manifold transition)			
11	REF: 323-924-202 (End Segment - Pc#1)	1 each	\$ 658.80
12	REF: 323-924-201 (Inner Segment - Pc#2, Pc#5)	2 ea Req'd	\$ 1,406.40
13	REF: 323-924-203 (Inner Segment - Pc#4)	1 each	\$ 670.80
14	REF: 323-924-204 (Inner Segment - Pc#3)	1 each	\$ 670.80
15	REF: 323-925-20 (End Segment - Pc#6)	1 each	\$ 787.20
16	REF: 214-356-001 (Segment Exp. Jt. - Pc#7)	5 ea. Req'd	\$ 1,362.00
17	Flange Cap (Manifold to Turbo Inlet Exp. Joint)	1 each	\$ 352.80

Terms: Net 30 Days • Typical Lead Time: 4-6 Weeks • FOB : N. Tonawanda, NY • Quick Ship: (2-3 Weeks) Add 7% • Export Crating: Available on Request



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INSULTECH

Turbocharger Exhaust Assemblies
Dresser Clark TRA-6

Design Specification No.:	HT1100MSGM
Features:	2" Blanket Thickness Standard Fastener: Stainless Steel Wiretwist Stapled Construction

Turbocharger and Sectional Manifold Assembly Price Sheet:		HT1100MSGM
Item	Description	List Price
Dresser Clark Model: TRA-6		
1	Turbocharger Inlet Elbow	\$ 1,044.00
2	Turbocharger Inlet Expansion Joint	\$ 985.20
3	Turbocharger Case	\$ 1,498.80
4	Turbocharger By-Pass	\$ 680.40
5	Turbocharger Exhaust Reducer Cone	\$ 432.00
6	Turbocharger Exhaust Cone Connection Flange.	\$ 596.40
Total Cost (1 each Set).....		\$ 5,236.80

Terms: Net 30 Days • Typical Lead Time: 4-6 Weeks • FOB : N. Tonawanda, NY • Quick Ship: (2-3 Weeks) Add 7% • Export Crating: Available on Request



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INSULTECH

Manifold Turbocharger Assemblies
Dresser Clark TLAD-8

Design Specification No.:	HT1100MSGM
Features: 2" Blanket Thickness Standard Fastener: Stainless Steel Wiretwist Stapled Construction	

Turbocharger Manifold Assembly Price Sheet: HT1100MSGM					
Item	Description	D-R Part Number	Qty	Unit Cost	Total Cost
Model: TLAD-8 - (1991-France Unit) - Turbocharger Assembly					
1	Exhaust Manifold Flange Cap	H57558CT1	1 ea.	\$746.40	\$746.40
2	Turbocharger Exhaust Cone	H57558CT2	1 ea.	\$495.60	\$495.60
3	Turbocharger Exhaust Transition	H57558CT3	1 ea.	\$1,381.20	\$1,381.20
4	Turbocharger By-Pass	H57558CT4	1 ea.	\$426.00	\$426.00
Total Cost (1 each Set).....					\$ 3,049.20
Model: TLAD-8 - Sectional Manifold					
5	Exhaust Transition - "Dog Leg"	H57616BT1	8 each	\$190.80	\$1,526.40
6	Manifold Body-Turbo End	H57616BT2	1 each	\$542.40	\$542.40
7	Manifold Body-36"	H57616BT3A	1 each	\$672.00	\$672.00
8	Manifold Body-25.5"	H57616BT3B	5 each	\$446.40	\$2,232.00
9	Manifold Body & Endcap	H57616BT4	1 each	\$555.60	\$555.60
10	Manifold Expansion Joints	H57616BT5	7 each	\$241.20	\$1,688.40
Total Cost (1 each Set).....					\$ 7,216.80
Model: TLAD-8 (U.S. Mftr'd Unit) - Turbocharger Assembly					
11	Turbocharger Inlet Elbow				\$ 883.20
12	Turbocharger Inlet Exp.Jt.				\$ 466.80
13	Turbocharger Case				\$ 1,164.00
14	Turbocharger By-Pass				\$ 302.40
15	Turbocharger Exhaust Red.Cone				\$ 493.20
16	Turbocharger Exhaust Cone Connect.Flg.				\$ 464.40
Total Cost (1 each Set).....					\$ 3,774.00

Terms: Net 30 Days • Typical Lead Time: 4-6 Weeks • FOB : N. Tonawanda, NY • Quick Ship: (2-3 Weeks) Add 7% • Export Crating: Available on Request



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INSULTECH

Turbocharger Manifold Assemblies
 Dresser Clark TLAD-10
 Dresser Clark TLA-10

Design Specification No.:	HT1100MSGM
Features:	2" Blanket Thickness Standard Fastener: Stainless Steel Wiretwist Stapled Construction

Turbocharger/Sectional Manifold Assembly Price Sheet:				HT1100MSGM	
Item	Blanket P/N	Drawing No.	Qty	Unit Cost	Total Cost
DC TLA-10 & TLAD-10 - Sectional Manifold					
1	H57556T6	214-256-002	9 each	\$ 279.60	\$ 2,516.40
2	H57556T5	F37924J	1 each	\$ 446.40	\$ 446.40
3	H57556T4	F37924F	1 each	\$ 556.80	\$ 556.80
4	H57556T3	F37924E	7 each	\$ 446.40	\$ 3,124.80
5	H57556T2	F37924H	1 each	\$ 634.80	\$ 634.80
6	H57556T1	F37924	10 each	\$ 213.60	\$ 2,136.00
Total Cost (1 each Set - REF: Dwg No. H57556).....					\$ 9,415.20
DC TLAD-10 - Turbocharger Assembly					
1	Inlet Exp. Joint	W75003AL	1 each	\$ 1,413.60	\$ 1,413.60
2	Turbo Exh. Inlet	H50811E	1 each	\$ 770.40	\$ 770.40
3	By-Pass Assembly	R58281M	1 each	\$ 374.40	\$ 374.40
4	Exh. Connection	F34015DP1	1 each	\$ 732.00	\$ 732.00
Total Cost (1 each Set).....					\$ 3,290.40
DC TLA-10 - Turbocharger Assembly					
1	Turbo Inlet Elbow		1 each	\$ 1,544.40	\$ 1,544.40
2	Turbo Inlet Exp. Jt.		1 each	\$ 2,256.00	\$ 2,256.00
3	Turbocharger Body		1 each	\$ 2,215.20	\$ 2,215.20
4	Exhaust Reduction Cone		1 each	\$ 630.00	\$ 630.00
5	Exhaust Cone Flange		1 each	\$ 1,093.20	\$ 1,093.20
6	Turbo By-Pass Assembly		1 each	\$ 632.40	\$ 632.40
Total Cost (1 each Set).....					\$ 8,371.20

Terms: Net 30 Days • Typical Lead Time: 4-6 Weeks • FOB : N. Tonawanda, NY • Quick Ship: (2-3 Weeks) Add 7% • Export Crating: Available on Request



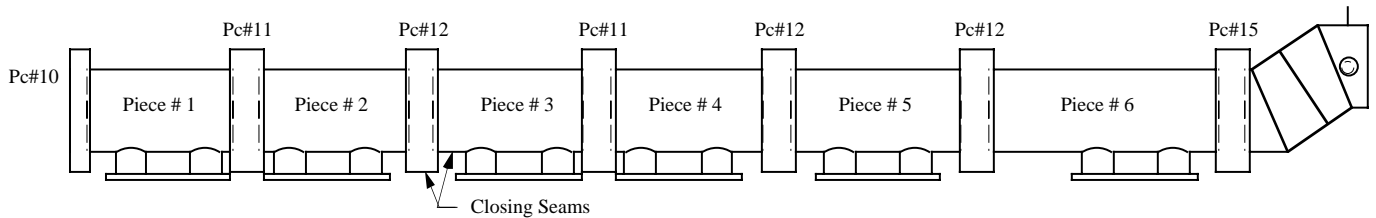
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INSULTECH

Sectional Manifold Assembly
Ingersol Rand 412-KVSE-101EP

Design Specification No.:	HT 1 1 OOMSGM
Features: 2" Blanket Thickness Standard Fastener: Stainless Steel Wiretwist Stapled Construction	

Ingersoll KVSE412 - Sectional Manifold Assembly



Manifold Assembly Price Sheet:			HT 1 1 OOMSGM	
Item	Description	Quantity	Unit Cost	List Price
Ingersoll Rand 412 - KVSE - 101EP				
1	Manifold Body x 23" Long PN: KVSE-412-01	4 ea.	\$269.40	\$1,077.60
2	Manifold Body x 25 1/2" Long PN: KVSE-412-02	1 ea.	\$298.80	\$298.80
3	Manifold Body x 37" Long PN: KVSE-412-03	1 ea.	\$433.20	\$433.20
4	Manifold Expansion Joint PN: KVSE-412-04	6 ea.	\$334.80	\$2,008.80
5	Manifold End Cap PN: KVSE-412-05	1 ea.	\$330.00	\$330.00
6	Cylinder Hd-Manifold Trans. PN: KVSE-412-06	12 ea.	\$63.60	\$763.20
7	Cylinder Hd-Elbow w/ Exp. Jt PN: KVSE-412-07	12 ea.	\$194.40	\$2,332.80
8	Manifold Offset Elbow PN: KVSE-412-08	1 ea.	\$892.80	\$892.80
9	Exhaust Transmission PN: KVSE-412-09	1 ea.	\$410.40	\$410.40
10	24" 125# Flanged Exp. Jt PN: KVSE-412-10	1 ea.	\$883.20	\$883.20
11	By-pass w/BFV & Flg Cap PN: KVSE-412-11	1 ea.	\$334.80	\$334.80
12	24" Engine Exh. Piping to Wall - 11 LF PN: KVSE-412-12 (Optional)	1 ea.(Set)	\$2,630.40	\$2,630.40
			Total Cost (1 ea. Set - P/N: IB-KVSE-412) ...\$ 12,396.00	

Terms: Net 30 Days • Typical Lead Time: 4-6 Weeks • FOB : N. Tonawanda, NY • Quick Ship: (2-3 Weeks) Add 7% • Export Crating: Available on Request



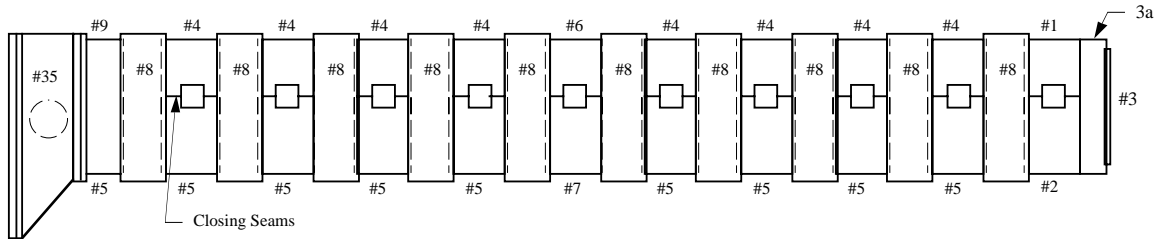
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INSULTECH

Manifold Exhaust Assembly
Cooper W330 & LSVB

Design Specification No.:	HT 1 1 OOMSGM
Features:	2" Blanket Thickness Standard Fastener: Stainless Steel Wiretwist Stapled Construction

Cooper LSVB-24 Manifold Assembly



Manifold Assembly Price Sheet:			HT 1 1 OOMSGM
Quantity	Description	Unit Cost	List Price
Cooper Bessemer Model: W330-8			
4 Each	Manifold Expansion Joints	\$ 532.80	\$ 2,131.20
4 Each	Manifold Spools	\$ 801.00	\$ 3,204.00
1 Each	Manifold Flanged Endcap	\$ 723.60	\$ 723.60
4 Each	Cylinder Head to Manifold Transition	\$ 167.10	\$ 668.40
1 Each	Manifold to Transition Spool	\$ 811.20	\$ 811.20
1Each	3" By-Pass Valve Elbow Assembly	\$ 304.80	\$ 304.80
1Each	Exhaust Transition to Piping	\$ 1,731.60	\$ 1,731.60
1 Each	32" Expansion Joint	\$ 1,584.00	\$ 1,584.00
1Each	32" Piping to Building Wall	\$ 278.40 / LF	\$289.20
Cooper Bessemer Model: LSVB-24			
1 Each	Adapter Exhaust Conn.	\$ 1,605.60	\$ 1,605.60
1 Each	Exhaust Bellows	\$ 943.20	\$ 943.20
9 Each	Manifold Body-23.5"L	\$ 324.00	\$ 2,916.00
1 Each	Manifold Body-27.5"L	\$ 414.00	\$ 414.00
10 Each	Manifold Exp. Joint	\$ 188.40	\$ 1,884.00
1 Each	Manifold Off-Set Trans.	\$ 482.40	\$ 482.40
1 Each	Turbo By-Pass	\$ 516.00	\$ 516.00
1 Each	Manifold End Cap	\$ 104.40	\$ 104.40

Terms: Net 30 Days • Typical Lead Time: 4-6 Weeks • FOB : N. Tonawanda, NY • Quick Ship: (2-3 Weeks) Add 7% • Export Crating: Available on Request

INSULTECH

Manifold Exhaust Assemblies
Cooper GMVH & GMPR

Design Specification No.:	HT 1 1 OOMSGM
Features:	2" Blanket Thickness Standard Fastener: Stainless Steel Wiretwist Stapled Construction

Turbocharger Exhaust Assembly Price Sheet:				HT 1 1 OOMSGM
Item	Quantity Required	Description	Unit Cost	Total Cost
Cooper Bessemer Model: GMVH-10				
1	2 Each	Manifold Body - End Spool	\$ 1,090.20	\$ 2,180.40
2	3 Each	Manifold Body - InLine Spool	\$ 854.40	\$ 2,563.20
3	4 Each	Manifold Body - ExpJoint	\$ 249.60	\$ 998.40
4	10 Each	Manifold Cylinder Hd Trans.	\$ 830.40	\$ 8,304.00
5	1 Each	Manifold Expansion Joint	\$ 423.60	\$ 423.60
Total Cost (1 each Set-Manifold).....				\$ 14,469.60
Cooper Bessemer Model: GMPR-24-4				
6	1 Each	Part # 2-03J-027-002	\$ 232.80	\$ 232.80
7	1 Each	Part # 2-03J-027-001	\$ 828.00	\$ 828.00
8	2 Each	Part # 2-03J-027-003	\$ 828.60	\$ 1,657.20
9	3 Each	Part # 2-03J-027-005	\$ 242.40	\$ 727.20
10	1 Each	Part # 2-03J-027-013	\$ 1,098.00	\$ 1,098.00
11	4 Each	Part # 2-03J-027-009 - (4 pcs / Bank)	\$ 806.10	\$ 3,224.40
12	1 Each	Part # 2-03J-027-015	\$ 232.80	\$ 232.80
13	1 Each	Part # 2-03J-027-014	\$ 451.20	\$ 451.20
Total Cost (1 ea. Engine Set - Manifold)....				\$ 8,451.60

Terms: Net 30 Days • Typical Lead Time: 4-6 Weeks • FOB : N. Tonawanda, NY • Quick Ship: (2-3 Weeks) Add 7% • Export Crating: Available on Request



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INSULTECH

Manifold Exhaust Assemblies
Cooper GMVH-1 O

Design Specification No. :	HT 1 1 OOMS GM
Features: 2" Blanket Thickness Standard Fastener: Stainless Steel Wiretwist Stapled Construction	

Turbocharger Exhaust Assembly Price Sheet:				HT 1 1 OOMS GM	
Item	Quantity Required	Description	Unit Cost	Total Cost	
Cooper Bessemer Model: GMVH-10					
1	1 Each	Manifold Body - End Cap - Fwd (2-99J-028-001) - Item#27	\$ 231.60	\$ 231.60	
2	1 Each	Manifold Body - End Spool - Fwd (2-99J-028-002) - Item#28	\$ 764.40	\$ 764.40	
3	1 Each	Manifold Body - Intermediate Spool (2-99J-028-003) - Item#29	\$ 876.00	\$ 876.00	
4	2 Each	Manifold Exp. Jt. - Expansion Joint (2-99J-028-004) - Item#30	\$ 324.00	\$ 648.00	
5	1 Each	Manifold Body - Flywheel End (2-99J-028-011) - Item#31	\$ 829.20	\$ 829.20	
6	1 Each	Manifold Endcap - Flywheel Endface (2-99J-028-012) - Item#32	\$ 231.60	\$ 231.60	
7	3 Each	Manifold Transition - Double Elbow (2-99J-028-006) - Item#35	\$ 830.40	\$ 2,491.20	
8	1 Each	Manifold Expansion Joint - Flywheel (2-99J-028-013) - Item#4	\$ 423.60	\$ 423.60	
Total Cost (1 each Set-Model: GMV-6).....				\$ 6,495.60	

Terms: Net 30 Days • Typical Lead Time: 4-6 Weeks • FOB : N. Tonawanda, NY • Quick Ship: (2-3 Weeks) Add 7% • Export Crating: Available on Request



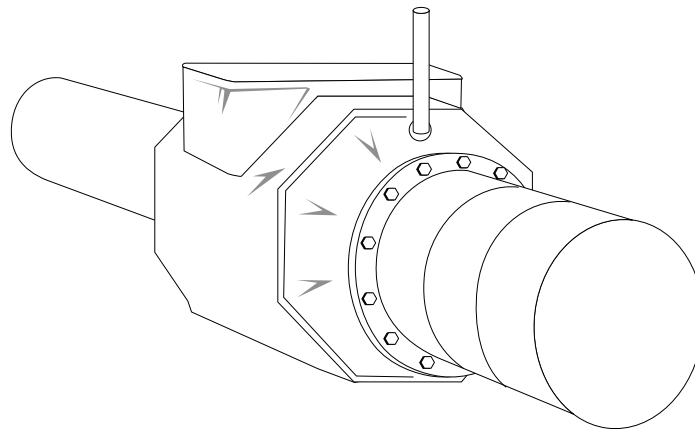
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INSULTECH

Miratech® Equi NOx
Catalytic Converter Housing

Turbocharger Exhaust Assembly Price Sheet: HT 1 300MA GM

Features: 2" Blanket Thickness
Standard Fastener: Stainless Steel Wiretwist
Stapled Construction



Design Specification No. : HT 1 300MA GM

Item	Description	Part Number	List Price
Equi NOx - Housing & Hatch			
1	EQ Model - 301	IB-EQ-301	\$ 339.60
2	EQ Model - 401	IB-EQ-401	\$ 471.60
3	EQ Model - 501	IB-EQ-501	\$ 524.40
4	EQ Model - 601	IB-EQ-601	\$ 576.00
5	EQ Model - 701	IB-EQ-701	\$ 633.60
6	EQ Model - 801	IB-EQ-801	\$ 727.20
7	EQ Model - 951	IB-EQ-951	\$ 831.60
8	EQ Model - 1101	IB-EQ-1101	\$ 904.80
9	EQ Model - 1251	IB-EQ-1251	\$ 1,014.00
10	EQ Model - 1401	IB-EQ-1401	\$ 1,098.00
11	EQ Model - 1501	IB-EQ-1501	\$ 1,014.00

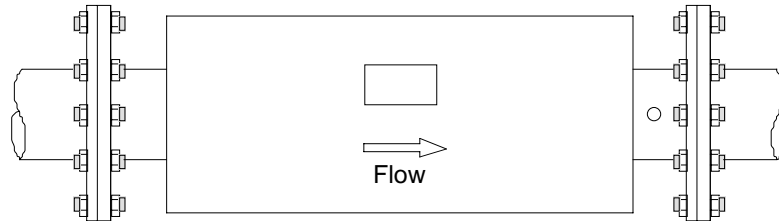
Terms: Net 30 Days • Typical Lead Time: 4-6 Weeks • FOB : N. Tonawanda, NY • Quick Ship: (2-3 Weeks) Add 7% • Export Crating: Available on Request

INSULTECH

Miratech®
MiraNOx Small Unit Housings

Design Specification No.: HT 1 1 OOMSGM

- Features:** 2" Blanket Thickness
Standard Fastener: Stainless Steel Wiretwist
Stapled Construction



Miratech - MN-10 - Small Housing

Miratech™ MiraNOx Housing Price Sheet:			HT 1 1 OOMSGM
Item	Description	Part Number	List Price
MiraNOx - Small Unit Housings			
1	MN Model # 04	IB-MN-04	\$ 105.60
2	MN Model # 06	IB-MN-06	\$ 163.20
3	MN Model # 07	IB-MN-07	\$ 198.00
4	MN Model # 08	IB-MN-08	\$ 237.60
5	MN Model # 09	IB-MN-09	\$ 273.60
6	MN Model # 10	IB-MN-10	\$ 307.20
7	MN Model # 11	IB-MN-11	\$ 343.20
8	MN Model # 12	IB-MN-12	\$ 391.20
9	MN Model # 13	IB-MN-13	\$ 410.40
10	MN Model # 14	IB-MN-14	\$ 451.20
11	MN Model # 15	IB-MN-15	\$ 486.00

Terms: Net 30 Days • Typical Lead Time: 4-6 Weeks • FOB : N. Tonawanda, NY • Quick Ship: (2-3 Weeks) Add 7% • Export Crating: Available on Request

INSULTECH

Design Specification No.: HT1 300MA GM

Features: 2" Blanket Thickness
Standard Fastener: Stainless Steel Wiretwist
Stapled Construction

Solar® Gas Turbine Insulation System Price Sheet:		HT1 300MA GM
Item	Description	Unit Cost
Solar Saturn®		
1	Discharge Collar	\$ 174.00
2	Turbine Housing	\$ 1,683.60
3	Discharge Expansion Joint	\$ 428.40
4	Discharge Flange Cap	\$ 408.00
		Total Cost (1 each Set).....\$ 2,694.00
Solar Centaur®		
5	Inlet Collar	\$ 399.60
6	Turbine Housing	\$ 4,014.00
7	Exhaust Expansion Joint	\$ 1,551.60
		Total Cost (1 each Set).....\$ 5,965.20
Solar Taurus®		
8	Inlet Collar	
9	Turbine Housing	
10	Exhaust Collar	
11	Exhaust Expansion Joint	
		Total Cost (1 each Set)....Available Upon Request
Solar Mars®		
12	Inlet Collar	
13	Turbine Housing	
14	Exhaust Collar	
15	Exhaust Expansion Joint	
		Total Cost (1 each Set)....Available Upon Request
Solar Titan®		
16	Inlet Collar	
17	Turbine Housing	
18	Exhaust Collar	
19	Exhaust Expansion Joint	
		Total Cost (1 each Set)....Available Upon Request

Terms: Net 30 Days • Typical Lead Time: 4-6 Weeks • FOB : N. Tonawanda, NY • Quick Ship: (2-3 Weeks) Add 7% • Export Crating: Available on Request



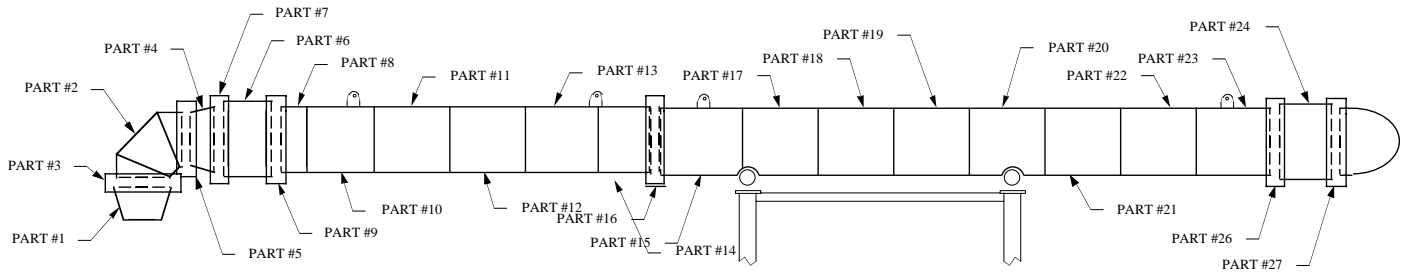
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INSULTECH

Sample
Assembly Drawing

Caterpillar Model 3616

Engine Exhaust Assembly



Design Specification No. :			LT450SS		
Part No.	Description	Part No.	Description	Part No.	Description
1-A	14" TRANSITION	10-A	18" PIPE	19-A	18" PIPE
1-B	14" TRANSITION	10-B	18" PIPE	19-B	18" PIPE
2-A	14" ELBOW	11-A	18" PIPE	20-A	18" PIPE
2-B	14" ELBOW	11-B	18" PIPE	20-B	18" PIPE
3-A	14" FLANGE	12-A	18" PIPE	21-A	18" PIPE
3-B	14" FLANGE	12-B	18" PIPE	21-B	18" PIPE
4-A	14"-18" REDUCER	13-A	18" PIPE	22-A	18" PIPE
4-B	14"-18" REDUCER	13-B	18" PIPE	22-B	18" PIPE
5-A	18" PIPE	14-A	18" PIPE	23-A	18" PIPE
5-B	18" PIPE	14-B	18" PIPE	23-B	18" PIPE
6-A	18" EXP. JOINT BODY	15-A	18" PIPE	24-A	18" EXP. JOINT BODY
6-B	18" EXP. JOINT BODY	15-B	18" PIPE	24-B	18" EXP. JOINT BODY
7-A	18" EXP. JOINT FLG.	16-A	18" FLANGE	25-A	18" PIPE TRANSITION
7-B	18" EXP. JOINT FLG.	16-B	18" FLANGE	25-B	18" PIPE TRANSITION
8-A	18" PIPE	17-A	18" PIPE	26-A	18" EXP. JOINT FLG.
8-B	18" PIPE	17-B	18" PIPE	26-B	18" EXP. JOINT FLG.
9-A	18" EXP. JOINT FLG.	18-A	18" PIPE	27-A	18" EXP. JOINT FLG.
9-B	18" EXP. JOINT FLG.	18-B	18" PIPE	27-B	18" EXP. JOINT FLG.

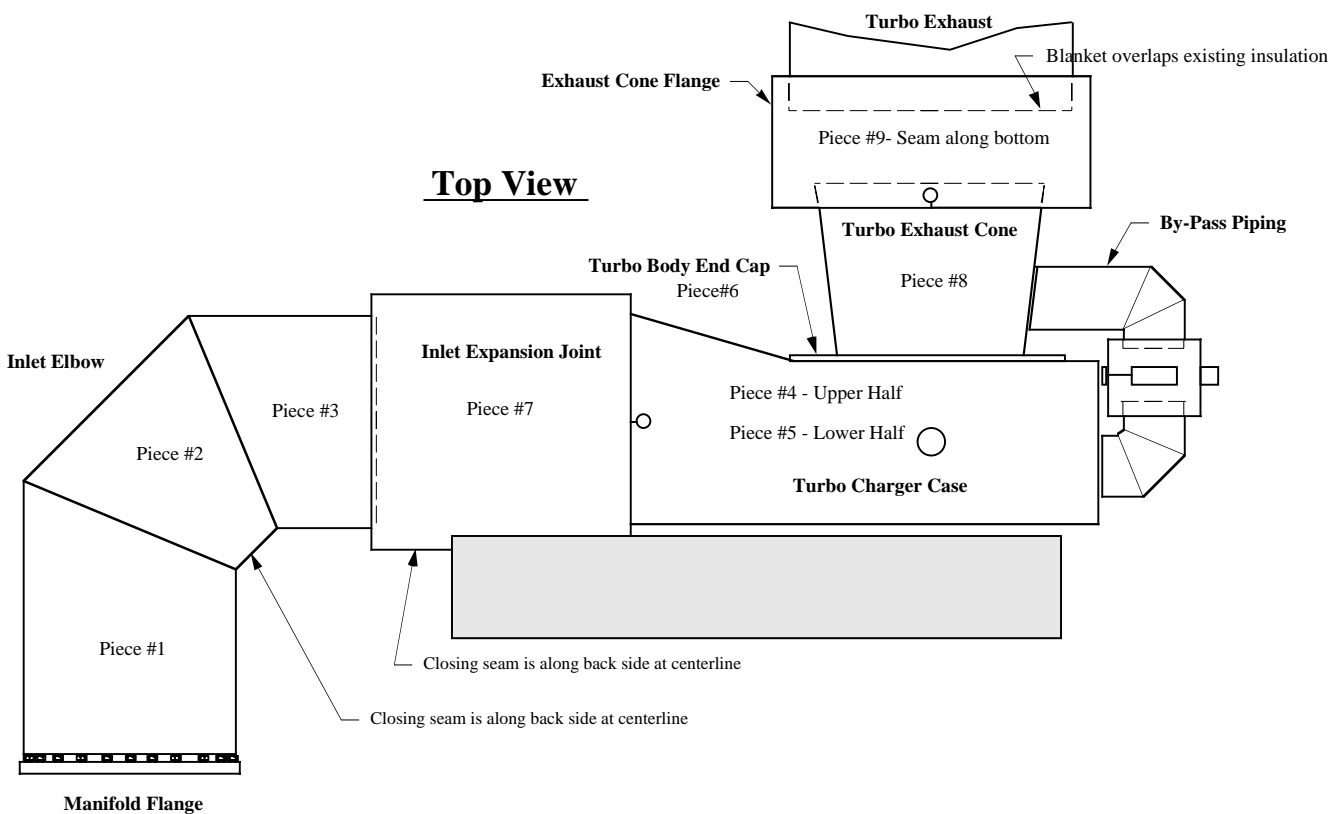
Installation Notes:

- Install blankets in numeric order from #1 to #27 for each pipe.
- Position and tack all pieces in place before securing permanently.
- Blanket pieces may require slight shifting or repositioning before final lacing.
- Part numbers 24-a, 24-b, 25-a, and 25-b may require field modification to match field installed piping. All tools and materials are included in the box labeled "modification kit".

Dresser Clark Model TLA-6

Engine Exhaust Assembly

Customer: Transportadora de Gas
Don Bosco 3672
1206 Buenos Aires, Argentina
Ref. PO# 007304/A
Engine# 1 & 2



Installation Notes:

- Pieces# 1, 2, 3, 10 & 11 have closing seams along back side throat of elbow.
- Hidden lines indicate an overlapping of blanket pieces.
- Install Pieces in tag number sequence. Pieces: #1 to #12.
- Installation may require pounding of blanket pieces to close off seams.
- Use the Wiretwists to draw seams together and to lock the seam.

INSULTECH

Engine Exhaust Price Sheet:

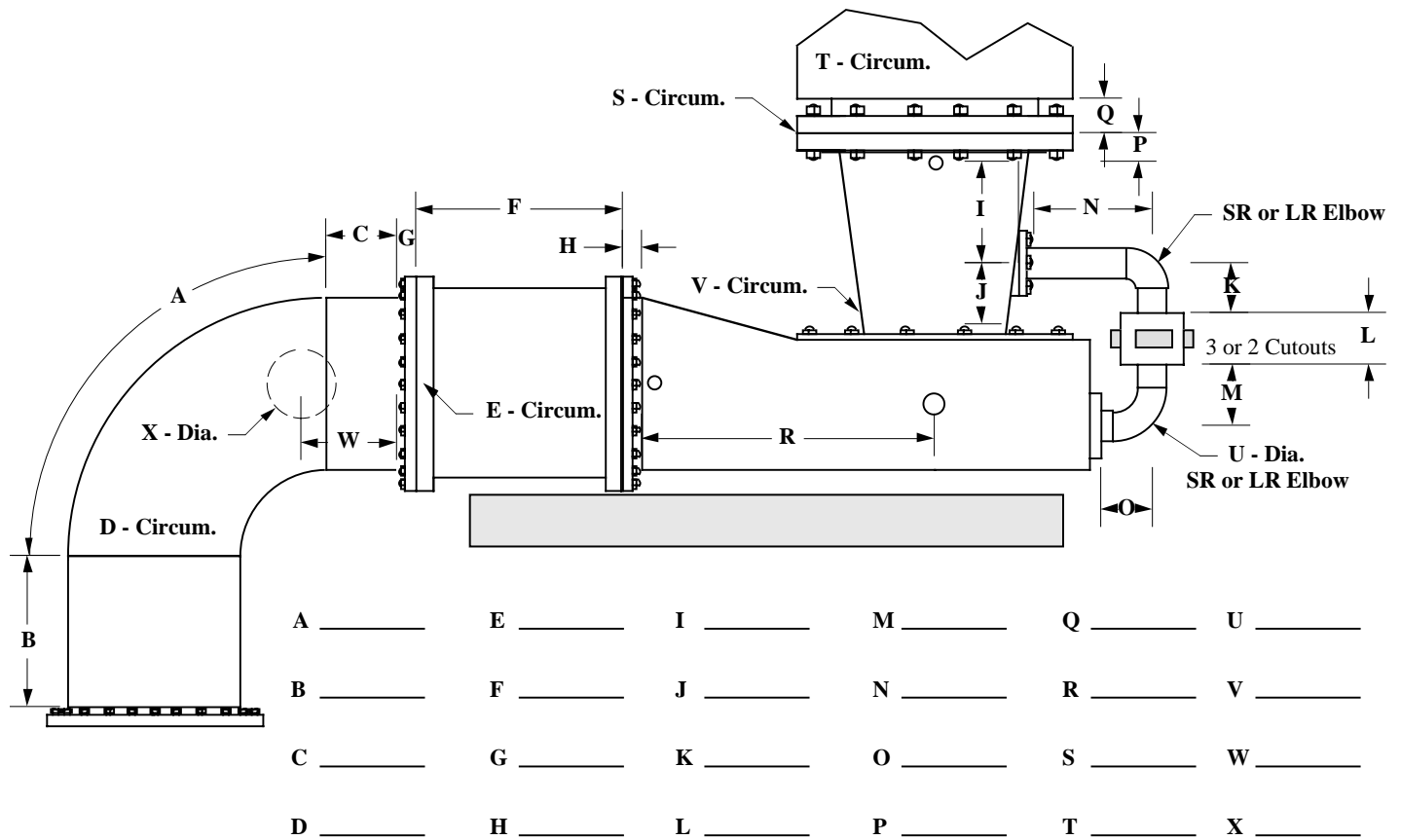
HT1 1 OOMSGM

Customer: _____

Location: _____

Contact: _____

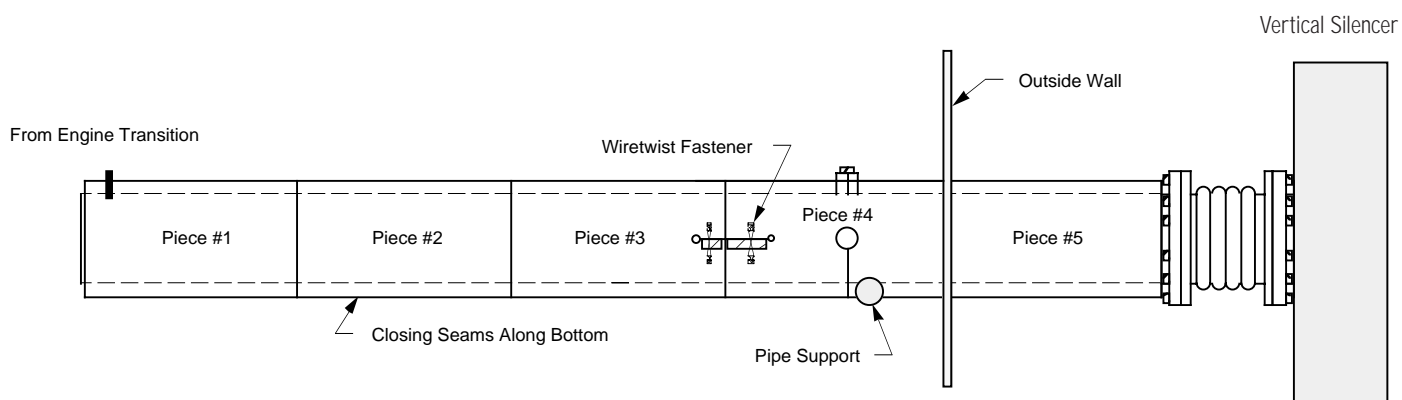
Engine No.: _____



Cooper Model GMV 8

Engine Exhaust Assembly

Customer: Equitrans LP
Location: Pratt Station
Engine : #1, #3, #4



1 1/2" Exhaust Piping Assembly

- Install material in tag number sequence
- Pieces may require pounding and pulling to get properly positioned

INSULTECH

Heat Loss & Surface Temperature Index

Temperataure	Page
This Index	5-1
200°F	5-2
300°F	5-3
400°F	5-4
500°F	5-5
600°F	5-6
700°F	5-7
800°F	5-8
900°F	5-9
1000°F	5-10
1100°F	5-11
1200°F	5-12
Bare Surface Heat Loss	5-13
Cost Comparison	5-14
Key to Savings	5-15
Energy Survey Log	5-16
Insulation Comparisons	5-17

INSULTECH

Heat Loss Analysis

Temperature at
200°F

Heat Loss & Surface Temperature

at: **80°F Ambient** **0 MPH Wind** **.9 Emmissivity**

Temperature: 200°F														
PIPE SIZE	1" Thick		1.5" Thick		2" Thick		2 1/2" Thick		3" Thick		3 1/2" Thick		4" Thick	
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST
1"	17.8	92	14.5	87.5	11.7	85	11.3	84	9.5	83.5	8.9	82.5	8.3	82.5
1.5"	22.2	93	17.7	88.5	14.3	85.7	12.7	84.5	11.5	84	10.5	83	9.9	82.5
2"	26.8	94	20.7	88.5	16.5	86	14.2	85	12.9	84	12.2	83	11.1	82.5
2.5"	31.2	96.5	23.2	89.5	18.8	86	16.4	85	14.2	84	13.3	83.5	12.3	82.5
3"	36.1	95	26.8	90	21.4	86.5	18.2	85	16.2	84.5	15.1	83.5	13.7	82.5
3.5"	40.5	95	31.8	90	23.6	86.5	20.4	85.5	17.5	84.5	16.2	83.5	14.9	83
4"	44.5	95.5	32.6	90	25.7	87.5	21.9	85.5	19.7	84.5	17.4	83.5	16.0	83
4.5"	48.3	95.5	37.5	90.5	27.8	87.5	23.3	85.5	20.9	84.5	18.9	84	17.7	83
5"	53.3	95	39.9	90.5	30.1	87.5	25.9	85.5	22.2	84.5	20.2	84	18.3	83
6"	62.4	96.5	43.9	90.5	34.8	87.5	28.4	86	25.3	84.5	22.87	84	20.6	83
7"	70.5	96.5	50.0	91	38.3	87.5	32.2	83	28.1	85	24.9	84	22.7	83.5
8"	79.0	96.5	55.1	91	43.2	88	35.8	86	30.5	85	27.7	84	24.8	83.5
10"	94.8	96.5	67.5	91	52.4	88.5	42.1	86	37.1	85	33.1	84.5	29.5	84
12"	110.2	96.5	77.1	91	59.4	88.5	60.0	98	53.5	96	37.7	84.5	33.5	84
14"	123.4	97	84.1	91.5	64.2	88.5	53.3	87	45.6	85	41.6	84.5	36.2	84
16"	138.8	97	94.4	91.5	73.4	88.5	60.3	87	51.0	85	44.5	84.5	40.3	84
18"	154.1	97	106.2	91.5	82.4	88.5	5.9	87	57.6	85.5	49.3	84.5	44.8	84
20"	169.3	97	116.8	91.5	89.8	88.5	72.6	87	62.0	85.5	54.6	84.5	48.5	84
22"	186.5	97.5	129.0	92	98.1	88.5	79.4	87	67.9	85.5	58.7	84.5	53.2	84
24"	202.9	97.5	138.6	92	106.3	89	85.6	87	73.7	85.5	63.9	84.5	57.3	84
28"	234.5	97.5	161.6	92	122.3	89	98.0	87	84.3	85.5	73.4	85	65.1	84.5
32"	271.5	97.5	182.3	92	139.4	89	112.3	87.5	95.4	85.5	81.9	85	73.4	84.5
36"	306.5	98	204.2	92	156.0	89	124.0	87.5	105.6	86	94.1	85	82.0	84.5
Flat 1 Sq. Ft.	31.2	98.5	20.8	92.5	15.6	90	12.48	88	10.4	86.5	8.91	85.5	7.8	85.0

HL=Heatloss = BTU/HR/LIN FT ST=Surface Temperature = °F

INSULTECH

Heat Loss Analysis

Temperature at
300°F

Heat Loss & Surface Temperature

at: **80°F Ambient** **0 MPH Wind** **.9 Emmissivity**

Temperature: 300°F														
PIPE SIZE	1" Thick		1.5" Thick		2" Thick		2 1/2" Thick		3" Thick		3 1/2" Thick		4" Thick	
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST
1"	29.4	102.5	27.6	93.5	22.2	90	21.5	87.5	18.1	86	16.9	85	15.9	84.5
1.5"	42.2	103.5	33.5	95	27.3	90.5	24.1	88	22.0	86.5	20.0	86	18.8	85
2"	51.0	105.5	39.6	96	31.6	91.5	26.8	88.5	24.5	88	53.3	86.5	21.1	85.5
2.5"	59.4	106.5	41.5	97.5	36.0	92	31.1	90	27.3	88.5	25.4	86.5	23.4	86
3"	69.0	107	46.7	97.5	40.8	92.5	34.6	90	30.9	88.5	28.7	87	26.1	86
3.5"	77.0	107.5	60.6	97.5	44.7	93	37.6	90	33.5	89	30.8	87.5	28.3	86.5
4"	84.8	108	61.8	98	48.8	93	41.6	90.5	37.4	89	33.1	87.5	30.5	86.5
4.5"	92.1	108	71.4	98.5	52.9	93.5	44.3	90.5	39.7	89.5	36.0	87.5	32.6	86.5
5"	104.5	109.5	72.5	98.5	57.5	93.5	49.2	90.5	42.1	89.5	38.4	88	34.8	86.5
6"	118.9	109.5	83.6	99	66.2	94	54.1	91	48.5	89.5	43.5	88	93.1	87
7"	134.3	110	95.3	99.5	73.0	94.5	61.2	91.5	53.7	90	47.6	88.5	43.2	87
8"	150.7	110	105	99.5	82.2	94.5	68.0	91.5	58.0	90.5	52.6	88.6	47.4	87
10"	180.9	110	128	100	99.3	95.5	80.2	91.5	70.7	90.5	62.8	89	56.1	87.5
12"	209.5	110	146	100	115.7	95.5	95.0	92	81.0	91	71.7	89	63.8	87.5
14"	232.5	111	160.2	100.5	122.2	95.5	101	92	86.7	91	77.0	89	69.1	88
16"	264.3	111	179.9	100.5	139.4	95.5	115	92.5	97.3	91	85.1	85.5	76.6	88
18"	294.5	111.5	201.9	101	156	96	125	92.5	110	91.5	93.7	89.5	85.1	88
20"	323.7	111.5	222.1	101	170	96	138	92.5	118	91.5	104	89.5	92.4	88.5
22"	358.6	111.5	246.3	101.5	186.6	96	151	92.5	129	91.5	112	89.5	101	88.5
24"	392.6	111.5	265.8	101.5	201.6	96.5	163	92.5	140	91.5	121	90	109	89
28"	453.7	111.5	306.9	102	233.0	96.5	187	93	163	92	140	90	124	89
32"	518.0	112	346.3	102	256.6	96.5	214.9	93	182	92	156	90.5	139	89
36"	585.1	112	385.6	102	297.4	96.5	237.3	93	201.3	92	179	90.5	157	89.5
Flat 1 Sq. Ft.	59.4	113	39.6	102.5	29.7	97.5	23.8	94	19.8	92.5	16.97	91	14.85	90

HL=Heatloss = BTU/HR/LIN FT ST=Surface Temperature = °F

INSULTECH

Heat Loss Analysis

Temperature at
400°F

Heat Loss & Surface Temperature

at: **80°F Ambient** **0 MPH Wind** **.9 Emmissivity**

Temperature:													400°F	
PIPE SIZE	1" Thick		1.5" Thick		2" Thick		2 1/2" Thick		3" Thick		3 1/2" Thick		4" Thick	
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST
1"	52.8	113.5	44.4	101.5	34.8	95.5	33.5	92	28.4	90	25.4	88	24.8	86.5
1.5"	65.9	115	52.4	103	42.7	97	37.8	93.5	34.3	91	31.2	89	29.5	88
2"	79.6	118	61.9	104.5	49.4	98	41.9	94	38.2	91.5	36.3	89.5	32.9	88.5
2.5"	92.8	119.5	64.8	105	56.1	89.5	48.4	95	42.8	92	39.7	90	36.5	88.5
3"	108	120.5	79.4	106	64.9	99	53.9	95.5	48.4	92.5	44.9	90.5	40.6	89
3.5"	120	121	94.6	107	70.0	99.5	60.2	96	52.7	93	48.1	90.5	44.3	89.5
4"	133	122	96.6	107.5	76.3	100	65.0	96	58.3	93.5	51.8	81	47.6	89.5
4.5"	144	122.5	111.6	108	82.6	100.5	69.2	96.5	61.1	93.5	56.5	91	50.7	90
5"	159	123.0	113.0	108.5	89.9	100.5	76.7	97	65.9	94	59.9	92	54.3	90
6"	186	124	131	109	103.1	101.5	85.5	97.5	75.4	94.5	67.9	92	61.3	90.5
7"	210	124.5	149	110	114.0	101.5	95.4	97.5	83.8	95	70.5	92.5	67.3	90.5
8"	235.5	125	164	110	128	108	106.3	98	90.6	95	82.2	93	97.9	91
10"	282.7	125	200	110.5	155	103	125.2	98.5	110.1	95.5	98.6	93	73.9	91
12"	327.5	125	229	110.5	176.9	103	148.8	99	126.2	96	111.9	93.5	99.7	91.5
14"	363.3	126	250	111.5	191.2	103	158.7	99	135.2	96	120.8	94	107.7	91.5
16"	409.2	126.5	281	111.5	218.0	103.5	179.5	99.5	151.7	96.5	135.4	94	119.9	92
18"	463.2	127	315	112	244.2	104	195.9	99.5	171.0	96.5	146.5	94.5	133.5	92
20"	509.2	127	346.7	112	266.3	104	215.8	100	184.1	96.5	162.4	94.5	144.4	92.5
22"	560.2	127	384.5	112.5	291.5	104.5	236.1	100	201.9	96.5	174.5	95	158.0	93
24"	613.6	127.5	415.0	112.5	314.5	104.5	254.4	100	219.1	96.5	190.1	95	170.9	93.5
28"	708.0	127.5	479.9	113	363.7	105	292.1	100	250.7	97	218.5	95	191.4	93.5
32"	809.9	128	541.4	113	414.5	105	334.9	100.5	284.0	97	243.5	95	218	93.5
36"	914.4	128.5	602.1	113.5	454.9	105.5	369.9	100.5	314.5	97	279.7	95.5	244.2	94
Flat 1 Sq. Ft.	92.8	129	61.87	114	46.4	106.5	37.1	101.5	30.9	93.5	26.9	96.5	23.2	95

HL=Heatloss = BTU/HR/LIN FT ST=Surface Temperature = °F

INSULTECH

Heat Loss Analysis

Temperature at
500°F

Heat Loss & Surface Temperature

at: **80°F Ambient** **0 MPH Wind** **.9 Emmissivity**

Temperature:													500°F	
PIPE SIZE	1" Thick		1.5" Thick		2" Thick		2 1/2" Thick		3" Thick		3 1/2" Thick		4" Thick	
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST
1"	74.0	125	60.4	109.5	48.7	100.5	46.9	96	39.7	93.5	36.8	91	34.9	89.5
1.5"	92.4	127.5	73.4	111	59.8	102	52.8	97.5	48.1	94.5	43.7	92	41.2	90.5
2"	111.4	131.0	86.7	113	69.1	103.5	58.8	98.5	53.4	95.5	50.9	93	46.2	91
2.5"	130.6	133	90.7	114.5	80.6	105.5	67.7	99	59.3	96	55.6	93.5	51.3	91.5
3"	151.2	135	111.4	115.5	89.4	106	75.6	100	67.7	96.5	62.8	94	57.2	92.5
3.5"	169.1	135	132.6	116.5	98.0	106.5	84.4	100.5	73.3	97.5	37.4	94.5	61.9	92.5
4"	185.3	136	135.4	117	107	107	91.1	101	81.7	97.5	72.2	95	66.6	93
4.5"	201.3	136.5	156.8	118	115.9	108	97.1	101.5	87.0	98	79.1	95.5	71.1	93.5
5"	232.8	137.5	158.9	119	126	108.5	107.6	102	92.4	98.6	84.1	96	76.3	93.5
6"	259.9	138.5	182.9	120.5	144.6	109	117.1	102.5	105.9	99	94.8	96.5	85.8	94
7"	293.7	139.7	208.8	120.5	159.9	109.5	133.6	103	117.1	99.5	104.0	97	94.7	94.5
8"	329.8	140	230.1	121.5	179.5	110.5	149.3	103.5	127	99.5	115.5	97.5	103.5	95
10"	396.0	140	280.6	121.5	217.3	111	175.5	104.5	154.2	100	137.8	97.5	123.0	95.5
12"	458.6	140	320.5	122.5	247.7	111	208.3	105.5	176.7	101	156.9	98	139.5	96
14"	509.1	141	350.7	122.5	268.1	111.5	222.1	105.5	189.5	101	168.9	98.5	150.9	96.5
16"	578.7	141.5	394.1	122.5	305.5	112	251.4	106	212.5	101.5	185.7	98.5	167.7	96.5
18"	653.7	142	441.0	123	342.1	113	274.3	106	239.8	102	205.7	99	186.6	97
20"	713.0	142	485.8	123	373.0	113	302	106.5	257.9	102	227.6	99	202.3	97
22"	785.0	142.5	539.1	124	407.9	113.5	330.4	106.5	282.9	102.5	245.2	99	221.7	97
24"	859.4	143	581.9	124	441.3	113.5	356.5	106.5	306.9	102.5	266.2	99.5	238.8	97.5
28"	991.9	143	758.5	124	580.3	114	419.5	107	398.0	102.5	341.4	99.5	305	97.5
32"	1135	143.5	758.5	124	580.3	114	419.5	107	398.0	102.5	341.1	99.5	305	97.5
36"	1281	144	343.0	124.5	651.2	114.5	469.5	107	440.0	103	403.8	100.5	342.1	98
Flat 1 Sq. Ft.	130.2	144.5	86.7	126	65.0	116	52.0	109.5	43.3	104.5	37.1	101.5	32.5	99.5

HL=Heatloss = BTU/HR/LIN FT

ST=Surface Temperature = °F



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INSULTECH

Heat Loss Analysis

Temperature at
600°F

Heat Loss & Surface Temperature

at: **80°F Ambient** **0 MPH Wind** **.9 Emmissivity**

Temperature: 600°F														
PIPE SIZE	1" Thick		1.5" Thick		2" Thick		2 1/2" Thick		3" Thick		3 1/2" Thick		4" Thick	
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST
1"	98.9	137.5	80.9	117	65.2	106.5	62.7	100.5	53.1	97	49.5	94.5	46.6	92.2
1.5"	123.6	140.5	98.4	120.5	79.2	108.5	70.6	102.5	64.3	98.5	58.4	96	55.2	93.5
2"	149.3	145	116.1	122.5	92.5	111.0	78.6	103	71.6	99	68.3	96.5	61.7	94.5
2.5"	174.1	147	121.6	124.5	105.3	112.5	90.7	105	79.5	100	74.4	97.5	68.7	95
3"	201.6	149	149.0	125.5	119.8	114	101.2	106	90.6	101.5	84.3	98	76.5	96
3.5"	225.9	150	177.6	127	131.3	114.5	113.0	107	98.0	102	90.1	98.5	82.9	96.5
4"	248.2	151	181.2	127.5	143.2	115	122	107.5	109.4	102.5	96.9	99	89.2	97
4.5"	270.8	152	209.3	128.5	155.1	116	129.8	108	116.3	103	105.6	99.5	95.2	97
5"	312	153	212.7	129.5	168.7	117	144.0	108.5	123.7	103.5	112.5	100	102.2	97.5
6"	348	154.5	244.9	131	193.5	118	158.2	109.5	141.4	104.5	128.1	100.5	114.9	98
7"	394	155.5	279.3	132	214.1	188.5	179.0	110.5	156.8	105	139.1	101	126.5	98.5
8"	440.1	156	308	132	240.2	119.5	199.8	111	169.8	105.5	154.5	101.5	138.3	99
10"	529.3	156	374	133	291.0	120.5	234.8	112	206.9	106.5	184.6	102.5	164.8	99.5
12"	613.0	156	427	133	331.3	120.5	278.9	113	236.7	107	210.2	103	186.9	100
14"	683.0	158	469	134.5	358.7	121	283.9	113	253.7	107.5	226.0	103.5	202.2	100.5
16"	774.1	158.5	527.3	134.5	408.	122	336.5	113.5	284.9	108	248.6	103.5	224.2	101
18"	869.8	159	590.7	135.5	457.9	122.5	367.2	113.5	321.2	109	274.7	104	249.9	101.5
20"	956.2	159	650.8	135.5	499.3	122.5	404.4	114.5	345.3	109.5	305	104.5	270.5	101.5
22"	1049	159.5	721.2	136.5	546.2	123	442.4	114.5	378.4	109.5	327.9	104.5	496.3	101.5
24"	1051	160.5	778.4	136.5	590.8	123	476.9	114.5	410.5	109.5	356.8	105	320.1	102
28"	1328	160.5	900.0	136.5	681.3	123.5	547.2	115	470.1	110	409.4	405.5	358.3	102
32"	1522	161	1015	136.5	777.2	124	628.2	115.5	532.0	110	456.5	105.5	408.7	102.5
36"	1711	161.5	1128	137	872.2	124.5	693.8	115.5	588.5	110	524.5	106.5	457.3	102.5
Flat 1 Sq. Ft.	174	162.5	116.0	139.5	87.0	126	69.6	118	58.0	112.5	49.7	108	43.5	104.5

HL=Heatloss = BTU/HR/LIN FT

ST=Surface Temperature = °F

INSULTECH

Heat Loss Analysis

Temperature at
700°F

Heat Loss & Surface Temperature

at: **80°F Ambient 0 MPH Wind .9 Emmissivity**

Temperature: 700°F														
PIPE SIZE	1" Thick		1.5" Thick		2" Thick		2 1/2" Thick		3" Thick		3 1/2" Thick		4" Thick	
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST
1"	126.7	151	103.6	126	83.6	113	80.6	105.5	68.0	101	63.4	97.5	59.8	95.5
1.5"	158.4	154	125.9	130	102.6	116.5	90.7	108	82.4	102.5	75.1	99	70.7	96.5
2"	191.2	159.5	148.6	133	118.6	118.5	100.7	110	91.6	104	87.4	100	79.4	97.5
2.5"	223	162.5	155.8	135	135.0	120.5	116.3	111.5	101.9	105.5	95.5	101.5	87.8	98.5
3"	258.9	164.5	190.9	136.5	153.3	122	129.6	113	116.1	106.5	107.7	102.5	98.1	99.5
3.5"	288.8	165.5	227.6	138	168.2	123	144.8	114	125.9	107.5	115.5	103	106.1	100
4"	318.6	167.5	232.2	139	183.5	124	156.4	114.5	140.1	108	126.5	103.5	114.5	100.5
4.5"	345.9	167.5	268.0	140	198.7	125	166.5	115.0	149.1	109	135.6	104	122.1	100.5
5"	382.5	169	272.0	141	216.1	126	184.6	116	158.6	109.5	144.3	104.5	131.0	101.5
6"	445.9	171	313.9	142.5	248	127	202.8	117	181.6	110.5	162.6	106	147.1	102
7"	504.3	172	358.0	143.5	274.5	127.5	229.3	118	201.2	111.0	178.3	106.5	162.4	103
8"	565.5	183	394.9	144	307.9	129	256	119	217.5	112	198.1	107	177.5	103.5
10"	679.0	173	481.5	145	372.9	130	301	120	264.8	113	236.5	108	211.6	104.5
12"	786.5	173	549.7	145	424.6	130	357.6	121	303.4	114	269.3	109	239.8	105
14"	873.2	175	601.6	147	459.7	131	381.2	121	325.2	114.5	289.7	109.5	259.2	105.5
16"	993.1	176	675.9	147	524.0	132	431	122	364.8	114.5	318.7	110	288.9	106
18"	1112.9	177	757.4	148	586.4	132.5	470.2	122	411.4	116	352.7	110.5	320.1	106.5
20"	1223.4	177	833.8	148.5	639.3	132.5	517.8	123	422.8	116	390.7	111	346.7	107
22"	1346.4	177.5	924.2	149	700.1	133	566.5	123	485.5	116.5	419.7	111	380.4	107.5
24"	1474.4	178.5	997.6	149	756.5	133.5	611.7	123	526.8	116.5	457.0	111.5	409.8	107.5
28"	1701.7	178.5	1153	149.5	873.2	134	701.8	123.5	603.0	117	535.1	112	464.9	108
32"	1945.5	179	1301	149.5	995.7	134.5	805.4	124	682.0	117	585.9	112	524.0	108
36"	2196.9	180	1446	149.5	1117.2	135	889.4	124	743.6	117.5	609.6	113	586.4	108.5
Flat	223	181	148.7	152.5	111.5	137	89.2	127	74.3	120	63.7	115	55.75	111

1 Sq. Ft.

HL=Heatloss = BTU/HR/LIN FT ST=Surface Temperature = °F

INSULTECH

Heat Loss Analysis

Temperature at
800°F

Heat Loss & Surface Temperature

at: **80°F Ambient** **0 MPH Wind** **.9 Emmissivity**

Temperature:													800°F	
PIPE SIZE	1" Thick		1.5" Thick		2" Thick		2 1/2" Thick		3" Thick		3 1/2" Thick		4" Thick	
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST
1"	159.8	166	130.7	136.5	105.2	120.5	101.5	111.5	85.8	105.5	79.8	101.5	75.2	98.5
1.5"	199.6	169.5	158.6	141	129.2	124.5	114.2	114.5	103.8	108	94.5	103.5	89.1	100
2"	240.9	176	187.3	144	149.5	127.5	127.0	116.5	115.4	110	110.1	105	99.8	101.5
2.5"	281.0	179	196.2	146.5	170.1	129.5	146.8	118.5	128.5	111	120.3	106.5	110.9	102.5
3"	326.3	182	240.6	148.5	193.3	131.5	163.2	120.5	146.5	113	135.9	107.5	123.7	103.5
3.5"	363.4	183	286.8	150	211.9	132.5	182.5	121.5	158.4	114	145.4	108.5	133.8	104.5
4"	502.2	185.5	292.8	151.5	231.3	133.5	197.2	122.5	176.6	115	156.2	109	144.3	105
4.5"	435.5	186	337.9	152.5	250.2	135	209.8	123.5	187.6	115.5	170.7	110	153.7	105.5
5"	503.4	187.5	343.3	153.5	272.3	135.5	232.8	124.5	199.9	116.5	181.7	110.5	164.7	106
6"	562.1	189.5	395.6	155.5	312.5	137.5	255.3	125.5	288.7	117.5	205	112	185.4	107
7"	635.0	191.5	451.3	157	346.0	138	288.9	126.5	253.5	188.5	224.4	112.8	204.4	108
8"	712.8	192	497.4	157.5	388.1	139.5	322.2	127.5	274.4	119	249.5	113.5	223.6	109
10"	855.9	192	606.7	159	469.9	141	378.1	128.5	333.7	120.5	297.8	115	266.2	110.5
12"	991.3	192	692.6	159	546.9	141.5	445.5	130	382	122	339.4	115.5	301.1	111
14"	1100.3	194.5	757.8	161	579.1	141.5	475	130	409.8	122	365.6	116	326.6	111.5
16"	1251.3	195	851.4	161.5	660.2	143	543	131.5	459.7	122.5	401.9	117	362.4	112
18"	1402.2	193.5	954.3	162	739.0	114	592.4	131.5	518.7	124	444	117.5	403.8	113
20"	1541.7	196.5	1050.5	162.5	805.7	144	652.4	132	557.8	124	492	117	437.6	113
22"	1696.9	197	1164.6	163.5	881.9	144.5	713.9	132	644.6	124.5	529	118.5	479.4	113.5
24"	1857.8	198	1257.0	163.5	95.6	145	770.6	133	663.6	124.5	575.2	119	512.5	114
28"	2144.2	198	1453.5	164	1100.3	145	883.9	133.5	760.0	125	661.9	119	586.6	114.5
32"	2451.9	198.5	1639.6	164	1254.7	146	1015.4	134	859.0	125.5	737.8	119.5	660.2	114.5
36"	2768.1	199.5	1822.6	164.5	1408.2	146.5	1121.4	134	951.5	126	847.1	120	739.6	115
Flat Surface 1 Sq. Ft.	281.0	200.5	187.3	167.5	140.5	149	112.4	137.5	93.66	129.5	80.36	123	70.25	118

HL=Heatloss = BTU/HR/LIN FT ST=Surface Temperature = °F

INSULTECH

Heat Loss Analysis

Temperature at
900°F

Heat Loss & Surface Temperature

at: **80°F Ambient** **0 MPH Wind** **.9 Emmissivity**

Temperature: 900°F														
PIPE SIZE	1" Thick		1.5" Thick		2" Thick		2 1/2" Thick		3" Thick		3 1/2" Thick		4" Thick	
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST
1"	191.1	179.5	156.2	145	125.9	127.5	121.2	117	102.6	110.5	95.5	105	89.8	101.5
1.5"	238.7	184	189.7	150.5	154.5	132	136.7	120.5	124.2	113	113	107.5	106.5	103.5
2"	288	191	224	154	178.7	135	152	123	138.0	115	131.8	109	119.4	105
2.5"	336	194.5	234.8	157.5	203.4	137	176.2	125.5	153.7	117.5	143.8	110.5	132.6	106.5
3"	290.1	197.5	287.7	159	228.7	139	195.1	127	175.1	118.5	162.4	112	147.8	108
3.5"	435.1	198.5	342.8	161	253.4	141	218.3	128.5	189.4	120	174.0	113.5	160.1	108.5
4"	480.1	201	351.4	162.5	276.5	142	235.6	129.5	211.2	120.5	186.9	114	172.5	109.5
4.5"	521.0	201.5	403.9	164	299.5	143.5	250.7	130.5	224.5	121.5	204.2	115	183.9	110.5
5"	576.3	203	410.4	165	325.5	144.5	278	132	239	122.5	217.1	116	197.0	111
6"	672.1	205.5	73	167.5	373.6	146.5	305.3	133	273	124	245.2	117	221.8	112.5
7"	759.8	207	539.5	169.5	413.4	147	345.5	134	302.9	124	268.2	118.5	244.4	113
8"	852.4	208	594.4	169.5	464	148.5	385.6	135.5	328.2	126	298.4	119	267.0	114
10"	1023.4	208	725.2	171	561.8	150.5	453.6	137	399.1	127.5	356.4	120	318.3	115.5
12"	1185.3	208	827.9	171	640.2	151	538.7	138.5	457.1	129	405.8	121.5	361.3	116
14"	1315.7	211	906.0	173.5	692.4	151.5	574.3	138.5	490.1	129	437	122.5	389.9	117
16"	1496.2	211.5	1018.2	173.5	789.7	153	649.5	140	549.5	130	486.4	123.5	433.3	117.5
18"	1676.8	212.5	1140.7	175	883.6	154	708.6	140	619.7	131	531.2	123.5	482.2	118.5
20"	1843.2	212.5	1256.4	175	963.4	154	780.2	140.5	666.8	131	588.5	124.5	522.6	119
22"	2029.1	213.5	1393.2	177	1044.7	155	853.6	140.5	731.1	132	633.0	124.5	573.0	119.5
24"	2221.4	214.5	1503.8	177	1140.5	155	921.3	141.5	793.4	132	688.5	125	617.6	120
28"	2563.4	214.5	1737.7	177.5	1315.5	155.5	1057.4	142	908.1	132.5	790.4	126	700.7	120.5
32"	2931.7	215.5	1960.2	177.5	1499.7	156.5	1213.9	143	1027.0	133	882.9	126	789.1	120.5
36"	3310.4	216	2179.9	178	1683.6	157.5	1340.5	143	1137.4	133	1012.9	127.5	883.6	121.5
Flat	336	217.5	224.0	181	168.0	160	134.4	146.5	114.0	137	96.0	130.5	84.0	124.5
1 Sq. Ft.														

HL=Heatloss = BTU/HR/LIN FT ST=Surface Temperature = °F

INSULTECH

Heat Loss Analysis

Temperature at
1 000°F

Heat Loss & Surface Temperature

at: **80°F Ambient** **0 MPH Wind** **.9 Emmissivity**

Temperature:													1 000°F	
PIPE SIZE	1" Thick		1.5" Thick		2" Thick		2 1/2" Thick		3" Thick		3 1/2" Thick		4" Thick	
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST
1"	235.4	197	192.4	157.5	155.1	137	149.5	124.5	126.4	116.5	117	110	110.8	106
1.5"	294.1	202	233.7	164	190.53	142	168.3	129	152.9	120	139.3	113	131.3	108.5
2"	354.9	210	275.9	168	220.1	145.5	187.1	131.5	170.1	122	162.3	115.5	147.2	110.5
2.5"	414.0	213.5	289.1	171.5	250.7	148	215.7	134	189.2	124	177.2	117	163.3	112
3"	480.8	216.5	354.7	174	284.8	151	240.5	136	215.6	126	200.1	119	181.8	113.5
3.5"	536.1	218.5	422	176.5	312.5	152.5	268.8	137.5	233.2	127.5	214.6	120.5	197.2	114.5
4"	591.4	221	431.2	177.5	340.7	154	290.3	139	260	129	230.3	121.5	212.5	115.5
4.5"	642	222	497.7	179.5	368.6	155.5	309.0	140.5	227	130	251.7	122.5	226.8	116.5
5"	742.1	224	503.5	181.5	401.1	157	342.5	142	295	131	267.7	123.5	242.8	117.5
6"	828.1	226.5	582.9	183.5	460.4	159	376.1	143	337	132.5	301.9	125	293.5	119
7"	936	229	664.8	185.5	509.5	160	425.7	114.5	374	134	330.7	126	301.1	120
8"	1050.1	229.5	732.7	186.5	571.6	162	475.1	145.5	404	135	367.4	127.5	333.6	121
10"	1260.9	229.5	893.6	188	692.2	164	558.7	147.5	492	137	438.9	129	393.4	123
12"	1460.4	229.5	1020.3	188	788.5	164.5	663.6	149	563	138	500	130	445.3	123.5
14"	1621.0	232.5	116.5	190.5	853.4	165	707.6	149.5	603	139	538.5	131	481	124.5
16"	1843.6	233.5	1256.9	191.5	973.1	166.5	800.4	151.5	677	139.5	591.8	131.5	533.8	125.5
18"	2066.1	234.5	1405.8	192	1088.6	168	873.3	151.5	764	141	654.3	132.5	594.5	126.5
20"	2271.7	234.5	1547.7	192.5	1186.9	168	961.6	152.5	822	141	724.6	133	644.3	126.5
22"	2500.0	236	1716.1	194	1299.3	169	1052	152.5	901	142	799.5	133	705.8	127.5
24"	2736.9	237	1852.3	194	1405.2	169	1136	153	978	142	847.8	134	760.9	128
28"	3158.9	237	2141	195	1621.5	169.5	1302	153.5	1110.5	143	974.9	135	863.8	128.5
32"	6311.6	238	2415.5	195	1848.2	170.5	1495.6	154.5	1266.0	143.5	1087	135	972.5	129
36"	4072.5	239.5	2684.8	195.5	2073.1	170.5	1651.5	154.5	1401.4	143.5	124.9	135	1088.6	129.5
Flat 1 Sq. Ft.	414	240.5	276	199	207.0	175	165.6	158.5	132	145	118	140	103.5	133.5

HL=Heatloss = BTU/HR/LIN FT

ST=Surface Temperature = °F

INSULTECH

Heat Loss Analysis

Temperature at

1100°F

Heat Loss & Surface Temperature

at: **80°F Ambient** **0 MPH Wind** **.9 Emmissivity**

Temperature: 1100°F														
PIPE SIZE	1" Thick		1.5" Thick		2" Thick		2 1/2" Thick		3" Thick		3 1/2" Thick		4" Thick	
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST
1"	270	209	220	167	178	144	173	130	145	121	136	114	127	109
1.5"	237	214	267	174	219	149	193	135	175	125	159	117	150	112
2"	405	223	315	178	252	153	215	138	165	127	185	120	169	114
2.5"	474	228	331	182	288	157	280	140	219	130	203	122	188	116
3"	550	231	407	185	325	159	227	143	250	132	229	124	208	117
3.5"	615	233	484	187	357	161	312	145	270	134	247	125	226	119
4"	677	236	494	189	390	163	335	146	299	135	264	127	243	120
4.5"	736	237	569	191	422	164	356	147	316	136	288	125	258	121
5"	814	239	578	193	459	166	392	148	336	137	307	129	277	122
6"	947	242	668	195	528	168	432	150	383	139	346	130	314	124
7"	1071	244	762	197	584	169	488	152	428	140	376	131	347	125
8"	1202	245	838	197	553	171	547	153	464	141	418	133	378	126
10"	1443	245	1024	200	791	173	639	155	558	143	503	135	448	128
12"	1672	245	1169	200	902	174	761	158	641	145	567	136	512	129
14"	1856	249	1277	202	977	175	810	158	691	145	611	137	553	130
16"	2110	250	1436	203	1116	176	918	159	777	147	678	139	609	131
18"	2363	251	1612	204	1244	178	1002	159	876	148	747	139	681	132
20"	2597	251	1770	205	1356	178	1105	160	946	148	831	139	740	132
22"	2864	252	1965	207	1485	179	1207	160	1037	149	897	140	809	133
24"	3133	254	2121	207	1605	199	1307	162	1122	149	972	141	872	134
28"	3616	254	2452	208	1852	180	1496	162	1281	150	1122	142	990	134
32"	4129	255	2766	208	2120	181	1717	164	1450	150	1244	142	1110	135
36"	1666	256	3104	280	2377	182	1894	164	1606	151	1435	143	1244	136
Flat 1 Sq. Ft.	474	257	316	211	237	186	190	169	158	156	135	142	119	149

HL=Heatloss = BTU/HR/LIN FT ST=Surface Temperature = °F

INSULTECH

Heat Loss Analysis

Temperature at
1 200°F

Heat Loss & Surface Temperature

at: **80°F Ambient** **0 MPH Wind** **.9 Emmissivity**

Temperature: 1 200°F														
PIPE SIZE	1" Thick		1.5" Thick		2" Thick		2 1/2" Thick		3" Thick		3 1/2" Thick		4" Thick	
	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST	HL	ST
1"	305.9	222	249.9	176	201.5	151	194.2	135.5	164.2	126	152.8	118	143.9	112.5
1.5"	382.1	228	303.9	182.5	247.3	157	218.8	141	198.8	130	180.9	122	170.7	115.5
2"	461.1	237.5	358.6	188.5	286.1	160	243.2	144	221.1	133	210.9	124.5	191.2	118
2.5"	538	242	375.8	192.5	325.6	164.5	280.5	157	246	135	230.2	126.5	212	120
3"	624.7	246	460.7	196	370.1	168	312.5	149.5	280.3	138	260	129	236.2	122
3.5"	696.6	248	548.8	198	405.9	170	349.3	152	303.2	139	278.8	130.5	256.2	123.5
4"	768.5	251	560.2	200	442.7	171.5	377.2	153.5	338.1	141	299.2	132	276.2	125
4.5"	834.5	252.5	646.8	202	479.1	173.5	401.8	155	359.6	142	326.7	133	294.4	126
5"	965.2	254	657.2	203.5	521.3	175	445.1	157	382.6	143.5	347.9	134	315.6	127
6"	1076	257	757.5	206.5	598.3	177.5	488.9	158	437.9	145	392.4	136	355	128.5
7"	1217	260	863.9	208.5	662.1	178.5	533.1	160	485.1	147	429.8	137	391.3	130
8"	1364.5	263.5	952.0	209.5	742.8	181.5	617.2	161.5	525.7	148	477.6	139	428	131.5
10"	1638.5	263.5	1161	211.5	899.4	183.5	726	163.5	639.1	150.5	570.7	141	510.2	133.5
12"	1897.7	263.5	1326	211.5	1047	184	862.1	166.5	731.6	152.5	649.5	142.5	578.3	134.5
14"	2106.7	264	1451	215.5	1109	185	919.2	166.5	784.6	153	699.7	143	624.4	135.5
16"	2395.2	265.5	1630	215	1264	187	1039.8	168	880.1	153.5	769.1	144	693.9	136.5
18"	2685.0	266.5	1827	216	1415	188.5	1135	168	990.7	156.8	850.2	145	773	137.5
20"	2951.4	266.5	2012	218	1543	188.5	1250	169	1068	156	941.6	145.5	837.1	138
22"	3248.6	267.5	2230	219	1688	189.5	1367	169	1171	157	1013	146	917.3	139
24"	3556.9	269	2407	219	1826	190	1475	170	1270	157	1102	147	988.8	139.5
28"	4105.3	269	2782	219.5	2107	190.5	1693	171	1454	158	1266	148	1108	140.5
32"	4694.7	270	3139	219.5	2402	192	1942	172	1645	158.5	1413	148.5	1264	140.5
36"	5299.4	271.5	3490	220	2695	193	2145	172	1821	159	1623	150	1415	141.5
Flat 1 Sq. Ft.	538	272.5	358.7	224	269	196.5	215.2	174	179.3	164.5	153.7	154	134.5	142.5

HL=Heatloss = BTU/HR/LIN FT ST=Surface Temperature = °F



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Bare (No Insulation) Heat Loss

PIPE SIZE	Operating Temperature (°F)								
	200	300	400	500	600	700	800	900	1000
2	161	370	649	1010	1471	2050	2771	3657	4735
4	287	664	1169	1829	2675	3746	5083	6732	8743
6	409	947	1673	2625	3850	5405	7351	9755	12693
8	521	1209	2140	3363	4942	6950	9466	12579	16386
10	638	1482	2629	4140	6093	8580	11701	15565	29294
12	747	1739	3084	4862	7164	10099	13785	18353	23946
14	815	1896	3367	5310	7830	15082	15082	20089	26221
18	1029	2396	4262	6734	9946	14049	19211	25618	33471
24	1344	3135	5585	8843	13085	18513	25354	33852	44278
FLAT*	260	599	1050	1633	2375	3309	4469	5895	7629

HL=Heatloss = BTU/HR/SQ. FT

INSULTECH

Cost Comparison

Conventional Insulation Vs. INSULTECH Thermal Blankets

Components	Conventional Insulation	INSULTECH Thermal Blanket
Outer Jacketing	0.016" Corrugated Aluminum	Silicone Fiberglass Cloth
Insulation	3" Thick Calcium Silicate	2" thick Fiberglass Mat
Inner Jacketing	NONE	Plain Fiberglass Cloth Stainless Steel Wire Mesh
Material Cost	Jacketing \$144.00 Calcium Silicate (6 linear feet) \$119.00 TIW Wool (Packing) \$5.00 Fibrous Adhesive \$11.00 Misc. (screws, wires, etc.) \$15.00	
Total Material Cost	\$294.00	\$485.00
Labor Cost	1 each man day @ \$35.00/hr.	1 each man day @ \$35.00/hr.
Total Labor Cost	\$280.00	\$35.00
Total Install Cost	\$574.00	\$520.00

Design Comparison

Conventional Insulation

INSULTECH Thermal Blanket

- Materials cannot be reused
- Service can not be performed
- Once wet insulation must be replaced
- Outer jacket is weatherproof
- Tools are required for removal
- Skilled labor is required for reinstallation

- INSULTECH is removable and reusable
- Service *can* be performed at any time
- Blanket *can* get wet with no damage
- Outer jacket is weatherproof
- No tools are required for removal
- Skilled labor is *not* required for installation

INSULTECH

The Key to Big Savings is
Insultech Thermal Blankets

Want to Save Big Money? How's over \$300 per valve, per year?

Apply our custom thermal insulation blankets – they'll pay for themselves within the first few months! Leaving a 6" 150# Gate Valve uninsulated for a full year can waste \$ 340.00 in annual energy cost. This cost is continuous, each and every year. Add up each and every valve and fitting on a process system and those small dollars turn into big bucks in unnecessary waste.



A SERIOUS LOOK

Take a serious look at INSULTECH Blanket Insulation:

- Pre - Engineered custom fit blanket insulation designs.
- Continuous savings year after year.
- Savings in labor and material after each removal.



PAYBACK ANALYSIS

* The typical payback period is less than one year.

Example: 6" 150# Gate Valve (Includes covering mating flanges)

Annual Energy Cost: Bare Surface (Uninsulated)	\$ 339.00 per year
Annual Energy Cost: Insulated (1 1/2" TK INSULTECH Blanket)	\$ 17.36 per year
Annual Savings: (year after year from INSULTECH)	\$ 321.64 each year
Total Savings: (15 Year Service Life)	\$ 4,838.55
Initial Cost of INSULTECH Blanket Insulation	\$ 310.00
Payback period on initial investment:	11.6 Months

The above calculations are based on the following criteria:

Operating Temperature :	357° F
Ambient Temperature :	80° F
Operating Hours :	8760 hr/yr
Fuel Cost :	\$ 5.50 per mm BTU (1000 lb/ stm)

* FREE Energy Surveys

We at Shannon Enterprises have had great success in promoting Insultech Blanket Insulation through energy surveys. This is because the survey allows you the customer an opportunity to see the effect of insulating with INSULTECH Blanket Insulation. Just like the 6" 150# Gate Valve sample above, itemized heatloss calculations can be determined in an organized categorical way. A descriptive fitting count is tallied, identifying actual locations and quantities. Actual blanket insulation costs are included in the calculation. These figures are used to determine an average payback period, which typically is less than one year. The payback period is the key to project approval. Allow Shannon Enterprises the opportunity to save your plant BIG MONEY!



Insulation Comparisons by Physical Properties

Insulation Type	K Factor	R Value	Density	Temperature Range
Fiberglass Pipe Covering	.23	4.35	3.25	-60F to +850F
Calcium Silicate	.38	2.63	14 lb/ft3	+ 1200F
*TIW Wool Type I	.22	4.55	1.5 lb/ft3	+ 1000F
*TIW Wool Type II	.22	4.55	2.5 lb/ft3	+ 1000F
Urethane 190	.14	7.14	1.9 lb/ft3	-40F to +225F
Foamglas(Cellular Glass)	.35	2.86	8.5 lb/ft3	-450F to +1200F
*Ceramic Needled Mat	.29	3.45	6 lb/ft3	+ 2300F
Mineral Wool	.25	4.00	8 lb/ft3	+ 1200F
Armaflex(Foam Rubber)	.28	3.57	6 lb/ft3	-40F to +220F
Fiberglass Needled Mat (INSULTECH Blanket)	.26	3.85	11 lb/ft3	+ 1200F

The physical characteristics of individual insulation products and materials commonly used in the insulation industry are referenced below. Some of the items indicated by *, can be substituted in a blanket design construction. refer to the recommended design section of the Thermal Blanket Insulation catalog for selecting the proper insulation for your blanket design.

*Optional insulation filler to the standard fiberglass needled mat filler.

$$R = \frac{\text{Thickness}}{K}$$

K Factor is based on a 75° F Ambient Temperature