94 Reservoir Park Drive
Rockland, MA 02370
(617)-544-3200

**January 31, 2024**

## Solution: Mechanical Insulation Upgrade
## Boiler Room #1

## Site: Somerville DPW, 17 Franey Rd., Somerville, MA 02145

**Presented To:**
**Andrew Reider**
**City of Somerville**
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**Prepared By:**
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**Inovis Energy, Inc, is a turn-key implementer of energy efficiency measures. We provide our clients with a streamlined approach to energy conservation projects that makes the process efficient, clear, and successful**

**We have included the necessary information for review of the above-mentioned project in this report. We hope you find our analysis clear and concise. If there are any specific questions, or additional information requested, please let us know.**

Tony Parente

**Tony Parente**
**Director of**
**Business**
**Development**
**Inovis Energy, Inc.**

INOVIS ENERGY
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## Proposed Scope of Work:

**Currently there is a significant energy loss identified through feet of steam piping in Boiler Room #1.**

**A general description of work is as follows:**

- **All Insulate 160'of existing Steam pipe with 1-1/2" & 2" thick fiberglass preformed pipe insulation with ASJ 41 fittings to be insulated and covered with a one-piece PVC fitting cover.**
- **Insulate 89'of existing domestic hot water pipe with 1" thick fiberglass preformed pipe insulation with ASJ. 11 fittings to be insulated and covered with a one-piece PVC fitting cover.**
- **Insulate 2 existing steam valves with removable blankets made from 1" thick Temp-Mat and jacketed in gray Teflon cloth.**
  **All materials will be installed and sealed per manufacturers recommendations.**

**Clarifications, Omissions, and Assumptions:**

1. **Work to be performed during normal, first shift hours (6a-4p), Monday-Friday, non-prevailing wage.**
2. **No existing code violations to be corrected.**
3. **Inovis will insulate pipes that are reachable within reasonable limits of a 10' ladder or lift access. Pipes on the underside of hot water tanks are excluded due to access.**
4. **This proposal excludes product/process pipe, permits, labels, painting, firestopping.**

## Financials:

| Description | Total Cost | Estimated Incentive | Net Cost | Annual Therm Savings | Annual Cost Savings | Payback (yrs) |
|---|---|---|---|---|---|---|
| Supply & Install pipe & fitting insulation | $24,100 | $2,550 | $21,550 | 1,700 | $2,125 | 10.1 |

*Incentives based on custom incentive rate $1.50/therm
*Cost savings based on a fuel cost of $1.25/therm

# GLT Tempmat

www.gltproducts.com

## SPECIFICATIONS

GLT Tempmat is non-corrosive, non-combustible, non-alkaline and chemically stable. Its excellent heat resistance, flexibility and low thermal conductivity make Tempmat an effective low-cost replacement for asbestos mats, millboard refractory paper and other similar products.

The transition from asbestos to glass fibers has resulted in an increasingly wide range of application for Tempmat, rather than organically bonded glass fiber insulating blanket. A 100% "E" fiberglass mat, Tempmat is manufactured in web form and mechanically needled together to form thicknesses of ¼″, ½″ and 1″. There are no binders in Tempmat. Instead, long textile fibers have been accurately chopped to provide maximum density, high insulation and strong physical properties in temperatures up to 1200°F.

| GLT Tempmat meets the following requirements of commercial and government specifications: | |
|---|---|
| MIL-1-24244 | Compliance with government specifications |
| MIL-1-16411, Type II | U.S. Coast Guard incombustible materials, USCG 164-009 |

GLT Tempmat is being used to solve increasingly complex applications in oil refineries, steam and gas turbines, exhaust systems on diesel tug, tankers, Coast Guard and Navy vessels, and pleasure yachts. It is used to relieve stress at welding points and on valve flange covers. In addition, Tempmat acts as an insulator over automotive thermactor switches, for floor pans over catalytic converters and in luggage compartments. In nuclear power plants, these blankets reduce labor costs during removal for inspection and service, and cut reinsulation costs associated with poor fitting rigid block.

### Physical Properties of GLT Tempmat

| | Thickness (in.) | Mass (density lbs./cu. ft.) | Width (in.) | Roll Length (ft.) | Surface Area (sq. ft./roll) | Approx. Roll Weight (net lbs.) |
|---|---|---|---|---|---|---|
| Style #1006 | ¼″ | 9 to 11 | 60 | 150 | 750 | 188 |
| Style #1050 | ½″ | 9 to 11 | 60 | 75 | 375 | 188 |
| Style #1031 | 1″ | 9 to 11 | 60 | 45 | 225 | 225 |

**Note:** Width and roll length can be made to order. All values above are nominal values.

### Acoustical Performance

| Thickness (in.) | 125 Hz | 250 Hz | 500 Hz | 1000 Hz | 2000 Hz | 4000 Hz | NRC |
|---|---|---|---|---|---|---|---|
| ¼″ | .05 | .10 | .20 | .45 | .75 | .85 | .30 |
| ½″ | .05 | .10 | .35 | .75 | .95 | .90 | .35 |
| 1″ | .10 | .30 | .85 | 1.00 | 1.00 | 1.00 | .60 |

# Pipe and Tank Wraps



Pipe and Tank Insulation wraps, also referred to as Lamella tank wraps are used extensively in industrial insulation applications to insulate horizontal/vertical tanks and vessels. GLT Products has a number of insulation options available to meet the needs of the industrial market no matter what the application. Our line of Pipe and Tank insulation wraps allow for the insulation of curved surfaces such as large pipes, cylindrical vessels, ducts, tanks and other round surfaces.

GLT Products offers both Fiberglass and Mineral Wool Pipe and Tank Insulation in FSK and ASJ facings manufactured in our own facilities. This insulation is designed for piping over 8" IPS and curved surfaces. Fiberglass is used to insulate cold and hot surfaces from -60ºF to 650ºF. Mineral Wool is generally used to insulate hot surfaces up to 1000ºF.

Additionally, we stock mineral wool boards from Rockwool such as ProRox SL 930 and Enerwrap® MA 960 for the insulation of tank walls. Our Radial Wrap™ line is also available and is suitable for both hot and cold applications. Radial Wrap is available in 48" Widths and 1.5" and 2" thicknesses.

Fiberglass Pipe & Tank Insulation

GLT Products Fiberglass Pipe & Tank Wrap is fabricated from a semi rigid fiberglass with segmented sections designed to insulate large piping (over 8" IPS) and curved surfaces.

Mineral Wool Pipe & Tank Insulation

Mineral Wool Pipe and Tank Insulation is a semi-rigid, mineral wool designed to insulate large piping (over 8" IPS), and other curved surfaces. It is made with the fibers perpendicular to the surface and comes with a variety of jacketing. GLT Products mineral wool jacketing is also available with an ASJ or FSK facing.

Radial Wrap Rolled Fiberglass Insulation

Radial Wrap™ rolled fiberglass insulation is a flexible rolled fiberglass insulation product that allows for installation on round surfaces in either hot or cold applications.

Enerwrap® MA 960

ENERWRAP® MA 960 from ROCKWOOL is a rolled and faced mineral wool (Stone Wool) insulation wrap/mat. It is designed for high-temperature industrial applications where flexibility is often desired. The product is ideal for large diameter piping, vessels, ducts and equipment subject to light mechanical loads.




# Original text

Contribute a better translation

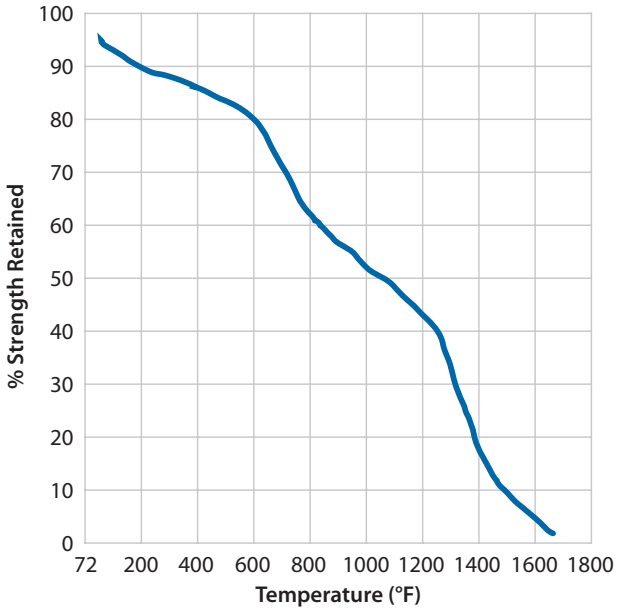
## Physical Properties

Service Temperature..... Up to 1200°F
Fire Resistance .....Incombustible
Density (Approximate).....9 - 11 lbs./cu. ft.
Moisture Absorption.....Negligible

**Thermal Conductivity ("K" value at 9.1 lbs./cu. ft.):**

| Mean Temperature | "K"–btu/sq. ft./hr./°F/in. |
|---|---|
| 300°F | 0.40 |
| 500°F | 0.50 |
| 700°F | 0.65 |

**Glass Filament Tensiles (at various temperatures)**




## Properties of Fiberglass "E" Glass

**Physical/Mechanical Properties of Glass Fibers**

Specific Gravity.....2.60 grams/cc.
Density ..... 0.094 lbs./cu. in.
Tensile Strength (PSI×$10^3$ @ 70°F).....500 lbs.
Modulus of Elasticity (PSI×10 @ 72°F)..... 10.5 lbs.
After Heating (PSI×10 @ 1000°F)..... 11.8 lbs.
Elongation (@ 72°F)..... 4.8%

**Thermal Properties of Bulk Glass**

Softening Point..... 1500°F
Strain Point.....1100°F
Annealing Point ..... 1200°F

**Electrical Properties of Bulk Glass**

Dielectric Constant
1 MHz @ 72°F.....6.33
10kHz @ 72°F..... 6.13
Power Factor
1MHz @ 72°F .....0.001
10kHz @ 72°F.....0.0039

**Note:** The physical and performance properties cited in this literature have been derived in tests conducted by various fiber companies.

Tests have been conducted on both fiber and fabrics woven with bulked glass fiber.

Reference to U.S. Government specification values as well as information provided on certain end uses which currently use bulked glass are presented for the information of potential customers in determining the potential suitability of these products for their own applications. No claims are made as to the accuracy or applicability of the test methods employed or the results derived therefrom.

**Important Cautionary Note:** Items of protective equipment manufactured from fiberglass fabrics such as aprons, gloves, mittens, etc. should be labeled to show the maximum short-term and continuous-exposure temperature limits established in accordance with the standard specifications applicable to the item of equipment being offered.



GLT PRODUCTS®
Insulation Innovation

**HEADQUARTERS:**
6810 Cochran Road | Solon OH 44139 | 440.914.1122 | 440.914.1133 Fax | **1.800.874.1748**

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# Fiberglass Pipe Insulation

**Approved Vendor Pipe Fitting Insulation—**Preformed fiberglass insulation for 90° elbows and tees eases installation and provides for greater thermal performance. Includes matching PVC cover. Installs with 1" Pipe Fitting Insulation Tape 6WXE4, sold separately. Use 3" Pipe Insulation Tape 4LFJ3 to seal butt joints. Insulation meets ASTM C547 and C300 Series.

- Application temp. range: 0° to 450°F
- White color

**Owens Corning Fiberglas Pipe Insulation—**The pressure sensitive adhesive system features a self-sealing flap to ease installation. GREENGUARD Certified.

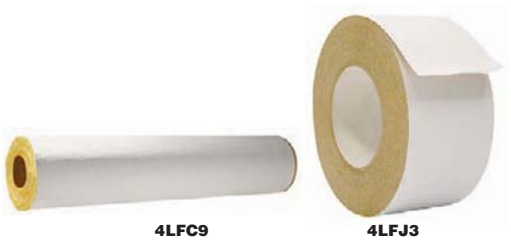
- 3-ft. lengths
- Service temp. range: 0° to 1000°F
- White color jacket

**Owens Corning ASJ Max Fiberglas Pipe Insulation—**Cleanable, encapsulated paper jacket doesn't support mildew or mold growth. Jacket resists moisture during intermittent, short duration precipitation exposure during installation (with joints sealed per installation guidelines). SSL Max closure system provides a tight, reliable seal without glue or staples. Certified by SCS Global Services to contain a minimum of 53% recycled glass content, 31% pre-consumer and 22% post-consumer. GREENGUARD Gold Certified. Meets UL 723, ASTM E84, and CAN/ULC S-102, ASTM C547, and ASTM C1136, Types I – IV.

- 3-ft. lengths
- Service temp. range: 0° to 1000°F (with heat-up schedule)
- White color

**Owens Corning 3"-Wide Pipe Insulation Tape—**Seals end joints and completes the closure systems.

- Service temp. range: 25° to 110°F (ambient)
- Service temp. range: -20° to 150°F
- White color jacket



4LFC9 4LFJ3

| MINIMUM QUANTITY OF 3" WIDE ASJ TAPE ROLLS REQUIRED | | |
|---|---|---|
| Iron Pipe or Copper Tube Size (in.) | No. of Sections per 25-ft. Roll | No. of Sections per 150-ft. Roll |
| ½ to 1⅜ | up to 10 | up to 60 |
| 1½ to 3⅛ | up to 8 | up to 48 |
| 4 to 6 | up to 5 | up to 30 |

*Example: 15 sections of 1.0" nominal pipe size would require two 25-ft. rolls of tape.*

| Insulation Nominal I.D. | Copper Tube Size (Nom. I.D. Plumbing) | Copper Tube Size (O.D. HVAC/R) | 90° Elbow Wall Thickness - Insulation 1" Item No. | 90° Elbow 1½" Item No. | 90° Elbow 2" Item No. | Tee Wall Thickness - Insulation 1" Item No. | Tee 1½" Item No. | Tee 2" Item No. |
|---|---|---|---|---|---|---|---|---|
| **Approved Vendor—Pipe Fitting Insulation** | | | | | | | | |
| ½" | — | — | 6WYC7 | 6MPW7 | 6MPX7 | 6MRC3 | 6MRD3 | 6MRE3 |
| ⅝" | ½" | ⅝" | 6MPY7 | 6MPZ6 | — | 6MRF3 | 6MRG2 | — |
| ¾" | — | — | 6WYC8 | 6MPW8 | 6MPX8 | 6MRC4 | 6MRD4 | 6MRE4 |
| ⅞" | ¾" | ⅞" | 6MPY8 | 6MPZ7 | 6MRA5 | 6MRF4 | 6MRG3 | 6MRH1 |
| 1" | — | — | 6WYC9 | 6MPW9 | 6MPX9 | 6MRC5 | 6MRD5 | 6MRE5 |
| 1⅛" | 1" | 1⅛" | 6MPY9 | 6MPZ8 | 6MRA6 | 6MRF5 | 6MRG4 | 6MRH2 |
| 1¼" | — | — | 6WYD0 | 6MPX0 | 6MPY0 | 6MRC6 | 6MRD6 | 6MRE6 |
| 1⅜" | 1¼" | 1⅜" | 6MPZ0 | 6MPZ9 | 6MRA7 | 6MRF6 | 6MRG5 | 6MRH3 |
| 1½" | — | — | 6WYD1 | 6MPX1 | 6MPY1 | 6MRC7 | 6MRD7 | 6MRE7 |
| 1⅝" | 1½" | 1⅝" | 6MPZ1 | 6MRA0 | 6MRA8 | 6MRF7 | 6MRG6 | 6MRH4 |
| 2" | — | — | 6WYD2 | 6MPX2 | 6MPY2 | 6MRC8 | 6MRD8 | 6MRE8 |
| 2⅛" | 2" | 2⅛" | 6MPZ2 | 6MRA1 | 6MRA9 | 6MRF8 | 6MRG7 | 6MRH5 |
| 2½" | — | — | 6WYD3 | 6MPX3 | 6MPY3 | 6MRC9 | 6MRD9 | 6MRE9 |
| 2⅝" | 2½" | 2⅝" | 6MPZ3 | 6MRA2 | 6MRC0 | 6MRF9 | 6MRG8 | 6MRH6 |
| 3" | — | — | 6WYD4 | 6MPX4 | 6MPY4 | 6MRD0 | 6MRE0 | 6MRF0 |
| 3⅛" | 3" | 3⅛" | 6MPZ4 | 6MRA3 | 6MRC1 | 6MRG0 | 6MRG9 | 6MRH7 |
| 4" | — | — | 6WYD5 | 6MPX5 | 6MPY5 | 6MRD1 | 6MRE1 | 6MRF1 |
| 4⅛" | 4" | 4⅛" | 6MPZ5 | 6MRA4 | 6MRC2 | 6MRG1 | 6MRH0 | 6WXE3 |
| 5" | — | — | 6MPW6 | 6MPX6 | 6MPY6 | 6MRD2 | 6MRE2 | 6MRF2 |

| Fits Pipe Size - Pipe Insulation | Fits Tube Size | Insulation Nominal I.D. | Wall Thickness - Insulation ½ in Item No. | 1 in Item No. | 1 ½ in Item No. | 2 in Item No. |
|---|---|---|---|---|---|---|
| **Owens Corning—Fiberglas Pipe Insulation** | | | | | | |
| ¾" | 1⅛" | 1⅜" | 40PP22 | — | — | — |
| 1" | 1⅜" | 1 25/64" | 40PP32 | — | — | — |
| 1¼" | 1⅝" | 1 11/16" | 40PP33 | — | — | — |
| 1½" | 2⅛" | 2 5/32" | 40PP18 | — | — | — |
| 3" | 3½" | 3 17/32" | — | — | — | 40PP20 |
| **Owens Corning—ASJ MAX Fiberglas Pipe Insulation** | | | | | | |
| ⅜" | ⅝" | ⅝" | — | 4LFG6 | 4LFH2 | — |
| ½" | ⅞" | ⅞" | — | 4LFC9 | 4LFE2 | 4LFF4 |
| ¾" | 1⅛" | 1⅜" | — | 4LFD1 | 4LFE3 | 4LFF5 |
| 1" | 1⅜" | 1 25/64" | — | 4LFD2 | 4LFE4 | 4LFF6 |
| 1¼" | 1⅝" | 1 11/16" | — | 4LFD3 | 4LFE5 | 4LFF7 |
| 1½" | — | 1 59/64" | — | 4LFD4 | 4LFE6 | 4LFF8 |
| — | 2⅛" | 2 5/32" | — | 4LFG7 | 4LFH3 | 4LFH7 |
| 2" | — | 2 13/32" | — | 4LFD5 | 4LFE7 | 4LFF9 |
| — | 2⅝" | 2 21/32" | — | 4LFG8 | 4LFH4 | 4LFH8 |
| 2½" | — | 2 29/32" | — | 4LFD6 | 4LFE8 | 4LFG1 |
| — | 3⅛" | 3 5/32" | — | 4LFG9 | 4LFH5 | 4LFH9 |
| 3" | — | 3 17/32" | — | 4LFD7 | 4LFE9 | — |
| — | 4⅛" | 4 5/32" | — | 4LFH1 | 4LFH6 | 4LFJ1 |
| 4" | — | 4 17/32" | — | 4LFD8 | 4LFF1 | 4LFG3 |
| 5" | — | 5 41/64" | — | 4LFD9 | 4LFF2 | 4LFG4 |
| 6" | — | 6 45/64" | — | 4LFE1 | 4LFF3 | 4LFG5 |
| 10" | — | 10" | — | — | 4LFG2 | — |

| Description | Temp. Range | Item No. |
|---|---|---|
| **Owens Corning—3"-Wide Pipe Insulation Tape** | | |
| 3" x 150-ft. Roll | 0 to 150°F | 4LFJ3 |

# Fiberglass Pipe Insulated Fitting Covers and Insulated Jacketing

- White color

Easily fit around pipe to create a protective barrier. Suitable for indoor or outdoor use on chilled water, hot water, steam and other piping systems in commercial, industrial, and institutional applications. Insulated Fitting Covers, when combined with Insulated Jacketing and PVC solvent cement (sold on page 2822), can form a sealed system suitable for washdown applications in food, beverage, and pharmaceutical facilities. Comply with ASTM D257, D638, D790, D792, D1784, D3679, E84, E136; USDA, ICBO, SBCCI, and BOCA.

| Fits Max. O.D. | Approx. R Value | 90° Elbow Item No. | End Cap Item No. | Tee Item No. |
|---|---|---|---|---|
| **Fiberglass Insulated Fitting Covers** | | | | |
| 1 ½ in | 3.5 | 6TEE0 | 6TEF9 | 6TEC1 |
| 2 in | | 6TEE1 | 6TEG0 | 6TEC2 |
| 2 ¼ in | | 6TEE2 | 6TEG1 | 6TEC3 |
| 2 ½ in | | 6TEE3 | 6TEG2 | 6TEC4 |
| 2 ¾ in | | 6TEE4 | 6TEG3 | 6TEC5 |
| 3 in | | 6TEE5 | 6TEG4 | 6TEC6 |
| 3 ¼ in | | 6TEE6 | 6TEG5 | 6TEC7 |
| 3 ⅝ in | | 6TEE7 | 6TEG6 | 6TEC8 |
| 4 in | | 6TEE8 | 6TEG7 | 6TEC9 |
| 4 ½ in | | 6TEE9 | 6TEG8 | 6TED0 |
| 5 ⅛ in | | 6TEF0 | 6TEG9 | 6TED1 |
| 5 ⅝ in | | 6TEF1 | 6TEH0 | 6TED2 |
| 6 ⅛ in | | 6TEF2 | 6TEH1 | 6TED3 |
| 6 ⅝ in | | 6TEF3 | 6TEH2 | 6TED4 |
| 7 ⅛ in | | 6TEF4 | 6TEH3 | 6TED5 |
| 7 ⅝ in | | 6TEF5 | 6TEH4 | 6TED6 |
| 8 ⅝ in | | 6TEF6 | 6TEH5 | 6TED7 |
| 9 ⅝ in | | 6TEF7 | 6TEH6 | 6TED8 |
| 10 ¾ in | | 6TEF8 | 6TEH7 | 6TED9 |

**FIBERGLASS INSULATED FITTING COVERS**

- Temp. range: -32° to 150°F
- R-value: 3.5

Fit over bare pipe elbows; include insert. PVC and fiberglass construction.

**PVC INSULATED PIPE JACKET**

- 4-ft. lengths
- Temp. range: -30° to 150°F

Fits over bare pipes and pipe insulation. PVC construction.

| Fits Max. O.D. | Thickness | Item No. |
|---|---|---|
| **PVC Insulated Pipe Jacket** | | |
| 2 in | 0.02 | 6TEH8 |
| 2 ½ in | | 6TEH9 |
| 3 in | | 6ZKJ1 |
| 3 ½ in | | 6ZKJ2 |
| 4 in | | 6ZKJ3 |
| 4 ½ in | | 6ZKJ4 |
| 5 in | | 6ZKJ5 |
| 5 ½ in | | 6ZKJ6 |
| 6 in | | 6ZKJ7 |
| 6 ½ in | | 6ZKJ8 |
| 7 ½ in | | 6ZKJ9 |
| 8 ½ in | | 6ZKK0 |
| 9 ½ in | | 6ZKK1 |
| 10 ¾ in | | 6ZKK2 |

6TEE0

6ZKJ3