

Trac-Loc System Vertical Lock-Seam Tank Insulation Specification

1 Scope

This specification covers the requirements for insulating large stationary steel storage tanks. It further details material selections for operating temperatures of -50°F to 500°F (-46°C to 260°C).

2 Trac-Loc Sidewall System

- A. The sidewall system shall be a Trac-Loc Vertical Lock-Seam Tank insulation system as supplied and installed by Tyco Thermal Controls.
- B. The specified insulation material shall be laminated to the panel cladding with a contact adhesive that is resistant to heat, moisture and aging.
- C. Sidewall insulation materials suited for lamination are:
 1. Polyisocyanurate
 2. Fiberglass
 3. Cellular Glass
 4. Mineral Wool
 5. Other materials per the customer's specifications
- D. The materials described above may be used singularly, or in combination, subject to their temperature limitations.
- E. Sidewall cladding may be constructed of the following metal(s) and the panels will be 12 inches to 24 inches wide dependant on the required width to fit the tank radius:
 1. 0.024 in (0.6 mm) thick stucco embossed aluminum
 2. 0.016 in (0.4 mm) thick stainless steel
 3. 0.024 in (0.6 mm) thick Galvalume[®]
 4. Other metal per the customer's specification
- F. All sidewall panels shall incorporate a 100% non-hygroscopic cellular glass footer at the bottom of the panels. The footer shall be a minimum of 9 in (228 mm) high in place of insulation on the remainder of the panel.
- G. Sidewall panels shall be attached to $\frac{1}{4}$ in (6.3 mm) 7 x 19 stranded stainless steel air craft quality cables circumferentially attached to the tank on 3 ft (914 mm) centers. The bottom cable shall be installed 9 in (228 mm) from the tank base. The top cable shall be positioned 12 in (305 mm) from the upper rim.
- H. The cables shall be pulled tight and tensioned with $\frac{3}{8}$ in (9.5 mm) x 6 in (152 mm) stainless steel turnbuckles.
- I. The panels shall be attached to the cables with $\frac{1}{2}$ in (12.7 mm) x 0.015 in (.381 mm) stainless steel straps that connect the Trac-Loc cable to the panel seams. The straps shall be looped around the cable and both ends shall extend over the standing seam. The seam shall be machine folded with straps entrapped. The double standing seams shall have a finished height of 1 in (25.4 mm).
- J. The sidewall panels shall terminate under the tank compression rim angle accounting for expansion/contraction of the tank sidewalls. Once the sidewall panels are completely installed, a $\frac{1}{8}$ in (3.1 mm) thick x 1.5 in (38mm) x 7 in (178mm) aluminum angle extrusion shall be attached to the roof anchor clips. The aluminum angle extrusion shall rest no higher than the tank roof insulation and cover the sidewall panels a minimum of 3 in (76.2 mm) past the maximum tank expansion.
- K. Protrusions through panels shall be tightly fitted, flashed, and caulked with an application specific caulking compound.
- L. The sidewall application shall be rated for 110 mph (177 km/h) wind.

3 Trac-Loc Roof System

- A. The roof system shall be a Trac-Loc Vertical Lock-Seam Tank insulation system as supplied and installed by Tyco Thermal Controls.
- B. The roof system shall be of a parallel or radial design having adequate expansion/contraction joints dependant upon the temperatures, size and slope of the tank roof.
- C. Roof insulation materials suited for use are:
 - 1. Polyisocyanurate
 - 2. Fiberglass
 - 3. Cellular Glass
 - 4. Mineral Wool
 - 5. Other materials per the customer's specifications
- D. The materials described above may be laminated or installed separately from the roof cladding and used singularly or in combination, subject to their temperature limitations.
- E. Roof cladding shall be constructed of the following materials (listed below). For a parallel seam design the panels will extend from side to side across the diameter of the tank and for a radial seam design, the panels will extend from the side to center in a radial seam design:
 - 1. 0.024 in (0.6 mm) – 0.032 in (0.8 mm) thick aluminum
 - 2. 0.016 in (0.4 mm) – 0.020 in (0.5 mm) thick stainless steel
 - 3. 0.024 in (0.6 mm) thick Galvalume
 - 4. Other metal per the customer's specifications
- F. The standing seam shall be fastened to 3/8 in (9.5 mm) diameter mild steel round anchor rods, tack welded with 1 in (25 mm) welds on alternate sides of the anchor rod every 4 ft (1.22 m).
- G. The ends of the anchor rods shall start 6 in (152 mm) from the tank edge and no rod shall be welded close than 6 in (152.4 mm) to the tank edge. Subsequent bars shall be on 3 ft (914 mm) centers.
- H. Seams shall run perpendicular to the anchor rods and shall be secured at each intersection with ½ in (13 mm) wide x 0.015 in (0.38 mm) stainless straps. The straps shall be looped around the rod with each end of the stainless strap folded into the standing seam.
- I. Roof anchor clips 3 in (76 mm) wide (compatible with tank material) shall be installed every 3 ft (914 mm) circumferentially around the top tank rim angle. The vertical leg of the angle clip shall be no higher than the roof insulation thickness and shall be installed parallel to the sidewall providing a clearance from the sidewall insulation panel (insulation thickness plus 1 in (25 mm) for the standing seam).
- J. The aluminum angle extrusion shall be bolted in place to the roof anchor clips or "out and down" steel rim angle by ¼ in (6.3 mm) x 1-1/2 in (38 mm) stainless steel bolts, or equivalent. Roof metal jacketing shall wrap around the 1-1/2 in (38 mm) horizontal leg and shall be secured by rivets on 12 in (305 mm) centers.
- K. All roof nozzles (1 in to 6 in diameter) shall be flashed with an EPDM flashing boots.
- L. The roof insulation application shall be rated for 110 mph (177 km/h) wind.
- M. The insulation material shall comply with Section 2 of this document.

4 Insulation Materials

- A. General
 - 1. Tank sidewalls and roofs shall be insulated using Polyisocyanurate, Fiberglass, Cellular Glass, Mineral Wool or other insulation per the customer's specification.
 - 2. These materials may be used either singularly or in combination, subject to their respective temperature limits.
 - 3. Material selection shall be based primarily on technical (thermal and mechanical) considerations, secondarily on economic considerations.

- B. Polyisocyanurate
1. Polyisocyanurate shall be a closed cell foam core bonded to glass fiber reinforced aluminum foil facers on each side with a nominal density no less than 2 lb/ft³ (32 kg/m³) in accordance with ASTM C 591-05.
 2. Thermal conductivity shall not exceed 0.17 Btu/hr-sq. ft. °F/inch (2.1 kg-cals/hr-sq. m °C/cm) at 75°F (24°C).
 3. Applicable temperature range shall be from -40°F to 250°F (-40°C to 121°C).
 4. Recommended manufacturers of board insulation product are:

Manufacturer	Product
Celotex	Thermax™ Sheeting
RMAX	Multi-Max® FA3, Thermasheath®-3, TSP-3
Hunter Panels	H-Shield-F, H-Shield-CG
- C. Fiberglass
1. Fiberglass shall be composed of inorganic glass fibers bonded in a semi-rigid, board like form, supplied unfaced in accordance with ASTM C 612-04, CLASS 3, and ASTM C 726-05e1.
 2. Applicable temperature range shall be ambient to 850°F (454°C).
 3. Acceptable manufacturers of board insulation products are:

Manufacturer	Product
Knauf Fiber Glass	Elevated Temp. Board 850°
Johns Manville	1000 Series Spin-Glas®
Owens-Corning Fiberglas®	Insul-Quick®
- D. Cellular Glass
1. Cellular Glass shall comply with ASTM C 552-07.
 2. Applicable temperature range shall be -40°F to 900°F (-40°C to 482°C).
 3. An acceptable manufacturer and product is Pittsburgh Corning's FoamGlas® Insulation.
- E. Mineral Wool
1. Mineral Wool shall be composed of long high temperature mineral fibers bonded with a thermo-setting binder in accordance with ASTM C 612-04 CLASS 3, and ASTM C 726-05e1.
 2. Applicable temperature range shall be -20°F to 1200°F (-28°C to 649°C).
 3. Minimum density shall be 4 lb/ft³ (64 kg/m³).
 4. Non-fibrous (shot) content of delivered product shall not exceed 30%, measured in accordance with ASTM C 612-04 CLASS 3, Material manufacturer shall not be allowed to adjust delivered density if shot content is less than 30%, as specified in ASTM C 612-04, CLASS 3.
 5. Alkalinity shall be neutral (6 to 8 pH).
 6. Mineral wool shall be silicone impregnated.
 7. Acceptable manufacturers of board insulation products are:

Manufacturer	Product
Rock Wool Manufacturing	Delta®-4 or Delta®-8 Board
Thermafiber	Industrial Board (4 or 8)

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