

# Engineering Specification for Trac-Loc Panel Systems

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## 1 Scope

This specification covers the requirements for insulating bulk liquid storage tanks. It further details material selections for operating temperatures of  $-50^{\circ}\text{F}$  ( $-46^{\circ}\text{C}$ ) to  $500^{\circ}\text{F}$  ( $260^{\circ}\text{C}$ ).

## 2 Materials

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### 2.1 Prefabricated Vertical Standing Seam Panel System

- A. The system shall be Tracer Trac-Loc Vertical Lock-Seam Tank insulation as supplied by Tyco Thermal Controls.
- B. Insulation panel cladding shall be constructed of 0.024 inch (0.61 mm) thick embossed aluminum, 24 inches (610 mm) wide, and to the height of tank sidewall.
- C. The specified insulation material shall be laminated to the panel cladding with non-flammable contact adhesive.
- D. Insulation materials suited for lamination are:
  - 1. Polyisocyanurate foam with a foil vapor barrier on both sides
  - 2. Fiberglass board or blanket
  - 3. Cellular glass
  - 4. Mineral wool board or blanket
- E. The materials described above may be used singularly, or in combination, subject to their temperature limitations.
- F. The panels shall be attached to 1/4 inch (6.4 mm) 7 x 19 stranded galvanized steel cables circumferentially attached to the tank on 3-foot (0.91 m) centers in accordance with the following details. The bottom cable shall be installed 9 inches (229 mm) from the tank base. The top cable shall be positioned 12 inches (305 mm) from the upper rim angle. The cables shall be pulled tight and tensioned with 3/8 inch (9.5 mm) x 6 inch (152 mm) galvanized steel turnbuckles.
- G. The panels shall be attached to the cables with 1/2 inch (13 mm) x 0.020-inch (0.51 mm) stainless steel straps. 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 inch (25 mm).
- H. The upper rim of the insulation panels shall be extended under a 1/8-inch (3.2 mm) thick rolled aluminum rim angle.
- I. Protrusions through the panel shall be tightly fitted, flashed, and caulked with silicone caulking.
- J. Panels susceptible to ground water or product wicking shall comply with Section 2.3, paragraph 2.3.1 for 100% non-hygroscopic insulation material.

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### 2.2 Standing Seam Roof Systems

- A. Insulation materials shall comply with Section 2.3.
- B. Standing seam roof systems should be of a parallel or radial design.
- C. When there is sufficient information relative to operating temperature and the extent of thermal expansion of the tank, then a calculation shall be made to determine whether to use a parallel or radial configuration.
- D. A 3-foot (0.91 m) wide x 0.024-inch (0.61 mm) aluminum weather barrier with heat-bonded 3 mil polycraft backing shall be applied to the tank roof, seam to seam, as described above in the double-folded seam system. For a parallel design, the weather barrier shall extend from side to side across the tank. For a radial design, the weather barrier shall extend from side to center in a radial fashion.
- E. The standing seam shall be fastened to 3/8-inch (9.5 mm) mild steel round bar stock, tack welded with 1-inch (25 mm) welds on alternate sides to the tank roof every 4 feet (1.22 m).
- F. Bars shall start 12 inches (305 mm) from tank edge. Subsequent bars shall be on:
  - 1. 3-foot (0.91 m) parallel centers for a parallel design, or
  - 2. 3-foot (0.91 m) centers of concentric reducing circles for a radial design.
- G. Seams shall run perpendicular to the round bar stock and shall be secured at each intersection with 1/2 inch (13 mm) wide x 0.020 (0.51 mm) inch stainless steel straps. The straps shall be looped around the bar with each end folded in down slope direction.

- H. Carbon steel angle clips shall be installed every 3 feet (0.91 m) along the tank circumference on a stiffening ring such that the back side of the clip has a minimum clearance of 1 inch (25 mm) from face of the insulation on the tank shell.
- I. The top rim of the tank shall be fitted with a 1-1/2 inch (38 mm) x 7 inch (178 mm) x 1/8 inch (3.2 mm) thick aluminum extrusion for roof-to-shell junction flashing.
- J. The rim extrusion shall be bolted in place to the angle clips by 1/4 inch (6.4 mm) x 1-1/2 inch (38 mm) stainless steel bolts, with a 1-1/2 inch (38 mm) leg extended out and set at a height equal to the roof insulation thickness. Roof metal jacketing shall wrap around the 1-1/2 inch (38 mm) horizontal leg and shall be secured by rivets on 12-inch (305 mm) centers.

## 2.3 Insulation Materials

### 2.3.1 GENERAL

- A. Tank sidewalls and roofs shall be insulated using fiberglass, cellular glass, polyisocyanurate, mineral wool, calcium silicate, or expanded perlite.
- B. These materials may be used either singularly or in combination, subject to their respective temperature limits.
- C. Material selection shall be based primarily on technical (thermal and mechanical) considerations, secondarily on economic considerations.

### 2.3.2 FIBERGLASS

- A. Fiberglass shall be composed of inorganic glass fibers bonded in a semi-rigid, boardlike form, supplied unfaced in accordance with ASTM C 612, Class 3, and ASTM C 726.
- B. The application temperature shall be as specified in Table 1.
- C. Some recommended products include:

**Table 1**

Manufacturer	Product	Temperature Range
CertainTeed Corporation	850 Board Insulation	ambient to 850°F (454°C)
Knauf Fiber Glass	Elevated Temperature Board	ambient to 850°F (454°C)
Manville	1000 Series Spin-Glass	ambient to 850°F (454°C)
Owens-Corning Fiberglass	Insul-Quick	ambient to 850°F (454°C)

### 2.3.3 CELLULAR GLASS

- A. Cellular glass shall comply with ASTM C 552.
- B. The application temperature shall be as specified in Table 2.
- C. Some recommended products include:

**Table 2**

Manufacturer	Product	Temperature Range
Pittsburgh Corning Corp	Foamglas	ambient to 900°F (482°C)

**2.3.4 POLYISOCYANURATE**

- A. Polyisocyanurate shall be a foil faced board product made from a glass fiber reinforced, polyisocyanurate foam plastic core with a nominal density no less than 2 lb/ft<sup>3</sup> (32 kg/m<sup>3</sup>) in accordance with ASTM C 726.
- B. Thermal conductivity shall not exceed 0.19 Btu/hr-sq ft °F/inch (0.026 W/m-K).
- C. The application temperature shall be as specified in Table 3.
- D. Some recommended products include:

**Table 3**

Manufacturer	Product	Temperature Range
Celotex	Thermax Sheeting	ambient to 250°F (121°C)
R-max	Thermosheet	ambient to 250°F (121°C)

**2.3.5 MINERAL WOOL**

- A. Mineral wool shall be composed of long high temperature mineral fibers bonded with a thermo-setting binder in accordance with ASTM C 612, Class 3, and ASTM C 726.
- B. Minimum density shall be 4 lb/ft<sup>3</sup> (64 kg/m<sup>3</sup>).
- C. Non-fibrous (shot) content of delivered product shall not exceed 30%, measured in accordance with ASTM C 612, Annex A1. Material manufacturer shall not be allowed to adjust delivered density if shot content is less than 30%, as specified in ASTM C 612, paragraph 6.1.3.1.
- D. Alkalinity shall be neutral (pH 6 to 8).
- E. Mineral wool shall be silicone treated.
- F. The application temperature shall be as specified in Table 4.
- G. Some recommended products include:

**Table 4**

Manufacturer	Product	Temperature Range
Partek	Rockboard 1240	ambient to 1000°F (538°C)
Partek	Rockboard 1280	ambient to 1200°F (649°C)
Rock Wool Manufacturing	Delta-4 Board	ambient to 850°F (454°C)
Rock Wool Manufacturing	Delta-8 Board	ambient to 1200°F (649°C)

**2.3.6 CALCIUM SILICATE**

- A. Calcium silicate flat block shall comply with ASTM C 533, Type I.
- B. Have nominal density of 13 lb/ft<sup>3</sup> (208 kg/m<sup>3</sup>).
- C. The application temperature shall be as specified in Table 5.
- D. Some recommended products include:

**Table 5**

Manufacturer	Product	Temperature Range
Manville	Thermo-12/Blue	250°F (121°C) to 1200°F (649°C)

**2.3.7 EXPANDED PERLITE**

- A. Expanded perlite flat block shall comply with ASTM C 610, Type II.
- B. Have nominal density of 12 lb/ft<sup>3</sup> (192 kg/m<sup>3</sup>).
- C. The application temperature shall be as specified in Table 6.
- D. Some recommended products include:

**Table 6**

<b>Manufacturer</b>	<b>Product</b>	<b>Temperature Range</b>
Manville	Sroule WR-1200	ambient to 1200°F (649°C)
Innova Technologies	Temperlite 1200	ambient to 1200°F (649°C)
Howred	Goodtemp	ambient to 1200°F (649°C)

**3 Engineering**

Successful vendor shall provide wind load, heat loss/gain, and snow loading (where applicable) calculations with finished design of system. Vendor to provide economic optimization to determine the proper insulation type and thickness of finished insulation.

**tyco**

*Flow Control*

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