

HALLSTEN

INGENUITY COVERED

ALUMINUM COVERS

HALLSTEN.COM

ALUMINUM COVERS

"...the most innovative and cost effective aluminum cover on the market, period!"



A TRADITION OF INNOVATION

The Hallsten Corporation Aluminum Cover is the result of a focused effort to design an aluminum cover specifically intended for environmental applications. The design effort has resulted in over a dozen United States Patents. These patents not only cover the primary structural design of the Hallsten Corporation Aluminum Cover but also many of the unique features found only on this cover system. Included in these features are the Gear Hinged Access Hatch Panel and the Double Seal Gutter. The patented Gear Hinged Access Hatch Panel allows any individual panel on a cover system to become a fully opening access hatch. This effectively allows for a cover system that provides total access to the tank below. The Double Seal Gutter provides a patented continuous double seal for irregular or damaged concrete often found in basin retrofit installations. Both of these features are only found on Hallsten Corporation Aluminum Covers. The modular structural design allows Hallsten Corporation to construct covers of any size required on projects of this type.

Hallsten Corporation's Aluminum Covers provide gaseous emissions containment for clarifiers, sludge holding tanks, bio-towers, aeration basins and any number of other storage vessels found in projects of environmental importance.

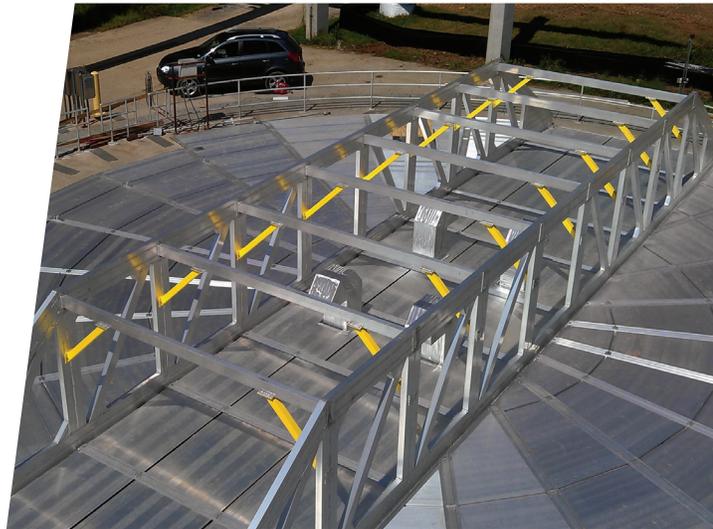
Innovative and cost effective, the Hallsten Corporation Aluminum Cover represents a breakthrough in modular design and structural efficiency. Hallsten Corporation pioneered the use of extruded aluminum for cover construction. Although imitated, the patented design of the Hallsten Corporation Aluminum Cover has never been equaled. Simply put, there is no "or equal". The Hallsten Corporation Aluminum Cover is the most innovative and cost effective cover on the market, period!



- **Air Tight**
- **Visually Appealing**
- **Structurally Superior**
- **Chemical Resistant**
 - **Energy Saving**
- **Maintenance Friendly**
 - **Easy To Install**

AIRTIGHT

Once installed, the patented double interlocking deck component combined with interlocking beams form a substantially air tight structure. Our unique fabrication techniques and the close design tolerances assure that gases and odors are safely contained. Polymer seals are used between adjoining panels and at the cover perimeter. These replaceable seals allow the thermal expansion and contraction of the cover without compromising the integrity of the joints. Our unique hatch and penetration details provide minimal leakage through these normally troublesome components.



STRUCTURALLY SUPERIOR

The patented design of the Hallsten Corporation Aluminum Cover is structurally superior to any competing cover. Each modular panel can be individually constructed to provide for high load pedestrian paths and working areas. Only Hallsten Corporation can provide a cover with sufficient strength to withstand concentrated loads in excess of 1000 pounds without permanent deformation. Surface dishing from concentrated load over-stressing, so common with bent metal or inferior component based covers, is eliminated with the Hallsten Corporation Aluminum Cover system. The panel and beam configuration allows Hallsten Corporation to design cover structures with extremely high distributed load capacity. The modular configuration provides for unlimited geometric options. Covers can be configured in any shape or size; circular, rectangular or irregular.

VISUALLY APPEALING

The low profile of the Hallsten Corporation Aluminum Cover provides for a very clean aesthetic appearance. Each component of the system has been designed with an eye towards this aesthetic. A camber is designed into every cover to assure proper drainage of rainwater. This camber can be increased or decreased to vary the aesthetic appearance. The standard mill finish of the aluminum surface components includes a ribbed texture that disguises the unwanted metal appearance common with bent sheet metal covers. Optionally, the cover can be sandblast finished or anodized.



CHEMICAL RESISTANT

The Hallsten Corporation Aluminum Cover is fabricated entirely of 6061-T6 alloy corrosion resistant aluminum extrusions. Every seal used between adjoining panels is of a corrosion resistant polymer. Even the patented connector between the beam and the panel is a structural polymer that is chemical resistant and will not weaken or corrode. A mechanical and replaceable Santoprene seal isolates the cover perimeter from the concrete or steel tank wall. No foam tape or caulk is used.



ENERGY SAVING

A flat cover, when used with odor control units such as scrubbers and other air handling equipment significantly reduces energy costs. By reducing the volume of the enclosed gases, the size of blowers, fans, ducts and scrubbers can be reduced with a proportional savings in power consumption. This creates an overall savings, both in initial construction cost and operation. If required, the Hallsten Corporation Aluminum Cover can be provided with insulation to minimize heat losses in thermally sensitive processes.

MAINTENANCE FRIENDLY

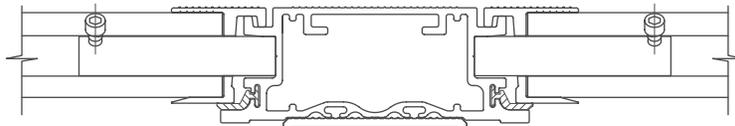
The modular design of the Hallsten Corporation Aluminum Cover makes maintenance substantially easier than our competitors bent metal or inferior component based covers. The Hallsten Corporation Aluminum Cover's modular sections can be easily removed because there are no corroded sheet metal screws, frozen nuts or wedged seals to hinder access. Each panel can be lifted by hand with only the force of its weight unlike some of our competitors units that require special lifting equipment to pry each panel loose. Each Hallsten Corporation Aluminum Cover is as easy to remove as it is to install assuring total access to process equipment. An optional temporary handrail system is available to protect maintenance workers.

The Hallsten Corporation Aluminum Cover includes an integral non-skid surface. Every panel and beam, regardless of position or load capacity, incorporates this surface. Slip resistance is critical to the safety of all personnel.

EASY TO INSTALL

The installation of bent metal and inferior component based covers is labor intensive and demands intricate field assembly. By combining fewer parts with modular panel design, Hallsten Corporation is able to reduce installation costs significantly over competitor's designs. This results in a tremendous savings, not only during initial installation, but also in longterm maintenance. A cover that is initially easy to install is also easy to remove and reinstall by plant maintenance personnel should the need ever arise.

SPEC-BID-BUILD



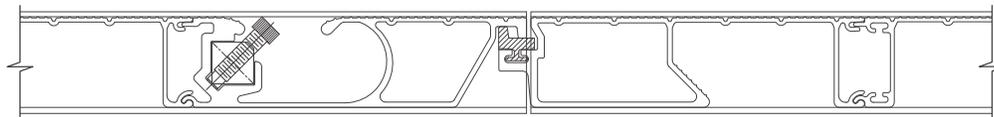
COMPETITION MAKES US COST EFFECTIVE

The combination of superior structural design, unique features and easy installation makes the Hallsten Corporation Aluminum Cover the most cost effective cover system available. Structural efficiency, born as a result of the rigorous competition found in municipal projects, results in a design that maximizes performance while considering the bottom line cost to construct.

Efficient and cost effective, the Hallsten Corporation Aluminum Cover is truly an innovation in structural technology. This unique system, the result of years of development, has been awarded



numerous United States Patents. Each component has been carefully designed to assure maximum performance. Unique manufacturing and assembly techniques, including the use of specialized adhesives, provide the optimal use of aluminum's special physical properties. This proven technology is a direct descendent of the weld less aluminum structural system developed and patented by Hallsten Corporation for use in the rugged marine environment. With proven performance since 1966, the quality of Hallsten Corporation engineering has passed the test of time.



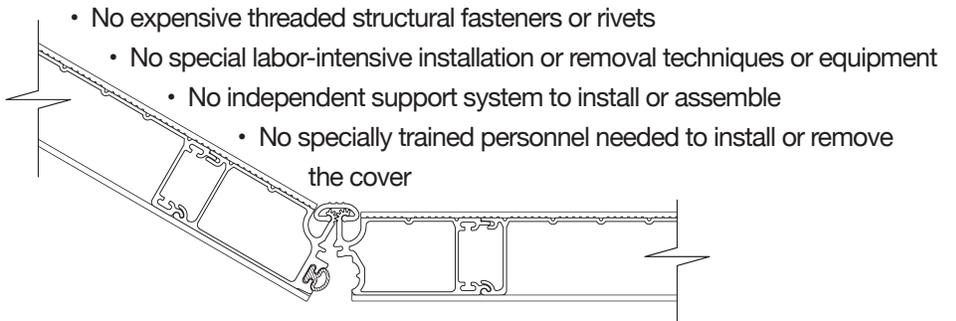
EFFICIENT

The Hallsten Corporation Aluminum Cover utilizes the efficiencies and simplicity of modular design. Although each cover is individually engineered, each shares a family of common components. This allows Hallsten Corporation to manufacture the cover system in a factory environment employing assembly line techniques and batch processing. The primary structural components, the beams, are sized and designed using computer analysis to optimize structural efficiency for each cover. The stacked beam assembly technique provides the ability to individually optimize each beam on every unique cover structure. Along with the patented Gear Hinged Access Hatch Panel, deck penetrations and other cover accessories are designed and constructed as an integral part of the cover structure. Deck penetration kits can be field installed to assure that there are no mistakes in the coordination of the trades. Course of construction changes can be easily accommodated with this combination of modular factory construction and field installable accessories and penetrations. The Hallsten Corporation Aluminum Cover system has been designed and is manufactured with real world construction in mind.

Bottom line, the Hallsten Corporation Aluminum Cover is less expensive to purchase, install and maintain.

COST EFFECTIVE

Efficient design results in cost savings. Savings are realized not only in the initial cost of the cover but also in the installation and maintenance. The Hallsten Corporation Aluminum Cover is less expensive to install and maintain because it has...



THE HALLSTEN

HALLSTEN CORPORATION A Technical Overview

Hallsten Corporation has developed a full line of structural aluminum products. These products are based on a structural system that has evolved through our experience in the design and fabrication of metal structures since 1966. These various products are used in marine, industrial and environmental applications. The basis for the structural system is a unique set of interlocking aluminum components. The use of these components provides a structural system that is very versatile, can be used in a variety of structures and provides unmatched strength and durability.

In the early 1970's Hallsten Corporation pioneered the use of aluminum components for the construction of structures to be used in a marine environment. The extreme corrosion resistance of aluminum in combination with the inherent strength of aluminum extrusions provided the basis for a marine structural system that provided unmatched quality and value. These early structures were fully assembled with welded connections. Hallsten Corporation continued to refine the design of these structures and by the 1980's had eliminated the majority of the welds required to assemble the components. The welded connections were replaced with details that included specialized adhesives as well as non-threaded mechanical connectors. Where welds were retained, the welds were designed to minimize the effect of fatigue induced in the heat effected areas. These welds were located in areas with minimal cyclical loading. Additionally, the remaining welded connections were designed with longer individual welds, which tend to be more fatigue resistant. The weldless design proved to be highly fatigue resistant as well as much more structurally efficient than a fully welded design due to the elimination of these heat effected areas and their corresponding allowable stress reductions.

The weldless structural design resulted in the issuance of United States Patent number 5,050,361, "Deck Structure". This structural system is comprised of panels that include the primary structural beam section as a frame member for the decking system. When assembled, the structure becomes self-framing as well as self-supporting.

The application of this structural system as a tank cover became evident to the engineers at Hallsten Corporation. A specific design was developed and subsequently United States Patent number 5,325,646, "Tank Cover Structure", was awarded. Our design provides for a cover system with integral support beams as well as a panel system that allows for spanning capacity to meet the needs of any field application. This structural system has been used to construct tank covers of all sizes and in all geometric configurations; square, round and irregular. This original patent has been supplemented with over a dozen additional patents that have added features and accessories to the original tank cover structural system.

Hallsten Corporation, in partnership with Ovivo® (formerly Enviroquip) of Austin, Texas, has developed and been awarded a United States Patent for a cover system with integral air distribution for the aeration of wastewater. This AirBeam cover integrates the innovative TransMax aeration system of Ovivo® into the Aluminum Cover. The beams of the cover structure become the air distribution plenums for the aeration system. Additionally, the air-metering orifice of the Ovivo® aeration system is located above the cover surface. This location makes the diffusers truly non-clogging and extremely accessible. Aeration system maintenance can be performed from the slip resistant deck of the cover surface.

ADVANTAGE

Hallsten Corporation has developed and patented a modular biofiltration support system for the construction of large Biofilters used in the elimination of odors for waste treatment processes. The Bio Floor modules can be quickly assembled to form a biofilter cell of any width and length. The system assures the even distribution of air emitted through the floor with minimal head losses. The floor system supports heavy wheel loads for the use of equipment to service the media beds. Hallsten Corporation has also developed and patented a Modular Containment System For Hazardous Materials. Like the Biofilter the Containment System, primarily used for the secondary containment of potentially hazardous materials, is comprised of polyethylene components. These interconnectable berm members can be configured to form virtually any desired containment perimeter.

Hallsten Corporation has established a reputation for our unique ability to create products that employ modular structural systems. These products allow Hallsten Corporation to engineer specific structures utilizing a family of predesigned components. The result is high performance, efficient structures at very competitive prices. Hallsten Corporation continues to provide design-build structures to a variety of industries. In addition to covers for wastewater and water treatment plants, Hallsten Corporation provides aluminum and steel structures for marine and industrial applications. Typical of these are marine access gangways, floating docks and structures, industrial mezzanines, stairways and man ways, conveyor crossovers and bridging structures as well as steel truss bridges for pedestrian and light vehicular use.



Hallsten Aluminum Covers Replace:

- Concrete
- Fiberglass
- Checkerplate
- Bent Sheet Metal



SPECIFICATION FOR ALUMINUM ACCESS

GENERAL

1. **SPECIFICATION:** This specification is for a fully engineered, substantially airtight, aluminum cover structure comprised of panels, and beams as manufactured by Hallsten Corporation, P.O. Box 41036, Sacramento, California 95841, (800)473-7440. This specification shall be regarded as a minimum standard for design and fabrication.
2. **SCOPE OF WORK:** Furnish all labor, materials, and equipment to provide a complete, installed system of fixed and removable, custom fit, flat aluminum covers. The Tank Cover system includes cover panels, structural supports, and attaching hardware.

ENGINEERING

A submittal shall be provided to the engineer prior to the beginning of fabrication. The submittal shall include:

1. Complete structural calculations showing the governing stresses in all members and connections, and detailed shop drawings. Preliminary drawings shall be stamped by cover manufacturer's PE. Final Drawings and calculations shall bear the stamp of local state PE if required.
2. Manufacturer's standard guarantee.
3. A letter of certification signed and sealed by a registered Professional Civil Engineer confirming that the aluminum cover is in full compliance with the plans and specifications including any testing provisions included therein.



QUALIFICATIONS

1. **MANUFACTURER:** Shall be a company specialized in providing engineered aluminum covers for wastewater treatment tanks/troughs for at least ten (10) years. When requested by the Engineer, submit written evidence to show experience qualifications and adequacy of plant capability and facilities for performance of contract requirements.
2. **ERECTOR:** Regularly engaged for at least ten (10) years in the erection of aluminum covers for wastewater treatment tanks.
3. **WELDERS:** Qualified within the past two (2) years in accordance with AWS.

COVERS

PERFORMANCE

1. **SPAN:** The clear span length of the cover shall be as noted in the scope of work.
2. **WIDTH:** The inside width of the cover shall be as noted in the scope of work.
3. **DISTRIBUTED DESIGN LIVE LOAD AND DEFLECTION:** All structural components shall be designed to support the dead weight of the structure, plus a live load of 50 pounds per square foot of surface. The maximum deflection of any component under this load shall not exceed $L/240$ of the span of that component. In no event shall the dead load deflection exceed the rise of any component in order to avoid surface ponding.
4. **CONCENTRATED LIVE LOAD:** The structural components shall be designed to support a 400-pound load on a 6" X 6" area located anywhere on the surface of the structure without permanently deforming the tested area.
5. **DESIGN STRESSES:** All allowable design stresses in structural aluminum shall be in accordance with the "Specifications for Aluminum Structures" for building-type structures by the Aluminum Association.
6. **SKID RESISTANCE:** The cover shall possess an integral non-skid surface and no exposed area of cover system wider than one inch shall be without ribs/non-skid surface. The aluminum-decking surface of the structure shall be Hallsten's Deck Slat, which is ribbed to provide an aggressively non-skid surface. The edges of adjacent deck slats shall double interlock so that the slats shall act together. The decking surface shall be manufactured from 6061-T6 alloy. The Manufacturer of the non-skid surface shall demonstrate in writing satisfactory performance for a minimum period of 10 years in the wastewater industry for the intended purpose. This surface shall not be achieved by the use of paint, adhesive tapes, sand blasting or any other means other than an extruded process.
7. **CHEMICAL RESISTANCE:** Panels shall be fabricated entirely of 6061-T6 corrosion resistant aluminum extrusions. Every panel to beam connection shall be chemical resistant and will not weaken or corrode and will interlock. A mechanical and replaceable Santoprene seal shall isolate the cover perimeter from the concrete wall. No foam tape or caulk shall be allowed.
8. **CONFIGURATION:** The aluminum cover shall be composed of panels and beams. All panels shall interlock with the adjoining beam and panels without the use of threaded fasteners. Uplift of each panel will be resisted with the use of an integral latch system. The weight of an individual panel shall not exceed 150 pounds. Each removable panel shall be easy to remove without disruption of adjacent panels and the lifting force required shall not exceed the dead weight of the panel.



SPECIFICATIONS Cont.

MATERIALS

1. **ALUMINUM:** All aluminum used in the fabrication of cover shall be alloy 6061-T6. All plate shall be alloy 6061-T6. Material shall be new and of top quality.
2. **WELDING ELECTRODES:** Welding shall be with electrodes of an alloy, which shall produce welds with strength and corrosion resistant characteristics compatible to the base metal.
3. **FASTENERS:** All fasteners between aluminum components shall be stainless steel or structural plastic. Aluminum shall be isolated from dissimilar materials by means of a stainless steel spacer or an elastomeric isolator. Beams and panels shall be fastened to concrete using stainless steel drill in place anchor bolts.
4. **STEEL ACCESSORIES:** No carbon steel components shall be used.
5. **SEALS:** A mechanical and replaceable Santoprene seal shall isolate the cover perimeter from dissimilar materials such as concrete and steel. No foam tape or caulk shall be allowed for isolation of cover system.
6. **ACCESS HATCH PANELS:** Access to any location under the cover shall be gained through integral gear hinged access hatches. The Access Hatch Panels shall have the identical properties as the rest of the aluminum cover including loads, deflection and slip resistance specifications. The access-hinged panels shall be the full panel width. The length of the access panel shall be clearly indicated on drawings. Hinged panel components including hinges, decking and lifting handles shall be extruded 6061-T6. While in the closed position the hatches will be completely flush therefore posing no tripping hazard. In the open position the panel shall lie flat on the cover and will not need a hold open device.
7. **HANDLES:** Handles shall be an integral flush mounted aluminum and incorporated into the non-skid deck slat.



FABRICATION & WORKMANSHIP

1. **WORKMANSHIP:** The quality of workmanship shall be equal to the best general practice in modern structural fabrication shops. Workmanship, fabrication, and shop connections shall be in accordance with the latest edition of ANSI/AWS D1.2 "Structural Welding Code - Aluminum".
2. **EXPERIENCE:** The manufacturer must furnish adequate evidence of a minimum of ten (10) years of ongoing experience in the manufacture of similar structures.

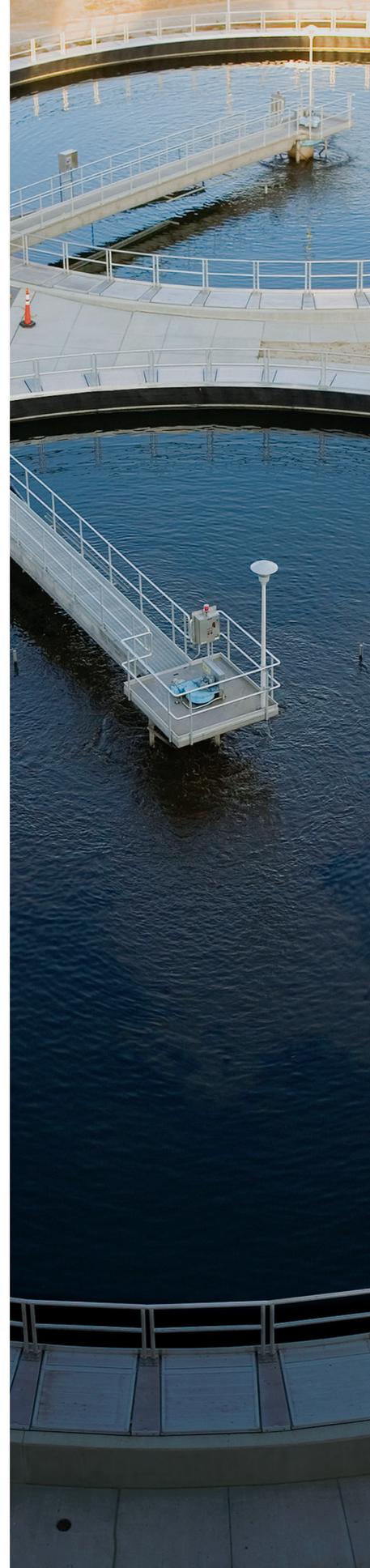
3. **PREPARATION FOR WELDING:** All components to be welded shall be free of dirt, grease, and other contaminants and shall fit up properly for sound welding. Surfaces to be welded may not be cut with oxygen. Sawing, shearing, or machining may be used.
4. **WELDING PROCEDURES:** All welding shall be with an inert gas shield arc process. Machine settings shall be developed with test welds of the same material, alloy and geometry as the work pieces and samples will be tested destructively.

TESTING

1. **LOADS:** After installation the cover structure will be tested for conformance with the deflection limits. A load of 400 pounds will be placed as directed by the Engineer and the maximum deflection created by the load will be measured.
2. **PREQUALIFIED SHOP TESTING:** MANUFACTURER shall perform a prequalified shop air tightness test and certification for the cover components proposed. This test shall be performed in accordance with the "Procedural Standards for Testing, Adjusting and Balancing of Environment System" as published by the National Environmental Balancing Bureau (NEBB) on cover components of not less than 80 square feet. Said test shall be conducted and witnessed by a NEBB certified technician. The method of testing, test apparatus and proposed contents of the test report shall be submitted to the ENGINEER for approval. Subsequent to the receipt of ENGINEER'S approval, the MANUFACTURER shall set up testing protocol and schedule the test. The MANUFACTURER will provide the ENGINEER with at least 72 hours notice prior to the scheduled test. A report of the test shall be prepared by the certified technician and shall be sealed with the NEBB seal. The report shall include a description and illustration of the test components, a description and illustration of the test apparatus and a report of the results. The cover shall maintain an air intrusion leakage rate not to exceed 0.2 cfm per square foot at an applied negative pressure of 0.2 inches of water column for a 5-minute duration.

DELIVERY & INSTALLATION

1. **DELIVERY:** Delivery of the components of the structure shall be made to a location nearest the site that is accessible to over the road trucks, unless otherwise specified.
2. **STORAGE:** The manufacturer shall be responsible for jobsite storage of the delivered components. The components shall be stored off the ground on level surface in such a manner as to prevent damage.
3. **INSTALLATION:** The manufacturer shall furnish such personnel, tools, equipment, and materials as required to install the cover using the recommended procedure.
4. **CONTRACTOR INSTALLATION:** The cover manufacturer can provide installation instructions, on site supervision, and inspection if desired.
5. **O & M MANUAL:** The manufacturer shall provide an O & M Manual that includes drawings, maintenance instructions, and removal and replacement instructions for the installed cover.





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