All designs, ideas, processes, or developments originated or disclosed by ATECO are proprietary, patented, or the subject matter for patent application, and may not be reproduced without written permission from ATECO TANK.
# TABLE OF CONTENTS

1. **INTRODUCTION**
   - The ATECO History.
   - The ATECO Product.

2. **GENERAL ERECTION INSTRUCTIONS**
   - 2.1 ATECO Safety Policy
   - 2.2 Worker Safety Responsibility
   - 2.3 Reference Material
   - 2.4 Personal Protective Equipment

3. **SPECIAL TOOLS FOR ERECTION**
   - 3.1 ERECTION TRIPOD
   - 3.2 THE HUCK BOLT SYSTEM

4. **PRE-ASSEMBLY INSTRUCTION**

5. **ASSEMBLY OF SUPPORTING STRUCTURE**

6. **ASSEMBLY OF DOME SHEETS**

7. **ASSEMBLY OF HUB CAPS**

8. **LIFTING OF THE ATECODOME**
   - 8.1 LIFTING AFTER ERECTION OUTSIDE THE TANK
   - 8.2 LIFTING AFTER ERECTION INSIDE THE TANK
   - 8.3 LIFTING AFTER ERECTION INSIDE THE TANK ON THE FLOATING ROOF

9. **MOUNTING THE SUPPORTS.**
   - 9.1 Version Fixed Supports
   - 9.2 Version Sliding Supports

10. **INSTALLATION OF ACCESSORIES**

11. **INSTALLATION OF ACCESSORIES**
   - 11.1 MANHOLE
   - 11.2 CENTRE VENT
   - 11.3 NEGOTIATION DEVICE

12. **WATER TEST**
1. INTRODUCTION

THE ATECO HISTORY

ATECO is specialized in the design of products, manufacturing, supplying and installing the products and systems used in the safe and effective transfer for storage of chemicals and hydrocarbons. The management of ATECO has an extensive track record in this industry, therefore excellently positioned in servicing your requirements in this area.

ATECO offers wide variety in products for the tank storage industry. Our main products include:

- Aluminium Geodesic Dome Roofs for Storage Tanks
- External Floating Roof Drain Systems
- Floating Roof Drain Seals, both for Internal and External Floating Roofs
- Aluminium Internal Floating Roofs (Non-Contact and Full-Contact Type)
- Floating Suction Systems, Oil Skimmers, Swivel Joints, Loading Arms, Integral Foam Dam
- External Floating Roof Emission Control Devices
- Special Tank Products (Roof Positioner-Bazookas, Vent Products, Seal Spares, Hydrocarbon Sensing Valve)

ATECO formed with the mission to support the design, manufacturing, supply, installation and maintenance of products and systems for industrial liquid transfer and storage. Particular emphasis was given to developing a product line for atmospheric storage tanks which includes amongst others aluminium Geodesic Domes, Internal Floating Roofs, Tank seals, Drain Systems, Floating Suction Systems and Oil Skimmers. Apart from that a dedicated and specialist line of products for the safe and effective transfer and storage of chemicals and hydrocarbons was developed, covering engineering systems.

We design, manufacture and install these products all around the world.

Kindly visit our website www.ateco.com.tr for more product details and data sheets.
THE ATECO DOMES

The ATECO TANK DOME product is a patented all-aluminium structural system. The main advantages of aluminium over conventional construction materials are corrosion resistance, high strength to weight ratio, the ability to utilize custom extrusions, and its manufacturability. As a result, ATECO TANK domes are durable and extremely lightweight, which also simplifies field assembly and minimizes the time it takes to install.

The main features of ATECO TANK DOME’s patented system are:

1. The use of a patented interlocking panel-to-batten connection that allows for prefabrication and quick installation of the panels. The panels have no exposed through-bolts, thus reducing the possibility of water leaks.

2. The beam structural elements are connected with top and bottom gussets to ensure high moment transfer at the joints. The structural beams are “SYMETRICAL DOUBLE WEB BEAM” sections with extruded grooves for connection of the interlocking panel and batten system.

3. The panels have no bending stiffness and transfer the environmental loads to the beam extrusion through membrane action. The panels also stabilize the top flange of the beams to prevent column buckling in the minor axis direction.

4. All structural elements are 6061-T6 aluminium and the interlocking panel membranes are 3003-H16 aluminium. The all-aluminium construction provides corrosion resistance even in the most severe environments.

The ATECODOME parts are pre-fabricated in TURKEY and delivered ready for assembly, complete with all necessary erection plans and instructions. All items are individually numbered for easy identification (see overview drawing).

The erection of the ATECODOME begins at its center, and is constructed on a ring by ring basis until the outer ring is finished. The ATECODOME structure comprises of profiles and hub plates which are fastened together by HUCK-BOLTS.

The ATECODOME sheets can then be installed and fastened with the clamping profiles.

The completed DOME can then be lifted and fastened on the tank.

Thereafter the flushing sheets and negotiation devices can be fitted to the DOME.

Illustration and Photograph of a Typical Joint Connection.
BASIC PERSONAL PROTECTIVE EQUIPMENT

<table>
<thead>
<tr>
<th>Helmet</th>
<th>Hearing Protection</th>
<th>Safety Glasses</th>
<th>Full-Body Safety Harness</th>
<th>Safety Gloves</th>
<th>Safety Shoes</th>
</tr>
</thead>
</table>

WORKER SAFETY RESPONSIBILITY

On the jobsite everyone is responsible for safety. Ateco employees are charged with the following.

- Become familiar with and follow the rules and regulations outlined in the injury and illness Prevention Program.
- Practice safe and healthful work habits, including the proper handling and disposal of chemicals and hazardous waste.
- Use the necessary personal protective equipment.
- Attend training sessions and safety meetings.
- Notify the supervisor with regards to potential hazards.
- Advise visitors of safety issues and be responsible for such visitors while they are on the premises.
- Read and follow safety and health communications.
- Advise the supervisor of safety and health violations or issues that are of concern to you.

REFERENCE MATERIAL

ATECO field supervisors have been issued the following manuals and these are available for review upon request.

1. Injury and Illness Prevention Program
2. GENERAL ERECTION INSTRUCTIONS

- Receipt of material on site.
- Unload material and examine for transport damage and missing parts.
- Move material to a point adjacent to the construction area.
- Mark out the construction area and check lifting equipment, cranes etc. for capacity against DOME weight.
- Assemble tripod (see drawing ATC.DWG.ERC.250.002) and chain block lifting gear.

Attention

The Aluminium Dome sheets have to be stored always upright, clean and dry. If this instruction is not followed, the Dome sheets can become discoloured by surface corrosion, which has not the material, but visually it is unsightly.

BASIC DOME ASSEMBLY
3. SPECIAL TOOLS FOR ERECTION

TOOL LIST

The following are recommended tools for the assembly of a typical dome. Additional common construction tools may also be required depending on the size of the dome and the site conditions.

### 3.1 POWER TOOLS

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>3/8&quot; Air impact tool with 3/8&quot; Socket (for batten screw installation)</td>
</tr>
<tr>
<td>B</td>
<td>Air Compressor (100 cfm @ 100 psi) with air hose and connectors.</td>
</tr>
<tr>
<td>C</td>
<td>Huck Bolt installation tool (#246 with 99-100 nose assembly)</td>
</tr>
<tr>
<td>D</td>
<td>½&quot; air drill with 3/8&quot; bits (for edge brace installation) and 7/32&quot; bits. (for 3/16&quot; pull rivet installation)</td>
</tr>
</tbody>
</table>
### 3.2 Hand Tools / Equipments

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>Adjustable Wrench</td>
</tr>
<tr>
<td>F</td>
<td>Torque Wrench</td>
</tr>
<tr>
<td>G</td>
<td>Ratchet Wrench (3/8” drive) with 9/16” socket (for edge brace installation)</td>
</tr>
<tr>
<td>H</td>
<td>Pull rivet tool (for flashing installation)</td>
</tr>
<tr>
<td>I</td>
<td>Caulking Gun</td>
</tr>
<tr>
<td>J</td>
<td>Hammer (2 or 3 lbs)</td>
</tr>
<tr>
<td>K</td>
<td>Metal Snips</td>
</tr>
<tr>
<td>L</td>
<td>Dead Blow Hammer</td>
</tr>
<tr>
<td>M</td>
<td>Utility knife with blades</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>Tool belt with (2) bolt bags.</td>
</tr>
<tr>
<td><strong>O</strong></td>
<td>Tape Measure</td>
</tr>
<tr>
<td><strong>P</strong></td>
<td>Alignment Pin (3/16” to 5/8” taper)</td>
</tr>
<tr>
<td><strong>Q</strong></td>
<td>Spatula (for caulking around gusset covers)</td>
</tr>
<tr>
<td><strong>R</strong></td>
<td>Mineral spirits solvent (for cleaning surfaces prior to caulking)</td>
</tr>
<tr>
<td><strong>S</strong></td>
<td>Cleaning Rags</td>
</tr>
</tbody>
</table>
3.1 ERECTION TRIPODS

The erection tripods are to be used during installation on the ground. The quantity required depends on the diameter of the ATECO DOME. It is a very simple construction, but very effective. We will provide our customers with the drawing (ATC.DWG.ERC.250.185) for local manufacture. The chain block is a standard tool. The required capacity of each should be 3 ton.
3.2 THE HUCK BOLT SYSTEM

The Huck Bolt System is a very simple, quick, versatile and advanced fastening system. It is designed to eliminate installation errors caused by operator or tool variables. The consistent high uniform clamp force is guaranteed. With a visual inspection you can see that the bolts are installed correctly.

Lock Bolt with Collar

Lockbolt Identification

Aluminium LockBolt

Stainless Steel LockBolt

Top Of Collar
HOW LOCKBOLTS WORK

Lockbolt Installation Sequence

1. The pin is inserted into the prepared hole and the smooth bore collar is placed on the pin.

2. The installation tool is applied to the pintail. When the tool is activated, the jaws in the nose assembly pull on the pintail and the nose anvil pushes on the collar to remove any gap.

3. The nose anvil starts to swage the collar into the lockgrooves on the pin. Continued swaging causes the collar to lengthen and develop clamp.

4. When swaging of the collar into the lockgrooves is complete, the pintail separates from the pin which completes the installation cycle.
TOOLS – HYDRAULIC SYSTEM

Hydraulic Unit 94U

Model 2600

TOOLS – PNEUMATIC SYSTEM

The principle is simple like the hydraulic Huck Bolt System. Can be used in connection with a local standard compressor.

| Tool -256 |

Standard Compressor to be locally provided Tool 256

<table>
<thead>
<tr>
<th>Minimum Compressor Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure</td>
</tr>
<tr>
<td>Air Tank Volume</td>
</tr>
<tr>
<td>Air System</td>
</tr>
</tbody>
</table>
4. **PRE-ASSEMBLY INSTRUCTION**

- Time schedules co-ordinate
- Obtain permissions, if necessary.
- Keep materials secure and clean.
- Before starting work at site check with the operator or site supervisor the safety regulations and other formalities to be observed or competed.
- Unload material as close to tank as possible and check for damage during transport. If damage is found, request signature of vehicle driver immediately and – if possible – notify representative of customer. Report damage immediately to ATECO in TURKEY.
- Supply of electricity, air and water required.
- Check the orientation of the DOME according to drawing.
- Special and standard tools in accordance with tool list.
- If oxy-acetylene cutting and welding operations have to be carried out on the tank, the customer must be advised. Check the relevant safety regulations.
- Check that all workers have put on their personal protective clothing.
1. STANDARD PACKAGING AND CRATING

The ATECO TANK product is a pre-engineered and pre-manufactured “Kit-of-Parts” that is carefully cleaned and crated to ensure a damage-free product, ready for installation. Once the shipment has arrived at the jobsite, visually inspect the material for damage that may have occurred during shipping. Off-loading material should be performed by qualified personnel in compliance with regulations for safety and accident prevention. Panels are shipped in wooden crates with metal straps attached to them. The straps are to be used for lifting and shifting the crates on the truck only and are not to be used for off-loading the crates from the truck. Use slings (at least 2) for unloading and hoisting the panel crates. Store the panel crates in an upright position to allow for moisture drainage and secure them from falling over. Tarp the material with a breathable material to prevent water damage. Struts and battens are bundled and secured with steel bands. Avoid using steel cable for lifting bundles unless the strut flanges are protected from deforming. Care should be taken when cutting the bands, employees should be wearing gloves and safety glasses. Shoes, gussets, gusset covers, fasteners, caulking, and other material are packed in wooden boxes. All boxes are clearly marked on the outside and a shipping list is included inside each box.

INVENTORY OF MATERIALS RECEIVED

After the material has arrived and been placed in a secured staging area, it is important to visually inspect the parts, and to count all material received. A complete shipping list is provided with a description of the part, the crate number it was packed in, and the quantity shipped. It is the responsibility of the “Installer” (as defined in the contract/sales order) to inventory all material and maintain the material in good condition.
DRAWING LABEL

The job specific written instructions and drawings used to assemble a dome are labeled “Assembly Drawings” and are stamped “Erector”. Assembly drawings can also be identified by the drawing number prefix “A” to indicate Assembly Drawings (e.g., A-1, A-2, A-3, etc.).

JOB SPECIFIC INSTRUCTIONS

The Assembly Drawings will provide the following job specific information:

- A site plan noting the general location and orientation of the dome to the jobsite.

- Specific erection method and layout instructions, the weight of the dome’s primary framing and total weight.

- The location and specific orientation of all the components of the dome.

- The Dome Assembly Notes will provide a detailed listing, quantity and description of the dome fasteners to be used. See detail of Figure 1.

- Detailed assembly instructions for special appurtenances such as dormers, cupolas, skylights, hatches, etc.

PART IDENTIFICATION

The strut part mark is printed on the top flange at one end. If a strut is labeled with a large dot (D) in the drawing, it indicates that the strut is not reversible and has to be installed with the strut’s stamped end in the same location as the large dot shown in the drawings.

The gusset part mark is engraved in the center and on the top surface of the gusset. It is also labeled “TOP” or “BOT” for top gusset or bottomgusset. The strut numbers are engraved on the gusset. To assemble, match the on the strut with the number engraved on the gusset (Figure 2). Once installed the engraved part marks on the gusset should read perpendicular to the dome radial line.

The panel part mark is engraved at the midpoint of the “horizontal edge.” Align this edge with the horizontal ring of struts.

The flashing part mark is also engraved at the midpoint of the “horizontal edge.”
UNDERSTANDING BOLTING PATTERNS

It is important to have a clear understanding of how bolting patterns are configured at each joint connection before framing the dome. ATECO TANK supplies a predetermined quantity of fasteners for the job. If bolts are not located as indicated in the Dome Assembly Notes, the quantity of each fastener will not be adequate to finish the job. More importantly, misplaced fasteners may compromise the structural integrity of the dome.

TYPICAL BOLT PATTERN

In general, the end of each strut will have 8 holes in the top and bottom flanges (Figure 1). If the bolting requires less than 8 bolts then the hole pattern in the gussets will govern the placement of the bolts. The last 2 holes of the top flange are the strut’s “control holes”. They are generally reserved for the drive rivets that are used to position the panels (Figure 2).

If the top flange connection requires 8 bolts or more, then the “control holes” will be used for bolting and the panel holes will be sized to clear the lockbolt collars. To position this type of panel, an “auxiliary panel hole” will be fabricated in both the panel and gusset, in between the two bolting patterns (Figure 3).
DOME ASSEMBLY METHODS

Over the past 10 years, ATECO has erected over 100 domes with a variety of dome sizes and site conditions. As a result, ATECO has developed several dome assembly and erection methods to accommodate specific job requirements. The four primary assembly methods are:

1. **Build in place method:** Assembled in place starting from the shoe and tension ring working towards the center with the use of scaffolding and man lifts.
2. **Hoist method:** Assembled inside the tank starting from the tension ring working towards the center and hoisted in place with grip pullers or other hoist mechanisms.
3. **Lift on method:** Assembled complete or in sections in a staging area and lifted in place with a crane.
4. **Tower erection method:** Assembled around a central tower working outward towards the tension ring. The dome is progressively hoisted up the tower to allow assembly to take place on the ground.

When applicable, specific instructions will be given as a supplement to the Assembly Drawings, (e.g., tower assembly procedures, lifting diagrams for crane picks, etc.). For the purpose of this manual, the “build in place method” and a 30’ (9 m) diameter dome will be used to illustrate the anatomy of a dome and fundamental assembly procedures.

LAYOUT OF DOME RADIUS

To begin the assembly of a dome built at grade, scribe the radius of the dome onto the surface where the assembly will take place. The center of each shoe lies on the scribed line. Distribute struts and gussets around the tension ring so that the assembly crew is allowed uninterrupted frame assembly. Assemble the struts, shoes and bottom gussets of the tension ring (Figure 1). Then complete the ring by assembling the top gussets, as shown in Figure 2. As the dome is assembled, always complete one ring before starting the next ring.
LEVEL CONSTRUCTION PLANE

If the construction area is not flat, the tension ring struts will sit at different elevations. This results in the diagonal struts not intersecting properly at the second ring. If this occurs, then some of the shoes must be raised and supported so that all the shoes are in the same plane.

PERIMETER DIAGONAL STRUTS

Connect the perimeter diagonal struts to the tension ring at the shoe top and bottom gussets. Diagonal struts that are installed onto the tension ring should intersect at the junction of the second ring. Do not install gussets at this junction until all of the diagonal struts are in place. Install the second ring’s bottom gusset to the diagonal struts first, then install the second ring of horizontal struts (Figure 1). Complete this ring, as before, by assembling the top gusset with a partial set of bolts as shown in Figure 2. Figure 3 also shows the installation of the top gusset. If this were a larger dome there would be more diagonal and horizontal rings of struts and the process would be repeated, completing each ring before starting the next.
THE FINAL SET OF DIAGONAL STRUTS

The final set of diagonal struts should now be installed into the previous ring of assembled struts. Notice that all the struts are coming together at the dome apex (Figure 4). If the shoes had not been in a plane, this final connection would be very difficult to fit-up.

The assembly of the top gusset at the dome apex completes the strut and gusset framing.
GENERAL INSTALLATION NOTES

The edge strut braces are installed only after the dome is completely framed and all shoes supported. It is important that when installing the edge strut braces, the perimeter and diagonal struts remain straight. Remove any blocks or shoring that may be supporting these struts. The edge strut braces are a one-size-fits-all aluminum angle with mitered ends. They require field locating and field drilling.

INSTALLATION PROCEDURES

1. Position edge brace as shown in Figure
2. Maintain equal distance between the center of the gusset and the ends of the brace.
3. Locate, mark, and field drill 3/8" diameter holes (2 at each end) through the strut top flange and brace. Maintain a minimum edge distance of 5/8" (16 mm) from the edge of the strut and 1-3/8" (35 mm) from the centerline of the strut.
4. Install edge brace with (2) 3/8" diameter x 1-1/4" stainless steel hex head bolts and aluminum locknuts at each end (Figure 1).
PANEL FIT/ALIGNMENT

This method of assembly requires panels to be installed only after the framing is complete and the edge strut braces installed. This is to ensure that all of the struts are in proper alignment. The dome panels are cut using a CNC router to precision tolerances. The 2 holes at each panel corner will be in alignment with the control holes in the top gusset. Each panel edge has been formed so that the panel will seat itself into the grooves at the top of the strut extrusion. The strut grooves must be clean of dirt and lockbolt pintails to eliminate any possibility of water leaks.

PRECAUTIONS/WARNINGS

The panel drive rivets are for alignment purposes only and the panels are not to be walked on or left without battens installed for any length of time. Never leave a panel overnight without all battens installed and batten screws permanently torqued (see 10.03). In windy conditions, it may be necessary to install battens immediately following placement of panels.
**Panel Drive Rivet Installation**

Position the panel on the struts and install only 1 drive rivet at each corner of the panel. Insert the rivet so that the head is seated against the panel. Then use a hammer to drive the pin flush with the rivet head. This will expand the prongs clinching the panel tightly to the gusset.

![Diagram of panel and struts with drive rivets installed.]

**Panel shown seated into the grooves on the top of the struts. Install 3 drive rivets (1 per corner).**

**The Function of the Batten**

The battens complete the patented interlocking panel-to-strut integrated structural system. They also function as the system’s weather seal. Special care must be taken while installing the battens. Again, clear all dirt and debris from the channel between the batten and the interlocking portion of the panel. Steel sandblast grit containing dissimilar material (carbon) will severely compromise the long term structural integrity of the batten/panel connection, and therefore it must be removed entirely. The strut’s batten screw chase must also be clear of debris.

**Installing Battens**

The batten’s shop installed preformed silicone gaskets require field trimming so that they end within 1/16” (2 mm) of the end of the batten. Install the battens so that about 1/8” (3 mm) space is left between the ends of the batten and the gusset plates (Figure 1). This space is necessary so caulking can be forced into the void when caulking the gusset covers. A common mistake is that the batten is lapped over the gusset. This prevents the batten from correctly seating against the panel and will cause leaking.

![Diagram of batten installation with silicone gaskets.]

(Silicone gaskets in photos are cut back for clarity)
SECURING BATTENS TO THE FRAME

Battens are secured to the frame with #14 batten screws with silicone washers. Batten screws should be installed so that the head is tight and completely seated against the batten. Begin tightening screws at one end of the batten and progressively work toward the other end. Never tighten both ends toward the center. After batten screws have been tightened, pound battens with a nonmetallic, dead blow hammer weighing approximately 3 pounds (1.5 kg) and retighten the screws with a torque wrench to 11 to 14 ft-lbs (15 to 19 Nm).

BATTEN FIELD REPAIR

Because of the importance of having every batten properly seated and secured, a list of field repair procedures are noted below:

1. If a screw is broken or over tightened to the point of stripping the extrusion, the recommended method is to turn the batten around from one end to the other. This eliminates drilling additional holes in the batten. The stripped screw must be removed or it will rest on the underside of the batten preventing a proper seal.

2. An alternative method for when a screw is broken or stripped is to remove the screw and carefully caulk the hole. Drill a new hole through the batten only and install an additional screw within 1" (25 mm) of the existing hole.

3. The new hole should be drilled with a 17/64" bit. If the hole is drilled smaller than 17/64", the screw will tap threads into the batten and this will prevent the batten from properly seating on the panel.

4. If a completely installed batten must be removed at any time during or after construction, the batten must be turned around from one end to the other prior to reinstallation.
FLASHING INSTALLATION

GENERAL NOTES

The flashing installation is very similar to the panel installation with the exception that the flashing pieces are spliced together at the shoe. The same precautions should be given to the flashing as prescribed for the panels.

INSTALLATION PROCEDURES

Clear dirt and debris from strut grooves and use 1 drive rivet at each corner of the flashing to secure its position. Install the flashing/panel batten along the tension ring strut (reference 10.00. Batten Installation).

Note that at the shoe’s radial centerline, the end of one flashing will overlap the other by 1" (25 mm). Apply a bead of sealant between the overlap and the full length of the splice.

Field drill through both pieces of flashing along the splice and fasten with aluminum pull rivets.

Field drill through the flashing into the shoe base plate and secure the flashing to the shoe with (3) #14 self-tapping screws.
GUSSET COVER FUNCTION

The function of the gusset cover is to cover all bolt holes and the ends of the panels and flashing so that when caulked they will provide a continuous weather seal for all the adjoining strut/batten ends and panel/flashing corners. This is the most susceptible area of the dome for water leaks, so extra care must be taken while installing gusset covers and caulking.

CLEAN CONTACT SURFACES

Contact surfaces should always be cleaned with isopropyl alcohol, unless otherwise specified. Dampen a clean paper towel with the isopropyl alcohol, scrub vigorously onto the contact surfaces, and then dry immediately with a clean paper towel. This surface must remain dry and should be caulked within 4 hours of cleaning.
CAULK GUSSET COVERS IN PLACE

Prior to installing gusset covers, inspect the ends of each batten to ensure the batten gasket is trimmed and the batten is not overlapping the gusset plate (Figure 1). Position the gusset cover directly over the gusset, hold in place, and apply a bead of sealant in a continuous motion around the cover (Figure 2). A positive pressure should be applied to properly fill the gap between the end of the batten and the gusset cover (Figure 3). Tool the sealant with light pressure to spread the material against the joint surfaces. The sealant responds easily to light pressure. Use the provided spatula to spread a concave profile and to keep the sealant within the joint (Figure 5). Finally, apply a small amount of sealant that overlaps and tapers over the end of the battens in a uniform and smooth transition (Figure 4).

SILICONE SEALANT PROPERTIES

Silicone cures when exposed to moisture in the air. Low humidity slows the curing time. Application of this sealant can be done within a range of -35°F to 140°F (-37°C to 60°C), provided the surfaces are clean, dry, and frost free. Batches of caulking should be field tested before use. If caulk does not start to cure within 20 minutes, the caulking is no longer good and must be reordered. The shelf life of silicone is 1 year. Pecora brand is coded with the manufacture date. Code 3352, for example, means the caulk was manufactured on the 335th day of 2002.
LIFTING OF THE ATECO DOME

Lifting after erection outside the tank

The nearly completed DOME is lifted to the tank rim using steel wires, ropes etc. which are attached to outer hubs. The number of lifting points necessary will depend on lifting capacity as well as the weight of the DOME. Refering details see static report.

Attention: Please note the lifting points should always be arranged symmetrically!

When lifting by crane the attention should be given to the number of lifting points required otherwise the maximum permissible stress on the hubs may be exceeded and/or the DOME structure may deform.

Webslings are to be used and looped round 2 or 3 carriage profiles. The hubs and profiles are to be protected and the underside of the hub gussets should be supported (through the use of wood etc.).

After lifting the DOME those DOMEsheets not installed adjacent to the lifting point, can be fitted.

Lifting of the DOME

The following steps are to be taken after lifting and positioning the DOME:

Bolting the support arms to the outer hubs.

Important: For the support arm longer Huck Bolts are to be used!
Lifting after erection inside the tank

When using the specially provided erection hubs a special attention should be paid to the procedures. The DOME will be erected on the ground of the tank according to our installation manual. On the outer side the special erection gusset plates (half plates) are used, otherwise a lifting is not possible, because of the distance to the tank shell and passing the tension ring. For the mounting regular bolts have are used, no Huck Bolts, because the half erection gusset plates have to be later replaced.

When using lifting devices the particular attention should be given to the number of lifting points required as otherwise the maximum permissible stress on the gusset plates may be exceeded and/or the DOME structure may deform.

1) On the tank curbangle, where the supports are installed, the lifting devices will be welded and bolted. The quantity is depending on the number of lifting points. A lifting device have to be installed at each lifting point. Please note the lifting points should always be arranged symmetrically.

2) Web slings are at each lifting point on the outer erection gusset plates. The gussets and profiles are to be protected and the underside of the gussets should be supported (through the use of wood etc.).

3) The web slings will be connected with steel wires to the tirfor. On every lifting device a worker or two has to control a slow and simultaneous lifting.

4) Lift the DOME until the gussets of the DOME are over the tank shell edge, one after the other, the erection gusset plates will be replaced by the regular ones and bolted with the Huck Bolts. The outer support arms will be mounted together with the supports.

5) The DOME can be lowered on the tension ring.

Bolting the support arms to the outer hubs.

Important: For the support arm the longer Huck Bolts are to be used.

Lifting after erection inside the tank on the floating roof

The DOME can be erected on the top of the steal floating roof in the same way as on the ground. The tank has to be filled with water, so that the floating roof is going up. The last ring of the structure can be mounted as soon the floating roof reaches the highest position. With the tripods the structure can be lifted over the tension ring. Then the support arms and the supports can be installed.
Mounting of the Supports

Version Fixed Supports

Attach the steel support to the support arms using the steel bolts provided and secure using the split pins. Set and position the DOME on to the steel tension ring and weld on the steel supports. (Min weld thickness a=6mm)

Attention: The support have to be welded complete around, because of corrosion reasons.

Drill ø 18 mm hole to the rim angle / tension ring through the steel support.

Note: Bolt the support bracket with a force of Fv = 100 kN with a torque wrench.
**Version Sliding Supports**

Attach the support brackets to the support arm using the aluminium bolts provided. Provisionally mount the steel plate (20x380x380) under the support bracket.

Set the DOME onto the tank rim. Check final DOME positioning.

Weld the steel plate (20x380x380) to tank rim.

Drill Ø 18 mm hole to the rim angle through the plate (20x380x380).

**Note:** Bolt the support bracket with a force of $F_v = 100 \text{ kN}$ with a torque wrench.
Completion of Assembly

Support arms to be fitted with extension angled support strips
- place flushing sheets and fasten using the edge clamping profile
- place and fasten the outer hubcaps
- erect bird screen
- flushings sheets to be cut to fit with any existing tank devices as well as installation of any necessary negotiation devices
- where necessary place and erect walkway in conjunction with existing steel platform
Installation of Accessories

Manhole

Like the centre vent exhaust also with the manhole first after the positioning a hole is cut into the intended DOMEsheets. Equally it is bolted. It serves to be able to take tests (water tests) or have also around view of the tank.
Centre Vent

In the first ring DOME sheet a hole is cut (see position plan), on which the central exhaust is fixed. It is bolted with the panel.
Negotiation Device

The assembly procedure of the negotiation device corresponds with that of the central exhaust as well as those of the manhole. However this negotiation device must be aligned and can only be fitted after the sheet is installed.
Measure outside pipe diameter and trim cone exactly where indicated. For square pipes add 30%.

With clip in down-stream position, tension top of cone around pipe and engage metal teeth in opposing pockets.

To assist in locating clip into pocket, place hand behind the seam. Fasten clip with pliers or multigrips, working from top to base. Do not overcrimp.

Apply a liberal bead of neutral silicone sealant to the underside of Dekkite base and press to contour of sheet profile.

Cut Dekkite cone where indicated for the relevant pipe size.

Slide Dekkite flashing down over pipe. Water can be used as a lubricant.

Apply neutral cure silicone sealant on underside of flange.

Press pipe flashing into contours of roof panel.

Fasten flashing with washered self drilling screws. As per diagram, secure clip by placing a fastener either side of the clip first.

Apply sealant to top of crimp closure and any other potential leak areas. (refer to page 13 for silicone types).

<table>
<thead>
<tr>
<th>Code</th>
<th>Material</th>
<th>Base mm</th>
<th>Pipe min</th>
</tr>
</thead>
<tbody>
<tr>
<td>K50653</td>
<td>Gray EPDM</td>
<td>140</td>
<td>36-70</td>
</tr>
<tr>
<td>K506200</td>
<td>Gray EPDM</td>
<td>275</td>
<td>58-150</td>
</tr>
<tr>
<td>K506300</td>
<td>Gray EPDM</td>
<td>340</td>
<td>65-215</td>
</tr>
</tbody>
</table>

EPDM withstands temperatures from -50°C - 115°C and up to 150°C intermittently.
Water Test

Final water-test to be carried out followed by final inspection

- Potable water have to be sprinkled on the DOME surface

- Look inside the tank if there is a leak
SKYLIGHT INSTALLATION

SKYLIGHT SPECIFICATION

1) SKYLIGHT PANEL 8mm TAN CLEAR ACRYLIC
2) FRAME & SUPPORT - MILL FINISH ALUMINUM
3) SKYLIGHT AREA - APPROXIMATELY 2m² EACH
4) TOTAL SKYLIGHT AREA = MIN. 1m²/100m² PROJECT AREA
PRESSURE VACUUM VENT INSTALLATION

GAUGE HATCH INSTALLATION
TYPICAL ROOF NOZZLE INSTALLATION

CENTER SAFETY LINE

1. NODE PLATE SUPPLIED WITH Ø11 HOLE
2. Painters pin is designed to support a 5000 LB load suspended over the edge of the dome
3. Ship plate assembled with stud, nuts, & washers shop installed to ensure the correct length of thread engagement (no caulk) and to ensure that cover plate is in place during dome erection.
4. Silicone sealant field applied to the hub cover flange, the top of the pipe and around the hole in the hub cover.

NOTE: EYEBOLT FOR DOME ACCESS MAINTENANCE ONLY BY QUALIFIED PERSONNEL. EYEBOLT RATED FOR OSHA FALL PROTECTION - MUST BE INSPECTED DAILY AND REPLACED AFTER FALL OR OTHER SHOCK LOADING. REMOVE ANY TEMPORARY SAFETY LINE IMMEDIATELY AFTER USE.
S.S. EYEBOLT AT DOME APEX

NOTE;

EYEBOLT FOR DOME ACCESS MAINTENANCE ONLY BY QUALIFIED PERSONNEL. EYEBOLT RATED FOR OSHA FALL PROTECTION - MUST BE INSPECTED OUR REPLACED AFTER FALL OR OTHER SHOCK LOADING. REMOVE ANY TEMPORARY SAFETY LINE IMMEDIATELY AFTER USE.

EYEBOLT CONNECTION & INSTALLATION DETAIL FOR IFR CABLE

NOTE:

LOCATE @ XX GUSSETS FOR TOTAL APPLIET LOAD = 38.7 kN
LOAD @ EACH CONNECTION = 121 kN
HATCH LID HOLD-DOWN INSTALLATION ENCLOSED-SEAL BATTEN

**INSTALLATION PROCEDURE:**

1. OPEN HATCH LID AND DETERMINE PROPER LOCATION FOR "HATCH LID HOLDOWN."
2. DRILL ONE 3/4" HOLE DOWN THROUGH THE BATTEN BAR OR SKIN PANEL. SKIP TO STEP 4 FOR LAPPED DOMES.

**EMERGENCY VENT**

**PARTS LIST**

<table>
<thead>
<tr>
<th>PART</th>
<th>DESCRIPTION</th>
<th>QUANTITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BODY</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>COVER</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>HANDLE</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>ARM</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>NUT</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>WASHER</td>
<td>1</td>
</tr>
</tbody>
</table>

**DIMENSIONS:**

- BODY: 210 x 210 x 115
- COVER: 210 x 210
- HANDLE: 210 x 210
- ARM: 210 x 210
- NUT: 210 x 210
- WASHER: 210 x 210

**OPENING PRESSURE:** XX PSW
ATECO Tank Technologies Engineering Service Co., Ltd.
ATECO Dome Assembly Manual

Lifting Lug Installation

Circular formed top gussets inside plate

Dome beam/strut

Orient lifting lugs to align with lifting brackets (note tightening prior to lifting dome)

Reinforced disk

Reinforced disk

If R Cables Housing Assembly

6.4mm (1/4") S.S. Wire Rope
Breaking strength: 16kN (3600 lbs)

Aluminum housing for cable storage

Copper stop sleeves
Normal pull-out strength: 25kN (5600 lbs)

Permanent washer

SS wire rope clamp

Top gusset with 12.1mm (1/2") hole at center & 10mm (3/8") hole at center

SS eye bolt with SS washer and IG SS nuts

Circular formed bottom gussets inside plate

Circular formed top gussets inside plate