FOR FLOATING ROOF STORAGE TANK

ATECO
DOME-ROOF-SEAL
Welcome To ATECO Tank Technology

ATECO TANK TECHNOLOGY ENGINEERING SERVICES LTD. specialises in floating roof tank seals and drain systems for above ground storage tanks. The Management Team have over 20 years experience in this business and is therefore able to provide impartial advice on the selection of the most suitable sealing system for a customer's needs taking into consideration service and operational requirements, climatic conditions and tank shell distortion.

ATECO TANK TECHNOLOGY ENGINEERING SERVICES LTD. is able to offer either complete floating roof seals or just replacement parts for virtually any of the multitude of seal designs that have been introduced over the years.

With its own in-house manufacturing facilities ATECO TANK TECHNOLOGY ENGINEERING SERVICES LTD. can offer a speedy turnaround in the event of an emergency situation.

The materials used in the seal construction have been proven in service around the world over many years.

ATECO TANK TECHNOLOGY ENGINEERING SERVICES LTD. specialise in the provision of seals for older tanks that suffer from tank shell distortion.

When required, seal installation can be arranged by the provision of either a complete team of experienced personnel or, if preferred, just a supervisor to assist a local contractor.

Through its network of associates ATECO TANK TECHNOLOGY ENGINEERING SERVICES LTD. can provide additional products and services, some of which are listed below:

* Geodesic Dome Roofs
* Internal Floating Roofs
* Emission Control Devices
* Roof Drain Systems
* Floating Suction Lines and Skimmers
* Internal Floating Roof Seals

ATECO TANK TECHNOLOGY ENGINEERING SERVICES LTD. operates a quality management system certified to BS:EN ISO 9001:2000 and its products comply with all the relevant international standards.

VAPOUR CONSERVATION:
Ateco Tank Ultimate Systems can provide you with a total service in Vapour Conservation. The skills and resources of the ATECO TANK are available for the full range of services from conceptual studies to turnkey contracts for your storage and handling terminal.

Changes in Point of Taxation and environmental protection to demand improve techniques.

Factor affecting your business:
* Custody Transfer
* High Labour Costs
* Conservation and Cost Save
* Environmental Protection
* Safety

We Can Help With...
* Geodesic Dome Roofs
* Internal Floating Roofs
* Floating Roof Seals and Secondary Seals, Double Seals
* Roof Drain Systems and Equipments
* Floating Roof Accessories (Vents, hatches, Foam Dams, Ladders, etc.)
* Emission Control Solutions
* Floating Suction Arms

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0090-262-335-1598
ATECO TANK ENGINEERING has its own in-house manufacturing facilities capable of producing all metallic components of any floating roof seal design.

Some of our facilities include:
- CNC Turret Punch Press
- CNC Guillotine
- CNC Abkant
- CNC Plasma Cutting Machine
- Benders
- Power Rollers
- Plasma Cutters
- Tig and Mig Welding
- Shot blast and Paint Spraying
- Eccentric Press 15-25-35-45-60 ton

Polymeric seal components are produced for us by partner companies to formulations that have been proven in service over many years. A complete range of polymers is available so that we are able to produce any seal design with materials resistant to any particular petroleum product.

Facilities include:
- Mills
- Calendars
- Rotocure
- Flat Bed Presses
- Extruders
- Moulds

Our organisation allows us to respond quickly where a client's operational needs require the production of either a complete seal or perhaps just replacement parts of a seal in the shortest possible time.

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SEAL SELECTION

FLOATING ROOF TANK SEAL

With over 20 years of experience in floating roof seals and drain systems for floating roof storage tanks, our engineering team can adapt any of our seal designs to suit your particular roof configuration. In particular, we have tank systems that suffer from tank shell distortion can make a sealing system that will provide an effective sealing solution.

We can also quote for replacement parts (tired-fit) for older types of seals subject to suitable drawings being supplied by the purchaser.

Our flexible floating roof tank designs are designed to withstand environmental conditions, stored product, tank data including rim space data/out-of-roundness surveys, and emission control.

Different types of seals and combinations are suitable for both pontoon & double deck floating roof tanks & fixed roof tanks with pan deck roofs or aluminium decks.

Floating roof tank seals normally fall into 3 different categories:

* Primary Seal
* Secondary Seal
* Double Seal

Please read our guide on Floating Roof Seals as below.

ULTIMATE SEAL QUALITY TECHNOLOGY ENGINEERING PRODUCTION SERVICES

PRIMARY SEAL

Mechanical Seals: Suitable for tanks without appreciable tank shell distortion & where the product stored is particularly aggressive. Unsuitable for distorted tanks shell collapses and must be supplied.

The compression spring type PTD systems are normally supplied in 1.4mm galvanised steel. We also supply stainless steel versions where corrosion is known to be a problem.

The standard material for the continuous seal fabric is a special grade of PTFE fabric on nylon fabric. For some products, aggressive products such as benzene, toluene etc., PTFE can also be supplied. Where further corrosion resistance is required, it is recommended that stainless steel should be used.

Liquid Seals: Suitable for tanks that require a completely tank shell distortion to be present.

The LVD seal design consists of the LVD design for the seal placed in a continuous inorganic sealant. The sealant is product mounted and therefore in the highest efficiency category as defined in API Publication 5C.

Double Seals: Used either as a replacement seal or in contact with the internal product or internal product mounted. Product mounting is much more efficient.

Care must be taken to ensure that the tank shell surface is free from sharp edges to avoid damage to the polymer seal.

The seal envelope may be either PVC. Suitable for oil in contact with up to 70% of the oil or in vapour contact with up to 10% aromatic hydrocarbons (barrier seal), 100% aromatic hydrocarbons and up to 10% water, but not for certain aggressive chemicals such as benzene, toluene or styrene. PVC and metal seals are available except for WNB.

SECONDARY SEAL

Rim Mounted Seals: Rim mounted secondary seals are fixed at the top of the rim plate on the floating roof. These seals are always fitted above the primary seal to provide additional secondary seal resistance, excellent secondary vapour barrier containment & also protects the tank contents & primary seal against weathering and contaminants.

The most efficient secondary seal design is the PTG-5100. This seal:

* Has a large contact depth with the tank shell.
* Is incorporated in continuous type or part in reinforced for optimum sealing efficiency.
* The compression plates are not separated (using a very flexible seal), better able to compensate for tank shell movements.
* The seal is applied with all necessary speed to give minimum installation time.
* The seal will re-expand the tank without damage or tendency to hang up in the accidental event of overfilling of the tank.

The PTG-5000 type design is a better solution with a vapour barrier membrane and in which the compression plates are bolted together with a gasket between to form the seal. Different bolt on systems are required to assembly the complete seal. The PTG-5000 can be supplied with a vapour barrier membrane to replace the plates thus giving a more flexible seal.

The PTG-5000 type design is similar to that of the Gasket type, but with a double type wiper.

Shoe Mounted Secondary Seal: Are only used on primary shoe mounted seals. These seals are fixed at the top of the shoe plate & after a 180° rotation key vaulted to form a vapour barrier containment. As per API 650, these seals are now normally restricted to use on normal float roof tanks.

Secondary Wiper Seals: Are commonly used on internal floating roof tanks in a suitable primary seal installed below. These consist of either a wedge-shaped rubber or foam extrusion bolted to the pontoon rim.

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SECONDARY SEAL

RIM MOUNTED SEAL

Rim mounted secondary seals are fixed at the top of the rim plate on the floating roof. These seals are always fitted above the primary seal to provide additional secondary seal resistance, excellent secondary vapour barrier containment & also protects the tank contents & primary seal against weathering and contaminants.

The most efficient secondary seal design is the PTG-5100. This seal:

* Has a large contact depth with the tank shell.
* Is incorporated in continuous type or part in reinforced for optimum sealing efficiency.
* The compression plates are not separated (using a very flexible seal), better able to compensate for tank shell movements.
* The seal is applied with all necessary speed to give minimum installation time.
* The seal will re-expand the tank without damage or tendency to hang up in the accidental event of overfilling of the tank.

The PTG-5000 type design is a better solution with a vapour barrier membrane and in which the compression plates are bolted together with a gasket between to form the seal. Different bolt on systems are required to assembly the complete seal. The PTG-5000 can be supplied with a vapour barrier membrane to replace the plates thus giving a more flexible seal.

The PTG-5000 type design is similar to that of the gasket type, but with a double type wiper.

SHOE MOUNTED SECONDARY SEAL

Shoe mounted secondary seals are only used on primary shoe mounted seals. These seals are fixed at the top of the shoe plate & after a 180° rotation, key vaulted to form a vapour barrier containment. As per API 650, these seals are now normally restricted to use on normal floating roof tanks.

SECONDARY WIPER SEAL

Secondary wiper seals are commonly used on internal floating roof tanks in a suitable primary seal installed below. These consist of either a wedge-shaped rubber or foam extrusion bolted to the pontoon rim.
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PRIMARY SCISSOR TYPE MECHANICAL SHOE SEAL MSS-P-SCR1

**BASIC INFORMATION**

<table>
<thead>
<tr>
<th>TYPE</th>
<th>DESCRIPTION</th>
<th>USED ON</th>
<th>RIM SPACE</th>
<th>SERVICE</th>
<th>API COMPLIANT</th>
<th>CODES COMPLIANT</th>
<th>API 2003 COMPLIANT</th>
<th>ARGOMATIC SERVICE</th>
<th>TYPICAL SERVICE LIFE</th>
<th>WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Primary Seal</td>
<td>External Floating Roof Tanks</td>
<td>Nominal Rim Space of 200mm±125mm or 300mm±225mm</td>
<td>Suitable for All Products with Correct Material Selection</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>%100</td>
<td>15-25 years</td>
<td>23 Kgs/m² (Typical Based On 200 mm Rim Space)</td>
</tr>
</tbody>
</table>

**DESIGN**

ATECO Tank Engineering primary shoe seal has been designed with a long lasting tensioning and hanger system to maintain seal compliance throughout the seal life.

**ADVANTAGES**

1. Designed to be installed as a bolted in-place seal system. No welding or hang-in-place in the rim plate is required.
2. The shoe seal can be installed while the tank remains in service. No need for hot work.
3. The design uses THREE-HANGER per shoe system. This eliminates gap problems which is common on seal systems with multiple hangers per shoe.
4. Custom shoes from 16” to 48” wide based on the rim height. Emissions are regulated by shoe extension below the liquid.
5. The MSS-P-SCR1 mini shoe is adaptable to aluminum and steel internal floating roofs. The mini shoes are designed to fit on pan-floating roofs with 15” or less of rim space. Custom shoe widths from 16” to 24” to meet the weight requirements of shallow steel roofs.
6. Tensioners are applied to the top and bottom of the shoe. This keeps the entire width of the shoe in contact with the tank shell. This is important with wax scraper designs.
7. The hanger maintains a constant shoe elevation. This eliminates gaps caused by uneven elevation in various rim-space widths.
8. Expansion joints at each shoe provide superior arrest of control during expansion and contraction while roof is in motion.
9. The MSS-P-SCR1 primary shoe seal is designed for flexibility in installation with egg-shaped tanks.

**REGULATORY COMPLIANCE**

ATECO Tank Engineering seals meet or exceed the allowable gap requirements set forth by the governmental and regulatory agencies throughout the universe. This design will show superior sealing ability throughout the roof travel accounting for roof shifting, out of roundness, buckling, and the expansion and contraction requirements of each tank.

**GUARANTEE**

ATECO TANK warrants its seals to be free from defects in the material and workmanship for a period of two years. Our liability under any express or implied warranty is limited to the purchase price of any part found defective. Any seal systems installed by ATECO TANK TECHNOLOGY ENGINEERING SERVICE will have an additional two-year warranty.

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PRIMARY PANTOGRAPH TYPE MECHANICAL SHOE SEAL MSS-P-PTG1

**BASIC INFORMATION**

<table>
<thead>
<tr>
<th>TYPE</th>
<th>Primary Seal</th>
</tr>
</thead>
<tbody>
<tr>
<td>DESCRIPTION</td>
<td>Pantograph Type Mechanical Shoe Seal</td>
</tr>
<tr>
<td>USED ON</td>
<td>External Floating Roof Tanks</td>
</tr>
<tr>
<td>RIM SPACE</td>
<td>Nominal Rim Space of 200mm or 255mm or 300mm or 325mm</td>
</tr>
<tr>
<td>SERVICE</td>
<td>Suitable for All Products With Correct Material Selection</td>
</tr>
<tr>
<td>API COMPLIANT</td>
<td>Yes</td>
</tr>
<tr>
<td>CODES COMPLIANT</td>
<td>Yes</td>
</tr>
<tr>
<td>API 2003 COMPLIANT</td>
<td>Yes</td>
</tr>
<tr>
<td>AROMATIC SERVICE</td>
<td>%100</td>
</tr>
<tr>
<td>TYPICAL SERVICE LIFE</td>
<td>25-40 years</td>
</tr>
<tr>
<td>WEIGHT</td>
<td>43 Kg/m² (Typical Based On 200 mm Rim Space)</td>
</tr>
</tbody>
</table>

**ADVANTAGES**

1. Designed to be installed as bolted or welded in seal system.
2. The shoe seal can be installed while the tank remains in service. In bolted systems, no need for hot works.
3. The design uses three hangar per shoe system. This eliminates gap problems which is common on seal systems with multiple hangers per shoe.
4. Custom shoes from 18" to 48" wide based on the rim height. Emissions are regulated by shoe extension below the liquid.
5. The MSS-P-PTG1 primary shoe seal is adaptable to steel internal-floating roofs. The mini shoes are designed to fit on pan-floating roofs with 13" or less of rim space. Custom shoe widths from 10" to 24" to meet the weight requirements of shallow steel roofs.
6. Hangers are applied to the top and bottom of the shoe. This keeps the entire width of the shoe in contact with the tank shell. This is important with wax scraper designs.
7. The shoe maintains a constant shoe elevation. This eliminates gaps caused by uneven elevation in various rim-space widths.
8. Expansion joint at each shoe provides superior seal gap control during expansion and contraction while roof is in motion.
9. The MSS-P-PTG1 primary shoe seal is designed for flexibility in installation with egg-shaped tanks.

**KEY COMPONENT MATERIAL**

<table>
<thead>
<tr>
<th>NO</th>
<th>PART NUMBER</th>
<th>MATERIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SEAL PLATE</td>
<td>1.6mm Galvanised or 1.2mm Stainless Steel</td>
</tr>
<tr>
<td>2</td>
<td>SPREADER ROD CLEATS</td>
<td>Carbon Steel, Hot Dip Galvanised Coating or Stainless Steel</td>
</tr>
<tr>
<td>3</td>
<td>SPREADER ROD</td>
<td>Carbon Steel or Hot Dip Galvanised Coating</td>
</tr>
<tr>
<td>4</td>
<td>FLOATING ROOF</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>M.S. GUIDES</td>
<td>Carbon Steel</td>
</tr>
<tr>
<td>6</td>
<td>SHOE ARMS</td>
<td>Carbon Steel or Hot Dip Galvanised Coating</td>
</tr>
<tr>
<td>7</td>
<td>COUNTERWEIGHT ARMS</td>
<td>Carbon Steel or Hot Dip Galvanised Coating</td>
</tr>
<tr>
<td>8</td>
<td>HINGE BRACKETS</td>
<td>Carbon Steel</td>
</tr>
<tr>
<td>9</td>
<td>COUNTERWEIGHT</td>
<td>Carbon Steel or Hot Dip Galvanised Coating</td>
</tr>
<tr>
<td>10</td>
<td>M.S. PINS</td>
<td>Carbon Steel or Hot Dip Galvanised Coating</td>
</tr>
<tr>
<td>11</td>
<td>FABRIC CLAMP</td>
<td>Galvanised or Stainless Steel</td>
</tr>
<tr>
<td>12</td>
<td>M10 x 50 BOLT</td>
<td>Galvanised or Stainless Steel</td>
</tr>
<tr>
<td>13</td>
<td>FLEXURE PLUG</td>
<td>PVC Nitrile</td>
</tr>
<tr>
<td>14</td>
<td>CONTINUOUS SEAL</td>
<td>PVC Nitrile, PTFE/Glass, Viton/Nylon</td>
</tr>
</tbody>
</table>

**REGULATORY COMPLIANCE**

ATECO Tank Engineering seals meet or exceed the allowable gap requirements set forth by the governmental and regulatory agencies throughout the universe. This design will show superior sealing ability throughout the roof travel accounting for roof shifting, out of roundness, buckling, and the expansion and contraction requirement of each tank.

**VARIATIONS**

Several variations on this basic seal type exist including ones to service riveted tanks.

**WAX SCRAPER PLATES**

These can be provided to deal with waxy crude deposits on tank shells.

**WEATHERSHIELDS**

Weathershields can also be provided.

**SECONDAiry SEAL**

The MSS-S series is the recommended secondary seal for use with this primary seal however we can produce a shoe-mounted secondary wiper seal if required. Shoe-mounted secondary seals are of course dependent on the shoe plates being in good contact with the shoe. A curtain extending from the wiper to the roof rim assists in improving this form of secondary seal.

**GUARANTEE**

ATECO TANK warrants its seals to be free from defects in the material and workmanship for a period of two years. Our liability, under any express or implied warranty, is limited to the purchase price of any part found defective. Any seal systems installed by ATECO TANK TECHNOLOGY ENGINEERING SERVICE will have an additional two-year warranty.

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SECONDARY SEAL - FLAT WIPER LIP ATC-S100

BASIC INFORMATION
- TYPE: Secondary Seal
- DESCRIPTION: Rim Mounted Compression Plate Type Secondary Seal
- USED ON: External Floating Roof Tanks
- RIM SPACE: Up to 250 mm Nominal. Values of Excess to This Require Modifications to The Postoon Rim
- SERVICE: Suitable for All Products With Correct Material Selection
- API COMPLIANT: Yes
- CODES COMPLIANT: Yes
- API 2003 COMPLIANT: Yes
- AROMATIC SERVICE: up to 9100
- TYPICAL SERVICE LIFE: 15-25 years
- WEIGHT: 11.5 Kg/m² (Typical Based On 200 mm Rim Space)

ADVANTAGES
- The secondary seal can be installed while the tank remains in service, since no hot work is required.
- Independent overlapping support plates, bolted together, produce greater flewing in the seal to accommodate shell deformations.
- The extruded seal lip is highly abrasion resistant and can be used in most services, resulting in a long life for a long-term maintenance-free operation. Alternative seal lips are available for lap welded and riveted tanks.
- The secondary seal design diverts most rainwater from entering the primary seal area. The standard vapor seal lip fits vertical with the shell. Seals designed with horizontal lips will not flip in unison causing compliance problems and more internal moisture.
- The secondary seal is designed for a tight fit to prevent vapor loss. Reduced vapor loss resulting in fewer odor problems and offering a cost-effective way of complying with air quality standards.
- A continuous fabric is installed as a vapor barrier to eliminate possible vapor leakage that occurs in bolted support plate construction. Fabric can be replaced on an undersides or on the top side of the support plates, depending on inspection requirements and exposure issues.
- Can be used in almost all service conditions up to 100% aromatics.
- Easy access for visual inspection.
- Can be paired with all primary seal types.
- Enhanced safety by reducing free hydrocarbons above the seal.
- Irregularly shaped tank shells can be accommodated.
- Includes seal stand-off wheels to protect against malfomed tank shells.

KEY COMPONENT MATERIAL

<table>
<thead>
<tr>
<th>NO.</th>
<th>PART NUMBER</th>
<th>MATERIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>COMPRESSOR PLATES</td>
<td>1.6mm Galvanised Steel or 1.5mm/1.2mm Stainless Steel</td>
</tr>
<tr>
<td>2</td>
<td>Y SECTION WIPER</td>
<td>Nitrile Rubber Extrusion</td>
</tr>
<tr>
<td>3</td>
<td>SHANKS</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>4</td>
<td>ANTI HANG UPS</td>
<td>1.6mm Galvanised Steel or 1.5mm/1.2mm Stainless Steel</td>
</tr>
<tr>
<td>5</td>
<td>CHANNEL CLAMP BARS</td>
<td>3mm Galvanised Steel or 2.5mm Stainless Steel</td>
</tr>
<tr>
<td>6</td>
<td>VAPOUR BARRIER MEMBRANE</td>
<td>Polyurethane on PVC Nitrile, PTFE/Glass, Viton/Nylon</td>
</tr>
</tbody>
</table>

DESCRIPTION
The 5-Series range of compression plate type secondary seals from ATECO TANK exploits the spring action obtained when custom designed steel plates are compressed to bridge the annular rim gap from tank roof to shell. The plates may be mounted on horizontal or vertical roof rings and made to accept specific bolt pitch. Adjacent compression plates are overlapped, lightly attached, and soft gasketed to permit relative movement while preventing an impervious barrier to the passage of vapour. Plates are clamped to the roof rim by channels.

As a variant on the above we can provide an option where a flexible vapour barrier is fitted behind the compression plates and the adjacent plates overlap but are not bolted and gasketed. This option is available on request; however, the former details are in our opinion superior for long life and fire safety.

Contact with the tank shell is by an extruded 5-Sealer seal polymer tip attached to the upper edge of the compression plate. The form of the extruded tip will be selected from the two styles described below:

2. Double contact: Suitable for butt welded tank shells. Lighter contact with shell. Use where shell distorted or very rough, protruding welds, etc. Can be supplied for bespoke service.

The above are formulated for long life in exposed, arduous conditions.

Available On Request
Fire Protection note: we can provide access ports in the compression plate for halon or BCF injection.

REGULATORY COMPLIANCE
ATECO Tank Engineering services meet or exceed the allowable gap requirements set forth by the governmental and regulatory agencies throughout the universe. This design will show superior sealing ability throughout the roof travel, accounting for roof shifting, out of roundness, buckling, and the expansion and contraction requirement of each tank.

GUARANTEE
ATECO TANK warrants its seals to be free from defects in the material and workmanship for a period of two years. Our liability under any express or implied warranty is limited to the purchase price of any part found defective. Any seal systems installed by ATECO TANK TECHNOLOGY ENGINEERING SERVICE will have an additional two-year warranty.

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SECONDARY SEAL - L WIPER LIP ATC-S200

BASIC INFORMATION
- TYPE: Secondary Seal
- DESCRIPTION: Rim Mounted Compression Plate Type Secondary Seal
- USED ON: External Floating Roof Tanks
- RIM SPACE: Up to 250 mm Nominal. Values of excess to this require modifications to the postioning rim.
- SERVICE: Suitable for all products with correct material selection
- API COMPLIANT: Yes
- CODES COMPLIANT: Yes
- API 2003 COMPLIANT: Yes
- AROMATIC SERVICE: 90/10
- TYPICAL SERVICE LIFE: 15-25 years
- WEIGHT: 12.5 Kg/ft (Typical Based on 200 mm Rim Space)

ADVANTAGES
1. The secondary seal can be installed while the tank remains in service, since no hot work is required.
2. Independent overlapping support plates, behind together, produces greater flexing in the seal to accommodate shell deformities.
3. The extruded seal tip is highly abrasion resistant and produces greater flexing in the seal to accommodate shell deformities.
4. The secondary seal design allows for maintenance free operation. Alternative seal tips are available for lap welded and riveted tanks.
5. The secondary seal design allows for a tight fit to prevent vapor loss. Reduced vapor loss resulting in fewer odor problems and offering a cost-effective way of complying with air quality standards.
6. An acrylate fabric is installed as a vapor barrier to eliminate possible vapor leakage that occurs in bolted support plate construction. Fabric can be replaced on an underside or on the top side of the support plates, depending on inspection requirements and exposure issues.
7. Can be used in almost all service conditions up to 100% aromatic.
8. Can be paired with all primary seal types.
9. Enhanced safety by reduced free hydrocarbons above the seal.
10. Includes seal stand-off washers to protect against malformed tank shells.

DESCRIPTION
The S-Series range of compression plate type secondary seals from ATECO TANK exploit the spring action obtained when custom designed steel plates are compressed to bridge the annular rim gap from tank roof to shell. The plates may be mounted on horizontal or vertical roof rims and made to accept specific bolt pitching. Adjacent compression plates are overlapped, lightly attached and soft gasketed to permit relative movement while preventing an impervious barrier to the passage of vapour. Plates are clamped to the rim by channels.

As a variant on the above we can provide an option where a flexible vapor barrier is fitted behind the compression plates and the adjacent plates overlap but are not bolted and gasketed. This option is available on request; however, the former details are in our opinion superior for long life and fire safety.

Contact with the tank shell is by an extruded S-Series seal polymer tip attached to the upper edge of the compression plate. The form of the extruded tip will be selected from the two styles described below:
2. Double contact: Suitable for butt welded tank shells. Lighter contact with shell. Use where shell distorted or very rough, protruding welds, etc can be supplied for tension service.

The above are formulated for long life in exposed, arduous conditions.

Available On Request
For protection, we can provide access ports in the compression plate for halon or BC3 commissioning.

REGULATORY COMPLIANCE
ATECO Tank Engineering Seals meet or exceed the allowable gap requirements set by the governmental and regulatory agencies throughout the world. This design will show superior sealing ability throughout the roof travel accounting for roof shifting, out of roundness, buckling, and the expansion and contraction requirement of each tank.

GUARANTEE
ATECO TANK warrants its seals to be free from defects in the material and workmanship for a period of two years. Our liability under any express or implied warranty is limited to the purchase price of any part found defective. Any seal systems installed by ATECO TANK TECHNOLOGY ENGINEERING SERVICE will have an additional two-year warranty.

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SECONDARY SEAL - DUAL WIPER LIP ATC-S300

<table>
<thead>
<tr>
<th>BASIC INFORMATION</th>
<th>TYPE</th>
<th>Secondary Seal</th>
</tr>
</thead>
<tbody>
<tr>
<td>DESCRIPTION</td>
<td>Rim Mounted Compression Plate Type Secondary Seal</td>
<td></td>
</tr>
<tr>
<td>USED ON</td>
<td>External Floating Roof Tanks</td>
<td></td>
</tr>
<tr>
<td>RIM SPACE</td>
<td>Up to 250 mm Nominal, Values of Excess to This Require Modifications to the Roof Design</td>
<td></td>
</tr>
<tr>
<td>SERVICE</td>
<td>Suitable for All Products With Correct Material Selection</td>
<td></td>
</tr>
<tr>
<td>API COMPLIANT</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>CODES COMPLIANT</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>API 2003 COMPLIANT</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>AROMATIC SERVICE</td>
<td>1% 100</td>
<td></td>
</tr>
<tr>
<td>TOTAL SERVICE LIFE</td>
<td>15-25 years</td>
<td></td>
</tr>
<tr>
<td>WEIGHT</td>
<td>16.5 Kg/m² (Typical Based On 200 mm Rim Space)</td>
<td></td>
</tr>
</tbody>
</table>

ADAVANTAGES
1. The secondary seal can be installed while the tank remains in service, since no hot work is required.
2. Independence of supporting plate, that is, the bolted together, produces the greatest flowing in the seal to accommodate shell deformity.
3. The expanded seal tip is highly abrasion-resistant and can be used in most services, resulting in a long life for a long-term maintenance-free operation. Alternative seal tips are available for lap welded and riveted tanks.
4. The secondary seal design allows for the integration of an existing seal in the primary seal area. The standard vapor seal is made with a vertical seal. Two seals designed with horizontal seals will not warp in unison causing compliance problems and more internal moisture.
5. The secondary seal is designed for a tight fit to prevent vapor loss. Reduced vapor loss resulting in fewer odor problems and offering a cost-effective way of complying with air quality standards.
6. A continuous fabric is installed as a vapor barrier to eliminate possible vapor leakage that occurs in bolted support plate construction. Fabrics can be replaced on one side or on the other side of the support plate, depending on inspection requirements and/or exposure issues.
7. Can be used in all service conditions up to 100% aromatics.
8. Easy access for visual inspection.
9. Can be paired with all primary seal types.
10. Enhanced safety by reduced free hydrocarbons above the seal.
11. Irregularly shaped tank shells can be accommodated.
12. Includes seal stand-off wheels to protect against malformed tank shells.

DESCRIPTION
The S-5 series range of compression plate type secondary seals from ATECO TANK exploits the spring action obtained when custom-designed steel plates are compressed to bridge the annular rim gap from tank roof to shell. The plates may be mounted on horizontal or vertical roof rims and are made to accept specific bolt pitch. Adjacent compression plates are overlapped, lightly attached and soft gasketed to permit relative movement while presenting an impermeable barrier to the passage of vapor. Plates are clamped to the roof rim by channels.

As a variant on the above, we can provide an option where a flexible vapor barrier is fitted behind the compression plates and the adjacent plates overlap but are not bolted and gasketed. This option is available upon request; however, the former details are in our opinion superior for long life and fire safety.

Contact with the tank shell is by an extruded S-5 seal polymer strip attached to the upper edge of the compression plate. The form of the extruded tip will be selected from the two styles described below:
2. Double contact: Suitable for butt welded tank shells. Lighter contact with shell. Use where shell distorted or very rough, protruding welds, etc. Can be supplied for berm service.

The above are formulated for long life in exposed, arduous conditions.

Available On Request
Fire Protection note, we can provide access ports in the compression plate for halon or BCF injection.

REGULATORY COMPLIANCE
ATECO Tank Engineering meets or exceed the allowable gap requirements set forth by the governmental and regulatory agencies throughout the universe. This design will show superior sealing ability throughout the roof travel accounting for roof shifting, out of roundness, buckling, and the expansion and contraction requirement of each tank.

GUARANTEE
ATECO TANK warrants its seals to be free from defects in the material and workmanship for a period of two years. Our liability under any express or implied warranty is limited to the purchase price of any part found defective. Any seal systems installed by ATECO TANK TECHNOLOGY ENGINEERING SERVICE will have an additional two-year warranty.

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A WORLD WIDE ENGINEERING AND SERVICE TO THE PETROLEUM-REFINERY AND CHEMICAL INDUSTRY

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DOUBLE SEAL - FLAT WIPER LIP ATC-D100

BASIC INFORMATION
- **TYPE**: Double Seal
- **DESCRIPTION**: Rim Mounted Compression Plate Type Double Seal
- **USED ON**: External Floating Roof Tanks
- **RIM SPACE**: Up to 250 mm Nominal, Values of Excess To This Require Modifications To The Penthouse Rim
- **SERVICE**: Suitable for All Products With Correct Material Selection
- **API COMPLIANT**: Yes
- **CODRES COMPLIANT**: Yes
- **API 2003 COMPLIANT**: Yes
- **AROMATIC SERVICE**: 9/100
- **TYPICAL SERVICE LIFE**: 15-25 years
- **WEIGHT**: 25 Kgs/mt (Typical Based On 200 mm Rim Space)

ADVANTAGES
1. The double seal can be installed while the tank remains in service, since no hot work is required.
2. Independent overlapping support plates, bolted together, produces greater flexing in the seal to accommodate shell deformities.
3. The extruded seal tip is highly abrasion resistant and can be used in most services, resulting in a long life for a long-term maintenance free operation. Alternative seal tips are available for lap welded and riveted tanks.
4. The double seal design diverts most rainwater from entering the primary seal area. The standard vapor seal tip fits vertical with the shell. Seals designed with horizontal tips will not flip in uneven causing compliance problems and more internal moisture.
5. The double seal is designed for a tight fit to prevent vapor loss. Reduced vapor loss resulting in fewer odor problems and offering a cost-effective way of complying with air quality standards.
6. A continuous fabric is installed as a vapor barrier to eliminate possible vapor leakage that occurs in bolted support plate construction. Fabric can be replaced on underside or on the top side or the support plates, depending on inspection requirements and/or exposure issues.
7. Can be used in almost all service conditions up to 100% aromatics.
8. Easy access for visual inspection.
9. Can be paired with all double seal types.
10. Enhanced safety by reduced free hydrocarbons above the seal.
11. Irregularly shaped tank shells can be accommodated.
12. Includes seal stand-off wheels to protect against misaligned tank shells.

DESCRIPTION
The D-Series double seal applies compression plate technology to both the primary and the secondary seal elements. Construction is as shown overhead and it should be noted that an option using a flexible membrane sheet is available with the double seal. Shell contact is by an extruded polymer lip attached to the upper edge of the secondary seal elements and to the lower edge of the primary seal element. The polymer will be selected to meet the needs of the particular application and to withstand abrasion from the tank shell and attack from the weather. It is also suitable for use in MTBE service. The lower, primary element seal tip is normally just above the stored liquid level. For highly volatile products such as gasoline or for dangerous substances such as benzene we recommend the addition of a skirt of light impermeable sheeting which is attached to the lower seal tip and, being weighted, drops into the stored liquid. This has the effect of enhancing the sealing efficiency in areas where seal tip to shell contact is less than perfect due to protruding welds, severe corrosion of shell plates etc.

REGULATORY COMPLIANCE
ATECO Tank Engineering seals meet or exceed the allowable gap requirements set forth by the governmental and regulatory agencies throughout the universe. This design will show superior sealing ability throughout the roof travel accounting for roof shifting, out of roundness, buckling, and the expansion and contraction requirement of each tank.

GUARANTEE
ATECO TANK warrants its seals to be free from defects in the material and workmanship for a period of two years. Our liability under any express or implied warranty is limited to the purchase price of any part found defective. Any seal systems installed by ATECO TANK TECHNOLOGY ENGINEERING SERVICE will have an additional two-year warranty.
The D-Series double seal from ATECO develops the concept of the compression plate secondary seal into a single unit combining the attributes of primary and secondary seals. Commencing from a new tank, the seal may be fitted without extensive welding of clips or attachments to the roof rim plate as is necessary with many other seals. The double seal is fitted solely to the rim plate projection. On retrofit applications, the double seal safely passes over the existing clips and fasteners previously welded to the roof rim plates as left behind by most primary seals. This minimises the stripping out work when seals are being upgraded.

### ADVANTAGES

1. The double seal can be installed while the tank remains in service since no hot work is required.
2. Independent overlapping support plates, bolted together, produces greater flexing in the seal to accommodate shell deflections.
3. The extruded seal tip is highly abrasion resistant and can be used in most services, resulting in a long life for a long-term maintenance free operation. Alternative seal tips are available for lap welded and riveted tanks.
4. The double seal design diverts most seawater from entering the primary seal area. The standard vapor seal tip fits vertically with the shell. Seals designed with horizontal tips will not flip in union causing compliance problems and more internal moisture.
5. The double seal is designed for a tight fit to prevent vapor loss. Reduced vapor loss resulting in fewer odour problems and offering a cost-effective way of complying with air quality standards.
6. A continuous fabric is installed as a vapor barrier to eliminate possible vapor leakage that occurs in bolted support plate construction. Fabric can be replaced on the underside on the top side of the support plates, depending on inspection requirements and exposure issues.
7. Can be used in almost all service conditions up to 100% aromatics.
8. Easy access for visual inspection.
9. Can be paired with all double seal types.
10. Enhanced safety by reducing free hydrocarbons above the seal.
11. Irregularly shaped tank shells can be accommodated.
12. Includes seal stand-off wheels to protect against misaligned tank shells.

### DESCRIPTION

The D-Series double seal applies compression-plate technology to both the primary and the secondary seal elements. Construction is as shown overhead and it should be noted that an option using a flexible membrane sheet is available with the double seal. Shell contact is by an extruded polymer tip attached to the upper edge of the secondary seal elements and to the lower edge of the primary seal elements. The polymer will be selected to meet the needs of the particular application and to withstand abrasion from the tank shell and attack from the weather. It is also suitable for use in MBIE service. This lower, primary element seal tip is normally just above the stored liquid level. For highly volatile products such as gasoline or for dangerous substances such as benzene we recommend the addition of a skirt of lightweight impervious shielding which is attached to the lower seal tip and, being weightless, drops into the stored liquid. This has the effect of enhancing the sealing efficiency in areas where seal tip to shell contact is less than perfect due to protruding welds, severe corrosion of shell plates etc.

### REGULATORY COMPLIANCE

ATECO Tank Engineering seals meet or exceed the allowable gap requirements set forth by the governmental and regulatory agencies throughout the universe. This design will show superior sealing ability throughout the roof travel accounting for roof shifting, out of roundness, buckling, and the expansion and contraction requirement of each tank.

### GUARANTEE

ATECO TANK warrants its seals to be free from defects in the material and workmanship for a period of two years. Our liability under any express or implied warranty is limited to the purchase price of any part found defective. Any seal systems installed by ATECO TANK TECHNOLOGY ENGINEERING SERVICE will have an additional two-year warranty.
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DOUBLE SEAL - DUAL WIPER LIP ATC-D300

BASIC INFORMATION

TYPE: Double Seal
DESCRIPTION: Rim Mounted Compression Plate Type Double Seal
USED ON: External Floating Roof Tanks
RIM SPACE: Up to 250 mm Nominal, Values of Excess to this require modifications to the Pontoone rim
SERVICE: Suitable for All Products With Correct Material Selection
API COMPLIANT: Yes
CODERES COMPLIANT: Yes
API 2008 COMPLIANT: Yes
AROMATIC SERVICE: 95%+%
TYPICAL SERVICE LIFE: 15-25 years
WEIGHT: 25 Kg/m2 (Typical Based On 200 mm Rim Space)

ADVANTAGES
1. The double seal can be installed while the tank remains in service, since no hot work is required.
2. Independent overlapping support plates, bolted together, produces greater flexing in the seal to accommodate shell deformities.
3. The extruded seal tip is highly abrasion resistant and can be used in most services, resulting in a long life for a long-term maintenance free operation. Alternative seal tips are available for lap welded and riveted tanks.
4. The double seal design diverts most rainwater from entering the primary seal area. The standard vapor seal tip fits vertical with the seal. Seals with horizontal tips will not slip in union causing compliance problems and more internal moisture.
5. The double seal is designed for a tight fit to prevent vapor loss. Reduced vapor loss resulting in fewer odor problems and offering a cost-effective way of complying with air quality standards.
6. A continuous fabric is installed as a vapor barrier to eliminate possible vapor leakage that occurs in bolted support plate construction. Fabric can be replaced on underside or on the top side of the support plates, depending on inspection requirements and/or exposure issues.
7. Can be used in almost all service conditions up to 100% aromatics.
8. Easy access for visual inspection.
9. Can be paired with all double seal types.
10. Enhanced safety by reduced free hydrocarbons above the seal.
11. Irregularly shaped tank shells can be accommodated.
12. Includes seal stand-off wheels to protect against malformed tank shells.

DESIGN
ATECO's Vapor Seal Follows an established industry design that has a proven record of service life and seal integrity. Design criteria:
1. Forms a vapor tight seal between the floating roof and tank shell wall meeting the radial variation of ±0.25 inches.
2. These can be installed while the tank remains in service. No hot work is required.
3. Operate independently and without interfering with the primary seal.
4. Designed to accommodate roof movement, shell defects, contraction, and expansion.

KEY COMPONENT MATERIAL

<table>
<thead>
<tr>
<th>NO</th>
<th>PART NUMBER</th>
<th>MATERIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PRIMARY COMPRESSION PLATES</td>
<td>1.6mm Galvanised Steel or 1.5mm/1.2mm Stainless Steel</td>
</tr>
<tr>
<td>2</td>
<td>RIM PROFILE</td>
<td>Polyethylene</td>
</tr>
<tr>
<td>3</td>
<td>VOLARA TAPE</td>
<td>Galvanised or Stainless Steel</td>
</tr>
<tr>
<td>4</td>
<td>CHANNEL CLAMP BARS</td>
<td>Galvanised or Stainless Steel</td>
</tr>
<tr>
<td>5</td>
<td>M10 X 30 BOLT</td>
<td>Galvanised or Stainless Steel</td>
</tr>
<tr>
<td>6</td>
<td>COMPRESSION PLATES</td>
<td>1.6mm Galvanised Steel or 1.5mm/1.2mm Stainless Steel</td>
</tr>
<tr>
<td>7</td>
<td>VAPOUR BARRIER MEMBRANE/SKIRT</td>
<td>Polyurethane on PVC, Nitrile, PTFE/Glass, Viton/Nylon</td>
</tr>
<tr>
<td>8</td>
<td>VAPOUR BARRIER MEMBRANE</td>
<td>Polyurethane on PVC, Nitrile, PTFE/Glass, Viton/Nylon</td>
</tr>
<tr>
<td>9</td>
<td>WIPER</td>
<td>Nitrile Rubber Extrusion</td>
</tr>
<tr>
<td>10</td>
<td>SHUNT</td>
<td>300 Series Stainless Steel</td>
</tr>
<tr>
<td>11</td>
<td>SKIRT WEIGHTS</td>
<td>Carbon Steel</td>
</tr>
<tr>
<td>12</td>
<td>ANTI HING</td>
<td>Galvanised or Stainless Steel</td>
</tr>
</tbody>
</table>

DESCRIPTION

The D-Series double seal applies compression plate technology to both the primary and the secondary seal elements. Construction is as shown overleaf and it should be noted that an option using a flexible membrane sheet is available with the double seal. Shell contact is by an extruded polymer lip attached to the upper edge of the secondary seal elements and to the lower edge of the primary seal elements. The polymer will be selected to meet the needs of the particular application and to withstand abrasion from the tank shell and attack from the weather. It is also suitable for use in MTBE service. The lower, primary element seal lip is normally just above the stored liquid level. For highly volatile products such as gasoline or for dangerous substances such as benzene we recommend the addition of a skirt of light impermeable sheeting which is attached to the lower seal lip and being weighted down into the stored liquid. This has the effect of enhancing the sealing efficiency in areas where seal lip to shell contact is less than perfect due to protruding welds, severe corrosion of shell plates etc.

REGULATORY COMPLIANCE

ATECO Tank Engineering seals meet or exceed the allowable gap requirements set forth by the governmental and regulatory agencies throughout the universe. This design will show superior sealing ability throughout the roof travel, accounting for roof shifting, out of roundness, buckling, and the expansion and contraction requirement of each tank.

GUARANTEE

ATECO TANK warrants its seals to be free from defects in the material and workmanship for a period of two years. Our liability under any express or implied warranty is limited to the purchaser price of any part found defective. Any seal systems installed by ATECO TANK TECHNOLOGY ENGINEERING SERVICE will have an additional two-year warranty.
GLOBAL SOLUTIONS FOR FLOATING ROOF STORAGE TANKS

LOW PROFILE SECONDARY SEAL LPS SERIES P-LPS-01

ADVANTAGES
1. Seal system sits at 10’ above floating roof on normal 8” rim space. This allows an additional 16’ of storage capacity.
2. A continuous fabric is installed as a vapor barrier to eliminate possible vapor leakage that occurs in bolted support plate construction. Fabric can be replaced on underside or on the top side of the support plates, depending on inspection requirements and/or exposure issues.
3. The secondary seal is designed for a tight fit to prevent vapor loss.
4. The extruded seal tip is highly abrasion resistant and can be used in most services, resulting in a long life for a long-term maintenance free operation. Alternative seal tips for lap welded and riveted tanks.
5. Low Profile – increases storage tank capacity by increasing the maximum floating roof operating height.
6. Wiper Tip - compatible with all stored products.
7. Water Shedding Ability – water will not collect on vapor barrier fabric but will drain off the seal surface.
8. Water Tight – keeps rainwater out of product, greatly decreases the amount of rainwater or moisture entering tank, therefore reducing water contamination.
10. Easy Vapor Barrier Replacement – fabric is pre-punched for ease installation with tank in service.
11. Light Weight – compared to other external secondary seals, ease installation also with the tank in service.
12. Long Service Life
13. Stainless Steel Construction

KEY COMPONENT MATERIAL

<table>
<thead>
<tr>
<th>SERIAL NO.</th>
<th>KEY NUMBER</th>
<th>MATERIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>COMPRESSION PLATES</td>
<td>1.6mm Galvanised Steel or 1.5mm/1.2mm Stainless Steel</td>
</tr>
<tr>
<td>2</td>
<td>WIPER</td>
<td>Nitrile Rubber Extrusion</td>
</tr>
<tr>
<td>3</td>
<td>VAPOUR BARRIER MEMBRANE</td>
<td>PVC, Teflon, PTFE/Glass, Viton/Nylon</td>
</tr>
<tr>
<td>4</td>
<td>SHUNT</td>
<td>300 Series Stainless Steel</td>
</tr>
<tr>
<td>5</td>
<td>CHANNEL CLAMP BARS</td>
<td>Galvanized or Stainless Steel</td>
</tr>
<tr>
<td>6</td>
<td>PRIMARY VAPOUR BARRIER MEMBRANE</td>
<td>PVC, Teflon, PTFE/Glass, Viton/Nylon</td>
</tr>
</tbody>
</table>

GUARANTEE
ATECO TANK warrants its seals to be free from defects in the material and workmanship for a period of two years. Our liability under any express or implied warranty is limited to the purchase price of any part found defective. Any seal systems installed by ATECO TANK TECHNOLOGY ENGINEERING SERVICE will have an additional two-year warranty.

The ATECO Low Profile Secondary Seal is specifically designed to enable tank owners to maximize the operation of their storage tanks. With its extremely low profile, this seal increases the capacity of a floating roof tank thus increasing the operating efficiency and allowing tank owners to maintain competitiveness and profitability.

The Low Profile Secondary Seals advanced materials of construction provides both a long-lasting operational life and compatibility with any product normally stored in floating roof tanks, including crude oil, benzene, naphtha, methanol, columns, TAME and MTBE. Its unique construction combines unsurpassed vapor sealing ability with exceptional water shedding capabilities, greatly reducing the amount of rainwater entering the product.

For this reason ATECO has modified a compression plate seal to achieve in a minimal elevation from the rim for the secondary seal (ATEC-P-LPS-01=Low Profile), and to allow the tank to be filled to a maximum level as before fitting the secondary seal. This by fitting a secondary seal on the basis of compression springs that penetrate the rim space, and allow a seal elevation of app 150 mm / 200 mm higher than the rim construction of the floating roof. Connecting the seal to the rim of the floating roof allows the seal to operate independent from the primary seal, which is a requirement by virtually all environmental codes.

The seal compression springs are covered with a weather and hydrocarbon resistant and static ATECO PTFE (Teflon®) ATECOTM68 vapour fabric, supported by leaf springs, and ensuring rainwater run off to the centre of the floating roof.

In cases where the primary seal would be replaced by a low rise shoe plate seal it is even possible to work with a low rise secondary seal elevation that is identical to the primary seal replaced. On this basis this low rise seal has now been approved by several major oil companies, and multiple tanks will be operating with this low rise secondary seal configuration throughout Unicore.
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TUBE LIQUID FILLED / BAG SEAL P-TB-01

**BASIC INFORMATION**

<table>
<thead>
<tr>
<th>TYPE</th>
<th>Primary Seal</th>
</tr>
</thead>
<tbody>
<tr>
<td>DESCRIPTION</td>
<td>Product Mounted Type Liquid Filled Primary Seal</td>
</tr>
<tr>
<td>USED ON</td>
<td>External Floating Roof Tanks</td>
</tr>
<tr>
<td>RIM SPACE</td>
<td>Nominal Rim Space up to 275mm</td>
</tr>
<tr>
<td>SERVICE</td>
<td>Suitable for All Products With Correct Material Selection</td>
</tr>
<tr>
<td>API 2005 COMPLIANT</td>
<td>Yes</td>
</tr>
<tr>
<td>CODES COMPLIANT</td>
<td>Yes</td>
</tr>
<tr>
<td>AROMATIC SERVICE</td>
<td>%75 or %80</td>
</tr>
<tr>
<td>TYPICAL SERVICE LIFE</td>
<td>10-15 years</td>
</tr>
<tr>
<td>WEIGHT</td>
<td>16 Kgs/m (Typical Based On 200 mm Rim Space)</td>
</tr>
</tbody>
</table>

The P-TB-01 is a liquid filled seal from ATECO and should be compared with the P-TB-00. The full range of floating roof tank sizes can be serviced and service in crude oil and diverse refined products is commonplace. Aromatics contents of up to 75% or 100% can be handled. The tube diameter can also be varied to meet a range of rim gap dimensions.

**ADVANTAGES**

1. Capable of compensating for tank shell distortion.
2. Product mounted and therefore in the highest efficiency category as defined in API Publication Chapter 19.
3. Soft sealing pressure against the tank shell.
4. May be attached to either a vertical or horizontal fixing point.
5. The tube may be filled with either kerosene, diesel fuel or water (this eliminates ever having to dispose of petroleum soaked foam).
6. The liquid seal literally circles the floating roof, finds and fills all the irregularities in the tank shell that metallic shoes or even soft foam cannot seal due to "bridging" when compressed.
7. The materials used in the construction are completely compatible with heated and unheated gasoline, benzene, crude oil (sweet and sour), 100% aromatic hydrocarbons, MTBE, etc.
8. More effective on riveted tanks than either metallic shoe seals or resilient foam seals.
9. Is not affected by temperature extremes.

**DESCRIPTION**

The P-TB-01 seal is similar to the P-TB-00 seal but has an additional component, an inner tube, and also differences in the metal support arrangements. Against the tank shell there is a scuffband of nylon fabric coated with an abrasion resistant polymer coating which prevents a ribbed surface to the shell. The scuffband is attached top and bottom by bolting in such a fashion that the lower portion of the scuffband is in contact with the stored liquid, i.e. product mounted.

Between the scuffband and the roof rim a tube of flexible polymer is inserted and filled with either kerosene or, if the local climate is extreme, a water/glycol mixture.

The filled tube exerts a hydraulic pressure outwards, holding the scuffband against the tank shell and so effecting a seal.

The scuffband and tube for this seal are supplied open ended which simplifies construction (no guidepods or rolling ladders etc. to negotiate).

** Replace Parts**

ATECO can also supply replacement parts and it may be possible to fit these from the roof topside.

**WeatherShield/Secondary Seal**

A Weathershield is almost essential with this type of seal; however even greater benefits can be obtained by fitting a secondary seal from the 5-Series range.

**REGULATORY COMPLIANCE**

ATECO Tank Engineering seals meet or exceed the allowable gap requirements set forth by the governmental and regulatory agencies throughout the universe. This design will show superior sealing ability throughout the roof travel accounting for roof shifting, out of roundness, buckling, and the expansion and contraction requirement of each tank.

**GUARANTEE**

ATECO TANK warrants its seals to be free from defects in the material and workmanship for a period of two years. Our liability under any express or implied warranty is limited to the purchase price of any part found defective. Any seal systems installed by ATECO TANK TECHNOLOGY ENGINEERING SERVICE will have an additional two-year warranty.

---

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FOAM GRAVER SEAL P-FG-01

**ADVANTAGES**

This seal is similar to the PFS-01 as both comprise tough, polymer-coated envelopes surrounding compressible polyurethane foam; however, in this case the foam is octagonal in cross-section.

The actual size of the foam is calculated from consideration of the nominal rim gap and shell deviations.

Movement of the foam in a vertical direction is controlled by internal hold-down plates. However, the foam is not fixed to the hold-down plates.

As with all foam seals a soft sealing pressure is exerted against the tank shell and, if the seal is product mounted, its efficiency is as high as possible as defined in API Chapter 19.

May be attached to either a vertical or horizontal fixing point.

**Disadvantages**

As with all foam seals the seal envelope can be subject to damage by sharp points on the tank shell leading to the tank contents coming into contact with the foam blocks causing seal failure. This may also occur if care is not taken when making the final point in the seal envelope.

**Installation/Maintenance**

Access is only required from the top of the roof which is advantageous in site conditions.

**Weathershield/Secondary Seal**

A weathershield is recommended to protect the seal; however, even greater benefits can be obtained by fitting a secondary seal from the S-Series range.

**REGULATORY COMPLIANCE**

ATECO Tank Engineering seals meet or exceed the allowable gap requirements set forth by the governmental and regulatory agencies throughout the universe. This design will show superior sealing ability throughout the roof travel accounting for roof shifting, out of roundness, buckling, and the expansion and contraction requirement of each tank.

**GUARANTEE**

ATECO TANK warrants its seals to be free from defects in the material and workmanship for a period of two years. Our liability under any express or implied warranty is limited to the purchaser price of any part found defective. Any seal systems installed by ATECO TECHNOLOGY ENGINEERING SERVICE will have an additional two-year warranty.
FOAM DELTOID SEAL P-FD-01

BASIC INFORMATION

TYPE: Primary Seal
DESCRIPTION: Product Mounted Type Foam Filled Primary Seal
USED ON: External Floating Roof Tanks or Internal Pan Deck Floating Roof Tanks
RIM SPACE: Nominal rim spaces of 125mm, 150mm, 200mm and 270mm
SERVICE: Suitable for All Products With Correct Material Selection
API COMPLIANT: Yes
CODES COMPLIANT: Yes
API 2003 COMPLIANT: Yes
AMORPHIC SERVICE: %100
TYPICAL SERVICE LIFE: 10-15 years
WEIGHT: 12 Kgs/m² (Typical Based On 200 mm Rim Space)

ADVANTAGES

This seal is similar to the P-FD-01 as both comprise tough, polymer coated envelopes surrounding compressible polyurethane foam; however, in this case the foam is octagonal in cross-section.

The actual size of the foam is calculated from consideration of the nominal rim gap and shell deviations.

Movement of the foam in a vertical direction is controlled by internal hold-down plates. However, the foam is not fixed to the hold-down plates.

As with all foam seals a soft sealing pressure is exerted against the tank shell and, if the seal is product mounted, its efficiency is as high as possible as defined in API Chapter 19.

May be attached to either a vertical or horizontal fixing point.

Disadvantages

As with all foam seals the seal envelope can be subject to damage by sharp points on the tank shell leading to the tank contents coming into contact with the foam blocks causing seal failure. This may also occur if care is not taken when making the final join in the seal envelope.

Vapour or Product Mounted Type Foam Filled Primary Seal

Safet Note:
Before carrying out hot work in any tank fitted with a foam seal, the seal should be removed to a safe place since its cellular structure may remain impregnated with hydrocarbons even after tank cleaning operations.

Installation/Maintenance
Access is only required from the top of the roof which is advantageous in site conditions.

Weathershield/Secondary Seal
A weathershield is recommended to protect the seal; however, even greater benefits can be obtained by fitting a secondary seal from the S-Series range.

REGULATORY COMPLIANCE
ATECO Tank Engineering Seals meet or exceed the allowable gap requirements set forth by the governmental and regulatory agencies throughout the universe. This design will show superior sealing ability throughout the roof travel, accounting for roof shifting, out of roundness, buckling, and the expansion and contraction requirement of each tank.

GUARANTEE
ATECO TANK warrants its seals to be free from defects in the material and workmanship for a period of two years. Our liability under any express or implied warranty is limited to the purchase price of any part found defective. Any seal systems installed by ATECO TANK TECHNOLOGY ENGINEERING SERVICE will have an additional two-year warranty.

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ATECO TANK TECHNOLOGIES ENGINEERING SERVICES CO.
www.atecotank.com - info@atecotank.com

FOAM SEAL P-FS-01

- **Basic Information**
  - **Type:** Primary Seal
  - **Description:** Vapour Mounted Type Foam Filled Primary Seal
  - **Used On:** External Floating Roof Tanks
  - **Rim Space:** Nominal rim spaces of 300mm
  - **Service:** Suitable for all products with correct material selection
  - **API Compliant:** Yes
  - **CDDS Compliant:** Yes
  - **API 2003 Compliant:** Yes
  - **Aromatic Service:** 90% 100%
  - **Typical Service Life:** 10-15 years
  - **Weight:** 11 Kg/m³ (Typical Based On 200 mm Rim Space)

FOAM SEAL P-FS-02

- **Basic Information**
  - **Type:** Primary Seal
  - **Description:** Vapour Or Product Mounted Type Foam Filled Primary Seal
  - **Used On:** External Floating Roof Tanks or Internal Pan Deck Floating Roof Tanks
  - **Rim Space:** Nominal rim spaces of 115mm, 140mm
  - **Service:** Suitable for all products with correct material selection
  - **API Compliant:** Yes
  - **CDDS Compliant:** Yes
  - **API 2003 Compliant:** Yes
  - **Aromatic Service:** 90% 100%
  - **Typical Service Life:** 10-15 years
  - **Weight:** 7 Kg/m³ (Typical Based On 200 mm Rim Space)

FOAM SEAL P-FS-03

- **Basic Information**
  - **Type:** Primary Seal
  - **Description:** Product Mounted Type Foam Filled Primary Seal
  - **Used On:** External Floating Roof Tanks
  - **Rim Space:** Nominal rim spaces of 203mm
  - **Service:** Suitable for all products with correct material selection
  - **API Compliant:** Yes
  - **CDDS Compliant:** Yes
  - **API 2003 Compliant:** Yes
  - **Aromatic Service:** 90% 100%
  - **Typical Service Life:** 10-15 years
  - **Weight:** 20 Kg/m³ (Typical Based On 200 mm Rim Space)

**Advantages**

This seal is similar to the P-FS-00 as both comprise tough, polymer coated envelopes surrounding compressible polyurethane foam; however, in this case the foam is octagonal in cross section.

The actual size of the foam is calculated from consideration of the nominal rim gap and shell deviations.

Movement of the foam in a vertical direction is controlled by internal hold-down plates. However, the foam is not fixed to the hold-down plates.

As with all foam seals a soft sealing pressure is exerted against the tank shell and, if the seal is product mounted, its efficiency is as high as possible as defined in API Chapter 19.

May be attached to either a vertical or horizontal fixing point.

**Disadvantages**

As with all foam seals the seal envelope can be subject to damage by sharp points on the tank shell leading to the tank contents coming into contact with the foam blocks causing seal failure. This may also occur if care is not taken when making the final joint in the seal envelope.

**Installation/Maintenance**

Access is only required from the top of the roof which is advantageous in site conditions.

**Weathershield/Secondary Seal**

A weathershield is recommended to protect the seal however, even greater benefits can be obtained by fitting a secondary seal from the S Series range.
INTEGRAL FOAM DAM FD-01

**BASIC INFORMATION**
- **TYPE**: Foam Dam
- **DIMENSION**: Rim Mounted Integral Type Foam Dam
- **USED ON**: External Floating Roof Tanks
- **RIM SPACE**: N/A
- **SERVICE**: N/A
- **API 2003**: Yes
- **CODERS**: Yes
- **AROMATIC SERVICE**: -
- **TYPICAL SERVICE LIFE**: 20-25 years
- **WEIGHT**: 12 Kgs/m² (Typical Based On 200 mm Rim Space)

** Major Benefits of the Integral Foam Dam**
The integral foam dam does not contact the pontoon top staging; thus the opportunity for deck corrosion is avoided.

**Any future repairs or replacement of an integral foam dam can be carried out purely by cold working methods.**

**When secondary seal is fitted, increasing the height of the foam dam may be desirable. This is readily achieved without welding.**

**Generally, the impounded volume of the integral foam dam will be smaller than that of a conventional, welded, foam dam, resulting in reduced filling time.**

**Our normal material of construction is 1.5mm thick aluclad which has excellent corrosion properties and has a higher temperature resistance than zinc coatings. Construction in thicker material is also available.**

**The illustrations show our S-Series secondary seal system, however the integral foam dam can be used over any seal type.**

**Advantages**
- Ease of installation.
- No hot work required.
- Reduced foam requirement.
- Designed to meet NFPA regulations.
- May be fitted above any conventional rim mounted Secondary Seal.
- May be attached to either a vertical or horizontal fixing point.

---

**DATASHEET ATECO PTFE FABRIC T = 0.25 ANTI-STATIC SPECIFICATION**

<table>
<thead>
<tr>
<th>PROPERTY</th>
<th>STANDARD</th>
<th>VALUE</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Available width</td>
<td>Max. 1500mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fabric Inlay</td>
<td>PTFE Inlay</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inlay material</td>
<td>Glass</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hardness</td>
<td>80 Shore A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>DIN EN 51505</td>
<td>2.23</td>
<td>g/100cm²</td>
</tr>
<tr>
<td>Minimum Service Temp.</td>
<td>-160 °C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Service Temp.</td>
<td>-50 °C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electric resistance</td>
<td>ASTM D27-98</td>
<td>≤ 10.5</td>
<td>Ω/cm²</td>
</tr>
</tbody>
</table>

**DATASHEET ATECO PVC/NBR FABRIC SPECIFICATIONS**

<table>
<thead>
<tr>
<th>PROPERTY</th>
<th>STANDARD</th>
<th>VALUE</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>3.1 Kg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adhesion after Fuel Aging**</td>
<td>100 Newtons</td>
<td>/25 mm</td>
<td></td>
</tr>
<tr>
<td>Tensile Strength after Fuel Aging**</td>
<td>1000 Newtons</td>
<td>/25 mm</td>
<td></td>
</tr>
<tr>
<td>Tensile Strength</td>
<td>1150 Newtons</td>
<td>/25 mm</td>
<td></td>
</tr>
<tr>
<td>Temperature Swelling (STMP)***</td>
<td>30% maximum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vapour Permeability</td>
<td>12 gms/50 Mic / h</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resistance (Zenith D518 50g/cm² 0.2mm thick)</td>
<td>No cracks after 7 days at 3 x magnification</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recommended Aromatic Service</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(i) Vapour</td>
<td>%100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ii) Liquid</td>
<td>%75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recommended Operating Temperature</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(i) Minimum</td>
<td>-10 C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(ii) Maximum</td>
<td>75 C</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Characteristics:**
- Suitable for reformates and all hydrocarbons and chemicals.
- Outstanding heat and cold resistance (from -70°C to +100°C).
- Low penetration rate.
- Excellent chemical resistance.
- High dielectric strength.
- Dimensional stability.
- Resistance to UV, IR and HF.
- Non-toxic and anti-static quality.
- Fireproof material.
### Numerical Classification of Current Atecoflex Seal Specifications

#### Continuous Seals

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>AF 100</td>
<td>Neoprene Anti-Static Continuous Seal, Asbestos Reinforced 3.2 mm</td>
<td>Use in vapours up to 85% Aromatics</td>
</tr>
<tr>
<td>AF 101</td>
<td>Neoprene Standard Continuous Seal, Asbestos Reinforced 3.2 mm</td>
<td>Use in vapours up to 85% Aromatics</td>
</tr>
<tr>
<td>AF 102</td>
<td>Neoprene Standard Continuous Seal, Asbestos Reinforced 5.4 mm</td>
<td>Use in vapours up to 85% Aromatics</td>
</tr>
<tr>
<td>AF 200</td>
<td>P.V.C. Continuous Seal, Nylon Reinforced 1.6 mm</td>
<td>Use in vapours up to 100% Aromatics</td>
</tr>
<tr>
<td>AF 300</td>
<td>P.V.C./Nitrile Standard Continuous Seal, Asbestos Reinforced 3.2 mm</td>
<td>Use in vapours up to 100% Aromatics</td>
</tr>
<tr>
<td>AF 301</td>
<td>P.V.C./Nitrile Standard Continuous Seal, Asbestos Reinforced 2.4 mm</td>
<td>Use in vapours up to 100% Aromatics</td>
</tr>
<tr>
<td>AF 302</td>
<td>P.V.C./Nitrile Standard Continuous Gasket Type Seal, Glass-Asbestos Reinforced 2.4 mm</td>
<td>Liquids up to 94% Aromatics</td>
</tr>
<tr>
<td>AF 103</td>
<td>Neoprene/Nylon Primary Seal 1.6 mm</td>
<td>Use in vapours up to 85% Aromatics</td>
</tr>
<tr>
<td>AF 104</td>
<td>Neoprene Standard Continuous Seal, Asbestos Reinforced 2.4 mm, Anti-Static</td>
<td>Use in vapours up to 85% Aromatics</td>
</tr>
<tr>
<td>AF 400</td>
<td>Viton Continuous Seal</td>
<td>Use in vapours and liquids up to 100% Aromatics</td>
</tr>
<tr>
<td>AF 405</td>
<td>Neoprene Continuous Seal, Asbestos Reinforced 2.4 mm</td>
<td>Use in vapours up to 85% Aromatics</td>
</tr>
<tr>
<td>AF 303</td>
<td>P.V.C./Nitrile Continuous Seal Fibreglass Reinforced 1.6 mm</td>
<td>Use in vapours up to 100% Aromatics</td>
</tr>
<tr>
<td>AF 304</td>
<td>P.V.C. Nitrile/Nylon Reinforced 2.4 mm thick for up to 100% Aromatic Vapours</td>
<td></td>
</tr>
</tbody>
</table>

#### Secondary Seals

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>AF 106</td>
<td>Neoprene Standard Secondary Seal, Non-Reinforced 2.4 mm</td>
<td>Use in vapours up to 85% Aromatics</td>
</tr>
<tr>
<td>AF 107</td>
<td>Neoprene Standard Secondary Seal, Cotton Reinforced 3.2 mm</td>
<td>Use in vapours up to 85% Aromatics</td>
</tr>
<tr>
<td>AF 305</td>
<td>P.V.C./Nitrile Standard Secondary Seal, Non-Reinforced 2.4 mm</td>
<td>Use in vapours up to 100% Aromatics</td>
</tr>
<tr>
<td>AF 308</td>
<td>Neoprene Anti-Static Secondary Seal Cotton Reinforced 3.2 mm</td>
<td>Use in vapours up to 100% Aromatics</td>
</tr>
<tr>
<td>AF 306</td>
<td>P.V.C./Nitrile Standard Secondary Seal, Cotton Reinforced 3.2 mm, 100% Aromatic Vapours</td>
<td>Use in vapours up to 100% Aromatics</td>
</tr>
</tbody>
</table>

#### Second Shoe Seals

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>AF 106</td>
<td>Neoprene Second-Shoe Seal, Glass Reinforced 1.6 mm</td>
<td>Use in vapours up to 85% Aromatics</td>
</tr>
<tr>
<td>AF 106</td>
<td>P.V.C./Nitrile Standard Seal, Continuous Gasket Type Seal, Glass/Asbestos Reinforced 2.4 mm</td>
<td>Use in vapours up to 100% Aromatics</td>
</tr>
</tbody>
</table>

#### Liquid Filled Seals

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>AF 106</td>
<td>Nitrile Fabric Seal, Nylon Reinforced</td>
<td>100% Aromatic Liquids</td>
</tr>
<tr>
<td>AF 106</td>
<td>P.V.C./Nitrile Fabric Seal, Nylon Reinforced</td>
<td>40% Aromatic Liquids</td>
</tr>
<tr>
<td>AF 106</td>
<td>Nitrile Fabric Seal, with liner, nylon reinforced</td>
<td>85% Aromatic Liquids</td>
</tr>
<tr>
<td>AF 106</td>
<td>P.V.C./Nitrile Graver Liquid Filled Seal</td>
<td>85% Aromatic Liquids</td>
</tr>
<tr>
<td>AF 106</td>
<td>P.V.C./Nitrile Tube Seal, Scuff Band</td>
<td>85% Aromatic Liquids</td>
</tr>
<tr>
<td>AF 106</td>
<td>P.V.C./Nitrile Tube Seal, Tube</td>
<td>85% Aromatic Liquids</td>
</tr>
</tbody>
</table>

**Note:** The filling liquid must be Kerosene or a similar low aromatic liquid.

#### Foam Filled Seals

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>AF 106</td>
<td>Polyurethane Foam Filled Seal</td>
<td>100% Aromatic Liquid</td>
</tr>
<tr>
<td>AF 106</td>
<td>P.V.C./Nitrile Foam Filled Seal</td>
<td>85% Aromatic Liquid</td>
</tr>
<tr>
<td>AF 106</td>
<td>Polyurethane Everseal Foam Seal</td>
<td>100% Aromatic Liquid</td>
</tr>
<tr>
<td>AF 106</td>
<td>P.V.C./Nitrile Everseal Foam Seal</td>
<td>5% Aromatic Liquid</td>
</tr>
<tr>
<td>AF 106</td>
<td>Polyurethane Gravers Foam Filled Seal</td>
<td>100% Aromatic Liquid</td>
</tr>
<tr>
<td>AF 106</td>
<td>P.V.C./Nitrile Gravers Foam Filled Seal</td>
<td>85% Aromatic Liquid</td>
</tr>
<tr>
<td>AF 106</td>
<td>Polyurethane Seal</td>
<td>100% Aromatic Liquid</td>
</tr>
<tr>
<td>AF 106</td>
<td>Polyurethane Delcol Seal</td>
<td>100% Aromatic Liquid</td>
</tr>
<tr>
<td>AF 106</td>
<td>Polyurethane Coated Nylon for all types of Foam Seal</td>
<td>100% Aromatic Liquid</td>
</tr>
<tr>
<td>AF 106</td>
<td>Polyurethane Coated Nylon material for general use</td>
<td>100% Aromatic Liquid</td>
</tr>
</tbody>
</table>

We reserve the right to change specifications on items described in this publication without prior notice.