



TECHNICAL SPECIFICATION

ATC.TS.200.101

SPECIFICATIONS FOR HONEYCOMB INTERNAL FLOATING ROOF

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Application Regular Hydrocarbon

ALUMAX-HEXCORE

FULL CONTACT TYPE INTERNAL FLOATING ROOF

SPECIFICATIONS FOR HONEYCOMB INTERNAL FLOATING ROOF


ATC.TS.20.101

REV.0

29.03.2012

KOCAELI-TURKEY

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REVISIONS					

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GENERAL

Especially developed for the petroleum and Petro-chemical industry, this internal floating roof for fixed roof tanks is either aluminium or stainless steel or a combination of both will reduce significantly vapor losses from storage tanks by around %95-%98 depending on the stored product and other operational factors.

ALUMAX-HEXCORE complies with the following standards: API 650, App. H.

ALUMAX-HEXCORE is worldwide the only INTERNAL ALUMINIUM FLOATING ROOF that also complies with the standards, safety regulations and emissions control legislation in force in EPA and EUROPEAN NORMS.

In addition to the industrial safety afforded by equipping tanks containing a wide variety of petroleum products with **ALUMAX-HEXCORE** internal floating roofs, attention has also been given to features that make the floating cover more effective, such as:

Specifications of **ALUMAX-HEXCORE** Full Contact roof type (IFR)

The ATECO Honeycomb (**ALUMAX-HEXCORE**) Full Contact IFR modules are seal welded and pressure-tested at our factory prior to shipment. Our design eliminates the frequent leaks associated with designs which use an adhesive to bond the enclosures, penetration frames and support legs. A test port seal-welded in each panel allows field testing of panels. If the modules are field tested, hot work permits can be written with confidence, knowing that each tested module is vapour free

All appurtenances, such as legs, column wells, anti-rotation guides, etc. are welded into the honeycomb modules and each assembly is pressure-tested at our factory, ensuring that leak free assemblies are shipped to your jobsite

Seal welding of our modules and all appurtenances eliminates compatibility issues associated with exposed adhesives

Seal welding eliminates the need for the field crew to apply adhesives to dirtied materials in an uncontrolled environment which can nearly assure improper adhesion and failure of the adhesive to provide a leak free joint

State-of-the-art welding technology and heavy duty material selections maintain the high quality required by ATECO

The **ALUMAX-HEXCORE** Full Contact IFR modules use 1 mm skins, almost three times as thick as recommended by API and provided by other vendors. This eliminates the punctures caused during handling, shipping and installation, and increases the strength factor of safety and corrosion allowance. The patented hook and pin design interlocks the modules, providing a strong connection which will not become submerged under live loads. This arrangement also eliminates gaps between modules and the resultant exposed product which is directly exposed to and can attack the sealant in the battens

1500 x 3000 or 1250 x 2500 modules minimize the number of seams as compared to other designs

100% pre-fabrication of all modules and components eliminates field cutting and gluing of perimeter modules, penetration panels for legs, columns, etc and ensures quality of the product.

The total **ALUMAX-HEXCORE** modules can be preferably shipped on eight (X) numbers of 45ft HC containers, and we have foreseen to unload the containers directly after the arrival on site.


ENGINEERING

Each ATECO **ALUMAX-HEXCORE** Full Contact Floating Roof is designed specifically for each individual tank under the supervision of a registered Professional engineer. We use the latest Autocad software and proprietary design softwares to ensure a complete, proper installation.

ATECO is continually investing in new computer hardware and software to take advantage of the latest Technologies. Because we design each IFR for a particular application, we are able to resolve particular needs or special circumstances which may arise.

Each ATECO **ALUMAX-HEXCORE** Full Contact Floating Roof is designed to be in compliance with API 650, Appendix -H and New Source Performance Standards, where applicable, and Aluminium Association Specifications.

A complete set of specific drawings is provided with each ATECO **ALUMAX-HEXCORE** Full Contact Floating Roof. Electronic copies of drawings are available upon request.

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FABRICATION

The ATECO **ALUMAX-HEXCORE** Full Contact Floating Roof IFR is completely prefabricated at our plant in Kocaeli-TURKEY. Prefabrication of components speeds

Installation time and helps to ensure the quality of the final installation.

All panels and accessories are seal welded and pressure tested at our fabrication at our plant by certified welders following qualified weld procedures, testing and quality control procedures. Quality is maintained by using state of art semi-automatic welding machines.


ATECO has complete control over the scheduling , fabrication, quality control and shipping of your ATECO **ALUMAX-HEXCORE** Full Contact Floating Roof. We are able to adjust schedules in order meet customer delivery requirements. ATECO has an excellent reputation for meeting delivery commitments.

DESIGN ADVANTAGES OF THE ATECO **ALUMAX-HEXCORE** FULL CONTACT FLOATING ROOF.

- Eliminates the vapor space between the floating roof and the product surface.
- Honeycomb panel enclosures are welded to the panel , eliminating possible adhesive failure.
- Surface panel material is 2 ½" times heavier than the API minimum requirement.
- Provides between %500 and %1100 excess flotation of the total dead weight of the floating roof
- Can be used as an outdoor oil water separator cover.

And

- FULLY WELDED MODULES.
- 1 mm THICK PANEL SKINS.
- %500 EXCESS BUOYANCY
- PATENTED SHOE SEAL
- NO EXPOSED ADHESIVE
- "VAPOUR-STOP" JOINTS.
- COMPLETELY SHOP FABRICATED.
- MAXIMIZED SURFACE CONTACT
- POSITIVE STATIC BONDING

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SPECIFICATION SCOPE


The roof shall be full-surface contact type designed to eliminate the presence of air-vapor mixture under the floating roof and shall meet these specifications and the intent of the latest edition of API Standard 650,-Appendix H

MATERIAL : GENERAL COMPONENTS & MATERIAL PROPERTIES / ATECO ALUMAX-HEXCORE Full Contact Floating Roof IFR

All material used in manufacture of the ATECO contact ifr will be new, first quality materials manufactured and fabricated in accordance with applicable government and industry specifications.

PART/ITEM	Dimensions / Thickness / Size	Material Description	
		AA Code	EN Code
ROOF PANEL			
Panel Type	Honeycomb Panel		
Configuration	Flat Rectangular 1-1/2"		
Core Material	Aluminium foil	AL3003	
Core Configuration	1" Hexagonal Cells 0.003" (0.050-0.060 mm)		
Skin Material	3003-H16 or H26	AL3003 or AL5052	
Skin Thickness	0.016"(0.5 mm) or (0.040" inch (1 mm)		
Core-to Skin Bond	Heat Cured Epoxy	MB101	
Size, approximate	up to 60" - 120"		
Test Plug	Hex Head Sealing Bolt M10 with Teflon O-Ring	SS18-8	
STRUCTURES			
Panel Modul Closure	Custom Extrusion	AL6061	
Rim Profile	Custom Extrusion 0.098 inch (2.5 mm)	AL6061	
LEGS			
Leg Profile	Tube 1 1/2" Diameter x 2 mm wall thickness	AL6061-T6 or AL6063-T6	
Leg Sleeve	Tube 2" Sch40	AL6061	
Leg Sleeve Reinforcing Plates	Sheet - 3 mm	AL5052	
Leg Isolation Pad	Custom Molded	ABS or TEFLON	
Support Cables	Wire Rope 6 mm	SS304	
Cable Attachment Plates	Sheet - 2 mm	SS304	
Wire Rope Thimble	Thimble - Thin pattern aircraft	SS304	
Wire Rope Clip	U-Bolt and Saddle Type	SS304	
Stop Sleeve	Compression Sleeve - 5 mm Crimp-On	Tin Plated Copper	
WELLS & APPURTENANCES			
Sheet for Wells and Appurtenances	Formed Sheet - 2.5 mm		
Gasket for Wells and Appurtenances	Extruded Bulb	NBR or EPDM	
MECHANICAL SHOE SEAL			
Shoe	Formed Sheet - 1.2 mm	SS304	
Shoe Seal Spring	Formed Hardened Strip	SS301	
Gasket	Continuous Strip - 3 mm	Volara - PE	
Shoe Seal Vapor Barrier	380 mm x 0.23/0.3 mm	Teflon	
Shoe Seal Support Bracket	Formed Sheet - 2.5 mm	AL5052	
Fabric Clamp	Custom Extrusion	AL6061	
Seal Clamp % Fabric Clamps	Custom Extrusion	AL6061	
WIPER SEALS			
Wiper Seal	12" Wide Closed Cell Wiper	Urethane	
Secondary Seal Riser	6" High or 9" high custom extrusion	AL6063 or AL606	
Seal Clamp	Custom Extrusion	AL6061	
FASTENERS			
Support Leg Pin Bolt	10 mm Hex Head	SS18-8	
Module Clamp-to-Clamp Bolt	6 mm Hex head	SS18-8	
Accessory and other Bolts	6 mm Hex Head	SS18-8	
Nuts	8 mm x 10 mm Hex Head	AL6061	
Bolt and Nut to the Shoe Seal shoe	8 mm Hex Head	SS18-8	

The above are Standard material specifications and may be changed to meet Project specifications and/or material compatibility. All thickness are nominal. Subject to change without notification.

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DESIGN

The roof and accessories shall be so designed as to allow the internal floating roof to operate throughout its normal travel without manual attention and without damage to any part of the tank or floating roof.

The roof shall be designed and built to float and rest in a reasonably horizontal pattern.

All basic components, except for the seal materials, are to be metal. For jet fuel service all metal parts in contact with the product shall be aluminum or stainless steel.

The internal floating roof shall be designed to safely support at least two men (500 pounds over one square foot) walking anywhere on the roof while the roof is floating or resting on its supports, without damaging the floating roof and without allowing product on the roof. For floating roofs less than 30 feet in diameter this criteria is reduced to 250 pounds over one square foot.

The floating roof shall be naturally buoyant and provide buoyancy to support at least twice its dead weight, plus additional buoyancy to offset the calculated friction exerted by peripheral and penetration seals, and shall not sink if punctured anywhere. Buoyancy is based on a product with a specific gravity of 0.70.

Complete electrical continuity of the floating roof and the full surface of the liquid shall be provided, with surface resistance less than 0.000725 ohms per foot DC at 70E F.

Panels shall be joined together by means of a bolted and gasketed clamp and channel members bonded to the panel edge. The joint shall transmit the design loads without failure or leakage

STRUCTURE

Supporting structures and composite panels of the ATECO contact ifr are designed to ensure that all stresses fall within the acceptable limits for the material used when subjected to a load of 500 pounds on one square foot anywhere on the surface. The contact ifr is capable of supporting this load while landed on its legs and receiving no buoyancy from the panels.

The ATECO contact ifr has supporting legs which are adjustable from the topside while in service. Leg length Normally provides 2.0 of nominal headroom between tank bottom and the underside of contact ifr. The legs are adjustable to the desired operating level, which is normally between 3 and 4 feet.


The contact ifr is normally installed at the operating height.

BUDYANCY

The ATECO contact ifr provides between %500 and %1100 excess floatation of the total dead weight of the ifr. In addition, the ifr is designed to support 2 persons (total weight of 500 pounds) to walk side-by-side anywhere on the interior surface in or out of service. This criteria may be waived for roofs less than 30 feet in diameter subject to agreements by the purchaser.

SUPPORT LEG

- Legs to be 2-3/8" O.D. x .120" wall or equal aluminum, austenitic stainless steel or, galvanized.
- Floating roof shall be provided with two position legs: low position 36", and high position ranging from 75" to 79 1/4" depending on material. However, the low position can be preset to other heights.
- Changing high/low position must be accomplished from the top side of the floating roof and while the tank is in service. In addition the legs shall be completely removable from the top side of the floating roof, while in service if necessary.
- Each leg must be capable of vertical adjustment of +_ 3" in the event that the tank bottom settles after the tank is in service. Adjustment to be made from the top side of the floating roof while the tank is in service.
- Legs and attachments to be designed to support a uniform load of 12.5 lb. per sq. ft.
- Legs shall be self-draining (notched or perforated)

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SEAL

Peripheral and other seals are designed to remain in full contact with the mating tank components throughout the entire travel span of the contact ifr. Provisions can be made to ensure seal contact with the tank shell at points of irregularity such as bulges, out-of-roundness, or tank lean. Recommended seal materials will remain sufficiently resilient under operating conditions to maintain good contact and will not deteriorate under prolonged exposure to the product or its vapors.

- The space between the outer periphery of the floating roof and the tank shell shall be sealed by primary and secondary flexible sealing devices.
- The seals shall be flexible foam covered with coated fabric wrap, flexible wiper or mechanical shoe seal.
- All materials used as part of the seals shall be durable in the tank's environment, abrasion resistant and shall not discolor or contaminate the liquid stored.
- The seals shall be designed to accommodate ± 4 inches of local deviation between the floating roof and the shell.
- Flexible seal construction shall be such that the seal can be installed, removed and replaced by hand from the top of the floating roof.
- The primary vapor mounted seal shall function above the liquid level.
- The secondary seal is to be installed above the primary seal

PENETRATIONS

Columns, ladders, and other rigid vertical appurtenances that penetrate the floating roof shall have a vapor seal provided which will permit a local deviation of ± 5 inches. Appurtenances shall be plumb within a tolerance of 3 inches. Gasketed sliding cover plates, which are free to move with the appurtenance relative to the cover, shall be sized to allow the full movement without exposing product within the opening.

A rim shall be provided around the floating roof periphery and shall extend 6 inches minimum above the liquid to contain product turbulence. Columns, ladders, and other openings shall extend 6 inches above the liquid.

MANWAYS

Each ATECO contact ifr will be equipped with at least one rectangular, round or oval manway with an opening of at least 4" square feet for passage between the top and bottom of the contact ifr.

At least one 30-inch diameter manhole shall be provided for access to and ventilation of the tank when the roof is on its supports and the tank is empty. The cover shall be gasketed and bolted closed.

GAUGING

If required the floating roof shall have an 8" diameter opening for gauging from the tank roof. The opening is to be located directly below the gauge hatch on the tank roof. On the top side of the floating roof the opening shall have a flapper type seal and a 20" diameter funnel

Each ATECO contact ifr will can be equipped with a sealed opening for gauging purposes directly beneath the existing gauge hatch on the tank roof. A 14" funnel will guide the sampling/gauging device into the well.


AUTOMATIC TANK GAGE

If required the floating roof shall have a covered and gasketed float well for an automatic gage. The float well shall be a minimum of 24" diameter and provide sufficient clearance for the float. The gage tape shall be at least 24" in from the tank shell.

GROUNDING

The floating roof shall be electrically bonded to the tank. This shall be accomplished with flexible cables from the tank roof to the floating roof (minimum of two, uniformly distributed). They shall be 1/8-inch diameter stainless steel aircraft cable to insure strength, corrosion resistance, joint reliability, flexibility, and service life.

Each ATECO contact ifr will be electrically grounded to the tank by a minimum of two lines of standard 1/16" flexible stainless steel wire rope attached to the contact ifr at two widely separated points and to the tank roof. The entire contact ifr will be continuously conductive electrically except for the Perimeter seal to minimize the chance of static charges building up to sparking potential.

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ANTI-ROTATION

The floating roof shall be prevented from rotation by means of two (2) or more vertical cables firmly fixed to the tank roof and bottom. The cables shall pass through a stainless steel bushing mounted in the floating roof. The cables shall be 1/4-inch diameter stainless steel aircraft type and made taut by means of a turnbuckle. All cable fittings shall be Type 304 or 316 stainless steel. A guide pole with rollers may be used as an alternative means

Each ATECO contact ifr will be equipped with least two anti-rotation systems consisting of two stranded 3/16" flexible stainless steel wire rope cables and guides to prevent the contact ifr from rotating out of position during operation. Additional systems can be added for high turbulence applications. The cable is attached to the tank bottom with a stainless steel spring and a 4" diameter pad which is seal welded to the bottom.

VENTS

Floating Roof: A pressure/vacuum gasketed vent shall be provided on the floating roof to prevent over stressing of the floating roof or seal. This vent shall be adequate to evacuate air and gasses from underneath the roof when the roof is on its supports during filling operations. It shall also be adequate to release any vacuum generated underneath the roof after it settles on its supports during withdrawal operations. It shall not open while the roof is fully afloat due to pressure or vacuum.

Each ATECO contact ifr will be equipped with a pressure/vacuum vent which will open automatically to allow passage of air or vapor when necessary to relieve pressure. The vent will remain closed at all times except when the contact ifr is on its legs or during the actual transfer of product. It is designed to pass air or vapor at a flow rate greater than the prescribed fill rate.

Tank Shell: Peripheral circulation vents shall be located on the tank roof. The maximum spacing shall be 32 ft. but in no case shall there be less than four equally spaced vents. The total open area of these vents shall be equal to, or greater than 0.2 sq.ft. per foot of tank diameter. Vents shall be covered with rain hood and coarse screen.

Fixed Roof: An open vent shall be provided at the center or at the highest elevation of the fixed roof. It shall have a weather cover and a maximum open area of 50 sq.in.

Vent opening shall be covered with a coarse screen

Tank ventilators having a total open area equal to or greater than 0.2 square feet per foot of tank diameter will be provided as recommended in API650 Appendix-H. This ensures there will be no buildup of hazardous vapors and is in compliance with all applicable air pollution control regulations.


EMERGENCY OVERFLOW SLOTS

The use of emergency overflow slots shall only be permitted if specified by the purchaser. If specified see API STD. 650 H.5.3.3 for details
Condensate Drain Pipes :

The ATECO contact ifr can be equipped with sufficient siphon-type drains to prevent retention of liquid on top of the contact ifr surface. The drain pipes will extend into the product at least 4" and will normally be 1" diameter for refined product and 1-1/2" diameter for crude oil applications

FLOAT WELLS

An optional covered float well may be installed in the contact ifr directly below the tape nozzle to accommodate an automatic gauge on the tank. It will permit the level gauge float to move freely, but guided, to a prescribed distance from the tank floor when the contact ifr is landed on its legs. The float well cover is designed to be easily removed for inspection purposes and also to prevent damage to the contact ifr should the gauge mechanism jam. An alternative to the covered float well is a specially designed landing area on the contact ifr to receive and contain a metallic weight attached to the gauge tape.

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FILLING SURGE PROTECTION

Tank inlet pipes may be fitted with a diffuser to limit the velocity of incoming product to 3 feet per second and to eliminate the danger of damage to, or flooding of, the contact ifr due to injection of large vapor slugs. In addition, the diffuser acts as a relaxation chamber to allow static charges to bleed out of the incoming stream.

MATERIAL PLACEMENT

Placement of the floating roof materials into the tank shall be through an opening (provided by others), 2-foot by 6-foot in the tank fixed roof or tank shell.

TESTING


Testing for buoyancy and leaks is not required as panels are inherently buoyant with over 6,000 flotation cells per panel.

EXPERIENCE

ATECO has been installing our full surface contact aluminum honeycomb floating roofs since 1972.

WARRANTY

The internal floating roof contractor must warrant its work for a period of one year from the date of completion of its work to the extent that it will repair any defects which may appear because of faulty design, workmanship or material furnished

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API650 STANDARD ACCESSORIES for ATECO ALUMAX-HEXCORE Full Contact Floating Roof IFR

No	Material Description	Nos	Type
1	Anti-Rotation System		
2	Grounding Cable		
3	Deck Manhole		
4	P/V Vents		

PROJECT ACCORDING ADDITIONAL ACCESSORIES / ATECO ALUMAX-HEXCORE Full Contact Floating Roof IFR

No	Material Description	Nos	Type
1	Anti-Rotation System		
2	Grounding Cable		
3	Deck Manhole		
5	P/V Vents		
6	Gauge Funnel		
7	Deck Drain		

PROJECT ACCORDING ACCESSORIES / ATECO ALUMAX-HEXCORE Full Contact Floating Roof IFR

No	Material Description	Nos	Type
1	AKdeck SEAL "WPE"		
2	Mechanical Shoe Seal		
3	Secondary Seal		
4	Negotiation devices for Columns		
4	Negotiation devices for Ladders		
5	Adjustable legs		
6	Negotiation devices for Guide Poles		
7	Floating Suction		
8	Diffuser		
9	Level Float Well		
10	Corrosion Gauge		
11	Foam Dams		
12	Roof Centre Vents		
13	Peripheral Air Scoops Tank Vents		
14	Funnel for temperature device (thermometer)		
15	Ladder Platform		
16	Leg Pads (for protection of floor coatings)		