אפי קגנובסקי הנדסה (א.ק.ה) בע״מ.

EFI KAGANOWSKI ENGINEERING (E.K.E) Ltd.

200903#

PETROLEUM & ENERGY INFRASTRUCTURE

ASHKELON Terminal.

INTERNAL FLOATING ROOF & FLOATING SUCTION ARM

(Version 006)

הערה	אישור	סטאטוס	תאריך
מהדורה 6	א.ק	OK	8/8/2018
	א.ק	OK	10/7/18
	א.ק	OK	25/7/18
	א.ק	OK	29/7/198
BID	א.ק	OK	30/7/2018

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SCOPE:

This document covers the technical requirements for the design, fabrication, supply, delivery, installation, manufacturer supervision to oversee and assist with the installation of internal full contact floating roofs as well as primary and secondary stainless steel mechanical shoe seal system and 8" floating suction arm to be install at tank N^{o} T-31at Ashkelon Terminal
The manufacturer shall submit complete design and material specifications, as well as emissions estimate with his proposal for purchaser approval of the internal floating roof.

SITE CONDITIONS:

1. Ashkelon South Terminal.
2. Site altitude is about 10 m above sea level.
3. Ambient temperature varies between 5^{0}C and 48^{0}C.
4. Relative humidity varies between 35% and 90%.
5. The tank is very close to sea shore.

TANK AND FLOATING ROOF DATA and ACCESSORIE:

1. Tank diameter & high — 10.7 m/ 8.0 m
3. Tank fix roof: — Existing steel dome roof.
4. Fixed roof venting requirement: 4 Circulation Vents.
5. Floating roof nozzles & accessories to be install by the contractor:
    - 8" guide pole double sealed penetration.
    - 2 Man ways.
    - Pressure / vacuum relief units.
    - Anti-rotation fittings & elements.
    - Grounding cables.
    - Support legs.
    - Ladder pad.

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6. Floating Suction Arm	8"
7. Tank shell manhole diameter:	2x30" shell and roof
8. Tank bottom:	1.5% slope to central.
9. Corrosion allowance:	1 mm.
10. Low leg level:	1300 mm.
11. High leg level:	2100 mm.
12. Filling / Empty flow rate:	200/120 m^3/hr.

LIQUID PROPERTIES:

The tanks will handle distillate as describe hereafter.
The choice of floating roof and floating suction arm materials shall be governed by compatibility with the specified liquids.

GAS OIL:

Density 15^0 C (gr/ml)	0.870
Kinematics viscosity @ 15^0 C (CST)	6-7.5
Sulphur content (wt %)	0.25% max
Acidity (mg koh/gr)	0.25
Cold filter plugging point (C)	9 (max summer) -2 (max winter)
Flash point:	55 C
Copper corrosion (2 HRS/100 c)	1 max

GASOLINES:

Density 15^0 C (gr/ml)	0.73 –0.765
Copper corrosion (2 hr. /100 C)	1 max
Aromatics (vol %)	60
MTBE (%)	15
Sulphur content (wt %)	0.15
Vapor pressure 37.8 ^{0}C (PSI)	9 max

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Part #001: Internal Floating Roof

ROOF BASIC STANDARDS & REGULATIONS:

The floating roof shall be designed, fabricated and installed according to the requirements of the following codes and standards:

1. API 650 Appendix H: Welded Tanks for Oil Storage, Twelfth Edition, including addendum 2 and errata 2.
2. Aluminum Design Manual as published by The Aluminum Association Inc.
3. ASTM B96.1 Section 2: Aluminum Components.
4. ASTM A240: Stainless Steel Components.
5. ASTM A193 and A194: Stainless steel fasteners

FLOATING ROOF DESCRIPTION:

The floating roof shall be made of aluminum sheets and extruded profiles

The deck surface shall be made of subdivided component panels, providing full contact with the storage liquid.

The floating roof shall not allowed to contain any enclosed or hollow compartments such as pontoons of honeycomb elements, so a floating roof inspection for safe operations and entry can be made from the tank fixed roof.

The roof design will allowed field repairs of any component of the roof to take place without the need to take the component out of the tank

The outer edge of the floating roof shall be circular, designed and fabricated to be concentric with the tank shell.

The internal floating roof shall include buoyancy required to support at least twice its dead weight. According to paragraph P.4.2.1.2

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The nominal space between the deck and the tank shell will be nom. 7" (175mm), and shall be sealed with both primary and secondary seal systems, design to accommodate the gap between those elements and a +/- 4 inch variance of the gap.
The floating roof shall be fitted with the following accessories:

- Guide pole penetration floating cover double seal element
- Floating cover gauge funnel with funnel plug located under the 10" fix roof nozzle.
- 2 Man ways bolted and gasket, which can be opened from above or below and incorporate access ladders (2 man ways).
- 2 Leg Type Pressure / vacuum relief units.
- 2 off Anti-rotation nozzles & elements including upper fix roof anchors, IFR cable guide blocks and tank bottom plate anchors units.
- 2 off Grounding cables including cable clips to the IFR beams and traps cable clips upon the tank fix roof.
- At least 4 fix roof vents devices.
- One (1) shell vents installation with hood & screen.

The floating roof shall not include any deck drains and will be design to withstand a live load of 12.5 psf (61 kg / m2) by H.4.2.2
The floating roof deck shall not include any elements that are not designed to be in contact with the liquid surface.

FLOATING ROOF DESIGN REQUIREMENTS:

1. The design and the construction of the floating roof shall be to minimize emissions from the tank. The floating roof vendor shall include with their proposal estimated emissions based on Tanks4.09d software and the following parameters: (24) turnovers of gasoline location Houston TX, and white tank in good condition.
2. The floating roof shall be designed to operate throughout its normal travel without manual attention and without damage to

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any part of the floating roof, or floating suction arm or the fixed roof.

3. The floating roof shall be naturally buoyant and provide buoyancy to support at least twice its dead weight, plus additional buoyancy to offset from friction exerted by peripheral and penetration seals.
4. The floating roof shall be designed to support at least two men walking anywhere on the roof while the roof is floating or resting on its supporting legs.
5. **Materials of construction**
    - All metallic parts of the floating roof shall be aluminum or austenitic stainless steel. Carbon steel components and plated fasteners are not allowed.
    - Pop-rivets, self-drilling and self-tapping fasteners are not allowed.
    - All bolts must be secured with nuts. All bolting except for rim and column seal components shall be 3/8" minimum. Rim seal bolts shall be 5/16" minimum, all other bolts shall be 1/4" minimum.
    - Aluminum shall conform to the requirements of section 2 of ASME B96.1. Components exposed to liquid shall be either 6061 or 5052.
    - Stainless steel shall conform to the requirements of ASTM A240M/A240.
    - Seal materials shall be selected after consideration of the ambient temperature, design temperature and the liquid that will be stored in the tanks. Shoe plates shall be stainless steel.
6. **Roof Technical information**:
    - The contractor shall supply all roof component and accessory detail and assembly drawings along with emissions estimates with their proposal
    - **Deck seams**: the field joints between the floating roof panels shall be bolted and sealed by seals.

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- **Minimum thicknesses**: aluminum components and shoe plates shall be at least 1.30 mm' By H.3.3 thick. Other stainless steel components shall be at least 0.030" thick.
- **Roof penetrations**: all appurtenances for the devices penetrating the deck shall be provided with a double seal system which will permit a local deviation of +5 inches. The sealing elements shall be designed to allow movements of the vertical devices without any liquid or vapor leaks.
- **Roof supports**: the floating roof shall be supplied with two-position zero-loss support legs. The support positions shall be adjustable with the tank in service from the top side of the floating roof. The design of the leg supports shall prevent damage to the fixed or floating roof at the overflow condition. Legs shall be aluminum or stainless steel, minimum 2" sch 40. The vendor shall provide calculations to support their leg diameter and wall thickness with their proposal.
- **Ladder**: The floating roof shall be supplied with ladders at each floating roof man way for access through the floating roof from the underside.
- **Pressure / vacuum vents**: the floating roof shall be fitted with at least two pressure vacuum relief vents suitable to prevent overstressing of deck due to environmental and operating conditions. These units shall be incorporated into man way cover plate(s) to minimize emission sources. These units shall remain closed unless required for pressure or vacuum relief.
- **Anti-rotation cables**: The floating roof shall include at least two anti-rotation cables. The cables shall be made from 1/4" minimum stainless steel stranded cable. The floating roof penetrations for each cable shall extend at least 6" above the liquid level.
- **Rim seals**: The floating roof shall be supplied with both primary and secondary sealing systems. The primary

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seal shall be scissor type mechanical shoe seal type and the secondary seal shall be a flat wiper compression plate. Emissions estimates shall include values for the seal system(s) proposed.

- **Guide pole**: The tank will be manufactured with a guide pole element. The floating roof manufacturer shall supply double seal devices to seal this penetration through the floating roof.
- **Dissimilar materials** which are not compatible shall be physically separated or insulated from each other by means of gaskets or insulating compounds. Spacers for stainless steel legs shall be provided.
- **Static bonding**: All floating roof metal elements shall be electrically interconnected and bonded to the tank fixed roof by means of at least two 1/8" minimum stranded stainless steel cables.

  The contractor will include as a part of the roof supply an inflow diffuser in the design.
  The roof contractor will include a reference list of roofs and contact persons in the last 5 years.

Part #002: 8" Floating Suction Arm

SCOPE:

The tank fitted with 8" floating suction arm. The arm is a scissors type unit as shown at the attached pictures. The contractor will dismantle the existing arm, supply and install a new 8" floating suction arm.

TECHNICAL REQUIRMENT:

The floating suctions arms shall be 8" diameter size ~ 8 m long installed inside the cylindrical vertical storage tank. The arm shall be

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fitted with a stainless steel restraining chain attached to upper end of the pipe and the tank bottom.
The floating arm as well as the roller must be placed as to miss the floating roof legs or the guide & pole device or the IFR nozzles.
The contractor shall supply and install floating arm base support up on the tank bottom plate.

The floating suction shall consist of the following components:
180 degrees style submerged, aluminum swing joint, ANSI Class 125 FF flanged with double row stainless steel ball bearings and Viton seals
The swivel shall be lubricated and sealed for submerged service for life time.
Swivel joint shall be internally hydro-tested to 50 psi prior to shipment.

- A 1/4" size vent hole shall be drilled in the suction tube elbow to allow the release of entrained air from the elbow.
- One pair of flooding ports 1/4 size shall be drilled near the swivel (one port on each side).
- Pivoted stainless steel floats, air tested with rated buoyancy at twice theoretically required floatation so that float is half submerged normally.
- The arm shall be fitted with roller to provide a smooth roiling of the arm under the IFR

PACKING:

- All rotation elements shall be factory lubricated and tied up.
- All ports and opening shall be blanked off.
- The goods shall be packed of in containers or wooden boxes with water repellent materials.
- Each box shall include itemized part list.

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- The package shall be suitable for export and capable of withstanding rough handing.

MARKING:

- All floating roof materials, items and accessories shall be suitably marked for identification on site.
- Loos parts shall be suitable tagged.
- All crates shall be marked.

SUPERVISION & EXPERIENCE:

The manufacturer shall provide a supervision person for oversee and assist with the installation of the internal floating roof system.

WARRANTY:

The contractor shall guarantee the design, materials, equipment's, and workmanship for a period of 24 months from operation but not later than 30 months after shipment.

Should any defect due to faulty design, materials or bad workmanship become apparent during the guarantee period, the vendor shall agree to make all necessary to repairs or replacements the defect parts, free of charge, and shall pay transportation costs involved.

SHOP DRAWING AND DESIGEN:

The contractor shall provide within 2 weeks from order all drawings, dimensions & sizes list, thickness, gauges, materials, finishes, joints attachments and erection procedure, and a complete set of design calculation for the purchaser's approval.

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Units: All drawings and dimension prints shall be in accordance with the SI System.

Language: All proposals, drawings, specifications, material/quality Control sheet, reports, test certificates and other documents shall be in English or Hebrew.

PRICE:

Nº	Description	Unit	Price ($)
1	IFR included primary and secondary seal, dome roof vents The offer includes the design, supply and delivery, installation and manufacturer supervision	Complete	
2	8" Floating suction arm fitted with all accesses. The offer includes dismantling of the existing arm the design, supply delivery, and installation of a new one.	Complete	

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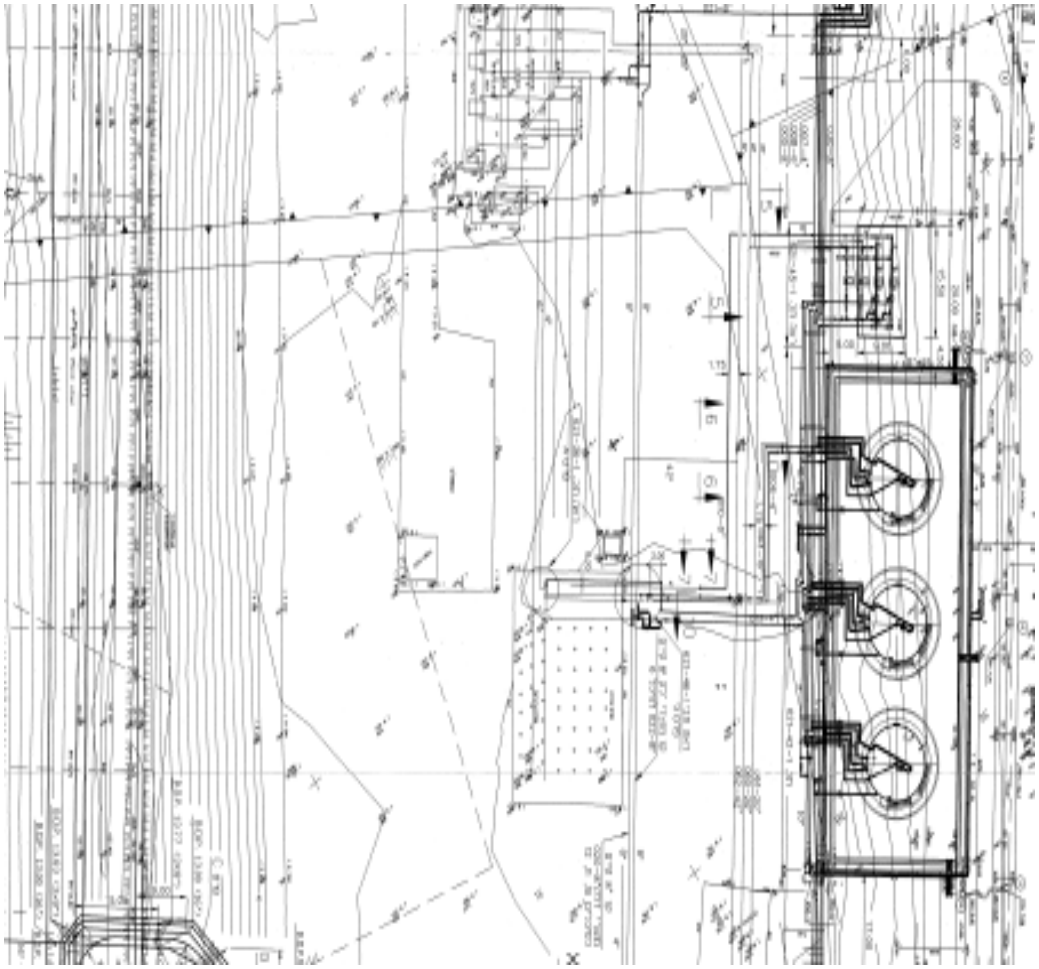

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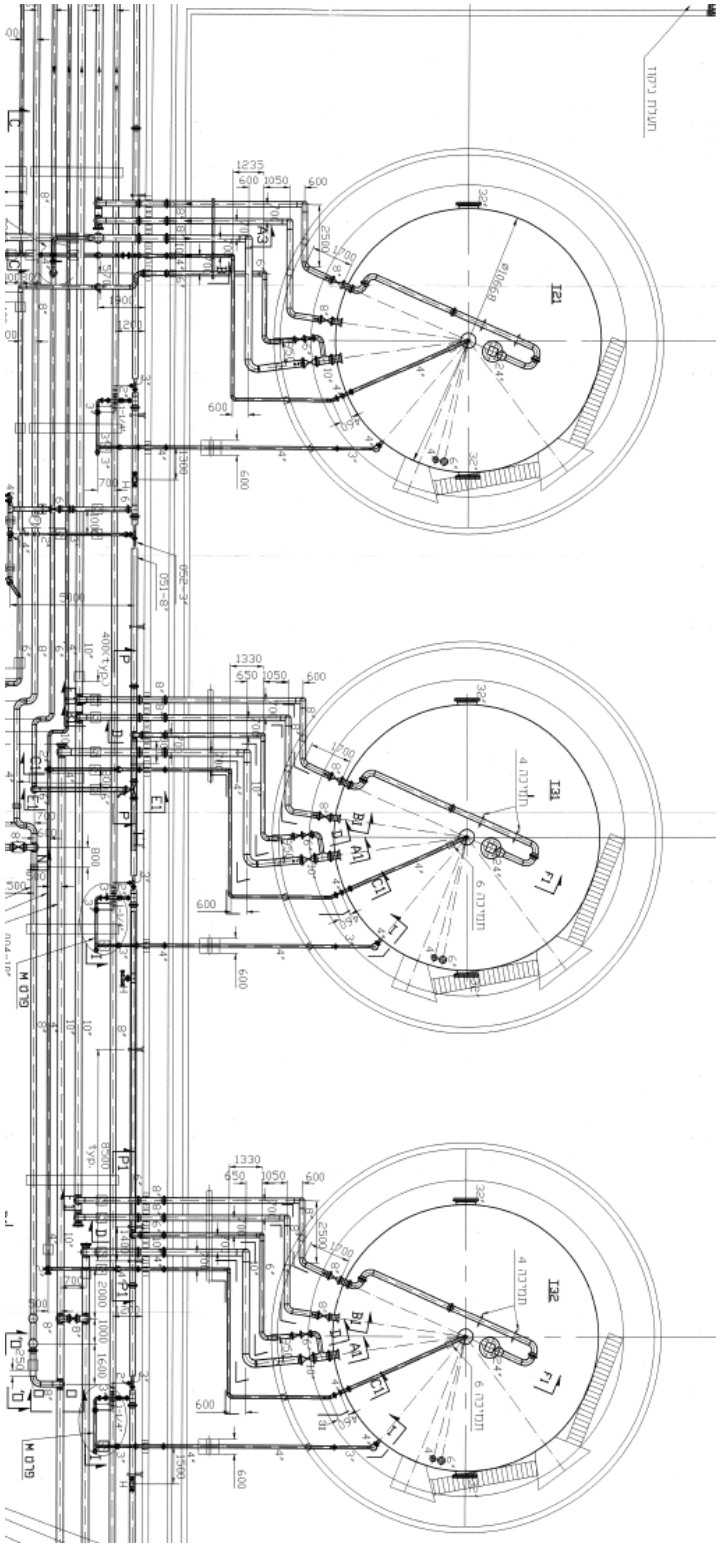

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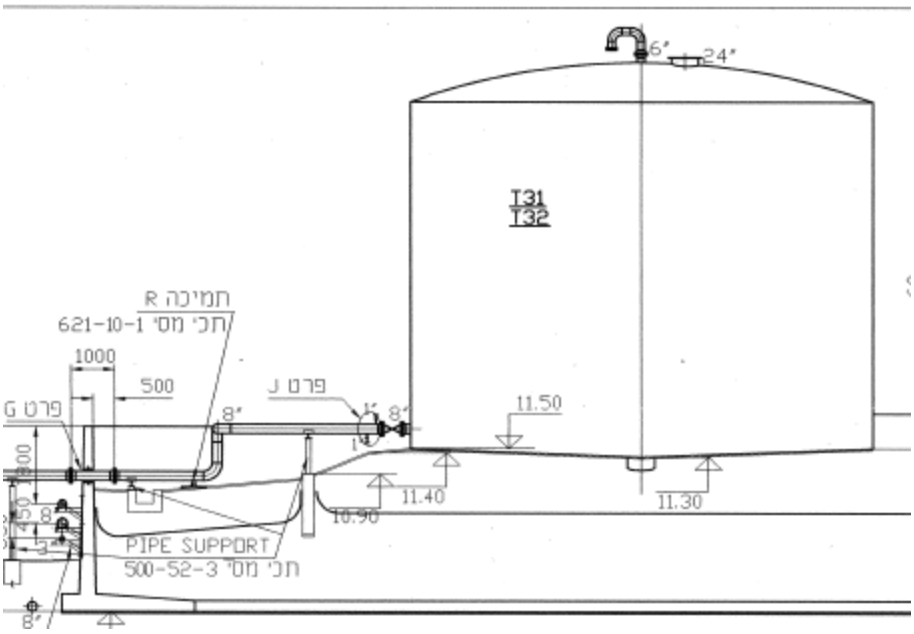

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