

Oil Products Pipeline Ltd.

Haifa Boosting Station

SPECIFICATION
No. 2334-SP-PMP-001

For

Centrifugal Pumps

P1	I.M.	29.10.23	FOR APPROVAL	I.M.	I.M.	
REV.	BY	DATE	DESCRIPTION	CK'D	MRS	CLIENT
					APPROVAL	

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1. General

The Haifa Oil Products Pipeline Ltd. requests suppliers to submit bids for 1 (one) centrifugal pump. This specification covers the requirements for the supply of this pump. The pump will be used as an auxiliary to pump product from Bazan storage to a pumping station within the compound.

The pump shall be Vertical Bowl Assembly type installed in suction well and designed for outdoor service. The pump to be suitable to handle a range of hydrocarbon liquids from gasoline to a light gas oil.

2. Scope of supply

→The vendor's scope of supply will be one (1) centrifugal pumps with motors per the datasheets in Appendix "B". The impeller of the pump selected should **not** be the maximum sized impeller for the model chosen.

The Pump & motor is to be chosen based on the datasheets in Appendix "B". The vendor is requested to supply pump curves for the operating point and for the maximum impeller for the model chosen. The motor supplied shall be for the maximum impeller at end of its curve. This will allow the purchaser to upgrade the system for a higher throughput without changing the motor. The Pump speed will be 1480 rpm. ←

The vendor shall supply all the pump parts, including and not only, the bowl assembly, suction well, pump head and all the connections.

The vendor shall supply all items and accessories as specified below:

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Certified drawings and documents, including assembly, dimensional and sectional drawings, as specified in Appendix "C".

Installation, operation, and maintenance manuals shall be prepared as specified in Appendix "C".

The vendor is responsible for the packing and delivery of the pump to the site (Haifa).

The vendor shall supply a list of recommended spare parts

3. **General requirements**

Specifications

A partial list of the applicable specifications is listed below. The vendor to state any exceptions to the specifications listed:

1. API 610 – Latest Edition
2. API 682 4th edition 2015, Shaft Sealing System for Centrifugal and
3. Rotary Pumps.
4. ANSI/ASME B16.5, Pipe Flanges and Flanged Fittings.
5. ANSI/ASME B16.20 Metric Gasket for Pipe Flanges.
6. ASTM A193/A193M Standard Specification for Alloy-Steel and Stainless-Steel Bolting for High Temperature or High-Pressure Service and Other Special Purpose Applications.
7. ASTM A194/A194M-18 Standard Specification for Carbon Steel, Alloy Steel, And Stainless-Steel Nuts for Bolts for High Pressure for High Temperature Service, Or Both.

Should there will be conflict between the requirements, data sheet , specification codes and standard the supplier shall obtain a written clarifications from the client before proceeding . The supplier shall identify and mark and any deviation, demands or requirement which he is unable to comply

Reference List

The vendor shall provide, with bid, a reference list of pumps operating in similar service.

Duty

Pump duty points shall be according to the datasheets in Appendix "B". Turn up from normal to maximum flow should require a minimum of recycle.

Pumps shall be able to operate in parallel.

Pump H-Q curves shall be gradually sloping in one direction with maximum head at the "NO FLOW" condition. The normal operating flow/head point shall be 10% below the maximum shut off pressure.

Counter clockwise rotation of vertical shaft when viewed from above is required.

Vendor to specify the time, which pumps can run at shut off condition.

Vendor to specify the minimum flow requirements, which should not exceed 20% of the design flow.

The characteristic curves to include the data for 100% impeller diameter.

The characteristic curves to include curves for head, NPSH required, efficiency and horsepower against flow.

Curves to be corrected for specific gravity and viscosity specified.

Spacer type coupling between the pump shaft and solid shaft of driver is to be all steel, flexible, adjustable type to comply with API Std. 610, section 3.2.

Pumps shall be fitted with thrust bearing.

Connections

Pump's Bowl Assembly together with the suction well to be installed in existing casing of the following dimensions:

Inner Diameter: 750mm

Depth: 1650mm

Pump discharge nozzles shall be flanged to 8" ANSI B-16.5, #150, R.F.

Pump suction nozzles shall be flanged to 12" ANSI B-16.5, #150, R.F.

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Painting

Painting shall be to the manufacturers standard, all carbon steel surfaces shall be preferably epoxy painted or powder coated. Vendor shall submit his painting specification.

Accessories

Pumps shall be supplied complete with all items and accessories necessary for their satisfactory operation, including the following:

The vendor will supply any lubrication system and fittings, including any piping, which may be necessary. Constant level oilers shall not be glass.

Vendor to supply any special tools required for maintenance and servicing.

The coupling between pump and motor includes a non-sparking guard.

→The pumps shall be supplied with single mechanical seals. The seals shall conform to API 610 seal plan 31. ←

The pump shall be supplied with API 682 double type mechanical seal manufacturer by John Crane or equivalent .

The mechanical seal shall be a complete unit including seal flush and external seal quench .

The replacement of the mechanical seal shall be done on both sides without having the need to disassemble the pump .

The unit shall include leak detection and alarm system contact .

Flange gaskets for cooling mechanical seal piping device shall be spiral wound type fitted with graphite

Connection

- Suction and discharge branches shall be arranged inline flanges shall be raised face, class 150, according to ANSI B 16.5 . Suction line shall be of size 12", discharge line shall be of size 8".
- Gasket contact surface shall have serrated spiral grooves machined with a 0.8 mm' nominal radius rounded-nose tool producing a grooved pitch of 0.35-0.45 mm .'
- The resulting surface roughness of between Ra 3.2 and 6.3 micron .
- Any screwed pipe connections shall be to ANSI B2.1
- Auxiliary piping connection to the pump casing shall not be less than 3/4" and pipe thickness shall be not less than sch.80 .

- All valve shall be ball type

Painting

- All external surfaces, other than austenitic steel surface shall be coated by an Epoxy painting system with UV protection according to manufacturer standard .
- Dry painting shall be not less than 300 microns.

Baseplate

The pump and the motor shall be installed at common baseplate fabricated from heavy duty steel profiles, fitted with motor align devices

The pump shall have lifting lugs suitable for horizontal lifting.

Coupling

The pump and motor shall be connected by "spacer" coupling and protected by non-sparking coupling guard.

The coupling materials should be resistible for liquid fuel.

The coupling shall allow complete removal of all parts as a unit, without removing the motor.

Pump Design

- The pump impeller diameter shall not exceed 95% of the maximum impeller diameter allowed for the pump.
- The pump efficiency at the design point shall not be less than 75%.
- Pump shall be suitable for parallel operation
- The head performance curve shall rise continuously.
- The vendor shall quote the pump curve reference to diesel or gasoline including efficiency, power and NPSH.
- The pump duty point shall be to the left of B.E.P.
- The pump shall be selected that the duty points at the best efficiency point, at a satisfactory noise level (which should not exceed 85 dBA at 1

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meter from the surface of the unit in the operating conditions) and without cavitation.

- The impellers shall be mounted on the shaft and dynamically balanced.
- Discharge head shall be fabricated of steel and hydrostatically tested according to API 610.
- Oil lubricated system will include a sight level indication glass for checking the oil level
- All tapped holes shall be plugged including seal, vent and drain connection

Materials

Materials of construction shall be according with API 610 standard recommendation table H-1, spec S-6

Pressure Casing: Carbon Steel

Shaft: AISI 410

Inner case parts: 12% chrome

Impeller: 12% chrome .

Case wear rings: 12% chrome .

Impeller wear ring: 12% chrome .

Casing gasket: Spiral wound 316 .

Material certificates: The vendor shall provide materials certification type including chemical composition and mechanical data EN 10204 3.1 type for all pressure contenting parts on pump .

Materials specification of all components listed in shall be clearly stated in supplier's proposal.

Pump Weight

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- The vendor shall quote the total pump, motor and baseplate weight as well as the main components weight such as but not limited: motor, pump fitted with all pump's axillary and the common base plate .
- No pump component such as motor; or the assembly of pump and baseplate shall weigh more than 3 tons each.

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Nameplate

The pump and motor shall bear an individual nameplate of at least 16-gauge stainless steel. Nameplate shall follow manufacturer's standard and contain the following data:

Pump

Name of manufacturer	P-14
Year of manufacture	Model number
Important equipment data (working point, shut-off pressure, RPM)	

Motor

Name of manufacturer	Rated power (kW)
Year of manufacture	Insulating class
AORL item number	RPM
Model number	Enclosure

Packing

Prior to packing, the pump shall be cleaned both internally and externally, and the interior protected by a suitable rust preventative, and all openings sealed with either plastic plugs or plywood covers securely bolted to flanges. Pumps are to be dowelled to baseplate.


Vulnerable threaded parts are to be coated with anti-corrosive paste and protected by suitable tape.

Pump assemblies are to be packed and firmly fixed in wooden crates suitable for ocean shipment.

Tests

Tests to be performed as specified in the attached datasheets (Appendix B).

Test procedures shall be in accordance with American Hydraulic Institute standards.

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Spare Parts

The supplier shall specify the spare part needed including the following:

- Body gasket cut with bolts holes, 1 set for pump
- Glass for lubricating bearing oil, 5 sets for pump
- Lubricant filter element, 10 sets

4. Electrical requirements (Drivers)

- 4.1 Vertical electric motor, three phase, cast iron, epoxy painted, squirrel cage, solid shaft, suitable for driving the centrifugal pump described under paragraph 3 for the complete range of the Q.H. curves and specific gravity of liquid handled, under environmental conditions as detailed in this inquiry.
- 4.2 The vertical electric motor shall comply with requirements of API Std. 610, paragraph. 3.1.
- 4.3 Power supply: 400V; 3 phase; 50 Hz; soft start starting at 300 to 400V.
- 4.4 Motor performance shall be according to IEC publication No. 34.
- 4.5 Motor dimensions shall be according to IEC publication No. 72-1.
- 4.6 Explosion proof for hazardous location to NEC 501, Class 1, Div. 2 Group D, temperature identification number T2C or EExdIIAT3 - EN50018.
 Outdoors weather protected, at least IP55. Tropical insulation moisture and fungus proof, classes F or better; maximum temperature rises according to class B.
- 4.7 Winding ends are to be brought out to terminals in the terminal box.
- 4.8 Self-cooling by ambient air; positive precaution to prevent reverse mounting of fan.
- 4.9 Information required with the quotation:

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1. Motor rating at ambient temperature of 45°.
2. Efficiency and power factor curves.
3. Detailed description of motor construction, standards followed for manufacture, particulars as to kind of enclosure, class, group, etc.
4. Dimension drawing, typical cross-section and other relevant drawings.
5. Testing authority to certify the explosion proof and weather protected construction.

4.10 The motor shall be able to provide the following information:

1. Temperature of the upper seal. – 1 PT100 at least
2. Temperature of the lower seal. – 1 PT100 at least
3. Temperature of the coils. – 6 PT100, two for each phase

5. Documentation

The vendor's proposal shall be written in English and shall include all items specified in "Documentation Requirements", Appendix "C".

Manufacturers certificates are to be submitted giving details of all tests undertaken.

6. Guarantee

Mechanical

Unless the vendor in his proposal records exception, it shall be understood that the vendor agrees to the guarantees specified in items 1 and 2 below.

1. The vendor shall guarantee against defective materials, design, and workmanship all equipment and component parts for 1 year after being placed in service (but not more than 18 months after date of shipment).
2. If any mal performance or defects occurs during the guarantee period, the vendor shall make all necessary alterations, repairs, and replacements free of charge, free on board factory. Field labor charges, if any, shall be subject to negotiation between the Vendor and the Purchaser.

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Performance

The equipment shall be guaranteed for satisfactory performance at all operating conditions specified on the datasheet. Field checks on performance, when made by the Purchaser, shall be made within 60 days of initial operation.

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Appendix "A"

Site Conditions

Temperature: minimum 0°C
 maximum 45°C

Relative Humidity: minimum. 25%
 maximum. 99%

Elevation: 5 (m) above sea level

Site: Eastern Mediterranean terminal with corrosive industrial atmosphere, close to the shoreline. Sandstorms carrying fine dust are possible.

Rain Average: 470 mm / year

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Appendix "B"

Data Sheets

NOTE : Information To Be Completed By Purchaser Manufacturer Service Distillates Transfer
 Applicable To : Proposal Purchase As Built Pump Mfr. _____
 For Petroleum and Energy Infrastructure Ltd Size & Type _____
 Site Kamad Haifa Rev. / Date / By No. Stages _____
 Unit _____ P0 / 26/10/2023 / IM Serial No. _____

No. Pumps Required : 1 No. Motor Driven 1 No. Turbine Driven _____
 Pump Item No. _____ Pump Item No. _____
 Motor Item No. _____ Turbine Item No. _____
 Motor Provided By _____ Turbine Provided By _____
 Motor Mounted By _____ Turbine Mounted By _____

LIQUID	OPERATING CONDITION	SITE CONDITION
Name <u>GASOLILE/JET FUEL/DIESEL OIL</u>	Capacity [m³/h] : Normal <u>400</u> Rated <u>450</u>	Temp. [°C] Max. <u>43</u> Min. <u>5</u>
Pumping Temperature [°C] : Normal <u>30</u> Max. <u>45</u> Min. <u>2</u>	Disch. Press. [Bar-g] : <u>10.0</u> Suct. _____	Rel. Hum.[%] Max. <u>75</u> Min. <u>40</u>
Relative Density @ <u>15</u> °C : <u>0.860</u>	Press. [Bar-g] : _____ -0.8	Altitude [m] <u>5</u>
Vapor Press. [Bar A] <u>0.800</u>	Max. <u>1.6</u> Rated Diff. Press. _____	<input type="radio"/> Indoor <input type="radio"/> Heated <input type="radio"/> Roof
Viscosity [CP] @ <u>20</u> °C : <u>4</u>	[Bar] <u>9</u> (Note 1) Diff. _____	<input checked="" type="radio"/> Outdoor <input type="radio"/> Unheated <input type="radio"/> Sun
Corrosion / Erosion Caused By : _____	Head [m] <u>116</u>	Area Classification : _____
Remarks : _____	NPSH Available [m] <u>-8.0</u>	Non classified
	Hyd. Power [HP] <u>164.4</u>	Other Remarks : _____

PERFORMANCE (TO BE COMPLETED BY MANUFACTURER)

Proposal Curve No. _____ Min. Continuous Flow [m³/h] : _____ NPSH Required [m Of Water] : _____
 Speed [rev / min] _____ Thermal _____ Stable _____ 3% Head Drop _____
 Efficiency [%] _____ Max.Head • Rated Imp. [m] _____ Suction Specific Speed _____
 Rated Power [HP] _____ Max.Power • Rated Imp.[HP] _____
 Remarks : _____

CONSTRUCTION (TO BE COMPLETED BY PURCHASER AND MANUFACTURER)

Nozzles :	SIZE	RATING	FACING	LOCATION	Misc. Conn. :	SIZE	LOCATION
Suction		150 #	RF		Drain		
Discharge		150 #	RF		Vent		
Bal. Drum					Press. Gage		
					Warm Up		

Casing Mount : Foot Impeller Diameter [mm] :
 Centerline Bracket Rated _____ Max. _____ Min. _____
 Near Centerline Inline Rotation (Viewed F'm CPLG): CW CCW Bearings (Type / No.) :
 In-Line Sump CW Radial _____ Thrust _____ Vertical
 Vertical Barrel Imp.Mount: Btwn.Brgs. Overhung Grease Ring Oil Oil Mist
 Casing Split : Axial Mechanical Seal : API Standard 682 Flood Flinger
 Radial API Standard 682 Constant Level Oiler Press.
 Casing Type : Single Volute Seal Type : A - Spring Pusher Coupling :
 Double Volute B - Rotating Metal Bellows Manufacturer _____
 Diffuser C - Stationary Metal Bellows Type _____ Model _____
 Staggered Seal Arrangement _____ Driver Half-Coupling Mounted By :
 Max. Allowable Pressure [Bar] : Manufacturer _____ Pump Mfr. Driver Mfr.
 At 15 °C Seal Code _____ Purchaser
 At Norm Pump Temp. Size/Type _____ Gland Type / matl. _____
 Hydro Test Pressure [Bar] Manufacturer Code _____ Gland Plate Taps Required :
 Seal Drwg. No. _____ Quench Drain Vent
 Remarks : **Note 1: Head must be delivered at maximum flow** Flush Barrier Fluid In/Out

C E N T R I F U G A L P U M P
 D A T A S H E E T
 M E T R I C U N I T S

OIL PRODUCT PIPELINE LTD.

						SHEET No. <u>1</u>
						OF <u>2</u>
P1	30/10/2023	For bid	IM			REV. No. <u>P1</u>
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MATERIALS (TO BE COMPLETED BY PURCHASER AND MANUFACTURER)

Table H-1 Class S-6 Case/Imp. Wear Rings _____ Baseplate : _____
 Barrel / Case CS Shaft _____ Material/Type _____
 Impeller _____ Sleeve _____ A Standard 610 _____
 Remarks : _____

AUXILIARY PIPING (TO BE COMPLETED BY PURCHASER AND MANUFACTURER)

Seal Flush Piping Plan _____ Auxiliary Flush Plan _____ Cooling Water Piping Plan _____
 Tubing Carbon Steel Tubing Carbon Steel Tubing Carbon Steel
 Pipe Stainless Steel Pipe Stainless Steel Pipe Stainless Steel
 Piping Assembly : External Seal Flush Fluid : _____ Copper _____
 Threaded Flanged _____ Sight Flow Indicators Required _____
 Seal Weld Socket Weld _____ Total C. W. Req'd [m³/h] _____
 Remarks : _____ Packing Cooling Injection Req'd _____
 _____ _____ m³/h _____ Bar _____ _____ m³/h _____ Bar

INSPECTION AND TEST (TO BE COMPLETED BY PURCHASER)

<u>TEST</u>	<u>NON WIT.</u>	<u>WIT.</u>	<u>OBSRVD</u>	<input type="checkbox"/> Casting Repair Procedure Approval Required	<input type="checkbox"/> Inspection Req'd For :
Performance	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/> Inspection Req'd For Nozzle Weld :	<input type="checkbox"/> Mag. Particle
Hydrostatic	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/> Mag. Particle <input type="checkbox"/> Dye Penetrant	<input type="checkbox"/> Dye Penetrant
NPSH	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="checkbox"/> Inspection Req'd For Castings :	<input type="checkbox"/> Radiographic
<input checked="" type="radio"/> Shop Inspection	<input checked="" type="radio"/> Material Cert.			<input type="checkbox"/> Radiographic <input type="checkbox"/> Ultrasonic	<input type="checkbox"/> Ultrasonic
<input type="checkbox"/> Dismantle & Inspect After Test					
Remarks : _____					

MOTOR DRIVER (TO BE COMPLETED BY PURCHASER AND MANUFACTURER)

_____ kW _____ rev/min Temperature Rise [°C] _____ Bearings _____
 Frame _____ Full Load AMPS _____ Lube _____
 Volts/Phase/Hertz 400 / 3 / 50 Locked Rotor AMPS _____ Vertical Shaft: Solid Hollow
 Type _____ Insulation _____ Vertical Thrust Capacity [kg] _____
 Enclosure _____ Manufacturer _____ Up _____ Down _____
 Remarks : _____

VERTICAL PUMPS (TO BE COMPLETED BY PURCHASER AND MANUFACTURER)

Pit Or Sump Depth [m] _____ Guide Bushing : _____ Float And Rod : _____
 Pump Length [m] _____ Bowl _____ Carbon Stl. Stainless Stl.
 Min. Submergence Req'd [m] _____ Line Shaft _____ Bronze None
 Column Pipe : Flanged _____ Guide Bushing lube : _____ Pump Thrust[kg] UP DOWN
 Threaded _____ Water Oil Grease _____ At Min. Flow _____
 Line Shaft: Open Enclosed _____ Float Switch _____ At Design Flow _____
 Remarks : _____ At Runout _____

MASSES (TO BE COMPLETED BY MANUFACTURER)

Mass Of Pump [kg] _____	Mass Of Pump [kg] _____	Remarks : _____
Mass Of Baseplate [kg] _____	Mass Of Baseplate [kg] _____	
Mass Of Motor [kg] _____	Mass Of Turbine [kg] _____	
Mass Of Gear [kg] _____	Mass Of Gear [kg] _____	
Total Mass [kg] _____	Total Mass [kg] _____	

ADDITIONAL INFORMATION

C E N T R I F U G A L P U M P
 D A T A S H E E T
 M E T R I C U N I T S

OIL PRODUCT PIPELINE LTD.


						SHEET No. <u>2</u>
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MOTOR DATA SHEET

General Data	1.0	Customer Data		
	1.1	Data Sheet No.		
	1.2	Location:	HAIFA ISRAEL	
	1.3	Plant/Unit:	KAMAD HAIFA	
	1.4	Project Name:	NEW AUXILIARY PUMP	
	1.5	Motor Function:	OIL PUMP	
	1.6	Motor Tag Number	P0014	
	1.7	Max./Min. Ambient. Temp.:	0-40°C	
	1.8	Altitude Over Sea Level	10m.	
	1.9	Relative Humidity:	90%	
	1.10	Atmosphere:	Petrochemicals	
	1.11	Environment classification	Zone 2	
	1.12		TEFC/IP-55	
	1.13	Type:	NON SPARKING	
	1.14	Specification:	I.E.C	
	1.15	Prepared By:	M.B.	
1.16	Date:	26/11/2023		
Electrical Data	2.0	Customer Motor Requirements		
	2.1	Motor Type:	Cage Rotor	
	2.2	Rated Output	By Vendor	kW
	2.3	Rated Voltage:	400	V
	2.4	Phases:	3	
	2.5	Frequency:	50	Hz
	2.6	Stator Winding Connection:	Y/Δ	
	2.7	Number Of Terminals:	6 - On terminal plate	
	2.8	Starting Method:	Soft Start	
	2.9	Insulating Class:	F	
	2.10	Stator Wind. Max. Temp.class	B	
	2.11	Efficiency Class	EFF-3/PREMIUM	
	2.12	Thermal Protection Device Type	PT-100	
	2.12.1	Mounted in a separate terminal box	YES	
	2.12.2	Control Cable Entries – Number/Size	1/M16	
	2.13	No.of Thermal Protection Device in winding	6	
	2.14	No.of Thermal Protection Device in bearings	2	
	2.15	Anti Condensation Heater type	1X99 W-230 VAC	
	2.15.1	Mounted in a separate terminal box	YES	
	2.15.2	Control Cable Entries – Number/Size	1/M20	
2.16	Starting Freq. (No. Of Starts/1H from hot) :	4		
2.17	Duty	S1		
2.18	Service Factor:	1.15		
2.19	Synchronous Speed:	1480	r.p.m	
Mechanical Data	2.20	Cable Size		mm ²
	2.21	Cable Type	N2XY	
	2.22	Enclosure Material:	CAST IRON	
	2.23	Type Of Enclosure - Motor:	TEFC/IP-55	
	2.24	Terminal Box Enclosure	Eexd IIA	
	2.25	Power Cable Entries – Number/size		
	2.26	Power Terminal Box Location	N/A	
		Control Terminal Boxes Location	N/A	
	2.27	Paint Standard	Epoxy	
	2.28	Frame Size:	VHS	
	2.29	Type Of Load:	VERTICAL OIL PUMP	
	2.30	Type Of Coupling:	N/A	
		Bearing Type:	By Vendor	
	2.31	Bearing Lubrication Type:	Grease	
2.32	Mounting:	VHS		
2.33	Canopy for vertical mounted motor	YES		
2.34	Direction Of Rotation (Viewed From The Drive End)	BIDIRECTIONAL		
2.35	Vibration Category:	NORMAL		
2.36	Method of Cooling:	AIR		

MOTOR DATA SHEET

General Data	1.0	Customer Data		
	1.1	Data Sheet No.		
	1.2	Location:	HAIFA ISRAEL	
	1.3	Plant/Unit:	KAMAD HAIFA	
	1.4	Project Name:	NEW AUXILIARY PUMP	
	1.5	Motor Function:	OIL PUMP	
	1.6	Motor Tag Number	P0014	
	3.0	Manufacturer Motor Data		
General Data	3.1	Prepared By:		
	3.2	Date:		
	3.3	Manufacturer:		
	3.4	Motor Type		
	3.5	Frame Size:		
	3.6	Environment classification		
	3.7	Type:		
	3.8			
	3.9	Rated Power		HP
Electrical Data	3.10	Full Load Current:		A
	3.11	Locked Rotor Current:		x I _n
	3.12	No Load Current:		A
	3.13	Power Factor At: 100% Full Load:		
	3.13.1	80% Full Load:		
	3.13.2	70% Full Load:		
	3.13.3	50% Full Load:		
	3.13.4	No Load:		
	3.14	Efficiency Class		
	3.14.1	Efficiency At: 100% Full Load:		%
	3.14.2	80% Full Load:		%
	3.14.3	70% Full Load:		%
	3.14.4	50% Full Load:		%
	3.15	Rated Torque:		Kg-m
	3.16	Locked Rotor Torque:		x T _n
3.17	Breakdown Torque:		x T _n	
Mechanical Data	3.18	Bearing Type On DE		
	3.19	Bearing Type On NDE		
	3.20	Method of Cooling:		
	3.21	Max. Permis. Temp. Of Bearings		
	3.22	Type Of Enclosure - Motor:		
	3.23	Terminal Box Enclosure		
	3.24	Net Weight:		Kg.
	3.25	Weight Of Rotating Parts:		Kg.
	3.26	Rotor Moment of Inertia		Kg-m ²

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Appendix "C"

Documentation Requirements

Vendor's proposal as per paragraph 6.2.1 and 6.2.4 of API Std. 610.

The following table specifies the documents required at the various stages of supply.

Column A: Shows documents to be submitted with bids.

Column B: Shows documents to be submitted for approval with in two (2) weeks of the issue of the purchase order.

Column C: Shows final and certified documents to be submitted on delivery of the pump.

Item	Document	A	B	C
1	General outline dimensions	5		
2	Foundation requirements and loads		2	
3	Cross section of pumps with complete list of parts, parts description and material specification.	5		
4	Completed pump data sheets	5		
5	Performance data for pressure, power and flow	5		
6	Installation operating and maintenance instructions including allowable nozzle loads and moments			6
7	List of any special tools required	2		
8	List of spare parts recommended for two (2) years operation with itemized prices	2		
9	Test certificates			3

Note: number in table refers to number of copies to be transmitted.

GENERAL SPECIFICATION

FOR:

L.V. MOTORS

P0	1/11/23	FOR BIDS	A. SHVARTSMAN	
ISSUE	DATE	REVISIONS	BY	APP. BY

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- A SITE CONDITIONS.
- B VENDOR'S DRAWINGS AND DATA REQUIREMENTS
- C CABLE SIZE AND GLANDS FOR ELECTRIC MOTORS.
- D MOTOR DATA SHEETS

1.0 **OBJECTIVES**

This specification is issued in order to present minimum requirements for the supply of 400V Asynchronous Induction Motors, Low Loss type for hazardous locations. The motor shall be supplied and installed in the Plants of Petroleum and Energy Infrastructure Ltd.

2.0 **SCOPE OF SUPPLY**

- 2.1 The 400V Asynchronous Induction Motors are required for Project.
- 2.2 The scope of supply will be as shown below, and complying with the attached "General Conditions of Purchase and Contract" and inclusive of the following items, all in accordance with this specification.
 - 2.2.1 Design, supply, manufacture, and testing of complete units.
 - 2.2.2 Epoxy painting of the units in accordance with approved manufacturer standard (to be provided by vendor).
 - 2.2.3 Packing and preparation for shipment.
 - 2.2.4 Every motor ordered will be accompanied by an individual motor data sheet, which shall be completed by the supplier and returned fourteen days after the date of order.
 - 2.2.5 Supply of special tools required for installation and maintenance.
 - 2.2.6 Provision of all technical data as required - see App. C.

3.0 **GENERAL**

- 3.1 Supplier shall have complete responsibility and it shall be his duty to satisfy himself that the units supplied are suitable for the duties specified, that they conform to the design and other requirements of this specification and that most particularly the units are suitable to operate in the ambient conditions of the site without additional protection. Approval by the Engineer of drawings or other documents shall not absolve the supplier from this responsibility.
- 3.2 All materials and components used in the construction of the motors shall be new.
- 3.3 The design of the equipment shall provide for interchangeability of components to the maximum extent possible, with particular emphasis on those units for which spare parts are required.
- 3.4 The inscriptions on rating plates, meters and other indicating instruments shall read in suitable units of the international metric system (SI).

- 3.5 All inscriptions on nameplates etc. shall be in English and/or Hebrew languages. Only symbols in line with I.E.C. recommendations may be used on equipment and on drawings.
- 3.6 Documentation shall be in the English or Hebrew language.
- 3.7 Suitable lifting facilities shall be furnished for shipment and erection for motors K32 and largers.
- 3.8 No aluminum or its alloys shall be used for the manufacture of motor parts or accessories.
- 3.9 All bolts shall be cadmium plated.

4.0 OPERATING CONDITIONS

- 4.1 a) Squirrel Cage Motors shall be suitable for direct on line starting, when the starting current of the motor shall not exceed its full load current by more than 6.5 times for the corresponding starting torques defined in the motor data sheets.
- b) Motors up to 2.2 kW shall be 400V with 3 terminals.
- c) Motors bigger than 2.2 kW shall be 400VD/690VY with 6 terminals.
- d) Cable connection to the motor shall be to terminals installed on terminal plate.
- 4.2 The motors, having attained full load temperature, shall then be capable of repeated starts of the frequencies and durations stipulated in the data sheets accompanying the purchase orders, but not less than:

3 cold repeated starts
2 hot repeated starts

The tenderer, shall contain particulars of these capabilities with respect to the motors offered.

- 4.3 Squirrel Cage Motors will usually be started direct on line but occasionally, Soft Start Systems will be selected.

In these instances, particulars will be given in the motor schedules/data sheets, otherwise direct on line starting may be assumed.

4.4 Electrical Power Supply and Earthing

- Nominal voltage V
- Variation from nominal voltage $\pm 10\%$
- Phase..... 3
- Nominal frequency... 50 Hz
- Variation from nominal frequency... $\pm 2\%$
- Fault current rating... kA at 400V
- Neutral Solid grounded
- Anti-condensation heater supply... 230VAC single phase.

4.5 Rating and Temperature Rise

- 4.5.1 The motors shall be capable of operating continuously at their nominal full load ratings, notwithstanding variations of approximately 5% and 2% from the nominal supply voltage and frequency respectively.
- 4.5.2 The motors shall be capable of operating continuously at their nominal full load ratings without reaching their temperature limit, as measured by the increase in resistance method for Class "B", as stated in the motor data sheets.

4.6 Voltage dips with standing

The power system suffers from short voltage dips several times a year due to bad weather and faults on overhead lines. During such dips the voltage may drop to 55% of this nominal value for up to 0.6 seconds. The motors shall be so constructed as to be able to withstand, without any harm to them, the most severe occurrence of "anti-phasing" due to slow decay on the back-EMF, during such voltage dips and the subsequent recovery. The motors shall also be capable of being re-closed onto the power source without sustaining damage in the event of being disconnected for duration of greater than 0.5 seconds due to the de-energizing of the respective contactor as a result of voltage dips.

4.7 Performance Guarantee

- 4.7.1 Without limiting or restraining in any way whatever any other guarantees required by the Contract/Purchase Order the Manufacturer guarantees, to the tolerances laid down in I.E.C. 60034, the 'On Site' performances of all motors as detailed in the relevant data sheets.
- 4.7.2 Notwithstanding operational criteria specified in this document, the Supplier shall carry full responsibility for the successful operation and attainment of design capacity.
- 4.7.3 If any criteria specified herewith are at variance with what the supplier would guarantee, this should be clearly stated by the supplier on the appropriate sheet in the Form of Tender.

5.0 DESIGN AND CONSTRUCTION

5.1 General

Motors shall be 3 phase, 400 Volts, Low Loss, 50 Hz. induction type, totally enclosed, external fan cooled, squirrel-cage, suitable for ambient conditions as specified in App. A, and use in petrochemical industry. The motors shall be approved for hazardous area operation - see the Motor Data Sheets enclosed to this specification.

The motors shall be constructed to withstand:

5.1.1 The conditions defined in motor data sheets.

5.1.2 Outdoor installation and direct exposure to the sun.

5.1.3 Frames shall be cast iron with heavy walls and all surfaces (interior and exterior) shall be epoxy painted.

5.2 Standards

The design, construction and testing of the motor shall conform to the latest applicable editions of the following specifications, recommendations and standards, with precedence given to I.E.C. publications wherever content matter conflicts.

I.E.C. 60072 & 72A:	Dimensions and output ratings for Rotating Electrical Machines.
I.E.C. 60034 Part 1:	Rating and performance of Rotating Electrical Machines
I.E.C. 60034 Part 2:	Methods of testing for losses and efficiency of Rotating Electrical Machines
I.E.C. 60034 Part 5:	Degrees of protection for Rotating Electrical Machines.
I.E.C. 60034 Part 6:	Methods of cooling Rotating Electrical Machines.
I.E.C. 60034 Part 8:	Terminal markings and direction of rotation of Rotating Electrical Machines.
I.E.C. 60034 Part 9:	Noise limits for Rotating Electrical Machines.
I.E.C. 60034 Part 11:	Rules for protection of rating electrical machinery.
I.E.C. 60085/ B.S.I. 2757:	Classification of insulating materials for Electrical Machinery and Apparatus.
B.S.I. 4999 Part 111 I.E.C. 60077/22761DC Part 1:	Draft Specification Built in thermal protection for Electrical

Motors – Chapter 1

I.E.C. 60117:	Recommended graphical symbols
I.S. 1-298:	Asynchronous Squirrel Cage Motors
I.S. 1-549:	Dimensions of Electrical Motors
DIN 6885 Part 1	Center holes type R.A.B and C

5.3 Efficiency

High energy efficient motors shall be preferred. The bidder shall provide - nominal efficiency values measured at 50%, 70%, 80% and 100% of motor rating power. The efficiency shall be measured to international IEC 60034 - 2. The additional investment cost of the motors will be weighed against the cost of energy saved due to reduced while the energy considered payback period shall be three years and the energy cost - 0.15 \$/kwh. 8000 hours per year for 80% loaded motor.

5.4 Vibration and Noise

5.4.1 The vibration and noise levels of the motors shall fall within the limits prescribed in I.E.C. 60034 - Parts 1 and 9 respectively.

5.4.2 If silencers or other noise reducing devices are necessary to satisfy the noise limitations imposed, their costs where applicable shall be quoted separately in the tender.

5.5 Constructional Features

5.5.1 Enclosure and Cooling

5.5.1.1 Hazardous Locations Enclosures

Totally enclosed, fan cooled with non –sparking fan EExn, suitable for Zone 2 Groups IIA, IIB & IIC locations to BS 4683/3 and BS 5000/16).

5.5.1.2 General Purpose Location Enclosures

TEFC. weatherproof, suitable for outdoor location enclosures, shall be provided for motors located in the non-classified areas.

5.5.1.3 Mounting and Enclosure Protection

Motors shall be of mounting type due to motor data sheet requirements, enclosed and protected in accordance with IP Code as stated in the motor data sheets.

Stator end-plates and terminal boxes shall be suitably sealed.

As a rule enclosure protection shall be (minimum) IP55.

5.5.2 Terminal Boxes

- 5.5.2.1 Terminal boxes shall satisfy Code IP56, as stated in the motor data sheet, and shall be sealed from the interior air of the motors. Gaskets shall be of Neoprene or approved equivalent.
- 5.5.2.2 The terminal boxes shall be designed to withstand, without rupture, the effects of electrical faults within the boxes.
- 5.5.2.3 The terminal boxes shall be designed to permit removal of the motors without significant disturbance of the ends of the feeder cables connected thereto. The integrity of the motor enclosure must be maintained.
- 5.5.2.4 Separate terminal boxes shall be provided for each auxiliary function (thermistors, anti-condensation heaters, etc.)
- 5.5.2.5 Terminal boxes shall be of ample size to permit interchanging of connections and a suitable earthing terminal shall be provided within each box for the connecting of the earth conductor incorporated in the supply cable, in addition to the usual earthing terminal located on the motor frame.
- 5.5.2.6 All cable entries in terminal boxes shall be drilled and tapped in accordance with the particulars that will be furnished at the purchase stage. These entries shall be suitably plugged to prevent ingress of contaminants during shipment and prior to cabling.
- 5.5.2.7 All ends of the motor winding shall be brought out into a terminal box for connection to the incoming and on the terminal plate.
- 5.5.2.8 Terminal boxes shall be completely and hermetically sealed from the stator.

5.5.3 Shafts and bearings

- 5.5.3.1 Every motor shall be equipped with a standard metric single-ended shaft, with key-way and key to metric standards as per DIN 6885, Sheet 1 Form A, unless otherwise specified in the accompanying motor schedules/data sheets. The shaft will be centering hole tapped as per DIN 332, Form D - for motors 25kW

and above.

- 5.5.3.2 End-shield mounted ball or roller type bearings are preferred for all motors. Pedestal mountings and sleeve bearings are to be avoided as far as practicable.
- 5.5.3.3 Antifriction deep bearings, groove ball/roller bearings of the cartridge type shall be used to permit dismantling of the machine without disturbance of the bearings.
- 5.5.3.4 The sealing of bearings shall adequately cater for the environmental conditions specified in the motor data sheet.
- 5.5.3.5 Grease relief systems shall be provided complete with grease nipples to B.S. 1486.
- 5.5.3.6 Bearing life shall be 50,000 hours at least.
- 5.5.3.7 Measures shall be taken to prevent damage to bearings during shipment. Should bearings fail or exhibit symptoms of Brinelling during the guarantee period of the motors, they shall be renewed promptly by the supplier or his appointed agent, free of charge. Costs of any removals, transportation and restoration shall also be borne by the supplier.
- 5.5.3.8 Lubrication type and interval shall be indicated on a data plate fixed to the motor.
- 5.5.3.9 Should the motor be equipped with bearings allowing axial displacement, the shaft shall be provided with a marking to indicate the correct coupling position.

5.5.4 Winding Insulation

The insulation of the motors shall be according to I.E.C. 60085 - Class "F" as specified in the motor data sheets.

- 5.5.4.1 Winding insulation phase to phase, and phase to earth, shall be thermosetting resins impregnated, rated Class F or higher; conductors will have V.P.I. impregnation.
- 5.5.4.2 The rated operating temperature rise shall be as per Class B and the limitation shall be indicated on the name-plate.
- 5.5.4.3 Windings shall be suitable to resist contaminants and solvents (solid, liquid, grease) of chemical, petrochemical and petroleum industrial environments.
- 5.5.4.4 Connections between windings and terminals shall be insulated with materials suitable for continuous operation at

the maximum temperature (measured by the resistance method) required by the Standards (see Clause 5.2) for the winding insulation class.

5.5.4.5 Connection as per Para 4.1 shall be fixed and arranged so as to withstand the short circuits and the mechanical stresses and vibrations during normal running.

5.5.5 Embedded Temperature Detectors

5.5.5.1 Embedded temperature detectors - RTD-shall be provided for 45 kW motors and larger, for winding and bearing temperature monitoring.

5.5.5.2 Temperature detectors of the thermocouple type shall be of the resistance type, non-inductive, with 100 ohm at 0 C platinum resistor and temperature coefficient of $3.85 \times 10^{-3} \text{ C}^{-1}$.- RTD DIN 43760 three conductors.

5.5.5.3 Two thermocouples shall be fitted per phase in the anticipated hottest parts of the windings according to Motor Data Sheet requirements.

5.5.5.4 Two additional thermocouples shall monitor the bearings temperature in order protect them against abnormal conditions caused by overheating or insufficient lubrication.

5.5.5.5 Thermocouple wiring shall be terminated in a separate terminal box possessing the same degree of protection as the stator terminal box.
Terminals shall be of the block type with a pressure pad between the conductor and the clamping screw.

5.5.5.6 The terminal box shall be clearly and durably labeled to quantify and define the thermocouples/ thermistors, and also to chart their positions in the windings.

5.5.6 Anti-Condensation Heaters

5.5.6.1 Anti-condensation heaters shall be provided where called for in the accompanying motor schedules/data sheets.

5.5.6.2 Heaters shall be of sufficient power rating to maintain the interior air temperature of the motor above dew point when the motor is not in service.
The heaters shall be suitable for connecting to a 220V 50Hz supply.

5.5.6.3 The leads from the heaters shall be terminated in a separate terminal box possessing the same degree of protection as the stator terminal box.
Terminals shall be of the block type with a pressure pad between the conductor and the clamping screw.

5.5.6.4 The terminal box shall be clearly and durably labeled to define the rated voltage and power consumption of the heater and shall also bear a separate wiring label reading:
DANGER - ISOLATE HEATER BEFORE OPENING.

5.5.7 Fans and Fan Covers

Fans and Fan Covers shall be fully protected against corrosion.
Covers made of plastic shall not be used.
Fans shall be of non sparking metal.

6.0 INSPECTION AND TESTING

- 6.1 Clients representative shall be permitted to carry out, during normal working hours, periodic inspections of the motors covered by this specification, at any stage of manufacture.
- 6.2 Clients representative shall be permitted to witness the final Factory Tests of the motors covered by this specification.
- 6.3 The manufacturer, shall carry out 'Performance Tests' on one motor of each design. A 'Type Test' certificate in triplicate for every motor shall be furnished to and approved by the Engineer prior to dispatch of the motor.
- 6.4 'Routine Tests' shall be conducted on every motor and a Certificate of Routine Test in triplicate shall be furnished to and approved by the Engineer prior to dispatch of the motor.
- 6.5 The manufacturer shall give two weeks notice of readiness for final inspection and factory tests.
- 6.6 All tests shall be carried out in compliance with the relevant specification as detailed in clause 5.2 of this specification.

7.0 TAGGING AND PERMANENT MARKING

- 7.1 Each motor shall bear a prominently positioned rating plate manufactured from stainless steel which shall be indelibly stamped with the information detailed in I.E.C. 60034 Part 1. Each Explosion proof motor shall have on the data plate of its classification (s.a. EEx"e", EEx"n" or others, and the relevant standard, (IEC, BS etc.).
- 7.2 In addition to the rating plate, the motor shall have a label of stainless steel bearing:
- (a) Purchase Order Number.
 - (b) Equipment Number.
 - (c) Item Number.
 - (d) Rotation Direction (if defined).

8.0 DRAWINGS AND DATA REQUIREMENTS

- 8.1 Drawing and Data Requirements are detailed in attached documentation - see App. B.
- 8.2 Bidder shall furnish with his Bid a "Supplier's Data Sheet" for each type/size of motor which shall contain all the information required thereon.
- 8.3 A Data Sheet will be provided by the Engineer for each motor at the time of order. The supplier shall complete these Data Sheets as specified.
- 8.4 The manufacturer shall provide with each motor a certificate from a recognized institute, which verifies the suitability of the motor to the area classification.
- 8.5 The manufacturer shall provide details of the production standard and code of manufacturing the motor (Exp. motors).
- 8.6 The supplier shall furnish the motor load curves with the motor supply.

9.0 SPARES

- 9.1 Spares shall be quoted by the vendor in accordance to the best of his knowledge, and shall list separately commissioning spares, initial spares, and maintenance spares required for ten years of operation.

10.0 PAINTING & PRESERVATION

10.1 Painting

- 10.1.1 Stainless steel surfaces, internal surfaces, and finish machined surfaces such as flange faces, shafts, and couplings,

shall not be painted.

- 10.1.2 External surfaces of machinery, baseplates, accessories and shall be epoxy painted prior to being shipped from the supplier's shop in accordance with approved suppliers standard.

10.2 Preservation

Prior to shipment all equipment shall be subjected to the following treatment:

- 10.2.1 Bearings, bearing housing, and oil systems shall be thoroughly cleaned and coated with a suitable rust preventative. Supplier shall ensure that no damage shall occur to bearings during transport.
- 10.2.2 Seal assemblies shall be fully protected from rusting and entry of moisture and dirt.
- 10.2.3 External nonpainted surfaces (except stainless steel), including bolting and flange faces, shall be coated with a suitable rust preventative.
- 10.2.4 Exposed shafts and shaft couplings and other machined surfaces shall be wrapped with waterproof moldable waxed cloth or equal.
- 10.2.5 All flanged openings shall be protected by securely fastened metal covers to prevent damage during shipment. Covers shall be installed with a suitable gasket, using a minimum of four full diameter bolts. The cover and flange shall be taped for waterproof protection. All other openings shall be plugged or covered to prevent damage during shipment.
- 10.2.6 Supplier is responsible for ensuring that no rust shall occur during shipment.

11.0 DATA FOR BID COMPARISON, QUANTITIES AND UNIT RATES

In order to compare bids quickly and on an equal basis, suppliers are requested to fill in the attached "schedule of prices and data", (in addition to data sheets).

The bidder is to fill the prices and manufacturer data within the "schedule of prices and data" for various types of motors as specified in this specification.

The motor sizes and the quantities are estimated only and the final quantities and requirements shall be placed with an order.

The manufacturer technical data shall be filled within columns 3 to 11 while the prices shall be quoted within columns 12 to 15.

The delivery period (weeks) shall be quoted for each motor within column No. 16.

APPENDIX A - SITE CONDITIONS

1. Plant Location : Kamad Haifa
2. Altitude of site : sea level
3. Climatic Conditions :
 - a) Barometric pressure : 960 mbara (942-972 mbara)
 - b) Ambient Temperature : 0-400C
 - Summer Conditions : Maximum dry bulb: 39°C (at wet bulb of 20°C)
Maximum wet bulb: 39°C (at dry bulb of 33°C)
 - Winter Conditions : Minimum temperature for design : +5°C
Minimum temperature for fluids that may freeze : +1°C
 - c) Rainfall : average per year : 810mm (30-160mm)

design max. per 10 min : 70.5mm
design max. per 1 hr : 130mm
design max. per day : 320mm
 - d) Wind : basic wind velocity : 47m/sec (169km/h)
basic wind pressure : 120 kg/m²
prevailing direction : North – West (day time)

according to Israeli Standards 414, last edition
4. Earthquake standard : Israeli Standard 413, last edition (Rev. July 1991)
Alpha factor = 2
5. Earthquake standard : average (standard pan) : 2700mm / year
6. Surrounding Conditions : Highly Corrosive and Dusty Atmospheric
containing:

APPENDIX B

VENDOR DRAWINGS AND DATA REQUIREMENTS

PLANT: ENERGY INFRASTRUCTURE

EQUIPMENT DESCRIPTION: L.V. MOTORS

EQUIPMENT TAG. NO.: _____

R.F.O./PO _____

DATE: 1.11.23

REV. NO. 0 _____

DESCRIPTION	Approval before Fab.	Proposal Drawings		AFTER RECEIPT OF ORDER			
		Qty. & type	Schedule	Preliminary		Final	
				Qty. & type	Schedule	Qty. & type	Schedule
1. Piping & Instrumentation Diagrams.							
2. General Arrangement / Dimensional Drwgs.		3P	TS	3P	0 + 15	S	D
3. Loads and Foundation Requirements	V			3P	0 + 15		
4. Assembly & Cross – Sectional Drwgs.				3P	0 + 15		
5. Complete Part List/Bill of Materials including Vendor & Original Mfr's Numbers.		3P	TS				
6. Fabrication Detailed Drwgs.	V			3P	0 + 15		
7. Electrical Schematics & Wiring Diagrams.	V			3P	0 + 15	S	D
8. Control & Instrument Drwgs. & Specifications.							
9. Driver Data Specifications Requirements.							
10. Piping Drwgs.							
11. Vendor Data Sheets.	V	3P	TS	3P	0 + 15	S	D
12. Test Certificates.						6P	D
13. Code/Material Certifications.	V						
14. Erection & Installations instructions.							
15. Operation & Maintenance instructions.				3P	0 + 15	6P	D
16. Lubrication Schedule: Frequency & Type.				3P	0 + 15	6P	D
17. Fabrication Schedule & Periodic Progress Report.	V						
18. Priced Recommended Spare Part list for 10 Years Operation.	V						

ABBREVIATIONS

1. DRAWINGS QUANTITY & TYPE Indicated above, P=Print, S=Sepia, T=Plastic Transparency, e.g. 3S=Three Sepias.
2. DRAWING SCHEDULE Indicated above, 0=Date of Order, D=Date of Despatch, A=Date of Approval, TS=Date of Tender submission, e.g. 0+30=30days after date of Order.

APPENDIX C

CABLE SIZES AND GLANDS FOR ELECTRIC MOTORS

POWER (KW)	FULL LOAD CURRENT (A)	N2XY CABLE SIZE (MM ²)	TAPPING IN MOTOR TERMINAL BOX FOR CABLE GLAND	
			PG	M
0.22	0.8	4x2.5	13	20
0.37	1.1	4x2.5	13	20
0.55	1.5	4x2.5	13	20
0.75	2.0	4x2.5	13	20
1.1	2.7	4x2.5	13	20
1.5	3.5	4x2.5	13	20
2.2	4.9	4x2.5	13	20
3	6.5	4x2.5	13	20
4	8.5	4x2.5	13	20
5.5	11.0	4x2.5	13	20
7.5	14.7	4x4	21	25
9.2	18.6	4x4	21	25
11	21.6	4x6	21	25
15	28.0	4x10	29	32
18.5	34.7	4x16	29	32
22	41.0	4x16	29	32
30	55.0	3x25/16	29	40
37	69.0	3x35/16	36	40
44	80.0	3x50/25	36	40
55	99.0	3x70/35	48	50
75	132	3x95/50	48	50
90	165	3x120/70	--	63
110	195	3x150/70	--	63
132	235	2(3x70/35)	2x48	2x50
160	285	2(3x95/50)	2x48	2x50
200	344	2(3x120/70)	--	2x63
250	438	2(3x150/70)	--	2x63
390	560	3(3x150/70)	--	3x63
430	620	3(3x150/70)	--	3x63

APPENDIX D

MOTOR DATA SHEETS

MOTOR DATA SHEET

General Data	1.0	Customer Data		
	1.1	Data Sheet No.		
	1.2	Location:	HAIFA ISRAEL	
	1.3	Plant/Unit:	KAMAD HAIFA	
	1.4	Project Name:	NEW AUXILIARY PUMP	
	1.5	Motor Function:	OIL PUMP	
	1.6	Motor Tag Number	P0014	
	1.7	Max./Min. Ambient. Temp.:	0-40°C	
	1.8	Altitude Over Sea Level	10m.	
	1.9	Relative Humidity:	90%	
	1.10	Atmosphere:	Petrochemicals	
	1.11	Environment classification	Zone 2	
	1.12		TEFC/IP-55	
	1.13	Type:	NON SPARKING	
	1.14	Specification:	I.E.C	
	1.15	Prepared By:	M.B.	
1.16	Date:	26/11/2023		
Electrical Data	2.0	Customer Motor Requirements		
	2.1	Motor Type:	Cage Rotor	
	2.2	Rated Output	By Vendor	kW
	2.3	Rated Voltage:	400	V
	2.4	Phases:	3	
	2.5	Frequency:	50	Hz
	2.6	Stator Winding Connection:	Y/Δ	
	2.7	Number Of Terminals:	6 - On terminal plate	
	2.8	Starting Method:	Soft Start	
	2.9	Insulating Class:	F	
	2.10	Stator Wind. Max. Temp.class	B	
	2.11	Efficiency Class	EFF-3/PREMIUM	
	2.12	Thermal Protection Device Type	PT-100	
	2.12.1	Mounted in a separate terminal box	YES	
	2.12.2	Control Cable Entries – Number/Size	1/M16	
	2.13	No.of Thermal Protection Device in winding	6	
	2.14	No.of Thermal Protection Device in bearings	2	
	2.15	Anti Condensation Heater type	1X99 W-230 VAC	
	2.15.1	Mounted in a separate terminal box	YES	
	2.15.2	Control Cable Entries – Number/Size	1/M20	
2.16	Stating Freq. (No. Of Starts/1H from hot) :	4		
2.17	Duty	S1		
2.18	Service Factor:	1.15		
2.19	Synchronous Speed:	1480	r.p.m	
Mechanical Data	2.20	Cable Size	mm ²	
	2.21	Cable Type	N2XY	
	2.22	Enclosure Material:	CAST IRON	
	2.23	Type Of Enclosure - Motor:	TEFC/IP-55	
	2.24	Terminal Box Enclosure	Eexd IIA	
	2.25	Power Cable Entries – Number/size		
	2.26	Power Terminal Box Location	N/A	
		Control Terminal Boxes Location	N/A	
	2.27	Paint Standard	Epoxy	
	2.28	Frame Size:	VHS	
	2.29	Type Of Load:	VERTICAL OIL PUMP	
	2.30	Type Of Coupling:	N/A	
		Bearing Type:	By Vendor	
	2.31	Bearing Lubrication Type:	Grease	
2.32	Mounting:	VHS		
2.33	Canopy for vertical mounted motor	YES		
2.34	Direction Of Rotation (Viewed From The Drive End)	BIDIRECTIONAL		
2.35	Vibration Category:	NORMAL		
2.36	Method of Cooling:	AIR		

MOTOR DATA SHEET

General Data	1.0	Customer Data		
	1.1	Data Sheet No.		
	1.2	Location:	HAIFA ISRAEL	
	1.3	Plant/Unit:	KAMAD HAIFA	
	1.4	Project Name:	NEW AUXILIARY PUMP	
	1.5	Motor Function:	OIL PUMP	
	1.6	Motor Tag Number	P0014	
	3.0	Manufacturer Motor Data		
General Data	3.1	Prepared By:		
	3.2	Date:		
	3.3	Manufacturer:		
	3.4	Motor Type		
	3.5	Frame Size:		
	3.6	Environment classification		
	3.7	Type:		
	3.8			
	3.9	Rated Power		HP
Electrical Data	3.10	Full Load Current:		A
	3.11	Locked Rotor Current:		x I _n
	3.12	No Load Current:		A
	3.13	Power Factor At: 100% Full Load:		
	3.13.1	80% Full Load:		
	3.13.2	70% Full Load:		
	3.13.3	50% Full Load:		
	3.13.4	No Load:		
	3.14	Efficiency Class		
	3.14.1	Efficiency At: 100% Full Load:		%
	3.14.2	80% Full Load:		%
	3.14.3	70% Full Load:		%
	3.14.4	50% Full Load:		%
	3.15	Rated Torque:		Kg-m
	3.16	Locked Rotor Torque:		x T _n
3.17	Breakdown Torque:		x T _n	
Mechanical Data	3.18	Bearing Type On DE		
	3.19	Bearing Type On NDE		
	3.20	Method of Cooling:		
	3.21	Max. Permis. Temp. Of Bearings		
	3.22	Type Of Enclosure - Motor:		
	3.23	Terminal Box Enclosure		
	3.24	Net Weight:		Kg.
	3.25	Weight Of Rotating Parts:		Kg.
	3.26	Rotor Moment of Inertia		Kg-m ²