The Procurement and Logistics Unit

May 29 , 2016

Request for information (RFI)

Vertical Electrical Motor

1. Introduction

1.1. Mekorot Water Company Ltd. (hereinafter: "Mekorot") is considering the possibility of purchasing a medium & low voltage Vertical (hollow or solid shaft) electric motors for an existing vertical turbine pumps.

1.2. This RFI is a preliminary process taken by Mekorot mainly for the purpose of receiving data and information.

1.3. The request for Information will be used for the purpose of preparing, if MEKOROT so decides an RFP (request for proposal) or tender.

1.4. For the avoidence od doubt, this RFI is not, by any means, a formal solicitation or an undertaking to tender or negotiate in any way. It is here by declaed that this RFI will not create any obligation and/or liability from MEKOROT side to the responder.

1.5. Mekorot does not commit to take any further step such as proceeding to a RFP or contract or negotiations, and does not commit itself to proceed with this procedure in any form. This RFI does not constitute a tender, a proposal or a RFP in any manner.

1.6. Mekorot reserves the right to cancel this procedure completely at any stage and for any reason, which will remain in Mekorot's sole discretion.

1.7. Respondents shall bear all costs associated with the preparation and submission of their responses to the RFI.

1.8. Typical characteristics of vertical electrical motors of Mekorot: Capacity from 30kW to 20 MW and nominal voltage from 0.4kV till 11kV.

1.9. About 30 new vertical motors are installed every year.

1.10. Mekorot is interested in to expand the list of suppliers of vertical electrical motors.

2. RFI Documents

This RFI includes the following parts:

Part A - The Information.

Part B – The technical requirements.

2.1. PART A – The Information

The Response shall refer and reply in detail to all the following clauses:

2.1.1. Name and contact details of a manufacturer.

2.1.2. Catalog of relevant prodacts.

2.1.3. Name and contact details of a local representative in Israel (if exists).

2.1.4. Professional capabilities of the supplier regarding the service.

2.1.5. If the supplier is not the manufacturer he needs to provide confirmation of the manufacturer on the right to the submission of its products.

2.1.6. A detailed list which includes the manufacturer's major customers, including but not limited to customer's contact person for reference (name, title, telephone, e-mail, facsimile).

2.1.7. Logistical capabilities that the supplier\manufacturer has in order to supply to Mekorot an electrical motors according to the technical requirement, including the location of his main office.

2.1.8. Details about the supplier's organization, location and support which will be provided to Mekorot if necessary.

2.1.9. Regulations, standards and licenses under which the service may be provided.

2.2. PART B – TECHNICAL REQUIREMENTS

According to Mekorot standart spesification 614.002

2.2.1. <u>General</u>

This specification deals with the technical requirements for purchase of vertical squirrel cage hollow or solid shaft three phase electric motor for drive of water pump in unattended pumping station. The motor shall comply with this specification and with the particular specification submitted for each enquiry of specific motor. Any deviation from these specifications shall be explicitly mentioned in the quotation.

Anything not covered in these specifications shall conform to IEC 60034 in case of European manufacturers and to NEMA MG1 in case of USA manufacturers.

2.2.2. Reference documents

- Israel electrical law-1954
- IEC/SI 60034
- NEMA MG1
- ISO 9001

2.2.3. Environmental conditions

- Ambient temperature: -5oC to + 45oC
- Relative humidity: maximum 95%
- Altitude above mean sea level: under 1,000 m

2.2.4. Electrical supply

- Voltage variation: + 10% (not including starting stage)
- Nominal voltage: see particular specification
- Nominal frequency: 50 Hz

2.2.5. Load

The motor shall be suitable for continuous load of water pump, service factor 1.15.

It should be permitted to start the motor at least three successive starts per hour from cold and two successive starts from hot.

Standard motors outputs

Output	**kW**	22	30	37	45	55	75	90	110	132	160
	HP	30	40	50	60	75	100	125	150	180	220

Output	**kW**	200	250	280	315	355	400	450	500	560	630
	HP	270	340	380	430	480	550	610	680	750	840

Output	**kW**	710	800	900	1000	1120	1250	1400	1600	1800	2000
	HP	950	1070	1200	1400	1500	1700	1900	2150	2450	2700

2.2.6. Inverter duty motor

The motor destined to work with frequency converter (VFD) has to be designed according IEC/TS 60034-25

2.2.7. Enclosure

2.2.7.1. The motor will be mounted outdoors, without weather protection shelter. All of coatings should ensure protection for tropical weather, moisture and fungus proof. The painting specification should be according to Mekorot Standard Specification 412.008 or approved by MEKOROT.

2.2.7.2. The motor enclosure shall be proposed in the following three alternatives:

- Weather protection WP I according to NEMA MG1 or IPW-23 according to IEC 60034.
- Weather protection WP II according to NEMA MG1 or IPW-24 according to IEC 60034 including air filters.
  With filters removed, the enclosure shall still comply to NEMA MG1-WP II or to IEC 60034 - IPW-24, as the case may be.
  Option: pressure switch for pressure drop in filters.
- Totally enclosed fan cooled (TEFC) IP 55 degree of protection.
  Usually the enclosure shall be the as follows:
  - Up to 220HP-TEFC
  - 220-500 HP-WPI
  - More than 500HP-WPII
  All according to particular specification.

2.2.8. Terminal boxes

2.2.8.1. The main terminal box should be provided with a terminal block and a removable blank flange which will be bored by the purchaser according to cable dimension. All leads shall be brought to the terminal block. The main terminal box for motor equal or greater then 600 HP should be equipped with a door. The door must be locked by bolts. Dimensions of motor main terminal box shall be not less as specified in the table 1.

Table 1

Option	Power, HP	Dimensions, mm
1	75-125	330x440x210
2	75-125	280x280x170
1	150-270	440x660x270
2	150-270	330x440x210
1	340-550	440x660x270
1	610-1200	820x670x390
1	1200-	820x670x390

A main terminal box for medium voltage motor shall be provided with surge arresters manufactured by Zorc, South Africa or equal. The box shall enable the entry of XLPE single core cables as specified in the particular specification (minimum cable cross section: 120 mm2).

Heaters may be installed in this box according to demands.

Terminals for these heaters shall be installed into the separate box.

2.2.8.2. All control and main terminal boxes shall be installed on the same side of the motor for sake of convenience. The control boxes shall include Pg cable glands.

2.2.8.3. All terminal boxes shall have IP55 enclosure.

2.2.8.4. All terminal boxes should be fixed directly to the motor's body without any external supports.

2.2.9. Coupling

2.2.9.1. The rabbet diameter (NEMA designation AK) shall be as specified in the particular specification.

2.2.9.2. For hollow shaft motor, the bore diameter of the top drive coupling, NEMA designation BX, shall be as specified in the particular specification.

2.2.9.3. For solid shaft motor, a fixed metallic "skirt" with the same AK as the motor shall be delivered.

2.2.9.4. For solid shaft motor, the motor shall be supplied with free shaft end for mounting of half coupling which will be supplied by pump manufacturer or the purchaser.

Option: final machining and fitting shall be carried out by the motor manufacturer.

2.2.10. Rotation

2.2.10.1. Direction of rotation shall be counterclockwise when viewed from non drive end unless otherwise stated.

2.2.10.2. Backspin speed: 125 % of synchronous speed, when driven accidentally by pump, for several minutes.

2.2.11. Non-reverse ratchet

If specified, the motor shall be provided with a non reverse ratchet which must be able to withstand pump reverse torque of 150% nominal motor torque

2.2.12. Thrust bearing

Bearings shall be air-cooled, mineral oil immersed or grease lubricated.

Oil level indicators shall be provided. Motor shall be protected against bearing currents by means of bearing insulation. The bearings outside nominal thrust should be minimum 125% of the pump's thrust at operating point. The L10 life at the nominal thrust should be minimum 20,000 hours. Momentary up thrust at starting and stopping shall be 30% of the nominal down thrust.

2.2.13. Pump torque

Pump torque curve from standstill to running speed shall be provided by pump manufacturer at a later stage. For preliminary design, the load torque during the starting period shall be assumed to be the higher of the following values:

2.2.13.1. Mo

2.2.13.2. [0.4 * Mo] + {[Mn - 0.4 * Mo] * (N/Ns)2}

Where:

Mo = Breakaway torque of load as specified in particular specification

Mn = Nominal torque at nominal speed

Ns = Synchronous speed

N = Actual speed from zero to nominal speed

2.2.14. Motor torque

2.2.14.1. Starting torque of the motor shall be about 80% of motor nominal torque.

2.2.14.2. Breakdown torque shall be about 200% of motor nominal torque.

2.2.15. Locked rotor current

In order to comply with the conditions of the power supply utility, the locked rotor current of the motor shall be according to code letter F to NEMA MG1 or less, with nominal voltage on motor terminals.

2.2.16. Starting methods

The following starting methods are envisaged:

2.2.16.1. Direct on-line starting at full rated voltage.

2.2.16.2. Reduced voltage starting in the following methods:

- Electronic soft starter
- Frequency converter for starting and operation

2.2.16.3. Capacitor starting for medium voltage

2.2.17. Electrical insulation

Winding insulation shall be of Class F, with V.P.I. varnish impregnation.

For TEFC enclosure V.P.I. varnish impregnation not required**.**

In consequence of continuous nominal output, ambient temperature of 45oC, the temperature rise shall be according to Class B insulation.

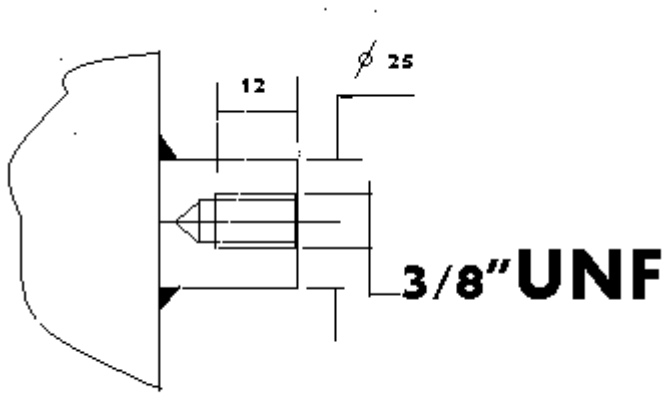
Temperature rise measurement according to resistance method.

2.2.18. Vibration

Motor vibration shall be according to “special” vibration limits according to IEC 60034-14.

The vibration test should be carried out for full equipped motor included the main terminal box.

The motor equal or greater than 270 HP (or for smaller one, if specified) should be equipped by two devices for vibration detector installation.



The devices should be erected on the motor vertically, perpendicular to the shaft.

The detector will be delivered by MEKOROT.

2.2.19. Winding temperature elements

Temperature elements shall be according to one of the following alternatives, as specified in particular specification:

2.2.19.1. Alternative 1 - Thermistors

For motor of up to about 200 HP: one set of 3 PTC thermistors is required.

For motor greater than 200 HP: 6 PTC thermistors shall be embedded in the stator winding (2 per phase), one set of 3 thermistors for active protection rise and the second set for spare. Terminals shall be brought out to a weatherproof terminal box. Thermistor operating temperature shall be equal to a winding temperature which is 5^{o}C lower than the maximum permitted according to the class of insulation at ambient temperature of 45^{o}C.

2.2.19.2. Alternative 2 - PT100 Elements

For motor equal or greater than 400 HP: 6 RTD resistance elements, PT100, embedded in the winding, for the temperature measurement. One set of 3 elements for active measurement, the second set is spare.

Resistance elements shall be of 100 Ohm at 0oC.

The terminals of the PT100 elements shall be brought out to a weatherproof

separate terminals box.

For medium voltage motors, the elements shall be protected at both ends with overvoltage arresters.

2.2.20. Thrust bearing temperature elements (if specified)

3.20.1 RTD resistance element, PT100, (similar to winding element), shall be included for the thrust bearing. The PT100 terminals shall be brought out to the terminals box mentioned for the winding temperature elements.

3.20.2 Option: temperature indicator, mounted on the motor, shall be provided for the thrust bearing, the sensor in contact with bearing seat.

2.2.21. Heater

The motor shall be equipped with an anti-condensation heater, single phase, 230V. The heater terminals shall be brought to a separate terminals box.

For medium voltage motors the heater shall be preferable withdrawable.

2.2.22. Efficiency

The efficiency at motor nominal output shall be stated net, not including the losses due to external thrust. Efficiency should be calculated according to IEC-60034, summation of losses method, even for motors of US manufacturers.

The low voltage motors should be Premium Efficiency (IE3) according to Table 7 of IEC-SI 60034 part 30 based on the test methods specified in IEC 60034-2-1:2014:

P		Number of poles		
kW	HP	2	4	6
30	40	93.3	93.6	92.9
37	50	93.7	93.9	93.3
45	60	94.0	94.2	93.7
55	75	94.3	94.6	94.1
75	100	94.7	95.0	94.6
90	125	95.0	95.2	94.9

110	150	95.2	95.4	95.1
132	180	95.4	95.6	95.4
160	215	95.6	95.8	95.6
200-375	270-500	95.8	96.0	95.8
>375	>500	95.8	96.0	95.8

2.2.23. Nameplates

The nameplates shall be according to NEMA MG1 or IEC 60034.

2.2.23.1. Motor nameplates shall be of stainless steel and shall be securely fastened to the motor frame with pins of a like material.

2.2.23.2. The following information shall be contained on the motor nameplate as a minimum:

a. Manufacturer name
b. No. of phases
c. Manufacturer motor code
d. Manufacturer serial number
e. Manufacturing standard
f. Rated output power
g. Efficiency according to IEC
h. Full load speed
i. Frequency
j. Rated voltage according to connection configuration
k. Rated power factor
l. Service factor
m. Insulation class and temperature rise
n. Degree of protection
o. Maximum ambient conditions
p. Full load current at nameplate voltage
q. Frame size designation
r. Inverter Duty (if designated)

s. Thrust bearing type
t. Nominal bearing downthrust, 20,000h, L10 life
u. Thrust bearing lubrication type
v. Permission overspeed
w. Total motor weight

2.2.24. Guarantee

Guarantee period shall be:

- For regular motors: at least 12 months from date of commissioning or 18 months from date of delivery to MEKOROT warehouse, whichever occurs first.
- For big motors over 800 HP: at least 18 months from date of commissioning or 24 months from date of delivery to MEKOROT warehouse, whichever occurs first.
- For inverter duty motors: at least 36 month from date of delivery to MEKOROT warehouse.
- Replacement, including repair of defective parts during the guarantee period, to be at the expense of the supplier.
- The supplier shall inform MEKOROT of detailed guarantee conditions.
- The supplier shall provide a guarantee to store and supply spare parts for a period of 8 years from date of expiry of the guarantee period.

3. Administrative information

3.1. Information is to be provided by all concerned on a voluntarily basis and with the understanding that this RFI is for information gathering purposes only and is not a formal solicitation.

3.2. All expenses associated with the submissions under this RFI shall be borne by the participants only. In no event, shall participants be entitled to any refund or monetary compensation in connection with their participation in this RFI.

3.3. MEKOROT reserves the right to introduce modifications and/or changes to this request, including the date of submission.

3.4. MEKOROT will be entitled to refer specifically to one or more participants for further information by means of Request for Clarification

3.5. Although this RFI may result in an RFP (Request for Proposal) it does not in itself constitute an invitation to negotiate or an offer to contract of any kind. For the avoidance of doubt, it is made clear that this request should not to be considered a commitment to publish a tender or to perform the work.

3.6. Without derogating from the above, MEKOROT alone will decide on how the performance of the works will be carried out (by public and/or private sector).

3.7. MEKOROT may transfer the information to its consultants and to every person entitled by law to receive it. If the information provided includes components that are proprietary professional or trade secrets, this should be pointed out explicitly within a confidentiality section.

3.8. If MEKOROT decides to publish a tender in the future, the information obtained within this request will not be considered as a part of the bids submitted, unless this information is re-submitted (in whole or in part), within the tender bid proposal itself.

4. <u>Submitt procedure</u>

4.1. The requested information should be sent not lather than June 30, 2016 at 12:00pm, to the Email adress: AuctionsMailbox24@MEKOROT.CO.IL.

4.2. Response or questions to this RFI, should be addressed to Mekorot's contact person only, via Fax, Tel or Email, unless noted otherwise:

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