

Tender Form J – Technical Specification Requirements

To be completed by the Tenderer

Instructions for completing this form:

1. The Tenderer shall complete all the cells in the column "Offered" in the table, as follows:
 - a. Where a blank line appears in the "Offered" column – the Tenderer shall insert the required data.
 - b. Where a box appears in the "Offered" column – the Tenderer shall tick the box as indication of its compliance with the applicable requirement.
 - c. Where the "Offered" column indicates "relevant document attached" – the Tenderer shall attaching the required graphs, drawings, curves, etc. (as applicable) and tick the box as confirmation that such documents have been attached to the tender.
2. The Pump characteristic curves (Item 8) shall also be submitted in digitized form (as tables).
3. The items 6, 7, 8 and 71 will be used to evaluate and score the proposals based on Life Cycle Cost analysis (LCC). See Clause 14.1.2 in the Request for Proposals.

No	Item	Required	Offered
	PUMP		
1.	Type of pump	Horizontal, double suction, axially split case, single stage	<input type="checkbox"/>
2.	Rated capacity (m ³ /h)	10,700 m ³ /h	<input type="checkbox"/>
3.	Total head at rated capacity (m)	140 m	<input type="checkbox"/>
4.	Pump flow range (m ³ /h)	Minimum Range 9,000 – 13,000 m ³ /h	Flow range: _____

No	Item	Required	Offered
5.	Nominal speed @50 Hz (rpm)	~990 rpm <u>or</u> ~740 rpm	<input type="checkbox"/> ~990 rpm <input type="checkbox"/> ~740 rpm
6.	Pump efficiency at rated condition point (%)	-	____%
7.	Overall efficiency (pump and motor) at rated condition point (%)	-	____%
8.	Pump characteristic curves (Total head, efficiency, absorbed power, NPSHR) for the full flow range	to be submitted	<input type="checkbox"/> relevant document attached
9.	Pump torque – speed curve	to be submitted	<input type="checkbox"/> relevant document attached
10.	Description of pump and detailed scope of supply	to be submitted	<input type="checkbox"/> relevant document attached
11.	Outline dimensioned drawings of pump and of pumping unit	to be submitted	<input type="checkbox"/> relevant document attached
12.	Pump cross sectional drawing with parts numbered and list of parts	to be submitted	<input type="checkbox"/> relevant document attached
13.	Materials specification (with standards)	to be submitted	<input type="checkbox"/> relevant document attached
14.	Direction of rotation, as seen from the motor	Clockwise	<input type="checkbox"/>
15.	Diameter of the largest sphere that could pass freely through the pump impeller (mm)	-	____mm
16.	Pump weight (kg)	-	____kg
17.	Weight and GD ² of rotating parts	-	____kg ____kg*m ²
18.	Pump casing working pressure (bar)	-	____bar
19.	Hydrostatic test pressure (bar)	-	____bar

No	Item	Required	Offered
20.	Suction flange rating	PN16 acc. to EN 1092	<input type="checkbox"/>
21.	Discharge flange rating	PN40 acc. to EN 1092	<input type="checkbox"/>
22.	Impeller	Double suction, mixed flow, enclosed type, cast in one piece	<input type="checkbox"/>
23.	Casing and impeller wear rings	Renewable	<input type="checkbox"/>
24.	Pump bearings	Forced lubricated sleeve bearings <u>or</u> anti-friction bearings	<input type="checkbox"/> Forced lubricated sleeve bearings <input type="checkbox"/> Anti-friction bearings
25.	Mechanical seals	Balanced split type	<input type="checkbox"/>
26.	Instrumentation (Minimum requirements)	2 pressure gauges <u>and</u> 2 vibration sensors Monitran TN/2285C <u>and</u> 2 temperature elements PT100	<input type="checkbox"/> 2 pressure gauges <input type="checkbox"/> 2 vibration sensors Monitran TN/2285C <input type="checkbox"/> 2 temperature elements PT100
27.	Coupling and coupling guard	included	<input type="checkbox"/>
28.	Coupling type	Flexible, spacer type	<input type="checkbox"/>
29.	Baseplate (common)	included	<input type="checkbox"/>
30.	Foundation bolts	included	<input type="checkbox"/>
31.	Accessories (for example: vents, drain valves, flushing pipes, seal drain pipes, etc.)	included	<input type="checkbox"/>
32.	Special tools (if required)	included	<input type="checkbox"/>

No	Item	Required	Offered
33.	Pump casing material	Cast steel <u>or</u> ductile iron	<input type="checkbox"/> Cast steel <input type="checkbox"/> Ductile iron
34.	Impeller material	CD4MCu	<input type="checkbox"/>
35.	Shaft material	17-4PH	<input type="checkbox"/>
36.	Bearing housing material	Cast steel <u>or</u> ductile iron	<input type="checkbox"/> Cast steel <input type="checkbox"/> Ductile iron
37.	Casing wear rings material	1.4027 <u>or</u> Stellite	<input type="checkbox"/> 1.4027 <input type="checkbox"/> Stellite
38.	Impeller wear rings material	1.4312 <u>or</u> Stellite	<input type="checkbox"/> 1.4312 <input type="checkbox"/> Stellite
39.	Shaft protecting sleeve material (if applicable)	Stainless steel	<input type="checkbox"/>
40.	Mechanical seal materials	Silicon carbide- Silicon carbide	<input type="checkbox"/>
41.	Baseplate material	Carbon steel (fabricated)	<input type="checkbox"/>
42.	Painting	Baked epoxy paint	<input type="checkbox"/>
43.	No. of paint layers	Minimum 2	____ paint layers
44.	Coating total thickness (DFT)	Minimum 250 microns	____ microns (DFT)

No	Item	Required	Offered
45.	External color	RAL 5012	<input type="checkbox"/>
46.	Rotating element balancing in the factory (static and dynamic)	Included	<input type="checkbox"/>
47.	Residual unbalance of rotating element	Class 2.5 acc. to ISO 1940	<input type="checkbox"/>
48.	First critical speed/nominal speed ratio	Minimum 1.25	ratio: _____
49.	Maximum allowed vibration level (mm/s RMS)	4.5 mm/s RMS acc. to ISO 10816	_____ mm/s RMS
50.	Noise pressure level of the pump at 1 m (dB(A))	-	_____ dB(A)
51.	Factory performance test	For all (4) pumps (With actual motor)	<input type="checkbox"/>
52.	Factory witnessed test	For one pump	<input type="checkbox"/>
53.	Factory test speed	Minimum 80% of the nominal speed	<input type="checkbox"/>
54.	Standard/grade for factory tests	ANSI/HI 14.6-2011 Grade 1U	<input type="checkbox"/>
55.	Maximum minus tolerance for efficiency at pump factory tests (%)	No minus tolerance	<input type="checkbox"/>
	MOTOR		
56.	Type of motor	Asynchronous, horizontal	<input type="checkbox"/>
57.	Type of construction (mounting)	IM B3	<input type="checkbox"/>
58.	Ambient temperature	Maximum 45°C	___ °C

No	Item	Required	Offered
59.	Nominal output (kW)	At least 115% of the pump maximum absorbed power	___ kW
60.	Motor duty type	S1	<input type="checkbox"/>
61.	Service factor (NEMA)	1.15	<input type="checkbox"/>
62.	Nominal voltage (Un) (V)	11,000 V @ 50 Hz	<input type="checkbox"/>
63.	Nominal current (In) (A)	-	___ A
64.	Direct on line starting current ratio (zero plus tolerance)	Maximum 6.5 x In	ratio: _____
65.	No load current (A)	-	___ A
66.	Nominal motor torque (Mn)	-	___ N*m
67.	Breakdown (maximum) motor torque	At least 200% Mn	___ N*m
68.	Locked rotor (starting) motor torque at 100% nominal voltage	At least 80% Mn	___ N*m
69.	Estimated starting torque of the load (pump)	According to pump	___ N*m
70.	Cos φ (power factor) 100% load 75% load 50% load Locked rotor	-	Cos φ at 100% load : _____ Cos φ at 75% load: _____ Cos φ at 50% load: _____ Cos φ at Locked rotor : _____
71.	Efficiency 100% load 75% load 50% load	-	Efficiency at 100% load: _____ Efficiency at 75% load: _____ Efficiency at 50% load: _____

No	Item	Required	Offered
72.	Motor speed at nominal output (rpm)	According to pump	___ rpm
73.	Maximum allowed reverse speed for 60 seconds (rpm)	125% of the synchronous speed	___ rpm
74.	Class and type of insulation	Class F, with V.P.I. impregnation	<input type="checkbox"/>
75.	Temperature rise of winding, continuous duty, as class B insulation	ETD method (Up to 45°C ambient temperature)	___ °C
76.	Bearing temperature rise	-	___ °C
77.	Starting method	Direct on line	<input type="checkbox"/>
78.	No. of possible successive starts (starting sequences)	3 successive starts with motor initially at ambient temperature; and 2 successive starts with motor initially at operating temperature	<input type="checkbox"/>
79.	Winding temperature elements	6 PT100 elements	<input type="checkbox"/>
80.	Temperature monitoring in NDE (non-drive end) bearing :	2 PT100 elements	<input type="checkbox"/>
81.	Temperature monitoring in DE (drive-end) bearing :	2 PT100 elements	<input type="checkbox"/>
82.	Overvoltage protection for PT100 of windings and bearings	included	<input type="checkbox"/>
83.	Removable anti-condensation heaters in stator frame and in terminal box	included	<input type="checkbox"/>
84.	Preparation for 4 vibration monitoring devices	included	<input type="checkbox"/>
85.	Main power terminal box dimensions	to be submitted	<input type="checkbox"/> relevant document attached

No	Item	Required	Offered
86.	Zorc surge suppressors in main power box	included	<input type="checkbox"/>
87.	Y connection of motor's windings, all winding ends brought to main junction box. Star point connection in the junction box.	yes	<input type="checkbox"/>
88.	3 CT for differential protection installed in the power box on the 3 windings, near the star point of windings. The CT shall be 1A secondary, 10P10, 20VA	yes	<input type="checkbox"/>
89.	Bearing: 100,000h, L10 life (if relevant)	-	<input type="checkbox"/>
90.	Bearing oil level sensor (if relevant)	-	<input type="checkbox"/>
91.	Type of NDE bearing	Anti friction or Sleeve bearing	<input type="checkbox"/> Anti friction <input type="checkbox"/> Sleeve bearing
92.	Type of DE bearing	Anti friction or Sleeve bearing	<input type="checkbox"/> Anti friction <input type="checkbox"/> Sleeve bearing
93.	NDE bearing insulation	yes	<input type="checkbox"/>
94.	DE bearing insulation	yes	<input type="checkbox"/>
95.	Earthing of motor shaft	yes	<input type="checkbox"/>
96.	Cooling method	IC81W	<input type="checkbox"/>
97.	Enclosure	IPW55	<input type="checkbox"/>

No	Item	Required	Offered
98.	Motor frame	-	Frame: _____
99.	Frame (enclosure) material	Steel <u>or</u> cast iron	<input type="checkbox"/> Steel <input type="checkbox"/> Cast iron
100.	Minimum thickness of steel plate of motor enclosure (mm)	-	____ mm
101.	Squirrel cage material	Copper	<input type="checkbox"/>
102.	Stator windings material	Formed wound copper coils	<input type="checkbox"/>
103.	Motor thermal limits curves	-	<input type="checkbox"/> relevant document submitted
104.	Moment of inertia of rotating parts (GD ²)	-	____ kg*m ²
105.	Motor torque-speed curves at Un and at 80% of Un (with tolerances), temperature to be stated.	to be submitted	<input type="checkbox"/> relevant document attached
106.	Current-speed curves at Un and at 80% of Un (with tolerances), temperature to be stated.	to be submitted	<input type="checkbox"/> relevant document attached
107.	Maximum allowed vibration level (mm/s RMS)	4.5 mm/s RMS acc. to ISO 10816	____mm/s RMS
108.	Noise pressure level of the motor at 1 m (dB(A))	Max. 85 dB(A) at 1 m	____ dB(A)
109.	Motor net weight (kg)	-	____ kg
110.	Net weight of rotating parts (kg)	-	____ kg
111.	Starting time, when Ustart=Un (sec)	-	____ sec
112.	Starting time, when Ustart=0.8*Un (sec)	-	____ sec
113.	Maximum stalling time (sec)	-	____ sec

No	Item	Required	Offered
114.	Warm up time constant (min)	-	___ min
115.	Cool down time constant (min)	-	___ min
116.	Motor outline dimension drawing	to be submitted	<input type="checkbox"/> relevant document attached
117.	Typical motor cross section	to be submitted	<input type="checkbox"/> relevant document attached
118.	Details of winding impregnation	to be submitted	<input type="checkbox"/> relevant document attached
AUXILIARY SYSTEMS			
119.	Oil supply unit for lubrication of the pump bearings (including connection pipes, cables and oil collecting sump)	included	<input type="checkbox"/>
120.	Description of oil supply unit for lubrication of the pump bearings	to be submitted	<input type="checkbox"/> relevant document attached
121.	Oil supply unit for lubrication of the motor bearings (including connection pipes, cables and oil collecting sump)	included	<input type="checkbox"/>
122.	Description of oil supply unit for lubrication of the motor bearings	to be submitted	<input type="checkbox"/> relevant document attached
123.	External motor water-to-air cooling system (including connection pipes, cables and supporting steel construction)	included	<input type="checkbox"/>
124.	Description of the external motor cooling system	to be submitted	<input type="checkbox"/> relevant document attached
125.	Heat exchanger material	Stainless steel	<input type="checkbox"/>
126.	Noise pressure level of the external motor cooling unit at 1 m (dB(A))	Max. 75 dB(A) at 1 m	___ dB(A)

No	Item	Required	Offered
127.	Any other auxiliary systems required to make the pumping unit operational	included	<input type="checkbox"/>