



Exploration & Production

GENERAL SPECIFICATION

ROTATING MACHINERY

GS MEC 273

**Supply of centrifugal pump class II
According to ISO 5199**

01	08/03	Change of Group name and logo
00	02/01	First issue
Rev.	Date	Notes



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1. Scope

The additional requirements set out in this specification are identified in the same way as [ISO 5199](#).

2. Reference documents

The reference documents listed below form an integral part of this General Specification. Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published at the EFFECTIVE DATE of the CONTRACT.

Unless otherwise specified, [ISO 13709](#) shall be applicable for mechanical seal (paragraph 2.7).

Unless otherwise specified, speed correction shall be in accordance to "Hydraulic standards for centrifugal, rotary, reciprocating pumps" latest edition.

Standards

Reference	Title
ISO 5199	Industrial Pumps – Technical Specification for Centrifugal Pumps - Class II
ISO 13709	Shaft Sealing System for Centrifugal and Rotary Pumps
ISO 2548	Centrifugal Pumps – Test Code – Class C

Professional Documents

Reference	Title
API 610	Centrifugal Pumps for Petroleum, Heavy Duty Chemical, and Gas Industry Services

Regulations

Reference	Title
Not applicable	

Codes

Reference	Title
Not applicable	

Other documents

Reference	Title
Not applicable	



Total General Specifications

Reference	Title
Not applicable	

3. Comments to ISO 5199

4.1 General

4.1.1 Characteristic curve

- Minimum acceptable diameter shall be at least 80% of the maximum impeller diameter
- Shut-off head shall be minimum 3% above rated head at rated speed
- For parallel configuration, differential head difference shall be less than 2% in the operating region
- Within the operating region (50-110% rated capacity), the head rise shall be at least 10% of the head at rated capacity.

4.1.2 Net Positive Suction Head (NPSH)

The margin between NPSHR at suction flange centre and NPSHA at same point shall be at least 10% of NPSHA or 0.6 meter whichever is greater at all flows (from minimum continuous stable flow to maximum allowable flow).

4.3 Critical speed, balance and vibration

4.3.2 Balance and vibration

The vibrations limits severity shall apply in the whole operations region (50-110% rated capacity).

4.4 Pressure containing parts

Axially split casing is prohibited for toxic or flammable liquid and when $SG < 0.7$.

4.4.2 Wall thickness

For liquid with $SG < 1$, the casing shall also be suitable for the operating at nominal speed with water.

4.4.4.6 External bolting

For submerged pumps, the bolting material shall depend on the liquid pumped (corrosion). They shall have locking devices.

4.5 Branches (nozzles) and miscellaneous connections

4.5.3 Vent, pressure-gauge and drain

Vent and drain connections shall be at least $\frac{1}{2}$ " NPT.

4.5.5 Auxiliary pipe connections

When forecast bearing oil temperature is above 80°C, cooling water system shall be provided.

4.6 External forces and moments on flanges (inlet and outlet)

Radial displacement shall not exceed 0.125 mm for all diameter at rated temperature.

5 Materials

5.1 Selection of material

Cast iron is prohibited for the following cases:

- Toxic, flammable liquid
- Discharge pressure > 10 Bar
- Operating temperature above 110°C or below -15°C.

6 Shop inspection and tests

6.3 Pump test and inspection

6.3.2.2 For variable speed pump, test data shall be taken at minimum and maximum speed.

For power > 400 kW, the performance and mechanical test shall last at least four continuous hours after bearing temperature stabilisation. The test shall be followed by a dismantling for wear and clearance checking in the presence of a purchaser representative.

For parallel configuration, differential head difference shall be less than 2% in the operating region. Performance curve shall be carried out on the whole operating region + shut-off and maximum capacity. The power tolerance at rated capacity and rated speed shall be + 4%.

6.3.2.3 NPSH test shall be carried out according [ISO 2548](#) class C.

When $(NPSHA - NPSHR) < 1$ m, NPSHR test shall be carried out in close loop configuration as described in [ISO 2548](#) except for type of pumps which has been already tested in that configuration.

7 Preparation for despatch

Unless otherwise in conflict with the contract or the specification, this section is applicable.



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CENTRIFUGAL PUMP (API 610-8TH) DATA SHEET SI UNITS		JOB NO. _____ ITEM NO. _____ PURCHASE ORDER NO. _____ SPECIFICATION NO. _____ REVISION NO. _____ DATE _____ PAGE 1 OF 5 BY _____
1 APPLICABLE TO: ☐ PROPOSALS ☐ PURCHASE ☒ AS BUILT		
2 FOR _____ UNIT _____		
3 SITE _____ SERVICE _____		
4 NO. REQ _____ PUMP SIZE _____ TYPE _____ NO. STAGES _____		
5 MANUFACTURER _____ MODEL _____ SERIAL NO. _____		
6 NOTES: INFORMATION BELOW TO BE COMPLETED: ☐ BY PURCHASER ☐ BY MANUFACTURER ☒ BY MANUFACTURER OR PURCHASER		
7 ☐ GENERAL (3.1.1)		
8 PUMPS TO OPERATE IN (PARALLEL) NO. MOTOR DRIVEN _____ NO. TURBINE DRIVEN _____		
9 (SERIES) WITH _____ PUMP ITEM NO. _____ PUMP ITEM NO. _____		
10 GEAR ITEM NO. _____ MOTOR ITEM NO. _____ TURBINE ITEM NO. _____		
11 GEAR PROVIDED BY _____ MOTOR PROVIDED BY _____ TURBINE PROVIDED BY _____		
12 GEAR MOUNTED BY _____ MOTOR MOUNTED BY _____ TURBINE MOUNTED BY _____		
13 GEAR DATA SHT. NO. _____ MOTOR DATA SHT. NO. _____ TURBINE DATA SHT. NO. _____		
14 OPERATING CONDITIONS		14 SITE AND UTILITY DATA (CONT'D)
15 ☐ CAPACITY, NORMAL _____ (m³/h) RATED _____ (m³/h)		15 WATER SOURCE _____
16 OTHER _____		16 CHLORIDE CONCENTRATION (PPM) _____ (3.5.2.6)
17 ☐ SUCTION PRESSURE MAX./RATED _____ / _____ (kPa)		17 INSTRUMENT AIR: MAX/MIN PRESS _____ / _____ (kPa)
18 ☐ DISCHARGE PRESSURE _____ (kPa)		18 LIQUID
19 ☐ DIFFERENTIAL PRESSURE _____ (kPa)		19 ☐ TYPE OR NAME OF LIQUID _____
20 ☐ DIFF. HEAD _____ (m) NPSHA _____ (m)		20 ☐ PUMPING TEMPERATURE: _____
21 ☐ PROCESS VARIATIONS _____ (3.1.2)		21 NORMAL _____ (°C) MAX. _____ (°C) MIN. _____ (°C)
22 ☐ STARTING CONDITIONS _____ (3.1.3)		22 ☐ VAPOR PRESSURE _____ (kPa abs) @ _____ (°C)
23 SERVICE: ☐ CONT. ☐ INTERMITTENT (STARTS/DAY) _____		23 ☐ RELATIVE DENSITY (SPECIFIC GRAVITY): _____
24 ☐ PARALLEL OPERATION REQ'D (2.1.11)		24 NORMAL _____ MAX _____ MIN _____
25 ☐ SITE AND UTILITY DATA		25 ☐ SPECIFIC HEAT, Cp _____ (kJ/kg °C)
26 LOCATION: (2.1.29)		26 ☐ VISCOSITY _____ (cP) @ _____ (°C)
27 ☐ INDOOR ☐ HEATED ☐ UNDER ROOF		27 ☐ MAX. VISCOSITY _____ (cP)
28 ☐ OUTDOOR ☐ UNHEATED ☐ PARTIAL SIDES		28 ☐ CORROSIVE/EROSIVE AGENT _____ (2.11.1.8)
29 ☐ GRADE ☐ MEZZANINE ☐ _____		29 ☐ CHLORIDE CONCENTRATION (PPM) _____ (3.5.2.6)
30 ☐ ELECTRIC AREA CLASSIFICATION (2.1.22 / 3.1.5)		30 ☐ H₂S CONCENTRATION (PPM) _____ (2.11.1.11)
31 CL _____ GR _____ DIV _____		31 LIQUID (2.1.3) ☐ HAZARDOUS ☐ FLAMMABLE
32 ☐ WINTERIZATION REQ'D ☐ TROPICALIZATION REQ'D.		32 ☐ OTHER _____
33 SITE DATA (2.1.29)		33 PERFORMANCE
34 ☐ ALTITUDE _____ (m) BAROMETER _____ (kPa abs)		34 PROPOSAL CURVE NO. _____ ☐ RPM
35 ☐ RANGE OF AMBIENT TEMPS: MIN/MAX. _____ / _____ (°C)		35 ☐ IMPELLER DIA. RATED _____ MAX. _____ MIN. _____ (mm)
36 ☐ RELATIVE HUMIDITY: MIN / MAX _____ / _____ (%)		36 ☐ RATED POWER _____ (BHP) EFFICIENCY _____ (%)
37 UNUSUAL CONDITIONS: (2.1.23) ☐ DUST ☐ FUMES		37 ☐ MINIMUM CONTINUOUS FLOW:
38 ☐ OTHER _____		38 THERMAL _____ (m³/h) STABLE _____ (m³/h)
39 ☐ UTILITY CONDITIONS:		39 ☐ PREFERRED OPERATING REGION _____ TO _____ (m³/h)
40 STEAM: DRIVERS HEATING		40 ☐ ALLOWABLE OPERATING REGION _____ TO _____ (m³/h)
41 MIN _____ (kPa) _____ (°C) _____ (kPa) _____ (°C)		41 ☐ MAX HEAD @ RATED IMPELLER _____ (m)
42 MAX _____ (kPa) _____ (°C) _____ (kPa) _____ (°C)		42 ☐ MAX POWER @ RATED IMPELLER _____ (kW)
43 ELECTRICITY DRIVERS HEATING CONTROL SHUTDOWN		43 ☐ NPSHR AT RATED CAPACITY _____ (m) (2.1.8)
44 VOLTAGE _____		44 ☒ SUCTION SPECIFIC SPEED _____ (2.1.9)
45 HERTZ _____		45 ☐ MAX. SOUND PRESS. LEVEL REQ'D _____ (dBA) (2.1.14)
46 PHASE _____		46 ☐ EST MAX SOUND PRESS. LEVEL _____ (dBA) (2.1.14)
47 COOLING WATER: (2.1.17)		47 REMARKS: _____
48 TEMP. INLET _____ (°C) MAX. RETURN _____ (°C)		48 _____
49 PRESS. NORM _____ (kPa) DESIGN _____ (kPa)		49 _____
50 MIN RETURN _____ (kPa) MAX ALLOW DP _____ (kPa)		50 _____



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1		JOB NO. _____ ITEM NO. _____	
2		REVISION NO. _____ DATE _____	
3		PAGE 2 OF 5 BY _____	
4		CONSTRUCTION (CONT)	
5		☐ SHAFT DIAMETER BETWEEN BEARINGS _____ (mm)	
6		☐ SPAN BETWEEN BEARING CENTERS _____ (mm)	
7		☐ SPAN BETWEEN BEARING & IMPELLER _____ (mm)	
8		REMARKS _____	
9		COUPLINGS: (3.2.2) DRIVER - PUMP	
10		☐ MAKE _____	
11		☒ MODEL _____	
12		☐ RATING (kW/100 RPM) _____	
13		☐ LUBRICATION _____	
14		☒ LIMITED END FLOAT REQUIRED _____	
15		☒ SPACER LENGTH _____ (mm)	
16		☒ SERVICE FACTOR _____	
17		DRIVER HALF COUPLING MOUNTED BY: (3.2.11)	
18		☐ PUMP MFR. ☐ DRIVER MFR. ☐ PURCHASER	
19		☐ COUPLING PER API 671 (5.2.7)	
20		BASEPLATES:	
21		☐ API BASEPLATE NUMBER _____ (APPENDIX M)	
22		☐ NON-GROUT CONSTRUCTION: (3.3.13/5.3.7.3.5)	
23		REMARKS: _____	
24		MATERIAL	
25		☐ APPENDIX H CLASS _____ (2.11.1.1)	
26		☐ MIN DESIGN METAL TEMP (2.11.4.5) _____ (°C)	
27		☐ BARREL/CASE _____ IMPELLER _____	
28		☐ CASE/IMPELLER WEAR RINGS _____	
29		☐ SHAFT _____	
30		☐ DIFFUSERS _____	
31		☐ COUPLING SPACER/HUBS _____	
32		☐ COUPLING DIAPHRAGMS (DISKS) _____	
33		REMARKS: _____	
34		BEARINGS AND LUBRICATION	
35		BEARING (TYPE/NUMBER):	
36		☐ RADIAL _____ / _____	
37		☐ THRUST _____ / _____	
38		☐ REVIEW AND APPROVE THRUST BEARING SIZE (5.2.5.2.4)	
39		LUBRICATION: (2.10)	
40		☒ GREASE ☒ FLOOD ☒ RING OIL	
41		☒ FLINGER ☐ PURGE OIL MIST ☐ PURE OIL MIST	
42		☐ CONSTANT LEVEL OILER PREFERENCE (SEE REMARKS) (2.9.2.2)	
43		☐ PRESSURE LUBE SYS (5.2.6) ☐ API-610 ☐ API-614	
44		☒ OIL VISC. ISO GRADE (5.2.6.5) _____	
45		REMARKS: _____	
46		SHAFT:	
47		☐ SHAFT DIAMETER AT COUPLING _____ (mm)	
48		REMARKS: _____	
49		_____	
50		_____	
51		_____	



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1	BEARINGS AND LUBRICATION (CONT)	MECHANICAL SEAL OR PACKING (CONT)
2	☐ OIL HEATER REQ'D ☐ ELECTRIC ☐ STEAM (2.9.2.9/5.2.6.3)	☐ VAPOR PRESSURE _____ (kPa abs) @ _____ (°C)
3	☐ OIL PRESS TO BE GREATER THAN COOLANT PRESS (5.2.6.2.b)	☐ HAZARDOUS ☐ FLAMMABLE ☐ OTHER _____
4	REMARKS _____	☐ FLOW RATE MAX/MIN _____ / _____ (m³/h)
5	_____	☐ PRESSURE REQUIRED MAX/MIN _____ / _____ (kPa)
6	_____	☐ TEMPERATURE REQUIRED MAX/MIN _____ / _____ (°C)
7	MECHANICAL SEAL OR PACKING	QUENCH FLUID:
8	SEAL DATA: (2.7.2)	☐ NAME OF FLUID _____
9	☐ SEE ATTACHED API-682 DATA SHEET (2.7.2)	☐ FLOW RATE _____ (m³/h)
10	☐ NON-API 682 SEAL (2.7.2)	SEAL FLUSH PIPING: (2.7.3.19 AND APPENDIX D)
11	☐ APPENDIX H SEAL CODE _____ (2.11.1.1)	☐ SEAL FLUSH PIPING PLAN _____
12	☐ SEAL MANUFACTURER _____	☐ TUBING ☐ CARBON STEEL
13	☐ SIZE AND TYPE _____ / _____	☐ PIPE ☐ STAINLESS STEEL
14	☐ MANUFACTURER CODE _____	☐ AUXILIARY FLUSH PLAN _____
15	SEAL CHAMBER DATA: (2.1.6/2.1.7)	☐ TUBING ☐ CARBON STEEL
16	☐ TEMPERATURE _____ (°C)	☐ PIPE ☐ STAINLESS STEEL
17	☐ PRESSURE _____ (kPa)	☐ PIPING ASSEMBLY: (3.5.2.10.1)
18	☐ FLOW _____ (m³/h)	☐ THREADED ☐ UNIONS ☐ SOCKET WELDED
19	☐ SEAL CHAMBER SIZE (TABLE 2.3) _____	☐ FLANGED ☐ TUBE TYPE FITTINGS
20	☐ TOTAL LENGTH _____ (IN) ☐ CLEAR LENGTH _____ (mm)	☐ PRESSURE SWITCH (PLAN 52/53) TYPE _____
21	SEAL CONSTRUCTION:	☐ PRESSURE GAUGE (PLAN 52/53)
22	☐ SLEEVE MATERIAL _____	☐ LEVEL SWITCH (PLAN 52/53) TYPE _____
23	☐ GLAND MATERIAL _____	☐ LEVEL GAUGE (PLAN 52/53)
24	☐ AUX SEAL DEVICE (2.7.3.20) _____	☐ TEMP INDICATOR (PLANS 21, 22, 23, 32, 41)
25	☐ JACKET REQUIRED (2.7.3.17)	☐ HEAT EXCHANGER (PLAN 52/53)
26	GLAND TAPS: (2.7.3.14)	REMARKS _____
27	☐ FLUSH (F) ☐ DRAIN (D) ☐ BARRIER/BUFF. (B)	
28	☐ QUENCH (Q) ☐ COOLING (C) ☐ LUBRICATION (G)	
29	☐ HEATING (H) ☐ LEAKAGE ☐ PUMPED FLUID (P)	
30	☐ BAL'NCE FLUID (E) ☐ EXTERNAL FLUID INJECTION (X)	
31	SEAL FLUIDS REQUIREMT AND AVAILABLE FLUSH LIQUID:	PACKING DATA: (APPENDIX C)
32	NOTE: IF FLUSH LIQUID IS PUMPAGE LIQUID (AS IN FLUSH PIPING	MANUFACTURER _____
33	PLANS 11 TO 41), FOLLWING FLUSH LIQUID DATA IS NOT REQ'D.	TYPE _____
34	☐ SUPPLY TEMPERATURE MAX/MIN _____ / _____ (°C)	SIZE _____ NO. OF RINGS _____
35	☐ RELATIVE DENSITY (SPECIFIC GRAVITY) _____ @ _____ (°C)	☐ PACKING INJECTION REQUIRED
36	☐ NAME OF FLUID _____	☐ FLOW _____ (m³/h) @ _____ (°C)
37	☐ SPECIFIC HEAT, Cp _____ (kJ/kg °C)	☐ LANTERN RING _____
38	☐ VAPOR PRESSURE _____ (kPa abs) @ _____ (°C)	
39	☐ HAZARDOUS ☐ FLAMMABLE ☐ OTHER _____	STEAM AND COOLING WATER PIPING
40	☐ FLOW RATE MAX/MIN _____ / _____ (m³/h)	☐ COOLING WATER PIPING PLAN _____ (3.5.4.1)
41	☐ PRESSURE REQUIRED MAX/MIN _____ / _____ (kPa)	☐ COOLING WATER REQUIREMENTS
42	☐ TEMPERATURE REQUIRED MAX/MIN _____ / _____ (°C)	SEAL JACKET/BRG HSG _____ (m³/h) @ _____ (kPa)
43	BARRIER/BUFFER FLUID (2.7.3.21):	SEAL HEAT EXCHANGER _____ (m³/h) @ _____ (kPa)
44	☐ SUPPLY TEMPERATURE MAX/MIN _____ / _____ (°C)	QUENCH _____ (m³/h) @ _____ (kPa)
45	☐ RELATIVE DENSITY (SPECIFIC GRAVITY) _____ @ _____ (°C)	TOTAL COOLING WATER _____ (m³/h)
46	☐ NAME OF FLUID _____	☐ STEAM PIPING: ☐ TUBING ☐ PIPE
47	ADDITIONAL REMARKS:	REMARKS _____
48	_____	
49	_____	
50	_____	
51	_____	



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MOTOR DRIVE (CONT) (3.1.5)	
REMARKS _____	
SURFACE PREPARATION AND PAINT	
☐ MANUFACTURER'S STANDARD ☐ OTHER (SEE BELOW)	
PUMP:	
☐ PUMP SURFACE PREPARATION _____ ☐ PRIMER _____ ☐ FINISH COAT _____	
BASEPLATE: (3.3.18)	
☐ BASEPLATE SURFACE PREPARATION _____ ☐ PRIMER _____ ☐ FINISH COAT _____	
SHIPMENT: (4.4.1)	
☐ DOMESTIC ☐ EXPORT ☐ EXPORT BOXING REQUIRED ☐ OUTDOOR STORAGE MORE THAN 6 MONTHS	
SPARE ROTOR ASSEMBLY PACKAGED FOR:	
☐ HORIZONTAL STORAGE ☐ VERTICAL STORAGE ☐ TYPE OF SHIPPING PREPARATION _____	
REMARKS _____	
WEIGHTS	
MOTOR DRIVEN:	
WEIGHT OF PUMP (kg) _____ WEIGHT OF BASEPLATE (kg) _____ WEIGHT OF MOTOR (kg) _____ WEIGHT OF GEAR (kg) _____ TOTAL WEIGHT (kg) _____	
TURBINE DRIVEN:	
WEIGHT OF BASEPLATE (kg) _____ WEIGHT OF TURBINE (kg) _____ WEIGHT OF GEAR (kg) _____ TOTAL WEIGHT (kg) _____	
REMARKS _____	
OTHER PURCHASE REQUIREMENTS	
☐ COORDINATION MEETING REQUIRED (6.1.3) ☐ REVIEW FOUNDATION DRAWINGS (2.1.27) ☐ REVIEW PIPING DRAWINGS ☐ OBSERVE PIPING CHECKS ☐ OBSERVE INITIAL ALIGNMENT CHECK ☐ CHECK ALIGNMENT AT OPERATING TEMPERATURE ☐ CONNECTION DESIGN APPROVAL (2.11.3.5.4)	
INSTRUMENTATION	
VIBRATION:	
☐ NONCONTACTING (API 670) ☐ TRANSDUCER ☐ PROVISION FOR MOUNTING ONLY (2.9.2.11) ☐ FLAT SURFACE REQ'D (2.9.2.12) ☐ SEE ATTACHED API 670 DATA SHEET ☐ MONITORS AND CABLES (3.4.3.3)	
REMARKS _____	
TEMPERATURE AND PRESSURE:	
☐ RADIAL BRG METAL TEMP ☐ THRUST BRG METAL TEMP ☐ PROVISION FOR INSTRUMENTS ONLY ☐ SEE ATTACHED API-670 DATA SHEET ☐ TEMP GAUGES (WITH THERMOWELLS) (3.4.1.3) OTHER _____ ☐ PRESSURE GAUGE TYPE (3.4.2.2) _____ LOCATION _____	
REMARKS _____	
SPARE PARTS (TABLE 6.1)	
☐ START-UP ☐ NORMAL MAINTENANCE ☐ SPECIFY _____	
MOTOR DRIVE (3.1.5)	
☒ MANUFACTURER _____ ☐ _____ (kW) ☐ _____ (RPM) ☒ HORIZONTAL ☒ VERTICAL ☐ FRAME _____ ☒ SERVICE FACTOR _____ ☒ VOLTS/PHASE/HERTZ _____ / _____ / _____ ☐ TYPE _____ ☒ ENCLOSURE _____ ☐ MINIMUM STARTING VOLTAGE (3.1.6) _____ ☐ TEMPERATURE RISE _____ ☒ FULL LOAD AMPS _____ ☒ LOCKED ROTOR AMPS _____ ☒ INSULATION _____ ☒ STARTING METHOD _____ ☒ LUBE _____ ☐ VERTICAL THRUST CAPACITY UP _____ (N) DOWN _____ (N) BEARINGS (TYPE / NUMBER): ☐ RADIAL _____ / _____ ☐ THRUST _____ / _____	
REMARKS: _____	



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OTHER PURCHASER REQUIREMENTS (CONT)			
1	☐ RIGGING DEVICE REQ'D FOR TYPE OH3 PUMP (5.1.2.7)		
2	☐ HYDRODYNAMIC THRUST BRG SIZE REVIEW REQ'D (5.2.5.2.4)		
3	☒ LATERAL ANALYSIS REQUIRED (5.1.3.3/5.2.4.1)		
4	☒ ROTOR DYNAMIC BALANCE (5.2.4.2)		
5	☒ MOUNT SEAL RESERVOIR OFF BASEPLATE (3.5.1.4)		
6	☒ INSTALLATION LIST IN PROPOSAL (6.2.3L)		
7	☐ SPARE ROTOR VERTICAL STORAGE (5.2.9.2)		
8	☐ TORSIONAL ANALYSIS/REPORT (2.8.2.6)		
9	☐ PROGRESS REPORTS REQUIRED (6.3.4)		
10	REMARKS:		
11			
12			
13			
14	QA INSPECTION AND TEST		
15	☐ REVIEW VENDORS QA PROGRAM (4.1.7)		
16	☐ PERFORMANCE CURVE APPROVAL		
17	☐ SHOP INSPECTION (4.1.4)		
18	☒ TEST WITH SUBSTITUTE SEAL (4.3.3.1.2)		
19	TEST	NON-WIT	WIT
20	HYDROSTATIC (4.3.2)	☐	☐
21	PERFORMANCE (4.3.3)	☐	☐
22	NPSH (4.3.4.1)	☐	☐
23	COMPLETE UNIT TEST (4.3.4.2)	☐	☐
24	SOUND LEVEL TEST (4.3.4.3)	☐	☐
25	☐ CLEANLINESS PRIOR TO	☐	☐
26	FINAL ASSEMBLY (4.2.3.1)		
27	☐ NOZZLE LOAD TEST (3.3.6)	☐	☐
28	☐ BRG HSG RESONANCE	☐	☐
29	TEST (4.3.4.5)		
30	☐ REMOVE/INSPECT	☐	☐
31	HYDRODYNAMIC BEARINGS		
32	AFTER TEST (5.2.8.5)		
33	☐ AUXILIARY EQUIPMENT	☐	☐
34	TEST (4.3.4.4)		
35	☐	☐	☐
36	☐	☐	☐
37	☐ MATERIAL CERTIFICATION REQUIRED (2.11.1.7)		
38	☐ CASING ☐ IMPELLER ☐ SHAFT		
39	☐ OTHER		
40	☐ CASTING REPAIR PROCEDURE APPROVAL REQ'D (2.11.2.5)		
41	☐ INSPECTION REQUIRED FOR CONNECTION WELDS (2.11.3.5.6)		
42	☐ MAG PARTICLE ☐ LIQUID PENETRANT		
43	☐ RADIOGRAPHIC ☐ ULTRASONIC		
44	☐ INSPECTION REQUIRED FOR CASTINGS (4.2.1.3)		
45	☐ MAG PARTICLE ☐ LIQUID PENETRANT		
46	☐ RADIOGRAPHIC ☐ ULTRASONIC		
47	ADDITIONAL REMARKS:		
48			
49			
50			
51			

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QA INSPECTION AND TEST (CONT'D)

☐ ADDITIONAL INSPECTION REQUIRED FOR: _____ (4.2.1.3)

☐ MAG PARTICLE ☐ LIQUID PENETRANT

☐ RADIOGRAPHIC ☐ ULTRASONIC

☐ ALTERNATE ACCEPTANCE CRITERIA (SEE REMARKS) (4.2.2.1)

☐ HARDNESS TEST REQUIRED FOR: _____ (4.2.3.2)

☐ WETTING AGENT HYDROTEST (4.3.2.5)

☐ VENDOR SUBMIT TEST PROCEDURES (4.3.1.2/6.2.5)

☐ RECORD FINAL ASSEMBLY RUNNING CLEARANCES

☐ INSPECTION CHECK-LIST (APPENDIX N) _____ (4.1.6)

REMARKS _____

GENERAL REMARKS

REMARK 1: _____

REMARK 2: _____

REMARK 3: _____

REMARK 4: _____

REMARK 5: _____

REMARK 6: _____



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1	VERTICAL TYPE (FIG 1.1)	☐ VS1 ☐ VS2 ☐ VS3 ☐ VS4 ☐ VS5 ☐ VS6 ☐ VS7 ☐ OTHER	
2	REMARKS _____		
3	_____		
4	_____		
5	_____		
6	VERTICAL PUMPS VERTICAL PUMPS (CONT'D)		
7	☐ PUMP THRUST: (+) UP (-) DOWN AT MIN FLOW _____ (N) _____ (N) AT RATED FLOW _____ (N) _____ (N) AT MAX FLOW _____ (N) _____ (N) MAX THRUST _____ (N) _____ (N) ☐ SOLEPLATE _____ (mm) X _____ (mm) ☐ SOLEPLATE THICKNESS _____ (mm) COLUMN PIPE: ☐ FLANGED ☐ THREADED DIAMETER _____ (mm) LENGTH _____ (m) GUIDE BUSHINGS: ☐ NUMBER _____ ☐ LINE SHAFT BEARING SPACING _____ (mm) GUIDE BUSHING LUBE: ☐ WATER ☐ OIL ☐ GREASE ☐ PUMPAGE LINE SHAFT: ☐ OPEN ☐ ENCLOSED ☐ LINE SHAFT DIA. _____ (mm) ☐ TUBE DIA. _____ (mm) LINE SHAFT COUPLING: ☐ SLEEVE & KEY ☐ THREADED ☐ SUCTION CAN THICKNESS _____ (mm) ☐ LENGTH _____ (m) ☐ DIAMETER _____ (m) ☐ SUCTION STRAINER TYPE _____ ☐ FLOAT & ROD ☐ FLOAT SWITCH ☐ IMPELLER COLLETS ACCEPTABLE (2.5.2) ☐ HARDENED SLEEVES UNDER BEARINGS (5.3.9.7) ☐ RESONANCE TEST (5.3.8.2) ☐ STRUCTURAL ANALYSIS (5.3.4.1) ☐ DRAIN PIPED TO SURFACE (5.3.12.6)		
23	SUMP ARRANGEMENT SUMP DIMENSION CENTERLINE OF DISCHARGE		
44	☐ SUMP DEPTH _____ (m) ☐ SUMP DIMENSION _____ (m) ☐ LOW LIQUID _____ (m) ☐ PUMP LENGTH _____ (m) ☐ SUBMERGENCE REQ'D _____ (m) ☐ CENTERLINE DISCHARGE HEIGHT _____ (m) ☐ DATUM ELEVATION _____ (m)		