

GENERAL SPECIFICATION

ROTATING MACHINERY

GS EP MEC 273

**Supply of Centrifugal Pump class II
according to ISO 5199**

05	04/2012	Update of ISO in reference
04	01/2012	Update of data sheets
03	10/2008	Update
02	10/2005	Addition of "EP" root to GS identification
00	02/2001	First issue
Rev.	Date	Purpose of the revision

Owning entity: DEV/TEC

Managing entity: DEV/TEC/MTH



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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.

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

Speed correction shall be in accordance to "Hydraulic standards for centrifugal, rotary, reciprocating pumps" latest edition.

External Documents

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published at the effective date of this document.

Reference	Title
API Std 610	Centrifugal Pumps for Petroleum, Petrochemical and Natural Gas Industries
ISO 9906	Rotodynamic pumps - Hydraulic performance acceptance tests - Grades 1 and 2
ISO 5199	Industrial Pumps - Technical Specification for Centrifugal Pumps - Class II
ISO 13709	Shaft Sealing System for Centrifugal and Rotary Pumps

Total General Specifications

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published in the applicable yearly collection.

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.

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- 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.

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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 stabilization. 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 9906](#) grade 2

When $(NPSHA - NPSHR) < 1 \text{ m}$, NPSHR test shall be carried out in close loop configuration as described in [ISO 9906](#) except for type of pumps which has been already tested in that configuration. NPSH test shall be carried out according [ISO 9906](#) grade 1.

7 Preparation for dispatch

Unless otherwise stipulated, this section is applicable.

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Appendix 1

Appendix 1 API Std 610 Data Sheets

API 610 11th Edition Data Sheets

This data sheet is intended to be used in its Excel format. As such there are numerous cells which contain drop-down selections.

As these selections are not presented to the user until the cursor is on the cell, the cells which contain a drop-down selection have been identified by colouring the cell Light Green.

In addition if the selected cell has a cross reference in the specification, a pop-up box will appear indicating the reference paragraph and some or all of the content of the referenced paragraph. These cells are coloured Light Grey

User should use 'Page Setup' to ensure printing is on the correct paper size.

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Appendix 1

CENTRIFUGAL PUMP DATA SHEET	
1	Note APPLICABLE TO: _____ APPLICABLE NTL/INTNL STANDARD: _____
2	FOR _____ UNIT _____
3	SITE _____ SERVICE _____
4	NO. REQ _____ PUMP SIZE _____ TYPE _____ No. STAGES _____
5	MANUFACTURER _____ MODEL _____ SERIAL NO. _____
6	LIQUID CHARACTERISTICS
7	LIQUID TYPE OR NAME: _____ Units _____ Maximum _____ Minimum _____
8	VAPOR PRESSURE: _____ Bara _____
9	RELATIVE DENSITY: _____
10	SPECIFIC HEAT: _____ kJ/(kg.K) _____
11	VISCOSITY: _____ Cp _____
12	OPERATING CONDITIONS (6.1.2)
13	NPSHa Datum: _____ C.L. Impeller _____
14	PUMPING TEMPERATURE: _____ °C _____
15	FLOW: _____ m3/h _____
16	DISCHARGE PRESSURE: (6.3.2) _____ Bara _____
17	SUCTION PRESSURE: _____ Bara _____
18	DIFFERENTIAL PRESSURE: _____ Bar _____
19	DIFFERENTIAL HEAD: _____ m _____
20	NPSH _a : _____ m _____
21	HYDRAULIC POWER: _____ kW _____
22	SITE AND UTILITY DATA
23	LOCATION: _____
24	MOUNTED AT: _____ TROPICALISATION REQD _____
25	ELECTRIC AREA CLASSIFICATION: 6.1.22 ZONE _____
26	GROUP _____ TEMP CLASS _____
27	SITE DATA:
28	ELEVATION (MSL): _____ m BAROMETER: _____ mmHg
29	RANGE OF AMBIENT TEMPS: MIN / MAX _____ / _____ °C
30	RELATIVE HUMIDITY: MIN / MAX _____ / _____ %
31	UNUSUAL CONDITIONS: _____
32	UTILITY CONDITIONS:
33	ELECTRICITY: DRIVERS HEATING CONTROL SHUTDOWN
34	VOLTAGE _____
35	PHASE _____
36	HERTZ _____
37	COOLING WATER:
38	TEMP °C INLET MAX RETURN MIN DESIGN MIN
39	PRESS. Bar _____
40	SOURCE _____
41	COOLING WATER CHLORIDE CONCENTRATION: _____ ppm
42	INSTRUMENT AIR: MAX _____ Bar MIN _____ Bar
43	STEAM
44	TEMP °C Max Min
45	PRESS. Bar Max Min
46	PERFORMANCE
47	PROPOSAL CURVE NO. _____ RPM _____
48	As Tested Curve No. _____
49	IMPELLER DIA.: RATED MAX. MIN. _____ mm
50	RATED POWER _____ kW EFFICIENCY _____ (%)
51	RATED CURVE BEP FLOW (at rated impeller dia) _____ m3/h
52	MIN FLOW: THERMAL _____ m3/h STABLE _____ m3/h
53	PREFERRED OPERATING REGION (6.1.11) _____ to _____ m3/h
54	ALLOWABLE OPERATING REGION _____ to _____ m3/h
55	MAX HEAD @ RATED IMPELLER _____ m
56	MAX POWER @ RATED IMPELLER (6.8.9) _____ kW
57	NPSH3 AT RATED FLOW: _____ m
58	CL PUMP TO U/S BASEPLATE _____ m
59	NPSH MARGIN AT RATED FLOW: _____ m
60	SPECIFIC SPEED (6.1.9) _____ m3/s, rpm, m
61	SUCTION SPECIFIC SPEED LIMIT _____
62	SUCTION SPECIFIC SPEED _____ m3/s, rpm, m
63	MAX. ALLOW. SOUND PRESS. LEVEL REQ'D (6.1.14) _____ (dBA)
64	EST MAX SOUND PRESS. LEVEL _____ (dBA)
65	MAX. SOUND POWER LEVEL REQ'D (6.1.14) _____
66	EST MAX SOUND POWER LEVEL _____
67	DRIVER (7.1.5)
68	Driver Type _____
69	GEAR _____
70	VARIABLE SPEED REQUIRED _____
71	SOURCE OF VARIABLE SPEED _____
72	OTHER _____
73	MANUFACTURER _____
74	NAMEPLATE POWER _____ kW
75	Nominal RPM _____
76	RATED LOAD RPM _____
77	FRAME OR MODEL _____
78	ORIENTATION _____
79	LUBE _____
80	BEARING TYPE: _____
81	RADIAL _____
82	THRUST _____
83	STARTING METHOD _____
84	SEE DRIVER DATA SHEET _____
85	DATA SHEET No. _____ Rev: _____ SHEET _____ of _____

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TOTAL		CENTRIFUGAL PUMP DATA SHEET	
1	Note	CONSTRUCTION	Rev
2	API PUMP TYPE: [Based on API 610 definitions]	CASING MOUNTING:	
3		CASING TYPE: (6.3.10)	
4	NOZZLE CONNECTIONS: (6.5.5)	OH3 BACKPULLOUT LIFTING DEVICE REQD. (9.1.2.6)	
5		CASE PRESSURE RATING:	
6	SUCTION	MAWP: (6.3.6)	Bara @ °C
7	DISCHARGE	HYDROTEST:	Bara @ °C
8	PRESSURE CASING AUX. CONNECTIONS: (6.4.3.2)		
9		HYDROTEST OH PUMP AS ASSEMBLY	
10	BALANCE/LEAK OF	SUCTN PRESS. REGIONS DESIGNED FOR MAWP	
11	DRAIN	ROTATION: (VIEWED FROM COUPLING END)	
12	VENT	• IMPELLERS INDIVIDUALLY SECURED :	
13	PRESSURE GAGE	• BOLT OH 3/4/5 PUMP TO PAD / FOUNDATION :	
14	TEMP GAGE	• PROVIDE SOLEPLATE FOR OH 3/4/5 PUMPS	
15	WARM-UP LINE	ROTOR:	
16		SHAFT FLEXIBILITY INDEX (SFI) (9.1.1.3)	
17	Drain Valve Supplied By	First Critical Speed Wet (Multi stage pumps only)	
18	DRAINS MANIFOLDED	COMPONENT BALANCE TO ISO 1940 G1.0	
19	VENT Valve Supplied By	SHRINK FIT -LIMITED MOVEMENT IMPELLERS (9.2.2.3)	
20	VENTS MANIFOLDED		
21	THREADED CONS FOR PIPELINE SERVICE & < 50°C (6.4.3.2)	COUPLING: (7.2.3) (7.2.13.f)	
22	SPECIAL FITTINGS FOR TRANSITIONING (6.4.3.3)	MANUFACTURER	
23	CYLINDRICAL THREADS REQUIRED (6.4.3.8)	MODEL	
24	GUSSET SUPPORT REQUIRED	RATING (POWER/100 RPM)	
25	MACHINED AND STUDDED CONNECTIONS (6.4.3.12)	SPACER LENGTH	mm
26	VS 6 DRAIN	SERVICE FACTOR	
27	DRAIN TO SKID EDGE	RIGID	
28		COUPLING WITH HYDRAULIC FIT (7.2.10)	
29	MATERIAL (6.12.1.1)	COUPLING BALANCED TO ISO 1940-1 G6.3 (7.2.3)	
30	APPENDIX H CLASS	COUPLING WITH PROPRIETARY CLAMPING DEVICE (7.2.11)	
31	MIN DESIGN METAL TEMP (6.12.4.1) °C		
32	REDUCED-HARDNESS MATERIALS REQ'D (6.12.1.12.1)	COUPLING IN COMPLIANCE WITH (7.2.4)	
33	Applicable Hardness Standard (6.12.1.12.3)	COUPLING GUARD STANDARD PER (7.2.13.a)	
34	BARREL :	Window on Coupling Guard	
35	CASE :		
36	DIFFUSERS		
37	IMPELLER :	BASEPLATE	
38	IMPELLER WEAR RING :	API BASEPLATE NUMBER :	
39	CASE WEAR RING :	BASEPLATE CONSTRUCTION (7.3.14)	
40	SHAFT:	BASEPLATE DRAINAGE (7.3.1)	
41	Bowl (If VS-type)	MOUNTING :	
42	Inspection Class	NON-GROUT CONSTRUCTION : (7.3.13)	
43	BEARINGS AND LUBRICATION (6.10.1.1)	VERTICAL LEVELING SCREWS :	
44	BEARING (TYPE / NUMBER): (6.11.4)	LONGITUDINAL DRIVER POSITIONING SCREWS :	
45	RADIAL /	SUPPLIED WITH : • GROUT AND VENT HOLES	
46	THRUST /	• DRAIN CONNECTION	
47	REVIEW AND APPROVE THRUST BEARING SIZE : (9.2.5.2.4)	MOUNTING PADS SIZED FOR BASEPLATE LEVELING (7.3.5)	
48		MOUNTING PADS TO BE MACHINED (7.3.6)	
49	LUBRICATION : (6.10.2.2) (6.11.3) (9.6.1)	PROVIDE SPACER PLATE UNDER ALL EQUIPMENT FEET	
50	PRESSURE LUBE SYSTEM TO ISO 10438- (9.2.6.5)	OTHER	
51	ISO 10438 DATA SHEETS ATTACHED		
52	Pressurized Lube Oil System mtd on pump baseplate	REMARKS :	
53	Location of Pressurized Lube Oil System mounted on baseplate :		
54	INTERCONNECTING PIPING PROVIDED BY		
55			
56	OIL VISC. ISO GRADE VG		
57	CONSTANT LEVEL OILER :		

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CENTRIFUGAL PUMP DATA SHEET		Rev
1	Note	
2	SEE ATTACHED API-670 DATA SHEET	
3	ACCELEROMETER (7.4.2.1)	
4	Number of Accelerometers	
5	Mounting Location of Accelerometers	
6		
7	PROVISION FOR MTG ONLY (6.10.2.10)	
8	Number of Accelerometers	
9	Mounting Location of Accelerometers	
10		
11	FLAT SURFACE REQUIRED (6.10.2.11)	
12	Number of Accelerometers	
13	Mounting Location of Accelerometers	
14		
15	VIBRATION PROBES (7.4.2.2)	
16	PROVISIONS FOR VIB. PROBES	
17	NUMBER PER RADIAL BEARING	
18	NUMBER PER AXIAL BEARING	
19	MONITORS AND CABLES SUPPLIED BY (7.4.2.4)	
20		
21	TEMPERATURE (7.4.2.3)	
22	PROVISIONS FOR TEMP PROBES	
23	RADIAL BEARING TEMP.	
24	NUMBER PER RADIAL BEARING	
25	THRUST BEARING TEMP.	
26	NUMBER PER THRUST BEARING ACTIVE SIDE	
27	NUMBER PER THRUST BEARING INACTIVE SIDE	
28	TEMP. GAUGES (WITH THERMOWELLS) (9.1.3.6)	
29	PRESSURE GAUGE TYPE	
30	Remarks	
31		
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34		
35		
36		
37		
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SEAL SUPPORT SYSTEM MOUNTING		Rev
SEAL SUPPORT SYSTEM MOUNTED ON PUMP BASEPLATE (7.5.1.4)		
IDENTIFY LOCATION ON BASEPLATE		
INTERCONNECTING PIPING BY		
MECHANICAL SEAL (6.8.1)		
SEE ATTACHED ISO 21049/API 682 DATA SHEET		
ADDITIONAL CENTRAL FLUSH PORT (6.8.9)		
HEATING JACKET REQ'D. (6.8.11)		
HEATING AND COOLING (6.1.17)		
COOLING REQ'D		
COOLING WATER PIPING PLAN		
COOLING WATER PIPING		
FITTINGS		
COOLING WATER PIPING MATERIALS		
COOLING WATER REQUIREMENTS:		
BEARING HOUSING m3/h		
HEAT EXCHANGER m3/h		
TOTAL COOLING WATER m3/h		
HEATING MEDIUM		
OTHER		
HEATING PIPING		
PIPING & APPURTENANCES		
MANIFOLD PIPING FOR PURCHASER CONNECTION (7.5.1.6)		
VENT		
DRAIN		
COOLING WATER		
TAG ALL ORIFICES (7.5.2.4)		
SOCKET WELD CONN ON SEAL GLAND (7.5.2.8)		

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CENTRIFUGAL PUMP DATA SHEET		Rev
1	Surf. Preparation and Paint	TEST
2	MANUFACTURER'S STANDARD	SHOP INSPECTION (8.1.1)
3	OTHER (SEE BELOW)	PERFORMANCE CURVE
4	SPECIFICATION NO.	& DATA APPROVAL PRIOR TO SHIPMENT.
5		TEST WITH SUBSTITUTE SEAL (8.3.3.2 b)
6	PUMP:	MATERIAL CERTIFICATION REQUIRED
7	PUMP SURFACE PREPARATION	(6.12.1.8) CASING
8	PRIMER	IMPELLER
9	FINISH COAT	SHAFT
10		OTHER
11	BASEPLATE:	CASTING REPAIR WELD PROCEDURE APPR REQD
12	BASEPLATE SURFACE PREPARATION	(6.12.2.5) (6.12.3.1)
13	PRIMER:	INSPECTION REQUIRED FOR CONNECTION WELDS (6.12.3.4 d)
14	FINISH COAT	(6.12.3.4 e) MAG PARTICLE
15	DETAILS OF LIFTING DEVICES	RADIOGRAPHY
16		LIQUID PENETRANT
17	SHIPMENT: (8.4.1)	ULTRASONIC
18	EXPORT BOXING REQUIRED	INSPECTION REQUIRED FOR CASTINGS
19	OUTDOOR STORAGE MORE THAN 6 MONTHS	MAG PARTICLE
20		RADIOGRAPHY
21	SPARE ROTOR ASSEMBLY PACKAGED FOR:	LIQUID PENETRANT
22	ROTOR STORAGE ORIENTATION (9.2.8.2)	ULTRASONIC
23	SHIPPING & STORAGE CONTAINER FOR VERT STORAGE (9.2.8.3)	HARDNESS TEST REQUIRED (8.2.2.7)
24		ADDNL SUBSURFACE EXAMINATION (6.12.1.5) (8.2.1.3)
25	N2 PURGE (9.2.8.4)	FOR
26	SPARE PARTS	METHOD
27	START-UP	PMI TESTING REQUIRED (8.2.2.8)
28	NORMAL MAINTENANCE	COMPONENTS TO BE TESTED
29	WEIGHTS kg	RESIDUAL UNBALANCE TEST (J.4.1.2)
30	ITEM No	NOTIFICATION OF SUCCESSFUL SHOP
31	PUMP	PERFORMANCE TEST (8.1.1.c) (8.3.3.5)
32	DRIVER	BASEPLATE TEST (7.3.21)
33	GEAR	HYDROSTATIC
34	BASE	HYDROSTATIC TEST OF BOWLS & COLUMN (9.3.13.2)
35	TOTAL	PERFORMANCE TEST
36		TEST IN COMPLIANCE WITH (8.3.3.2)
37		TEST DATA POINTS TO (8.3.3.3)
38		TEST TOLERANCES TO (8.3.3.4)
39		NPSH (8.3.4.3.1) (8.3.4.3.4)
40		NPSH-1ST STG ONLY (8.3.4.3.2)
41		NPSH TESTING TO HI 1.6 OR ISO 9906 (8.3.4.3.3)
42		TEST NPSHA LIMITED TO 110% SITE NPSHA (8.3.3.6)
43		RETEST ON SEAL LEAKAGE (8.3.3.2 d)
44		RETEST REQUIRED AFTER FINAL HEAD ADJ (8.3.3.7 b)
45		COMPLETE UNIT TEST (8.3.4.4.1)
46		SOUND LEVEL TEST (8.3.4.5)
47		CLEANLINESS PRIOR TO FINAL ASSEMBLY (8.2.2.6)
48		LOCATION OF CLEANLINESS INSPECTION
49		NOZZLE LOAD TEST
50		CHECK FOR CO-PLANAR MOUNTING PAD SURFACES
51		MECHANICAL RUN TEST UNTIL OIL TEMP STABLE
52		4 HR. MECH RUN AFTER OIL TEMP STABLE (8.3.4.2.1)
53		4 HR. MECH RUN TEST (8.3.4.2.2)
54		BRG HSG RESONANCE TEST (8.3.4.7)
55		STRUCTURAL RESONANCE TEST (9.3.9.2)
56		REMOVE / INSPECT HYDRODYNAMIC BEARINGS AFTER TEST
57		(9.2.7.5)
58		AUXILIARY EQUIPMENT TEST (8.3.4.6)
59		EQUIPMENT TO BE INCLUDED IN AUXILIARY TESTS
60		LOCATION OF AUXILIARY EQUIPMENT TEST
61		IMPACT TEST (6.12.4.3) PER EN 13445
62		PER ASME SECTION VIII
		REMOVE CASING AFTER TEST
DATA SHEET No. _____		Rev: _____
SHEET _____		of _____

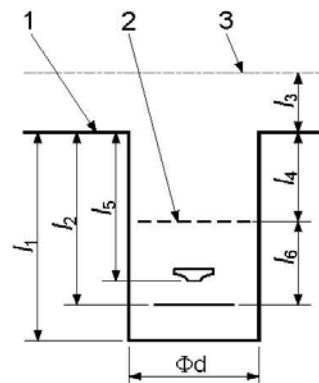
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TOTAL		VERTICAL PUMP SUPPLEMENTAL DATA SHEET	
1	Note	VERTICAL TYPE (FIG 1.1) 	Rev
2	REMARKS		
3			
4			
6		VERTICAL PUMPS	VERTICAL PUMPS (CONTD)
7	PUMP THRUST:	(+) UP (-) DOWN	LINE SHAFT:
8	STATIC THRUST	_____ N _____ N	LINE SHAFT DIAMETER _____ mm
9	AT MIN FLOW	_____ N _____ N	TUBE DIAMETER _____ mm
10	AT RATED FLOW	_____ N _____ N	LINE SHAFT COUPLING:
11	AT MAX FLOW	_____ N _____ N	LINESHAFT CONNECTION
12	MAX THRUST	_____ N _____ N	
13	SOLEPLATE REQUIRED		• SUCTION STRAINER TYPE
14	SOLEPLATE Length x Width	_____ m X _____ m	• LEVEL CONTROL
15	SOLEPLATE THICKNESS	_____ mm	IMPELLER COLLETS ACCEPTABLE
16	MOUNTING FLANGE REQUIRED		HARDENED SLEEVES UNDER BEARINGS (9.3.10.5)
17	COLUMN PIPE:		RESONANCE TEST
18	DIAMETER	_____ mm	STRUCTURAL ANALYSIS (9.3.5)
19	LENGTH	_____ m	
20	NUMBER	_____	DRIVER ALIGNMENT SCREWS
21	SPACING	_____ m	SUCTION CAN
22	GUIDE BUSHINGS:		SUCTION CAN THICKNESS _____ mm
23	NUMBER	_____	LENGTH _____ m
24	LINE SHAFT BEARING SPACING	_____ mm	DIAMETER _____ mm
25	GUIDE BUSHING LUBE:		SEPARATE MOUNTING PLATE (9.3.8.3.1)
26			PROVIDE SEPARATE SOLEPLATE (9.3.8.3.3)
27			DRAIN PIPED TO SURFACE (9.3.13.5)
28			BOWL HEAD CALCULATION REQUIRED
29		MATERIALS (additional)	
30	SUCTION CAN / BARREL:	_____	LINESHAFT SLEEVES : _____
31	DISCHARGE HEAD • 	_____	BEARING RETAINER : _____
32	BOWL SHAFT :	_____	SHAFT ENCLOSING TUBE : _____
33	LINESHAFT :	_____	DISCHARGE COLUMN : _____
34	LINESHAFT HARDFACING :	_____	PRESSURE RATING:
35	BELLMOUTH :	_____	MAWP HYDRO
36	BOWL BEARING :	_____	HEAD _____
37	LINESHAFT BEARING :	_____	COLUMN PIPE _____
38			BOWL _____
39		SUMP ARRANGEMENT	
40	SUMP DIMENSIONS :		
41	GRADE ELEVATION	1 _____ m	
42	LOW LIQUID LEVEL	2 _____ m	
43	C.L. OF DISCHARGE	3 _____ m	
44	SUMP DEPTH	l ₁ _____ m	
45	PUMP LENGTH	l ₂ _____ m	
46	GRADE TO DISCH.	l ₃ _____ m	
47	GRADE TO LOW LIQUID LVL	l ₄ _____ m	
48	GRADE TO 1ST STG IMPL'R.	l ₅ _____ m	
49	SUBMERGENCE REQ'D	l ₆ _____ m	
50	SUMP DIAMETER	Φd _____ m	
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TOTAL		CENTRIFUGAL PUMP DATA SHEET	
1	Note	PRESSURE VESSEL DESIGN CODE REFERENCES	
2		THESE REFERENCES MUST BE LISTED BY THE MANUFACTURER	
3		CASTING FACTORS USED IN DESIGN (TABLE 3)	
4		SOURCE OF MATERIAL PROPERTIES	
5			
6		WELDING AND REPAIRS	
7		THESE REFERENCES MUST BE LISTED BY THE PURCHASER. (DEFAULT TO TABLE 10 IF NO PURCHASER PREFERENCE IS STATED)	
8		ALTERNATE WELDING CODES AND STANDARDS	
9		WELDING REQUIREMENT (APPLICABLE CODE OR STANDARD)	
10		WELDER/OPERATOR QUALIFICATION	
11		WELDING PROCEDURE QUALIFICATION	
12		NON-PRESSURE RETAINING STRUCTURAL WELDING SUCH AS BASEPLATES OR SUPPORTS	
13		MAGNETIC PARTICLE OR LIQUID PENETRANT EXAMINATION OF PLATE EDGES	
14		POSTWELD HEAT TREATMENT	
15		POSTWELD HEAT TREATMENT OF CASING FABRICATION WELDS	
16			
17		MATERIAL INSPECTION	
18		THESE REFERENCES MUST BE LISTED BY THE PURCHASER	
19		DEFAULT TO TABLE 14	
20		ALTERNATIVE MATERIAL INSPECTIONS AND ACCEPTANCE CRITERIA (SEE TABLE 14) (8.2.2.5)	
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Appendix 1

		NOTES
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