Centrifugal pump process data sheet —

JOB NO. ITEM NO.(S) 070-P-101A/B
REQ./SPEC. NO. /
PURCH. ORDER NO. DATE
ENQUIRY NO. BY

APPLICABLE TO: ● PROPOSALS ○ PURCHASE ◎ AS BUILT

FOR **NGHI SON REFINERY AND PETROCHEMICAL LIMITED LIABILITY COMPANY** UNIT

SITE **NGHI SON, VIETNAM** SERVICE **LPG FEED PUMPS**

NOTES: INFORMATION BELOW TO BE COMPLETED: ○ BY PURCHASER ☐ BY MANUFACTURER ◎ BY MANUFACTURER OR PURCHASER

○ DATASHEETS

	ITEM NO.	QT'Y	Attached	ITEM NO.	QT'Y	Attached	ITEM NO.	QT'Y	Attached
PUMP	070-P-101A/B	2	○			○			○
MOTOR		2	○			○			○
GEAR			○			○			○
TURBINE	---		○			○			○

APPLICABLE OVERLAY STANDARD(S):

REVISIONS

NO.	DATE	BY
1		
2		
3		
4		
5		

● OPERATING CONDITIONS (5.1.3)

FLOW, NORMAL 115 (m3/h) RATED 126.56 (m3/h)
OTHER

SUCTION PRESSURE MAX./RATED 1560 / 1358.3 (kPa)
DISCHARGE PRESSURE 5079.5 (kPa)
DIFFERENTIAL PRESSURE 3721.2 (kPa)
DIFF.HEAD 817.8 (m) NPSHA 4.35 (m)
PROCESS VARIATIONS (5.1.4)
STARTING CONDITIONS (5.1.4)
SERVICE: ● CONT. ○ INTERMITTENT(STARTS/DAY)
○ PARALLEL OPERATION REQ'D (5.1.13)

○ SITE DATA (5.1.3)

LOCATION (5.1.30):
○ INDOOR ○ HEATED ○ OUTDOOR ○ UNHEATED
○ ELECTRICAL AREA CLASSIFICATION (5.1.24 / 6.1.4)
CL GR DIV
○ WINTERIZATION REQ'D. ○ TROPICALIZATION REQ'D.

SITE DATA (5.1.30):
○ ALTITUDE (m) BAROMETER (kPaA)
○ RANGE OF AMBIENT TEMPS: MIN. / MAX. / (℃)
○ RELATIVE HUMIDITY: MIN. / MAX. / (%)

UNUSUAL CONDITIONS: (5.1.30) ○ DUST ○ FUMES
○ OTHER

● DRIVER TYPE

● INDUCTION MOTOR ○ STEAM TURBINE ○ GEAR
○ OTHER

● MOTOR DRIVER (6.1.1/6.1.4)

◎ MANUFACTURER
■ 280 (kW) ■ 2975 (r / min)
☐ FRAME ◎ ENCLOUSURE
■ HORIZONTAL ◎ VERTICAL ◎ SERVICE FACTOR
■ VOLTS / PHASE / HERTZ 690 / 3 / 50
○ TYPE
○ MINIMUM STARTING VOLTAGE (6.1.5)
◎ INSULATION ○ TEMP. RISE
◎ FULL LOAD AMPS
◎ LOCKED ROTOR AMPS
◎ STARTING METHOD
◎ LUBE

BEARING (TYPE / NUMBER):
☐ RADIAL /
☐ THRUST /
☐ VERTICAL THRUST CAPACITY
UP (N) DOWN (N)

● LIQUID (5.1.3)

LIQUID TYPE OR NAME PROPANE
○ HAZARDOUS ○ FLAMMABLE ○ (5.1.5)

		MIN.	NORMAL	MAX.
PUMPING TEMP.	(℃)		42	67
VAPOUR PRESS.	(kPaA)		1437	
RELATIVE DENSITY (SG):			0.464	
VISCOSITY	(cP)		0.085	

SPECIFIC HEAT, Cp (kJ/kg·K)
○ CHLORIDE CONCENTRATION (6.5.2.4) (ppm)
○ H2S CONCENTRATION (ppm) WET (5.12.1.12.c)
CORROSIVE / EROSIVE AGENT (5.12.1.9)

MATERIALS (5.12.1.1)

● ANNEX H CLASS (5.12.1.1) S-5LT
○ MIN DESIGN METAL TEMP (5.12.4.1) (℃)
○ REDUCED HARDNESS MATERIAL REQ'D (5.12.1.12)
■ BARREL/CASE SFL2 IMPELLER SCS13A
■ CASE/IMPELLER WEAR RINGS SUS420J2 / SUS420J2
■ SHAFT 17-4PH
■ DIFFUSERS SFL2

■ PERFORMANCE:

PROPOSAL CURVE NO. HGM-1211D ■ 2975 r / min
■ IMPELLER DIA. RATED 249.4 MAX. 260 MIN. 229 (mm)
■ IMPELLER TYPE DOUBLE SUCTION, CLOSED
■ RATED POWER 192 (kW) EFFICIENCY 68 (%)
■ MINIMUM CONTINUOUS FLOW:
THERMAL (m3/h) STABLE 40 (m3/h)
■ PREFERRED OPER. REGION 90 TO 154 (m3/h)
■ ALLOWABLE OPER. REGION 40 TO 160 (m3/h)
■ MAX. HEAD @ RATED IMPELLER 1022 (m)
■ MAX. POWER @ RATED IMPELLER 208 (kW)
■ NPSHR AT RATED FLOW 3.5 (m) (5.1.10)
◎ MAX SUCTION SPECIFIC SPEED: 9321(m3/h, m, rpm) (5.1.11)
◎ MAX. SOUND PRESS. LEVEL REQ'D (dBA) (5.1.16)
◎ EST. MAX. SOUND PRESS. LEVEL (dBA) (5.1.16)
◎ EST. MAX. SOUND POWER LEVEL (dBA) (5.1.16)

○ UTILITY CONSUMPTIONS (5.1.3)

ELECTRICITY	VOLTAGE	PHASE	HERTZ
DRIVERS	690	3	50
HEATING			

SYSTEM VOLTAGE DIP ○ 80% ○ OTHER (6.1.5)

STEAM	MAX.PRESS	MAX.TEMP.	MIN.PRESS	MIN. TEMP.
DRIVERS				
HEATING				

COOLING WATER: (5.1.19) SOURCE
SUPPLY TEMP. (℃) MAX.RETURN TEMP. (℃)
NORM. PRESS. (kPa) DESIGN PRESS (kPa)
MIN. RET. PRESS. (kPa) MAX ALLOW.D.P. (kPa)
CLORHIDE CONCENTRATION: (ppm)

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		REMARKS
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02		PUMP MODEL: 4 BTBFD-11st
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Centrifugal pump data sheet — Between bearings(type BB) —

JOB NO. ITEM NO.(S) 070-P-101A/B
REQ./SPEC. NO. /
PURCH. ORDER NO. DATE
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CONSTRUCTION

ROTATION: (VIEWED FROM COUPLING END) ☐ CW ■ CCW

PUMP TYPE: (4.1)

☒ BB1 ☒ BB2 ☒ BB3 ■ BB5

CASING MOUNTING:

■ CENTERLINE ☐ NEAR CENTERLINE

☐ FOOT

CASING SPLIT:

☒ AXIAL ■ RADIAL

CASING TYPE:

☐ SINGLE VOLUTE ☐ MULTIPLE VOLUTE ■ DIFFUSER

■ BETWEEN BEARINGS ■ BARREL

CASE PRESSURE RATING:

■ MAX. ALLOWABLE WORKING PRESSURE 7400 (kPa)

@ 67 (℃)

■ HYDROTEST PRESSURE 11100 (kPa)

● SUCTION PRESS. REGIONS MUST BE DESIGNED FOR MAWP (5.3.6)

☐ **NOZZLE CONNECTIONS: (5.4.2)**

	SIZE (DN)	FLANGE RATING	FACING	POSITION
SUCTION	6	ANSI600#	RF	TOP
DISCHARGE	4	ANSI600#	RF	TOP
BALANCE DRUM				

PRESSURE CASING AUX. CONNECTIONS: (5.4.3)

	No.	SIZE (DN)	TYPE
■ DRAIN	1	1"	W/V & F
☒ VENT	-	-	-
☒ PRESS. GAUGE			
☒ TEMP. GAUGE			
☒ WARM-UP			
☒ BALANCE / LEAK-OFF			

☒ MACHINED AND STUDDED CONNECTIONS (5.4.3.8)

○ CYLINDRICAL THREADS REQUIRED (5.4.3.3)

ROTOR:

○ COMPONENT BALANCE TO ISO 1940 G1.0 (5.9.4.4)

○ SHRINK FIT - LIMITED MOVEMENT IMPELLERS (8.2.2.3)

COUPLINGS: (6.2.2)

● MANUFACTURER METASTREAM ■ MODEL TSK0350

☐ RATING (kW per 100 r / min)

☒ SPACER LENGTH (mm) ☒ SERVICE FACTOR

DRIVER HALF COUPLING MOUNTED BY:

● PUMP MFR. ○ DRIVER MFR. ○ PURCHASER

○ COUPLING WITH HYDRAULIC FIT (6.2.10)

○ COUPLING BALANCED TO ISO 1940 -1 G6.3 (6.2.3)

○ COUPLING PER ISO 14691 (6.2.4)

○ COUPLING PER ISO 10441 (6.2.4)

○ COUPLING PER API 671 (6.2.4)

● NON-SPARK COUPLING GUARD (6.12.14c)

○ COUPLING GUARD STANDARD PER (6.2.14.a)

BASEPLATES:

☐ API BASEPLATE NUMBER (ANNEX D)

○ NON-GROUT CONSTRUCTION(6.3.13)

○ OTHER

MECHANICAL SEAL: (5.8.1)

● SEE ATTACHED ISO 21049 / API 682 DATA SHEET

SURFACE PREPARATION AND PAINT

○ MANUFACTURER'S STANDARD ○ OTHER (SEE BELOW)

○ SPECIFICATION No.

PUMP:

○ PUMP SURFACE PREPARATION

○ PRIMER

○ FINISH COAT

BASEPLATE: (6.3.17)

○ BASEPLATE SURFACE PREPARATION

○ PRIMER

○ FINISH COAT

○ DETAILS OF LIFTING DEVICES (6.3.20)

SHIPMENT: (7.4.1)

○ DOMESTIC ● EXPORT ● EXPORT BOXING REQUIRED

○ OUTDOOR STORAGE MORE THAN 6 MONTHS

SPARE ROTOR ASSEMBLY PACKAGED FOR:

○ SHIPING CONTAINER (8.2.8.3) ○ VERTICAL STORAGE(8.2.8.2)

○ TYPE OF SHIPPING PREPARATION ○ N2 PURGE(8.2.8.4)

HEATING AND COOLING

○ HEATING JACKET REQ'D (5.8.9) ■ COOLING REQ'D

■ COOLING WATER (C.W.) PIPING PLAN (6.5.3.1) M(For Reservoir)+A

C.W. PIPING:

■ PIPE ☒ TUBING; FITTINGS

C.W. PIPING MATERIALS:

☒ S.STEEL ■ C.STEEL ☒ GALVANIZED

COOLING WATER REQUIREMENTS:

☐ BEARING HOUSING (m3/h) @ (kPa)

☐ HEAT EXCHANGER (m3/h) @ (kPa)

STEAM PIPING: ○ TUBING ○ PIPE

BEARINGS AND LUBRICATION

BEARING (TYPE / NUMBER) (5.10.1):

■ RADIAL SLEEVE /

■ THRUST BALL /

LUBRICATION (5.11.3, 5.11.4):

■ RING OIL ☒ HYDRODINAMIC ☐ FLOOD ☐ FLINGER

○ PURGE OIL MIST ○ PURE OIL MIST

● CONSTANT LEVEL OILER PREFERENCE (5.10.2.2):

○ PRESSURE LUBE SYS. ISO 10438-3 ○ ISO 10438-2 (8.2.6.1/8.2.6.5)

☒ OIL VISCOSITY ISO GRADE

○ OIL PRESS. TO BE GREATER THAN COOLANT PRESSURE

○ REVIEW AND APPROVE THRUST BEARING SIZE [8.2.5.2.4.d)]

☒ OIL HEATER REQUIRED: ○ STEAM ○ ELECTRIC

INSTRUMENTATION (6.4.2)

○ SEE ATTACHED API 670 DATASHEET

○ ACCELEROMETER(S) (6.4.2.1)

○ PROVISION FOR VIBRATION PROVES (6.4.2.2)

○ RADIAL PER BRG. ○ AXIAL PER BRG.

○ PROVISION FOR MOUNTING ONLY (5.10.2.11)

○ FLAT SURFACE REQ'D (5.10.2.12)

○ RADIAL BEARING METAL TEMP. ○ THRUST BEARING METAL TEMP.

○ TEMP. GAUGES (WITH THERMOWELLS)

○ MONITORS AND CABLES SUPPLIED BY (6.4.2.4.)

REMARKS

MASSES (kg)

PUMP BASEPLATE

DRIVER TOTAL

GEAR

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SPARE PARTS (TABLE 18)

○ START UP ○ NORMAL MAINTENANCE

○ SPECIFY

OTHER PURCHASER REQUIREMENTS

○ COORDINATION MEETING REQUIRED (9.1.3)
● MAXIMUM DISCHARGE PRESSURE TO INCLUDE (5.3.2)
● MAX RELATIVE DENSITY
○ MAX. DIA. IMPELLERS AND/OR No.OF STAGES
○ OPERATATION TO TRIP SPEED
○ CONNECTION DESIGN APPROVAL (5.12.3.4/8.2.1.4)
○ INERT GAS INHIBITED STORAGE-SPARE CARTRIDGE(8.2.8.4)
○ TORSIONAL ANALYSIS REQUIRED (5.9.2.1)
○ TORSIONAL ANALYSIS REPORT (5.9.2.6)
○ PROGRESS REPORTS(9.3.3)
○ OUTLINE OF PROCEDURES FOR OPTIONAL TESTS (9.2.5)
○ ADDITIONAL DATA REQUIRING 20 YEARS RETENTION (7.2.2.1f)
○ LATERAL ANALYSIS REQUIRED(8.2.4.1/8.2.4.1.3)
● DYNAMIC BLANCE ROTOR (8.2.4.2)
MANIFOLD PIPING TO SINGLE CONNECTION (6.5.1.6)
○ VENT ○ DRAIN ○ COOLING WATER
○ MOUNT SEAL RESERVOIR OFF BASEPLATE (6.5.1.4)
○ FLANGES REQ'D IN PLACE OF SOCKET WELD UNIONS (6.5.2.8)
CONNECTION BOLTING
○ PTFE COATING ○ ASTM A153 GALVANIZED
○ PAINTED ○ SS
○ INSTALLATION LIST IN PROPOSAL (9.2.3 L)

QA INSPECTION AND TESTING

○ SHOP INSPECTION (7.1.4)
○ PERFORMANCE CURVE APPR.
○ TEST WITH SUBSTITUTE SEAL (7.3.3.2)
● MATERIAL CERTIFICATION REQUIRED (5.12.1.8)
● CASING ● IMPELLER ● SHAFT
○ OTHER
○ CASTING REPAIR PROCEDURE APPROVAL REQ'D (5.12.2.5)
○ INSPECTION REQUIRED FOR CONNECTION WELDS (5.12.3.4 e)
○ MAG PARTICLE ○ LIQUID PENETRANT
○ RADIOGRAPHIC ○ ULTRASONIC
○ INSPECTION REQUIRED FOR CASTINGS (7.2.1.3/5.12.1.5)
○ MAG PARTICLE ○ LIQUID PENETRANT
○ RADIOGRAPHIC ○ ULTRASONIC
○ HARDNESS TEST REQUIRED: (7.2.2.3)
○ ADDITIONAL SURFACE / SUBSURFACE EXAMINATION FOR (7.2.1.3)
FOR
METHOD

QA INSPECTION AND TESTING (CONT.)

TEST	NON-WIT	WIT	OBSERVE
● HYDROSTATIC (7.3.2)	○	●	○
● PERFORMANCE (7.3.3)	○	●	○
● NPSH (7.3.4.2)	○	●	○
○ RETEST ON SEAL L'KGE(7.3.3.2d)	○	○	○
○ RETEST REQUIRED AFTER FINAL HEAD ADJUSTMENT (7.3.3.5.b)	○	○	○
○ COMPLETE UNIT TEST (7.3.4.3)	○	○	○
● SOUND LEVEL TEST (7.3.4.4)	○	●	○
○ CLEAN LINES PRIOR TO FINAL ASSEMBLY (7.2.2.2)	○	○	○
○ NOZZLE LOAD TEST (6.3.6)	○	○	○
○ CHECK FOR CO-PLANAR MOUNTING PAD SURFACES (6.3.3)	○	○	○
● MECHANICAL RUN UNTIL OIL TEMP. STABLE (7.3.4.7.1)	○	●	○
○ 4 h MECHANICAL RUN AFTER OIL TEMP. STABLE (7.3.4.7.3)	○	○	○
○ 4 h MECH. RUN TEST(7.3.4.7.2)	○	○	○
○ TRUE PEAK VELOCITY DATA (7.3.3.4d)	○	○	○
○ BRG HSG RESONANCE TEST (7.3.4.6)	○	○	○
● REMOVE/ INSPECT HYDRODYNAMIC BEARINGS AFTER TEST (8.2.7.5)	○	●	○
○ AUXILIARY EQUIPMENT TEST (7.3.4.5)	○	○	○
○ CHARPY TEST (EN 13445/ASME VIII)	○	○	○
○	○	○	○
○	○	○	○
○	○	○	○

○ VENDOR KEEP REPAIR AND HT RECORDS (7.2.1.1.c)
○ VENDOR SUBMIT TEST PROCEDURES (7.3.1.2 / 9.2.5)
○ VENDOR SUBMIT TEST DATA WITHIN 24h (7.3.3.3 e)
○ INCLUDE PLOTTED VIBRATION SPECTRA (5.9.3.3)
○ RECORD FINAL ASSEMBLY RUNNING CLEARANCES
○ COMPLETION OF INSPECTION CHECK LIST (7.1.6)

REMARKS

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Centrifugal pump — References

JOB NO. ITEM NO.(S) 070-P-101A/B

REQ./SPEC. NO. /

PURCH. ORDER NO. DATE

ENQUIRY NO. BY

☐ **PRESSURE DESIGN CODES**
○ **WELDING REQUIREMENTS**
◎ **PURCHASER-DEFINED MATERIAL INSPECTIONS**

APPLICABLE TO: ● PROPOSALS ○ PURCHASE ◎ AS BUILT

FOR **NGHI SON REFINERY AND PETROCHEMICAL LIMITED LIABILITY COMPANY** UNIT

SITE **NGHI SON, VIETNAM** SERVICE **LPG FEED PUMPS**

NOTES: INFORMATION BELOW TO BE COMPLETED: ○ BY PURCHASER ☐ BY MANUFACTURER ◎ BY MANUFACTURER OR PURCHASER

PRESSURE VESSEL DESIGN CODE REFERENCES.

☐ THESE REFERENCES MUST BE LISTED BY THE MANUFACTURER

CASTING FACTORS USED IN DESIGN (5.3.4) (TABLE 3)	☐
SOURCE OF MATERIAL PROPERTIES	☐

WELDING AND REPAIRES (5.12.3)

THESE REFERENCES MUST BE LISTED BY THE PURCHASER (DEFAULT TO TABLE 10 IF NO PURCHASER REFERENCES IS STATED)

○ ALTERNATIVE WELDING CODES AND STANDARDS (5.12.3.1)

Welding Requirement (Applicable Code or Standard)	**Purchaser-defined**	**Default per Table 10**
Welder/Operator qualification	○	○
Welding procedure qualification	○	○
Non-pressure-retaining structural welding such as baseplates or supports	○	○
Magnetic particle or liquid penetrant examination of the plate edges	○	○
Postweld heat treatment	○	○
Postweld heat treatment of casing fabrication welds	○	○

MATERIAL INSPECTION (7.2.2.1) (7.2.1.3)

THESE REFERENCES MUST BE LISTED BY THE PURCHASER (DEFAULT TO TABLE 13 IF NO PURCHASER REFERENCES IS STATED)

○ ALTERNATIVE MATERIAL INSPECTIONS AND ACCEPTANCE CRITERIA (SEE TABLE 13)

Type of inspection	Methods	For fabrications	Castings
Radiography	○	○	○
Ultrasonic inspection	○	○	○
Magnetic particle inspection	○	○	○
Liquid penetrant inspection	○	○	○

REMARKS

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