DATA SHEET AND PERFORMANCE CURVE FOR PUMP

namvaran Consulting Engineers; Managers	**Project Name : 5000 MTPD SIRAF Methanol Plan** **Project No. : 1246**

Purchaser review and comments shall not be assumed to indicate either responsibility or liability for accuracy and completeness of this document or alter any contractual terms and conditions, and will not absolve vendor from his responsibility for correct design, manufacturing and operation of equipment.

1	✓	No comments.
2		Comments as marked, proceed.
3		Comments as marked, revise & resubmit.
4		For information.

Signature	SOH	Date:	05.11.17

REV.	DESCRIPTION	PREPARED	CHECKED	APPROVED	DATE
A3	Issued For Approval	Jens Schönherr	Sandra Simianer	Sandra Simianer	2017/10/17
A2	Issued For Approval	Jens Schönherr	Sandra Simianer	Sandra Simianer	2017/08/15
A1	Issued For Approval	Jens Schönherr	Sandra Simianer	Sandra Simianer	2017/06/22

OWNER:

Siraf Energy Investment Co.

MC:

Shargan Consultant Engineers

CONTRACTOR:

namvaran Consulting Engineers; Managers

PROJECT: **5000 MTPD SIRAF Methanol Plant Bandar Dayyer**

VENDOR DOC.(NO.LOGO,PO NO).

SULZER

DOCUMENT NUMBER

Project No.	MR Number	Vendor Abbr.	Type of Doc.	Doc. Group	Seq. No.
1246	22025	SLZ	DS	EMR	22001

TABLE OF CONTENT

OWNER: Siraf Energy Investment Co.

MC: Shargan Consultant Engineers

CONTRACTOR: namvaran Consulting Engineers; Managers

PROJECT: 5000 MTPD SIRAF Methanol Plant Bandar Dayyer

VENDOR DOC.(NO.LOGO,PO NO). SULZER

DOCUMENT NUMBER

Project No.	MR Number	Vendor Abbr.	Type of Doc.	Doc. Group	Seq. No.
1246	22025	SLZ	DS	EMR	22001

TABULATION OF REVISED PAGES

SHEET	A1	A2	A3	A4	SHEET	A1	A2	A3	A4	SHEET	A1	A2	A3
1	X	X	X										
2	X	X	X										
3	X	X	X										
4	X	X	X										
5	X	X	X										
6	X	X	X										
7	X	X	X										
8	X	X											
9	X	X	X										
10	X	X	X										
11	X	X											
12	X	X	X										

OWNER:

Siraf Energy Investment Co.

MC:

Shargan Consultant Engineers

CONTRACTOR:

namvaran Consulting Engineers; Managers

PROJECT: 5000 MTPD SIRAF Methanol Plant Bandar Dayyer

VENDOR DOC.(NO.LOGO,PO NO).

SULZER

DOCUMENT NUMBER

Project No.	MR Number	Vendor Abbr.	Type of Doc.	Doc. Group	Seq. No.
1246	22025	SLZ	DS	EMR	22001

SHEET 3 OF 12 REV. A3

SULZER namvaran Consulting Engineers, Managers

OWNER DOCUMENT NUMBER					DOCUMENT NUMBER				
UNIT NO.	GROUP	SUB-UNIT	TYPE	DOC. NO.	JOB	TYPE	SIZE	GROUP	DOC. NO.
22025	EMR		DS	22001	1246	DS	4	EMR	22001
OWNER PROJECT NO.:					SHEET 1	OF 4		REV. A3	

MECHANICAL DATA SHEET FOR BFW PUMPS

APPLICABLE TO: ○ PROPOSAL ● PURCHASE ☐ AS BUILT — Rev

FOR: SIRAF ENERGY INVESTMENT COMPANY — UNIT: METHANOL UNIT

SITE: BANDAR DAYYER — SERVICE: BFW PUMPS

No. of Req'd: 3 Service 2 / Stand by 1

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

● DATA SHEETS

	ITEM NO.	ATTACHED	ITEM NO.	ATTACHED	ITEM NO.	ATTACHED
PUMP	P-7001 C	●	P-7001 A/B	●		○
MOTOR	MP-7001 C	○		⬭		○
GEAR		○		⬭		○
TURBINE		○	FT-7001 A/B	⬭		○

APPLICABLE OVERLAY STANDARD(S) : API 610 10TH ED.

REVISIONS

NO.	DATE	BY
0		
1		
2		
3		
4		

● OPERATING CONDITIONS (5.1.3)

FLOW, NORMAL 222.7 (Note 2) (m^3/h) RATED 267,3 (m^3/h)

OTHER: Intermediate Take Off ITO: 32m³/h @599m

SUCTION PRESSURE MIN/MAX 2 / 5 (barg)

DISCHARGE PRESSURE 126 (barg)

DIFFERENTIAL PRESSURE 124 (bar)

DIFF. HEAD 1341,8 (m) NPSHA 8,6 (m)

PROCESS VARIATIONS (5.1.4)

STARTING CONDITIONS (5.1.4) OPEN DISCHARGE VALVE

SERVICE: ● CONT ○ INTERMITTENT (STARTS/DAY)

● PARALLEL OPERATION REQ'D (5.1.13) P-7001 A & B

● SITE DATA (5.1.3)

LOCATION: (5.1.30)

○ INDOOR ○ HEATED ● OUTDOOR ○ UNHEATED

● ELECTRICAL AREA CLASSIFICATION (5.1.24 / 6.1.4) (See Remark No.1)

ZONE 2 GR IIC CL T3

○ WINTERIZATION REQ D. ● TROPICALIZATION REQ D.

SITE DATA (5.1.30)

○ ALTITUDE (m) BAROMETER 0.99-1.1 (bar)

● RANGE OF AMBIENT TEMPS:MIN,MAX. 5 / 52 (°C)

● RELATIVE HUMIDITY: MIN-MAX 65 / 100 (%)

UNUSUAL CONDITIONS: (5.1.30) ● DUST ○ FUMES

○ OTHER

Remark 1: PM-7001 C is in SAFE AREA.

● DRIVER TYPE

● INDUCTION MOTOR ● STEAM TURBINE ● GEAR

○ OTHER

MOTOR DRIVER (6.1.1 / 6.1.4)

◯ MANUFACTURER ABB

☐ 1500 (kw) ☐ 2984 (r/min)

☐ FRAME ● ENCLOSURE IP 55 Weather Proof

● HORIZONTAL ◯ VERTICAL ◯ SERVICE FACTOR

● VOLTS / PHASE / HERTZ 6000 / 3 / 50

● TYPE ASYNCHRONOUS

● MINIMUM STARTING VOLTAGE (6.1.5) 80%

● INSULATION Class F ● TEMP. RISE B

◯ FULL LOAD AMPS

◯ LOCKED ROTOR AMPS Less than 6xIn

● STARTING METHOD DOL

◯ LUBE

BEARINGS (TYPE / NUMBER) :

☐ RADIAL /

☐ THRUST /

☐ VERTICAL THRUST CAPACITY

UP (N) DOWN (N)

● LIQUID (5.1.3)

LIQUID TYPE OR NAME: BOILER FEED WATER

○ HAZARDOUS ○ FLAMMABLE (5.1.5)

	MIN.	NORMAL	MAX.
PUMPING TEMP (°C)		120	
VAPOUR PRESS . (bara)		2	
RELATIVE DENSITY (SG):		0,943	
VISCOSITY (cP)		0,234	

SPECIFIC HEAT, C_P 4,2 (kj/kg .k.)

○ CHLORIDE CONCENTRATION (6.5.2.4) (mg/kg)

○ H_2S CONCENTRATION WET (5.12.1.12c)

CORROSIVE / EROSIVE AGENT (5.12.1.9)

MATERIALS (5.12.1.1) (VTA)

● ANNEX H CLASS (5.12.1.1) S6

○ MIN DESIGN METAL TEMP (5.12.4.1) (°C)

○ REDUCED HARDNESS MATERIALS REQ D. (5.12.1.12)

☐ BARREL / CASE ASTM A182GrF22Cl 3 IMPELLER ASTMA743GR CA6NM

☐ CASE / IMPELLER WEAR RINGS A743 Gr CA40 WNT/A743 Gr CA6NM

☐ SHAFT A182 Gr F6NM

☐ DIFFUSERS A743 Gr CA6NM

◯ PERFORMANCE

PROPOSAL CURVE NO. 4611.07.611-01 (r/min)

☐ IMPELLER DIA RATED 351 MAX. 365 MIN. 320 (mm)

☐ IMPELLER TYPE closed, radial

☐ RATED POWER 1192 (kw) EFFICIENCY 72,2 (%)

☐ MINIMUM CONTINUOUS FLOW :

THERMAL (m^3/h) STABLE 110 (m^3/h)

☐ PREFERRED OPER. REGION 191,5 TO 328,2 (m^3/h) A3

☐ ALLOWABLE OPER. REGION 110 TO 328,2 (m^3/h) A3

☐ MAX. HEAD @ RATED IMPELLER 1531 (m)

☐ MAX. POWER @ RATED IMPELLER 1408 (kw)

☐ NPSHR AT RATED FLOW 4,3 (m) (5.1.10)

◯ MAX SUCTION SPECIFIC SPEED : 8878 (5.1.11)

● MAX . SOUND PRESS LEVEL REQ. D 85 (dba) (5.1.16)

◯ EST MAX. SOUND PRESS LEVEL 85 (dba) (5.1.16)

◯ EST MAX. SOUND POWER LEVEL (dba) (5.1.16)

● UTILITY CONDITIONS (5.1.3)

ELECTRICITY	VOLTAGE	PHASE	HERTZ
DRIVERS	6000	3	50
HEATING	230	1	50

SYSTEM VOLTAGE DIP ● 80% ○ OTHER (6.1.5)

STEAM	NOR. PRESS.	NOR. TEMP	DES. PRESS.	DES. TEMP
DRIVERS	44 barg	355 °C	52 barg	410 °C
HEATING	7 barg	187 °C	9.5 barg	340 °C

COOLING WATER: (5.1.19) SOURCE Closed loop cooling water

SUPPLY TEMP. 38 (°C) MAX. RETURN TEMP. 48 (°C)

NORM. PRESS. 4,4 (barg) DESIGN PRESS. 7,5 (barg)

MIN. RET. PRES 2,1 (barg) MAX. ALLOW. D.P. 2,3 (barg)

CHLORIDE CONCENTRATION : 10 (mg/kg)

INSTRUMENT AIR PRESSURE (MIN/MAX): 7 / 8.5 (bar)

REV.	DESCRIPTION	PREPARED	CHECKED	APPROVED	DATE
A3	ISSUED FOR APPROVAL	Jens Schönherr	Jens Schönherr	Sandra Simianer	17-October-2017
A2	ISSUED FOR APPROVAL	Jens Schönherr	Jens Schönherr	Sandra Simianer	14-August-2017
A1	ISSUED FOR APPROVAL	Jens Schönherr	Jens Schönherr	Sandra Simianer	27-March-2017

SULZER namvaran Consulting Engineers; Managers

OWNER DOCUMENT NUMBER					DOCUMENT NUMBER				
UNIT NO.	GROUP	SUB-UNIT	TYPE	DOC. NO.	JOB	TYPE	SIZE	GROUP	DOC. NO.
22025	EMR		DS	22001	1246	DS	4	EMR	22001
OWNER PROJECT NO.:					SHEET 2	OF 4		REV. A3	

MECHANICAL DATA SHEET FOR BFW PUMPS

CONSTRUCTION

ROTATION (VIEWED FROM COUPLING END) ■ CW ☐ CCW

PUMP TYPE : (4.1) **(VTA)**

☐ 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 203 (bar)

@ 160 (°C)

■ HYDRO TEST PRESSURE (1.5 x MAWP) 304,5 (bar)

○ SUCTION PRESS REGIONS MUST BE DESIGNED FOR MAWP (5.3.6)

■ NOZZLE CONNECTIONS : (5.4.2)

	SIZE (DN)	FLANGE RATING	FACING	POSITION
SUCTION	10"	1500 #	RTJ	UP
DISCHARGE	6"	1500 #	RTJ	UP
BALANCE DRUM	3"	1500 #	RTJ	

PRESSURE CASING AUX. CONNECTIONS : (5.4.3)

	NO.	SIZE (DN)	TYPE
■ DRAIN	1	1"	VALVED
☐ VENT			
☐ PRESS. GAUGE			
☐ TEMP GAUGE			
■ ~~WARM-UP~~ ITO	1	3"	1500 RTJ
■ BALANCE LINE ~~/ LEAK-OFF~~ Note 20:	2	1,5"	2500 RTJ

☐ MACHINED AND STUDDED CONNECTIONS (5.4.3.8)

○ CYLINDRICAL THREADS REQUIRED (5.4.3.3)

ROTOR :

○ COMPONENT BALANCE TO ISO 1940-1 G1.0

● SHRINK FIT-LIMITED MOVEMENT IMPELLERS (8.2.2.3)

COUPLINGS :(6.2.2) **(Note 3)**

○ MANUFACTURER KTR ☐ MODEL RIGIFLEX

☐ RATING (kw per 100 r/min) gearb.pump: 50 KW / turbine pump: 41,1KW / motor pump 50 KW per 100rpm

■ SPACER LENGTH 250 mm ■ SERVICE FACTOR MIN. 1.5

DRIVER HALF COUPLING MOUNTED BY: As per 1246-DS-4-EMR-22028

○ 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 (6.2.14c)

○ COUPLING GUARD STANDARD PER (6.2.14a)

BASEPLATES: **(Note 4)**

☐ API BASEPLATE NUMBER (ANNEX D)

○ NON-GROUT CONSTRUCTION (6.3.1..3)

○ OTHER

MECHANICAL SEAL : (5.8.1) **SINGLE MECHANICAL SEAL**

☐ SEAL MANUFACTURER Eagle Burgmann

○ CATEGORY

○ TYPE (SEAL CODE) 21A-LXN-100-23/61 1CW-FL

● ARRANGEMENT 1

● SEAL/AUXILIARY PLAN 23/61

SEAL CONSTRUCTION: Vendor shall fill out mech. Seal data sheet of API 682

☐ SLEEVE MATERIAL ASTM A276 Type S31803

☐ GLAND MATERIAL ASTM A276 Type 316L

☐ AUX SEAL DEVICE (2.7.3.20)

☐ JACKET REQUIRED (2.7.3.17)

SEAL CHAMBER DATA: (2.1.6/2.1.7)

☐ TEMPERATURE (°C) 120

☐ PRESSURE (BARG) 2 max. 5,7

☐ FLOW (LIT/MIN)

SURFACE PREPARATION AND PAINT

● MANUFACTURERS STANDARD ○ OTHER (SEE BELOW)

● SPECIFICATION NO. 1246-SP-4-EMM-24008

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 12 MONTHS

SPARE ROTOR ASSEMBLY PACKAGED FOR :

● SHIPPING 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 PIPING PLAN (6.5.3.1) M

C.W. PIPING:

● PIPE ● TUBING : FITTINGS HY-LOK

C.W. PIPING MATERIALS :

● S.STEEL ○ C.STEEL ○ GALVANIZED

COOLING WATER REQUIREMENTS S8 (NOTE 3)

☐ BEARING HOUSING N/A (m^3/h) @ (bar)

☐ HEAT EXCHANGER 1,2 (m^3/h) @ 4,4 (bar)

STEAM PIPING ○ TUBING ○ PIPE

BEARINGS AND LUBRICATION

BEARING (TYPE / NUMBER) (5.10.1)

☐ RADIAL 1x FORCED OIL LUBRICATED SLEEVE BEARING; TEGOSTAR73 A3

☐ THRUST 1x THRUST SLEVE BEARING KINGSBURY 10,5" A3

LUBRICATION (5.11.3 , 5.11.4) :

○ RING OIL ○ HYDRODYNAMIC ○ 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 VISC. ISO GRADE VG46

● OIL PRESSURE TO BE GREATER THAN COOLANT PRESSURE

○ REVIEW AND APPROVE THRUST BEARING SIZE (8.2.5.2.4)

○ OIL HEATER REQUIRED : ○ STEAM ○ ELECTRIC A3

INSTRUMENTATION (6.4.2)

○ SEE ATTACHED API-670 DATA SHEET

○ ACCELEROMETER (S) (6.4.2.1)

● PROVISION FOR VIBRATION PROBES (6.4.2.2)

○ RADIAL 2x PER BRG. ○ AXIAL 2x PER Thrust BRG.

○ PROVISION FOR MOUNTING ONLY (5.10.2.11)

○ FLAT SURFACE REQ D (5.10.2.12)

● RADIAL BEARING METAL TEMP. ● THRUST BRG METAL TEMP.

○ TEMP GAUGES (WITH THERMO WELLS)

○ MONITORS AND CABLES SUPPLIED BY (6.4.2.4) by vendor

REMARKS

☐ MASSES (kg)

PUMP	5686 kg	BASEPLATE P-7001A/	5117 kg
		BASEPLATE P-7001C	3918 kg
GEAR	1100kg		
DRIVER TURBINE	2300 kg		
DRIVER MOTOR	5310 kg		

TOTAL

P-7001 A/B 17303 kg

P-7001 C 17834 kg

SULZER

namvaran
Consulting Engineers, Managers

OWNER DOCUMENT NUMBER					DOCUMENT NUMBER				
UNIT NO.	GROUP	SUB-UNIT	TYPE	DOC. NO.	JOB	TYPE	SIZE	GROUP	DOC. NO.
22025	EMR		DS	22001	1246	DS	4	EMR	22001
OWNER PROJECT NO.:					SHEET 3	OF 4		REV. A3	

MECHANICAL DATA SHEET FOR BFW PUMPS

SPARE PARTS (TABLE 18)

● START-UP ● NORMAL MAINTENANCE
● SPECIFY **FOR 2 YEARS**

OTHER PURCHASER REQUIREMENTS

● COORDINATION MEETING REQUIRED (9.1.3)
● MAXIMUM DISCHARGE PRESSURE INCLUDE (5.3.2)
● MAX. RELATIVE DENSITY
● MAX. DIA. IMPELLER AND / OR NO. OF STAGES
● OPERATION TO TRIP SPEED
○ CONNECTION DESIGN APPROVAL (5.1.2.3.4 , 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 (7.2.2.10)
■ LATERAL ANALYSIS REQUIRED (8.2.4.1 / 8.2.4.1.3)
■ DYNAMIC BALANCE 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 (9.2.3L)

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 **SHAFT SLEEVES, WEAR RINGS, MECHANICAL SEAL PARTS**
○ CASTING REPAIR PROCEDURE APPROVAL REQ D (5.12.2.5)
■ INSPECTION REQUIRED FOR CONNECTION WELDS (5.12.3.4e)
■ MAG PARTICLE ■ LIQUID PENETRANT
☐ RADIOGRAPHIC ■ ULTRASONIC
■ INSPECTION REQUIRED FOR CASTINGS (7.2.1.3)(5.12.1.5) Inspection Class I
☐ MAG PARTICLE ☐ LIQUID PENETRANT
☐ RADIOGRAPHIC ■ Visual Insp. ☐ ULTRASONIC
○ HARDNESS TEST REQUIRED : _____ (7.2.2.3)
○ ADDITIONAL SURFACE / SUBSURFACE EXAM INATION (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) (Note 5)	○	●	○
○ RETEST ON SEAL LKGE (7.3.3.2d)	○	○	○
○ RETEST REQUIRED AFTER FINAL HEAD ADJUSTMENT (7.3.3 Sb)	○	○	○
● COMPLETE UNIT TEST (7.3.4.3)	○	●	○
● SOUND LEVEL TEST (7.3.4.4)	○	●	○
● CLEANLINESS PRIOR TO FINAL ASSEMBLY (7.2.2.2)	●	○	○
○ NOZZLE LOAD TEST (6.3.6)	○	○	○
○ CHECK FOR CO-PLANNER MOUNTING PAD SURFACE (6.3.3)	○	○	○
○ MECHANICAL RUN UNIT OIL TEMP P. STABLE (7.3.4.7.1)	○	○	○
○ 4 HR. MECHANICAL RUN AFTER OIL TEMP STABLE (7.3.4.7.3)	○	○	○
● 4 HR. 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 1.344.5/ASME VID	○	○	○
○ _____	○	○	○
○ _____	○	○	○
○ _____	○	○	○

● VENDOR KEEP REPAIR AND HT RECORDS (7.2.11C)
● VENDOR SUBMIT TEST PROCEDURES (7.3.1.2 / 9.2.5)
● VENDOR SUBMIT TEST DATA WITHIN 24 HOURS (7.3.3.3E)
● INCLUDE PLOTTED VIBRATION SPECTRA (5.9.3.3)
● RECORD FINAL ASSEMBLY RUNNING CLEARANCES
● COMPLETION OF INSPECTION CHECK LIST (7.1.6)

Rev.

REMARKS

SEE REMARKS ON PAGE 4

SULZER namvaran Consulting Engineers; Managers	OWNER DOCUMENT NUMBER					DOCUMENT NUMBER				
	UNIT NO.	GROUP	SUB-UNIT	TYPE	DOC. NO.	JOB	TYPE	SIZE	GROUP	DOC. NO.
	22025	EMR		DS	22001	1246	DS	4	EMR	22001
	OWNER PROJECT NO.:					SHEET 4	OF 4			REV. A3

MECHANICAL DATA SHEET FOR BFW PUMPS

GENERAL NOTE

- PUMP ESTIMATED SHUT-OFF PRESSURE : 170 BARG. THIS FIGURE HAS BEEN CALCULATED AS FOLLOWS (TO BE FINALIZED BY VENDOR): THE ESTIMATED SHUT-OFF PRESSURE FOR INTER-STAGE EXTRACTION IS 80 BARG (TO BE FINALIZED BY VENDOR). DIFFERENTIAL HEAD AT RATED FLOW X 120 % + LH (LEVEL HIGH) SUCTION STATIC HEAD + MAX OPERATING PRESSURE SUCTION SIDE.
- VTA MEANS "VENDOR TO ADVISE".

NOTES

Note 1: AUTOMATIC RECIRCULATION VALVE (ARC VALVE) TYPE AS MINIMUM FLOW DEVICE SHALL BE SPECIFIED AND SUPPLIED BY PUMP VENDOR.

Note 2: INTERSTAGE EXTRACTION OF 0-32 m3/hr AT MINIMUM 55.8 bara SHALL BE POSSIBLE. FOR RATED SPEED 2984rpm!
EXTRACTION FLOWRATE IS CONTINUOUS OPERATING AND VARY FROM 0 ~ 32 m3/hr.
EXTRACTION FLOWRATE: NORMAL FLOWRATE: 27 m3/hr @ 637m
RATED FLOWRATE: 32 m3/hr

Note 3: DRY, FLEXIBLE, MULTI DISK, SS MEMBRANE, SPACER TYPE COUPLING SHALL BE USED.

Note 4: GROUT TYPE SHALL BE SPECIFIED BY VENDOR.

Note 5: NPSH TEST SHALL BE PERFORMED WHEN THE MARGIN BETWEEN NPSHA AND NPSHR IS LESS THAN 1 M.

Note 6: PURCHASER/COMPANY HAVE THE RIGHT TO ORDER DISMANTLING THE PUMPS AFTER MECHANICAL RUNNING TEST, IF THE TEST RESULTS DO NOT MEET API 610 REQUIREMENTS

Note 7: PUMP SEAL DATASHEET SHALL BE FILLED IN BY VENDOR.

Note 8: FOR PROCESS CENTRIFUGAL PUMP SPECIFICATION PLEASE REFER TO "TECHNICAL SPECIFICATION FOR HEAVY DUTY CENTRIFUGAL PUMPS (1246-SP-4-EMR-22032)"

Note 9: FOR ELECTRICAL MOTOR SPECIFICATION PLEASE REFER TO "LV MOTOR SPECIFICATION (1246-SP-4-EEE-30008-C1)" AND "MV MOTOR SPECIFICATION (1246-SP-4-EEE-30007-C1)".

Note 10: FOR STEAM TURBINE SPECIFICATION PLEASE REFER TO "TURBINE SPECIFICATION (1246-SP-4-EMR-22033-A1)".

Note 11: ALLOWABLE LOADS AND MOMENTS ACTING ON PUMP PROCESS NOZZLES SHALL BE TWICE API 610 10TH ED., AS A MINIMUM.

Note 12: Deleted.

Note 13: INSTRUMENT ENCLOSURE AND EX PROTECTION ARE IP65 AND EEXia IIC T4, RESPECTIVELY.

Note 14: DATASHEET FOR ALL INSTRUMENTS SHOULD BE SUBMITTED BY PUMP VENDOR FOR CHECKING AND APPROVAL.

Note 15: ALL ALARM SETPOINTS SHOULD BE DEFINED IN INSTRUMENT DATASHEET FOR FUTURE PROGRAMMING IN PLANT CONTROL SYSTEM.

Note 16: ELECTRICAL CONNECTION FOR TRANSMITTERS / SWITCHES IS M20 x 1.5 ISO.

Note 17: THERE IS ONE PRESSURE SAFETY VALVE (PSV) AT SUCTION LINE OF EACH PUMP WITH SET POINT 6 barg FOR PREVENTION OF REVERSE FLOW THROUGH THE PUMP AT BLOCKED OUTLET CASE. THE CAPACITY AND SIZING OF THIS PSV SHALL BE DEFINED BY PUMP VENDOR.
Defined capacity/sizing: 54,720 kg/h (20% flow of Best Efficiency Point; BEP 273,6m³/h; SG 1,0)

Note 18: FOR INSTRUMENTATION TECHNICAL SPECIFICATION , PLEASE REFER TO DOCUMENT :" PACKAGE INSTRUMENTATION SPECIFICATION (1246-SP-4-EJJ-40009).

Note 19: BEP is at 273,5 m³/h (speed 2984 rpm)

Note 20: Connection to suction casing / pump casing: BLOCK FLANGE connection, butt welded
Balance line size: 1,5" schedule 160; Balance line flange rating: 2500 RTJ

SULZER

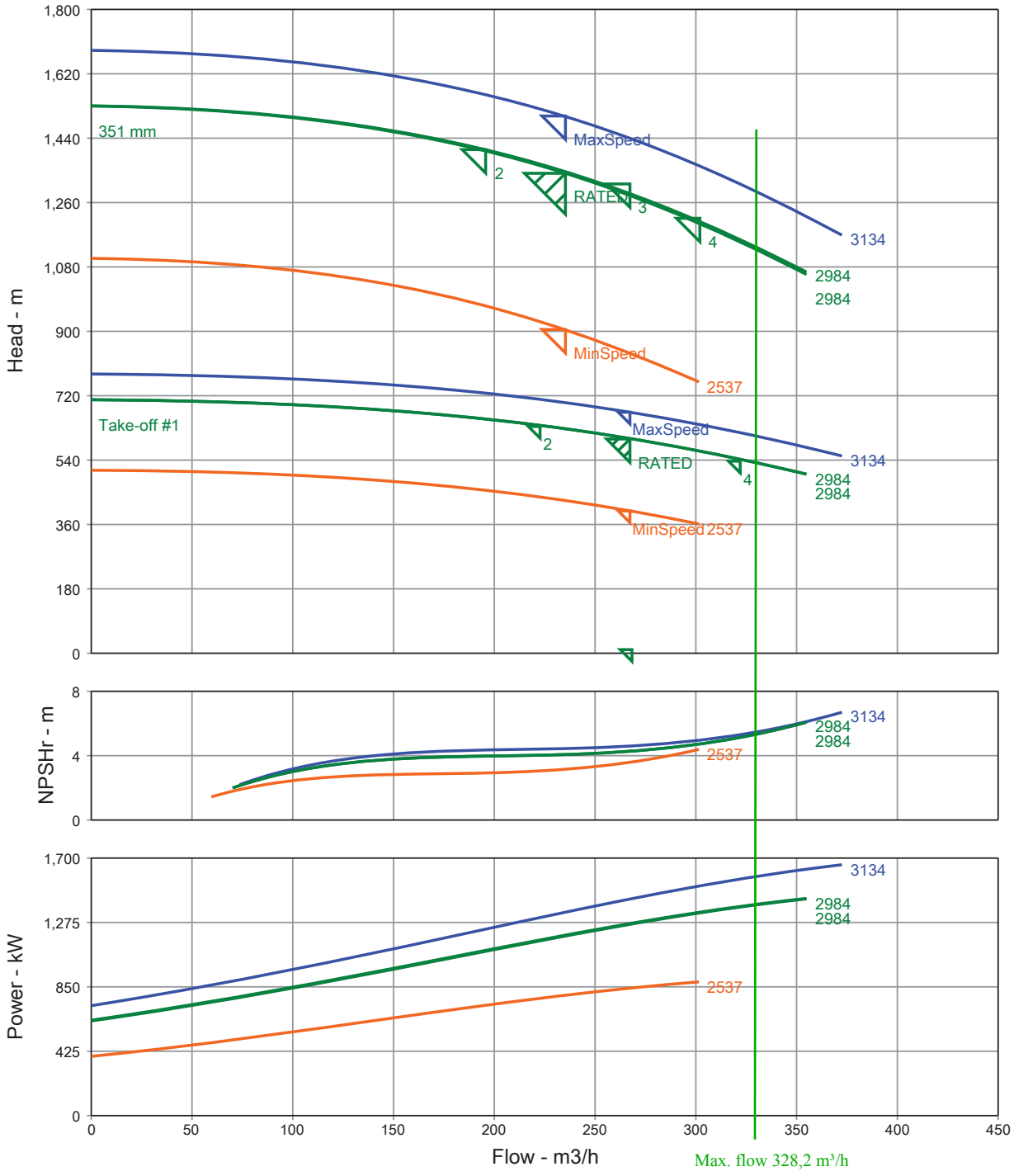
Multiple Conditions Datasheet

Customer	: SIRAF ENERGY INVESTMENT COMPANY PJS	Quantity	: 2	Type / Size	: GSG 150-360 (L)(L)(Dd)
Inquiry Number/ID	:	Sulzer Reference ID	: IRN.0662-ATH.15.0097-F1	Stages	: 8
Item number	: P-7001 A/B Turbine Driven_JH	Date of Last Update	: 02 Nov 2016 1:26 PM	Speed, rated	: 2986
Service	: BFW PUMPS				

Condition #		1	2	3	4	5	6	7	8
Description		RATED	NORMAL	Dis Flow=267.3m3/h&closed ITO	MaxFlow&open ITO	MaxSpeed	MinSpeed		
Temperature, max	deg C	160.0	160.0	160.0	160.0	160.0	160.0		
Fluid density, rated / max	SG	0,943	0,943	0,943	0,943	0,943	0,943		
Viscosity, rated	cP	0.23	0.23	0.23	0.23	0.23	0.23		
Primary condition		◉	○	○	○	○	○	○	○
Final Discharge									
Type / Size		GSG 150-360 (L)							
Stages		8							
Impeller diameter, rated	mm	351							
Flow, rated	m3/h	235.3	195.7	267.3	302.0	235.3	235.3		
Head, rated (requested)	m	1,341.8	1,408.0	1,312.0	1,216.0	1,502.0	905.0		
Head, rated (actual)	m	1,343.2	1,409.0	1,312.8	1,216.8	1,502.1	905.3		
Suction pressure, rated / max	bar.g	2.00 / 5.00	2.00 / 5.00	2.00 / 5.00	2.00 / 2.00	2.00 / 5.00	2.00 / 5.00		
NPSH available, rated	m	8.6	8.6	8.6	6.4	8.6	8.6		
Speed, rated	rpm	2984	2984	2984	2984	3134	2537		
Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]		1.00 / 1.00 / 1.00 / 1.00	1.00 / 1.00 / 1.00 / 1.00	1.00 / 1.00 / 1.00 / 1.00	1.00 / 1.00 / 1.00 / 1.00	1.00 / 1.00 / 1.00 / 1.00	1.00 / 1.00 / 1.00 / 1.00		
Efficiency	%	72.2	69.3	72.9	72.8	71.7	72.8		
NPSH (3% head drop)	m	4.3	4.0	4.3	5.1	4.6	3.6		
Power, rated	kW	1,192	1,085	1,237	1,333	1,343	796		
Interstage Take-off #1									
		Alt. first stage				**Other stages**			
Type / Size		GSG 150-360 (Dd)				GSG 150-360 (L)			
Stages		1				3			
Impeller diameter, rated	mm	280				344			
Flow, rated	m3/h	32.00	27.00	1.00	20.00	32.00	32.00		
Head, rated (requested)	m	599.0	634.0	10.00	537.0	673.9	397.9		
Head, rated (actual)	m	600.4	637.0	599.5	542.1	673.9	397.6		
Efficiency	%	71.8	69.5	71.8	71.6	71.5	71.5		

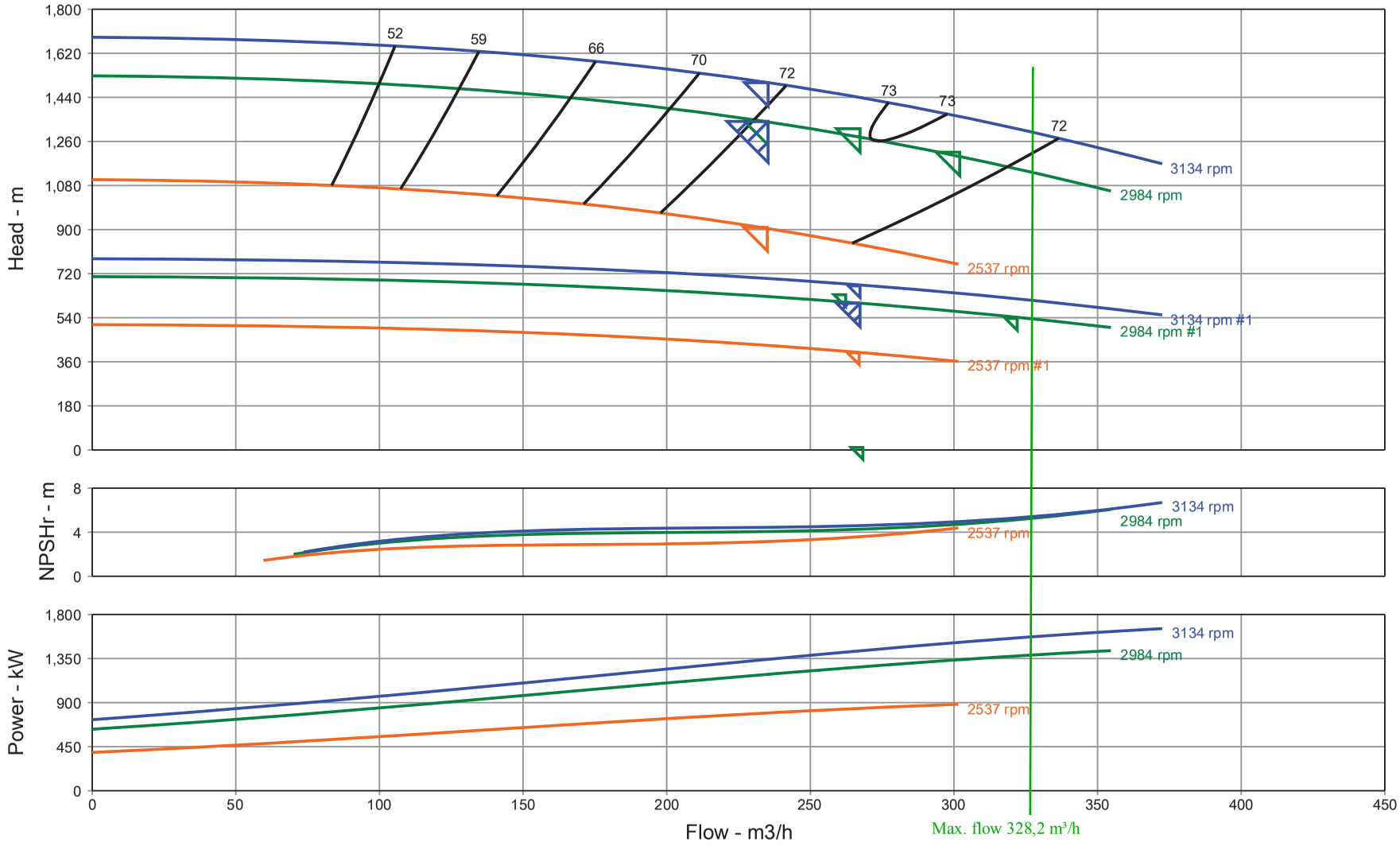
SULZER

Multiple Conditions Curve



Customer	: SIRAF ENERGY INVESTMENT COMPANY PJS	Type / Size	: GSG 150-360 (L)(L)(Dd)
Inquiry Number/ID	:	Stages	: 8
Item number	: P-7001 A/B Turbine Driven_JH	Speed, rated	: 2984 rpm
Service	: BFW PUMPS	Based on curve number	: 4611.07.611-01
Quantity	: 2	Efficiency	: 72.2 %
Sulzer Reference ID	: IRN.0662-ATH.15.0097-F1	Power, rated	: 1,192 kW
Date of Last Update	: 02 Nov 2016 1:26 PM	NPSH (3% head drop)	: 4.3 m
Flow, rated	: 235.3 m3/h	Viscosity	: 0.23 cP
Differential head / pressure, rated	: 1,341.8 m	Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00 / 1.00
Fluid density, rated / max	: 0,943 SG	Submergence	: -

Multi-Speed Performance Curve



Customer	: SIRAF ENERGY INVESTMENT COMPANY PJS	Type / Size	: GSG 150-360 (L)(L)(Dd)	Flow, rated	: 235.3 m3/h
Inquiry Number/ID	:	Stages	: 8 (3 / 4x(L) / 1x(Dd))	Differential head / pressure, rated	: 1,341.8 m
Item number	: P-7001 A/B Turbine Driven (100255888-0010)	Based on curve number	: 4611.07.611-01	Speed, rated	: 2984 rpm
Service	: BFW PUMPS	Efficiency	: 72.2 %	Impeller diameter, rated	: 351 mm
Quantity	: 2	Power, rated	: 1,192 kW	Fluid density, rated / max	: 0.943 / 0.943 SG
Sulzer Reference ID	: IRN.0662-ATH.15.0097-F1	NPSH (3% head drop)	: 4.3 m	Viscosity, rated	: 0.23 cP
Date of Last Update	: 02 Nov 2016 1:26 PM	Frequency	: 50 Hz	Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00 / 1.00
		Nominal speed	: 2984 rpm		

SULZER

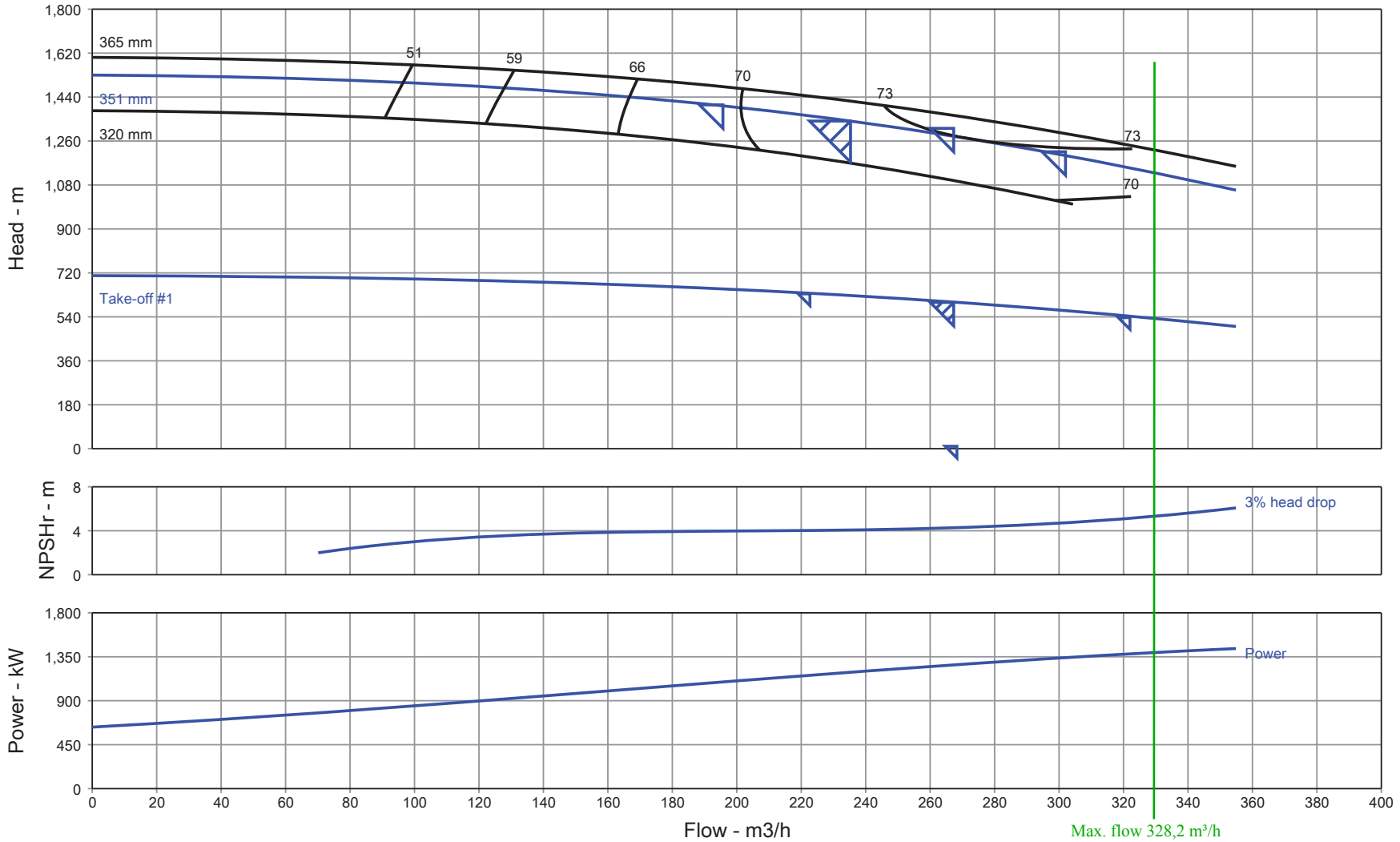
Multiple Conditions Datasheet

Customer	: SIRAF ENERGY INVESTMENT COMPANY PJS	Quantity	: 1	Type / Size	: GSG 150-360 (L)(L)(Dd)
Inquiry Number/ID	:	Sulzer Reference ID	: IRN.0662-ATH.15.0097-B1	Stages	: 8
Item number	: P-7001 C Motor driven	Date of Last Update	: 07 Mar 2016 3:16 PM	Speed, rated	: 2984
Service	: BFW PUMPS				

Condition #		1	2	3	4	5	6	7	8
Description		RATED	NORMAL	Dis Flow=267.3m3/h&closed ITO	MaxFlow=322m3/h&open ITO				
Temperature, max	deg C	160.0	160.0	160.0	160.0				
Fluid density, rated / max	SG	0,943	0,943	0,943	0,943				
Viscosity, rated	cP	0.23	0.23	0.23	0.23				
Primary condition		◉	○	○	○	○	○	○	○
Final Discharge									
Type / Size		GSG 150-360 (L)							
Stages		8							
Impeller diameter, rated	mm	352							
Flow, rated	m3/h	235.3	195.7	267.3	302.0				
Head, rated (requested)	m	1,341.8	1,408.0	1,312.0	1,216.0				
Suction pressure, rated / max	bar.g	2.00 / 5.00	2.00 / 5.00	2.00 / 5.00	2.00 / 2.00				
NPSH available, rated	m	8.6	8.6	8.6	6.4				
Speed, rated	rpm	2984	2984	2984	2984				
Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]		1.00 / 1.00 / 1.00 / 1.00	1.00 / 1.00 / 1.00 / 1.00	1.00 / 1.00 / 1.00 / 1.00	1.00 / 1.00 / 1.00 / 1.00				
Efficiency	%	72,2	69.3	73.0	72.9				
NPSH (3% head drop)	m	4.3	4.0	4.3	5.1				
Power, rated	kW	1,192	1,084	1,236	1,332				
Interstage Take-off #1									
		Alt. first stage				**Other stages**			
Type / Size		GSG 150-360 (Dd)				GSG 150-360 (L)			
Stages		1				3			
Impeller diameter, rated	mm	280				344			
Flow, rated	m3/h	32.00	27.00	1.00	20.00				
Head, rated (requested)	m	599.0	634.0	10.00	537.0				
Head, rated (actual)	m	597.5	634.1	596.6	539.2				
Efficiency	%	71.8	69.5	71.8	71.6				

SULZER

Pump Performance Curve



Customer	: SIRAF ENERGY INVESTMENT COMPANY PJS	Type / Size	: GSG 150-360 (L)(L)(Dd)	Flow, rated	: 235.3 m3/h
Inquiry Number/ID	:	Stages	: 8 (3 / 4x(L) / 1x(Dd))	Differential head / pressure, rated	: 1,341.8 / 599.0 / 1,341.8 m
Item number	: P-7001 C Motor driven (100255888-0020)	Speed, rated	: 2984 rpm	Liquid type	: Water
Service	: BFW PUMPS	Based on curve number	: 4611.07.611-01	Additional liquid description	: BOILER FEED WATER
Quantity	: 1	Efficiency	: 72.2 %	Temperature, rated / max	: 120.0 / 160.0 deg C
Sulzer Reference ID	: IRN.0662-ATH.15.0097-F1	Power, rated	: 1,192 kW	Fluid density, rated / max	: 0.943 / 0.943 SG
Date of Last Update	: 02 Nov 2016 1:31 PM	NPSH (3% head drop)	: 4.3 m	Viscosity, rated	: 0.23 cP
				Cq/Ch/Ce/Cn [ANSI/HI 9.6.7-2010]	: 1.00 / 1.00 / 1.00 / 1.00