DATA SHEET - PUMP 06-P1
HDS (HPM) Feed Pump

04				
03	**Reissued for Purchase**			
02	**Issued for Purchase**			
01	**Issued acc. to Client Commets**			
00	**Emis pentru aprobare**	**08.05.2024**	**Costinas Radu**	
Rev/Rev	Denumirea modificarii/Change description	Data/Date	Intocmit/Designer	Verificat/Checked

S.C. PETROTEL - LUKOIL S.A. 100140, PLOIESTI , STR. MIHAI BRAVU, 235 TEL.: +40 244 054 000 e-mail: office@petrotel.lukoil.com		Nr. Proiect / Project no.	Nr.document / Document no.	Rev/Rev
				0

Beneficiar/Client	**PETROTEL - LUKOIL S.A.**	Specialitate doc./Speciality doc.	F
Instalatie/Plant	**Instalatia HPM / HDS Unit**	**Mechanical**	**4**
Scara/Scale	Denumire document / Document name		
-	**DATA SHEET - PUMP 06-P1**		

08.05.24

08.05.2024

LUKOIL OIL COMPANY	HDS (HPM) Feed Pump	Tag Name: 06-P1

CENTRIFUGAL PUMP DATA SHEET

Not | Rev

APPLICABLE TO: PURCHASE — APPLICABLE NTL/INTNTL STANDARD: API-610 / ISO 13709 (7)

FOR: Petrotel-Lukoil S.A. — UNIT: Diesel Hydrotreating Unit

SITE: Petrotel-Lukoil Rafinery — SERVICE: HDS Unit Feed Pump

NO. REQ: 1 — PUMP SIZE: — TYPE: Centrifugal — No. STAGES:

MANUFACTURER: — MODEL: API 610 - BB5 — SERIAL NO.:

LIQUID CHARACTERISTICS

	Units	Maximum	Minimum
LIQUID TYPE OR NAME :		Gasoil	
VAPOR PRESSURE :	bar a	0.052	
DENSITY @PUMPING TEMP. :	kg/m³	845.0 (b)	820
SPECIFIC HEAT :	kJ/(kg-K)	1.8492	
VISCOSITY :@PUMPING TEMP. :	cP	2.261	

SERVICE : CONTINUOUS

PUMPS OPERATE IN: PARALLEL

CORROSION DUE TO : (6.12.1.9) N/A

EROSION DUE TO : (6.12.1.9)

H2S CONCENTRATION (ppm) : (6.12.1.12) (a)

CHLORIDE CONCENTRATION (ppm) : N/A

PARTICULATE SIZE (DIA IN MICRONS) <500

PARTICULATE CONCENTRATION (PPM) 0.1

Remark:
(a) There may be traces of H2S
(b) DENSITY @15 °C: 860.0 kg/m³

OPERATING CONDITIONS (6.1.2)

	Units	Maximum	Rated	Normal	Minimum
NPSHa Datum:		C.L. Impeller			
PUMPING TEMPERATURE :	°C	80	60	50	30
FLOW :	m³/h	225	210	210	120 (27)
DISCHARGE PRESSURE : (6.3.2)	barg	110 (1), (26)	90	90	
SUCTION PRESSURE :	barg	2	1.6		0.6
DIFFERENTIAL PRESSURE :	barg		78.4		
DIFFERENTIAL HEAD :	m		1200		
$NPSH_A$:	m		10.00		
HYDRAULIC POWER :	kW				

SITE AND UTILITY DATA

LOCATION: OUTDOOR — UNHEATED

MOUNTED AT : GRADE — ● WINTERISATION REQD

ELECTRIC AREA CLASSIFICATION: 6.1.22 ZONE 1 (2G)

GROUP Group IIB — TEMP CLASS T3

SITE DATA :

ELEVATION (MSL) : 160 m — BAROMETER : mmHg

RANGE OF AMBIENT TEMPS:MIN / MAX -29 / +40.5 °C

RELATIVE HUMIDITY: MIN / MAX 35 / 80 %

UNUSUAL CONDITIONS:

UTILITY CONDITIONS :

ELECTRICITY :	DRIVERS	HEATING	CONTROL	SHUTDOWN
VOLTAGE (V)	400	230	230	
PHASE	3Ph	1Ph	1Ph	
HERTZ	50	50	50	

COOLING WATER :

	INLET	RETURN	DESIGN
TEMP °C		MAX	
PRESS. bar g		MIN	
SOURCE			

COOLING WATER CHLORIDE CONCENTRATION: ppm

INSTRUMENT AIR : MAX bar g MIN bar g

		DRIVERS	HEATING
TEMP kW/m²	Max		
	Min		
PRESS. m	Max		
	Min		

PERFORMANCE

PROPOSAL CURVE NO. RPM

As Tested Curve No.

IMPELLER DIA.: RATED MAX. MIN. mm

RATED POWER kW EFFICIENCY (%)

RATED CURVE BEP FLOW (at rated impeller dia) m³/h

MIN FLOW : THERMAL m³/h STABLE m³/h

PREFERRED OPERATING REGION (6.1.11) to m³/h

ALLOWABLE OPERATING REGION to m³/h

MAX HEAD @ RATED IMPELLER m

MAX POWER @ RATED IMPELLER (6.8.9) kW

NPSH3 AT RATED FLOW : m

CL PUMP TO U/S BASEPLATE m

NPSH MARGIN AT RATED FLOW : m

SPECIFIC SPEED (6.1.9) m3/h, rpm, m

SUCTION SPECIFIC SPEED LIMIT

SUCTION SPECIFIC SPEED m3/h, rpm, m

MAX. ALLOW. SOUND PRESS. LEVEL REQD (6.1.14) 85@ 1m (dBA)

EST MAX SOUND PRESS. LEVEL (dBA)

MAX. SOUND POWER LEVEL REQ'D (6.1.14)

EST MAX SOUND POWER LEVEL

DRIVER (7.1.5)

Driver Type	MOTOR
GEAR	NO
VARIABLE SPEED REQUIRED	NO
SOURCE OF VARIABLE SPEED	
OTHER	
MANUFACTURER	(28)
NAMEPLATE POWER	kW
Nominal RPM	
RATED LOAD RPM	
FRAME OR MODEL	
ORIENTATION	HORIZONTAL
LUBE	
BEARING TYPE:	
RADIAL	/
THRUST	/
STARTING METHOD	DOL (Direct on line)
SEE DRIVER DATA SHEET	
ENCLOSURE	IP55
DUTY SERVICE (acc. EN 60034-1)	S1

08.05.24

08.05.2024

LUKOIL OIL COMPANY	HDS (HPM) Feed Pump	Tag Name: 06-P1

CENTRIFUGAL PUMP DATA SHEET

CONSTRUCTION

API PUMP TYPE: BB5 [Based on API 610 definitions]

NOZZLE CONNECTIONS: (6.5.5)

		Size	Facing	Rating	Position
SUCTION	(Note 12)				TOP
DISCHARGE	(Note 12)				TOP

PRESSURE CASING AUX. CONNECTIONS: (6.4.3.2)

	No.	Size	Type	Facing	Rating	Posn.
BALANCE/LEAK OFF						
DRAIN						
VENT						
PRESSURE GAGE						
TEMP GAGE						
WARM-UP LINE						

Drain Valve Supplied By	SUPPLIER
DRAINS MANIFOLDED	YES
VENT Valve Supplied By	SUPPLIER
VENTS MANIFOLDED	YES
THREADED CONS FOR PIPELINE SERVICE & < 50°C (6.4.3.2)	NO
SPECIAL FITTINGS FOR TRANSITIONING (6.4.3.3)	
CYLINDRICAL THREADS REQUIRED (6.4.3.8)	
GUSSET SUPPORT REQUIRED	
MACHINED AND STUDDED CONNECTIONS (6.4.3.12)	
VS 6 DRAIN	
DRAIN TO SKID EDGE	

MATERIAL (6.12.1.1)

APPENDIX H CLASS	C-6	(23)
MIN DESIGN METAL TEMP (6.12.4.1)	-30	°C
REDUCED-HARDNESS MATERIALS REQ'D (6.12.1.12.1)		
Applicable Hardness Standard (6.12.1.12.3)		
BARREL :		
CASE :		
DIFFUSERS		
IMPELLER :		
IMPELLER WEAR RING :	(21)	
CASE WEAR RING :		
SHAFT:		
Bowl (if VS-type)		
Inspection Class	Level 2	

BEARINGS AND LUBRICATION (6.10.1.1) (19, 20)

BEARING (TYPE / NUMBER): (6.11.4)

RADIAL	SLEEVE	/
THRUST	ROLLER	/

REVIEW AND APPROVE THRUST BEARING SIZE : (9.2.5.2.4)

LUBRICATION : (6.10.2.2) (6.11.3) (9.6.1)	RING OIL
PRESSURE LUBE SYSTEM TO ISO 10438-	(9.2.6.5)
ISO 10438 DATA SHEETS ATTACHED	
Pressurized Lube Oil System mtd on pump baseplate	
Location of Pressurized Lube Oil System mounted on baseplate :	
INTERCONNECTING PIPING PROVIDED BY	Supplier
OIL VISC. ISO GRADE	VG
CONSTANT LEVEL OILER :	REQUIRED

CASING MOUNTING:	CENTERLINE
CASING TYPE: (6.3.10)	
OH3 BACKPULLOUT LIFTING DEVICE REQD. (9.1.2.6)	

CASE PRESSURE RATING:

MAWP :	(6.3.6)		bar g @	°C
HYDROTEST :			bar g @	°C

HYDROTEST OH PUMP AS ASSEMBLY	YES
SUCT'N PRESS. REGIONS DESIGNED FOR MAWP	YES
ROTATION: (VIEWED FROM COUPLING END)	CW
• IMPELLERS INDIVIDUALLY SECURED :	
• BOLT OH 3/4/5 PUMP TO PAD / FOUNDATION :	
• PROVIDE SOLEPLATE FOR OH 3/4/5 PUMPS	
ROTOR:	
SHAFT FLEXIBILITY INDEX (SFI) (9.1.1.3)	
First Critical Speed Wet (Multi stage pumps only)	
COMPONENT BALANCE TO ISO 1940-1 G2.5	YES
SHRINK FIT -LIMITED MOVEMENT IMPELLERS (9.2.2.3)	

COUPLING:(7.2.3) **(7.2.13.f)**

MANUFACTURER	
MODEL	
RATING (POWER/100 RPM)	
SPACER LENGTH	mm
SERVICE FACTOR	1.5
RIGID	NO
COUPLING WITH HYDRAULIC FIT (7.2.10)	
COUPLING BALANCED TO ISO 1940-1 G2.5 (7.2.3)	YES
COUPLING WITH PROPRIETARY CLAMPING DEVICE (7.2.11)	
COUPLING IN COMPLIANCE WITH (7.2.4)	API 610 compliant
COUPLING GUARD STANDARD PER (7.2.13.a)	ANSI B15.1
Window on Coupling Guard	YES

BASEPLATE (Note 7)

API BASEPLATE NUMBER :	
BASEPLATE CONSTRUCTION (7.3.14)	
BASEPLATE DRAINAGE (7.3.1)	Entire Baseplate Drain Pan
MOUNTING :	GROUTED
NON-GROUT CONSTRUCTION : (7.3.13)	
VERTICAL LEVELING SCREWS :	REQUIRED
LONGITUDINAL DRIVER POSITIONING SCREWS :	REQUIRED
SUPPLIED WITH : • GROUT AND VENT HOLES	YES
• DRAIN CONNECTION	YES
MOUNTING PADS SIZED FOR BASEPLATE LEVELING (7.3.5)	YES
MOUNTING PADS TO BE MACHINED (7.3.6)	YES
PROVIDE SPACER PLATE UNDER ALL EQUIPMENT FEET	YES
OTHER	(7)

REMARKS :

1. Baseplate according to API 610

Proiect nr./Project no.	Nr. Document/Document no.	Denumire document / Document name
		DATA SHEET - PUMP 06-P1

08.05.24

08.05.2024

LUKOIL OIL COMPANY	HDS (HPM) Feed Pump	Tag Name: 06-P1

CENTRIFUGAL PUMP DATA SHEET

	Note	INSTRUMENTATION		
2		SEE ATTACHED API-670 DATA SHEET		
3		ACCELEROMETER (7.4.2.1)		
4		Number of Accelerometers		0
5		Mounting Location of Accelerometers		
6		**Ventor to advise**		
7		PROVISION FOR MTG ONLY	(6.10.2.10)	YES
8		Number of Accelerometers		8
9		Mounting Location of Accelerometers		Pump and Motor
10				
11		FLAT SURFACE REQUIRED	(6.10.2.11)	NO
12		Number of Accelerometers		
13		Mounting Location of Accelerometers		
14		**As per API610 Ed.11 point 6.9.3.2.**		
15		VIBRATION PROBES (7.4.2.2)		
16		PROVISIONS FOR VIB. PROBES		YES
17		NUMBER PER RADIAL BEARING		0
18		NUMBER PER AXIAL BEARING		0
19		MONITORS AND CABLES SUPPLIED BY (7.4.2.4)		
20		**by vendor**		
21		TEMPERATURE (7.4.2.3)		
22		PROVISIONS FOR TEMP PROBES		YES
23		RADIAL BEARING TEMP.		YES
24		NUMBER PER RADIAL BEARING		1
25		THRUST BEARING TEMP.		YES
26		NUMBER PER THRUST BEARING ACTIVE SIDE		1
27		NUMBER PER THRUST BEARING INACTIVE SIDE		1
28		TEMP. GAUGES (WITH THERMOWELLS) (9.1.3.6)		YES
29		PRESSURE GAUGE TYPE		
30		**Remarks**		
31		1. Pump supplier will provide and install JunctionBox for all intruments		
32		2. All intruments will be connected to JunctionBox		
33		3. The motor shall have a separate junction boxes (power, PTCs)		
34		4. All JunctioBox's will be instaled on BASEPLATE		

SEAL SUPPORT SYSTEM MOUNTING		
SEAL SUPPORT SYSTEM MOUNTED ON PUMP BASEPLATE	(7.5.1.4)	YES
IDENTIFY LOCATION ON BASEPLATE		
INTERCONNECTING PIPING BY		Supplier

MECHANICAL SEAL (6.8.1) (10,15,18,22, 24)		
SEE ATTACHED ISO 21049/API 682 DATA SHEET		YES
ADDITIONAL CENTRAL FLUSH PORT	(6.8.9)	NO
HEATING JACKET REQ'D.	(6.8.11)	NO

HEATING AND COOLING (6.1.17)		
COOLING REQ'D		N / A
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	YES
DRAIN	YES
COOLING WATER	
TAG ALL ORIFICES (7.5.2.4)	YES
SOCKET WELD CONN ON SEAL GLAND (7.5.2.8)	NO

Proiect nr./Project no.	Nr. Document/Document no.	Denumire document / Document name
		DATA SHEET - PUMP 06-P1

08.05.24

08.05.2024

LUKOIL OIL COMPANY	HDS (HPM) Feed Pump	Tag Name: 06-P1

CENTRIFUGAL PUMP DATA SHEET

Note	SURFACE PREPARATION AND PAINT	
	MANUFACTURER'S STANDARD	YES
	OTHER (SEE BELOW)	YES
	SPECIFICATION NO.	
	PUMP:	
	PUMP SURFACE PREPARATION	by vendor (9)
	PRIMER	by vendor (9)
	FINISH COAT	by vendor (9)
	BASEPLATE:	
	BASEPLATE SURFACE PREPARATION	by vendor (9)
	PRIMER:	by vendor (9)
	FINISH COAT	by vendor (9)
	DETAILS OF LIFTING DEVICES	
	SHIPMENT: (8.4.1)	EXPORT
	EXPORT BOXING REQUIRED	YES
	OUTDOOR STORAGE MORE THAN 6 MONTHS	YES
	SPARE ROTOR ASSEMBLY PACKAGED FOR:	
	ROTOR STORAGE ORIENTATION (9.2.8.2)	
	SHIPPING & STORAGE CONTAINER FOR VERT STORAGE (9.2.8.3)	
	N2 PURGE (9.2.8.4)	
	SPARE PARTS	
	START-UP (16)	YES
	NORMAL MAINTENANCE (16)	YES

WEIGHTS kg

ITEM No	PUMP	DRIVER	GEAR	BASE	TOTAL

OTHER PURCHASER REQUIREMENTS

COORDINATION MEETING REQUIRED (10.1.3)	YES
MAXIMUM DISCHARGE PRESSURE TO INCLUDE	
MAX RELATIVE DENSITY	YES
OPERATION TO TRIP SPEED	
MAX DIA. IMPELLERS AND/OR NO OF STAGES	YES
CONNECTION DESIGN APPROVAL (9.2.1.4)	YES
TORSIONAL ANALYSIS / REPORT (6.9.2.10)	
PROGRESS REPORTS	YES
OUTLINE OF PROC FOR OPTIONAL TESTS (10.2.5)	
ADDITIONNAL DATA REQUIRING 20 YEARS RETENTION (8.2.1.1)	
	YES
LATERAL ANALYSIS REQUIRED (9.1.3.4) (9.2.4.1.3)	
MODAL ANALYSIS REQUIRED (9.3.9.2)	
DYNAMIC BALANCE ROTOR (6.9.4.4)	YES
INSTALLATION LIST IN PROPOSAL (10.2.3.l)	YES
VFD STEADY STATE DAMPED RESPONSE ANALYSIS (6.9.2.3)	
TRANSIENT TORSIONAL RESPONSE (6.9.2.4)	
(17,19) BEARING LIFE CALCULATIONS REQUIRED (6.10.1.6)	YES
IGNITION HAZARD ASSMT TO EN 13463-1 (7.2.13.e)	YES
CASING RETIREMENT THICKNESS DRAWING (10.3.2.3)	YES
FLANGES RQD IN PLACE OF SKT WELD UNIONS (7.5.2.8)	YES
INCLUDE PLOTTED VIBRATION SPECTRA (6.9.3.3)	YES
CONNECTION BOLTING (7.5.1.7)	
CADMIUM PLATED BOLTS PROHIBITED	YES
VENDOR TO KEEP REPAIR AND HT RCDS (8.2.1.1.c)	YES
VENDOR SUBMIT TEST PROCEDURES (8.3.1.1)	YES
SUBMIT INSPECTION CHECK LIST (8.1.5)	YES

TEST			Rev
SHOP INSPECTION (8.1.1)		Yes	
PERFORMANCE CURVE & DATA APPROVAL PRIOR TO SHIPMENT.		YES	
TEST WITH SUBSTITUTE SEAL (8.3.3.2.b)		NO	
MATERIAL CERTIFICATION REQUIRED (6.12.1.8)	CASING	YES	
	IMPELLER	YES	
	SHAFT	YES	
	OTHER	YES	
CASTING REPAIR WELD PROCEDURE APPR REQD (6.12.2.5) (6.12.3.1)		YES	
INSPECTION REQUIRED FOR CONNECTION WELDS (6.12.3.4.d) (6.12.3.4.e)	MAG PARTICLE	YES	
	RADIOGRAPHY	YES	
	LIQUID PENETRANT	YES	
	ULTRASONIC		
INSPECTION REQUIRED FOR CASTINGS	MAG PARTICLE	YES	
	RADIOGRAPHY	YES	
	LIQUID PENETRANT	YES	
	ULTRASONIC		
HARDNESS TEST REQUIRED (8.2.2.7)		YES	
ADDNL SUBSURFACE EXAMINATION (6.12.1.5) (8.2.1.3)			
FOR			
METHOD			
PMI TESTING REQUIRED (8.2.2.8)			
COMPONENTS TO BE TESTED			
RESIDUAL UNBALANCE TEST (J.4.1.2)		YES	
NOTIFICATION OF SUCCESSFUL SHOP PERFORMANCE TEST (8.1.1.c) (8.3.3.5)			
BASEPLATE TEST (7.3.21)			
HYDROSTATIC		OBSERVE	
HYDROSTATIC TEST OF BOWLS & COLUMN (9.3.13.2)			
PERFORMANCE TEST		WIT	
TEST IN COMPLIANCE WITH (8.3.3.2)		8.3.3.2	
TEST DATA POINTS TO (8.3.3.3)		8.3.3.3	
TEST TOLERANCES TO (8.3.3.4)		TABLE 16	
NPSH (8.3.4.3.1) (8.3.4.3.4)			
NPSH-1ST STG ONLY (8.3.4.3.2)			
NPSH TESTING TO HI 1.6 OR ISO 9906 (8.3.4.3.3)		WIT	
TEST NPSHA LIMITED TO 110% SITE NPSHA (8.3.3.6)		YES	
RETEST ON SEAL LEAKAGE (8.3.3.2.d)		WIT	
RETEST REQUIRED AFTER FINAL HEAD ADJ (8.3.3.7.b)			
COMPLETE UNIT TEST (8.3.4.4.1)			
SOUND LEVEL TEST (8.3.4.5) at rated capacity		WIT	
CLEANLINESS PRIOR TO FINAL ASSEMBLY (8.2.2.6)		WIT	
LOCATION OF CLEANLINESS INSPECTION			
NOZZLE LOAD TEST			
CHECK FOR CO-PLANAR MOUNTING PAD SURFACES			
MECHANICAL RUN TEST UNTIL OIL TEMP STABLE		WIT	
4 HR. MECH RUN AFTER OIL TEMP STABLE (8.3.4.2.1)		WIT	
4 HR. MECH RUN TEST (8.3.4.2.2)			
BRG HSG RESONANCE TEST (8.3.4.7)			
STRUCTURAL RESONANCE TEST (9.3.9.2)			
REMOVE / INSPECT HYDRODYNAMIC BEARINGS AFTER TEST (9.2.7.5)			
AUXILIARY EQUIPMENT TEST (8.3.4.6)		OBSERVE	
EQUIPMENT TO BE INCLUDED IN AUXILLIARY TESTS			
MECHANICAL SEAL, MOTOR ROUTINE TEST			
LOCATION OF AUXILIARY EQUIPENT TEST			
IMPACT TEST (6.12.4.3)	PER EN 13445		
	PER ASME SECTION VIII		
REMOVE CASING AFTER TEST			

08.05.24

07.05.2024

CENTRIFUGAL PUMP DATA SHEET

Note	PRESSURE VESSEL DESIGN CODE REFERENCES	Rev
	THESE REFERENCES MUST BE LISTED BY THE MANUFACTURER	
	CASTING FACTORS USED IN DESIGN (TABLE 4)	
	SOURCE OF MATERIAL PROPERTIES	
	WELDING AND REPAIRS	
	THESE REFERENCES MUST BE LISTED BY THE PURCHASER. (DEFAULT TO TABLE 11 IF NO PURCHASER PREFERENCE IS STATED)	
	ALTERNATE WELDING CODES AND STANDARDS	
	WELDING REQUIREMENT (APPLICABLE CODE OR STANDARD)	
	WELDER/OPERATOR QUALIFICATION	
	WELDING PROCEDURE QUALIFICATION	
	NON-PRESSURE RETAINING STRUCTURAL WELDING SUCH AS BASEPLATES OR SUPPORTS	
	MAGNETIC PARTICLE OR LIQUID PENETRANT EXAMINATION OF PLATE EDGES	
	POSTWELD HEAT TREATMENT	
	POSTWELD HEAT TREATMENT OF CASING FABRICATION WELDS	
	MATERIAL INSPECTION	
	THESE REFERENCES MUST BE LISTED BY THE PURCHASER — DEFAULT TO TABLE 14 — YES	
	ALTERNATIVE MATERIAL INSPECTIONS AND ACCEPTANCE CRITERIA (SEE TABLE 14) (8.2.2.5)	

TYPE OF INSPECTION	METHOD	FOR FABRICATIONS	FOR CASTINGS
RADIOGRAPHY			
ULTRASONIC INSPECTION			
MAGNETIC PARTICLE INSPECTION			
LIQUID PENETRANT INSPECTION			
VISUAL INSPECTION (all surfaces)			

NOTES :

(1) Centrifugal pump shut-off head shall not exceed 125% of specified differential head inclusive of all tolerances.
(2) Flow rate excludes continous spillback allowance. Vendor to increase capacity as necessary.
(3) PED fluid group 1, as per EU Directive 2014/68/EU (PED), article 13.
(4) Rated Point should be placed on the left side of BEP.
(5) The impeller diameter should be selected in such a way that a discharge head reserve of 10% is given.
(6) Pipe fittings of the sealing system piping shall be SWAGELOCK.
(7) Considering the limited available space where the pump will be installed, the length of the pump baseplate should not exceed 6500 mm and width max 2000 mm
(8) If the difference between NPSHa and NPSHr is less than 1m, than the curve must be confirmed by NPSH acceptance test.
(9) For QA/QC requirements on surface preparation and painting see API610
(10) Sealing sytem will be aircooled.
(11) Allowable external nozzle forces & moments shall be twice the value indicated in table 5 /API 610 11th Ed
(12) The sizes of flanges in the suction line diameter and the discharge line diameter according with ISO EN, and EN class rating respectivelly. Vendor shall indicate the necessary pumps nozzles sizes and rating. Pump will be delivered with 1 set of contraflanges for suction and discharge line.
(13) Pump self venting type is preferred.
(14) Motor should be sized for end of the curve pump operation with selected impeller diameter and maximum fluid specific gravity.
(15) The pump will be provided with double mechanical sealing EagleBurgmann (acc. to Client request) and recirculation system plan 53B according API 682 last edition. Acc. to Annex 1.
(16) Commissioning and start up spare parts shall be included in the main offer and shall contain at least one spare mechanical seal and pump gaskets. Two years of operation spare parts shall be quoted separately as option to the main offer. Acc. to Annex 2.
(17) Pump bearing housing shall be from steel – cast iron not acceptable.
(18) Double mechanical seal acording API682 "face to back" is preffered
(19) Bearings life time shall be 40000 hours at pump design conditions. Bearing seals shall be inpro or similar. Vendor shall indicate the manufacturer in the offer.
(20) Oil and lubrication - pump, seal and motor shall be guaranteed for Lukoil products use. Pump bearings lubrification by grease is not permited.
(21) Only impellers with weare rings are accepted.
(22) Sealing shall be designed to withstand reverse pressure.
(23) Vendor to confirm material selection.

25.05.24 08.05.2024

NOTES

	Note		Rev
		(24) Instrumentation requirements:	
		I. General:	
		All instruments, junction boxes and connecting cables shall be provided and mounted by vendor	
		Instruments shall be CE marking.	
		II.Examinations, Inspections and Testing Certificates shall be performed in accordance with:	
		- Declaration of Conformity in accordance with European Directive ATEX 2014/34/EU	
		- Declaration of Conformity in accordance with Pressure European Directive (PED) 2014/68/EU	
		- Material traceability certification per EN 10204 3.1;	
		- Declaration of Conformity acc. to EMC 2014/ 30 /EC (applicable for electronic instruments).	
		- Calibration certificate.	
		III.Documentation:	
		- Installation, operating and maintenance manual in Romanian and English language.	
		- Technical datasheet and vendor catalogues in English language	
		- Pump and parts drawings	
		IV. Instrumentation Main Technical Characteristics	
		- Ambient temperature: -29÷40.5°C.	
		- All wetted part, fitting and tubing shall be min. SS 316 material.	
		- Ingress protection: IP65	
		- Hazardous Area certification: min. ATEX Ex ia IIB T3 Gb (Note: Pressure and Temperature Gages provided with ATEX Cerification too)	
		- Transmitters output signal: 4-20mA/ HART	
		- Transmitters adjustable range to be at least 2 x calibrated range.	
		- Transmitter with local indicators, with a digital display in SI units to be provided.	
		- Transmitter heads shall be rotatable.	
		- Transmitters power supply: 24Vdc, loop powered	
		- Cable Entries: M20x1.5	
		- Transmitters enclosure material: Epoxy Coated Aluminium	
		- Pressure and Temperature Gages case material: 316 SS	
		V. Miscellaneous	
		- All instruments shall have SS tag plate, securely fastened and engraved with the following information as minimum:	
		tag no.,size, rating, material, manufacturer, model no.	
		- Manufacturer to confirm that the instruments are rated to withstand the refinery environmental conditions.	
		- All unused cable entries for electronic instruments to be provided with stainless steel plug, ATEX certified.	
		V. Electrical	
		- The motor shall be provided with a terminal box for the power cable separate from the terminal box for the control (PTC) cable.	
		- The motor shall be equipped with double-sealed, ATEX-certified metal glands (for power and control cables). Reinforced cables, with standard	
		dimension related to the nominal power of the selected motor, will be considered	
		- The motor rating will be selected to provide a maximum 10% pump overload.	
		- The motor and the pump shall be provided with earthing terminals.	
		- Protection degree level, acc to SR EN 60529: min. IP55 for motor and min. IP65 for terminal boxes; Energy efficiency: min. IE2	
		- The pump supplier will deliver the complete pump and motor assembly.	
		- The electrical motor power supply shall not exceed 6kW due to site limitations	
	(25)	Vendor to propuse the flushing fluid in consultancy with the client.	
		Vendor to propuse the operating parameter for flushing fluid.	
	(26)	Calculated shut-off pressure of pump, will be confirmed by Vendor. The MAWP will be confirmed after pump selection.	
	(27)	Vendor to confirm minimum continuous stable flow. Minimum flow rate to be confirmed by pump manufacturer.	
		The 120 m3/h flow is desired for the Start-Up of the unit for a period of 72h.	
	(28)	Recommended supplier/vendors for the electrical driver are : ABB, Siemens and Veg	
		Recommended supplier/vendors for the couplings are : John Crane, EagleBurgmann, AESSEAL, Flowserve	
		The pump should be manufactured in EU	

08.05.24

08.05.2024

LUKOIL OIL COMPANY	HDS (HPM) Feed Pump	Tag Name: 06-P1

MECHANICAL SEAL DATA SHEET FOR CENTRIFUGAL & ROTARY PUMPS S.I. UNITS

Rev

- ☐ ○ DEFAULT SELECTION
- ○ INDICATES DATA COMPLETED BY PURCHASER
- ☐ BY SEAL VENDOR
- ☐ BY SEAL VENDOR OR PURCHASER

DATA SUPPLIED; ○ CUSTOMARY UNITS ● SI UNITS
HARDWARE SUPPLIED ○ CUSTOMARY UNITS ● SI UNITS
STANDARDS APPLICABLE; ○ PRIMARY REFERENCE (5.2) ○ SECONDARY REFERENCE (5.2)

SEAL SPECIFICATION - (REF CLAUSE 1.2, FIGURES 1 TO 6)

CATEGORY	○ SEAL CATEGORY 1 (1.2)	○ SEAL CATEGORY 2 (1.2)	☐ SEAL CODE (ANNEX J)
TYPE (CODE-CW)	☐ TYPE A (3.78)	☐ TYPE B (3.79)	☐ ALTERNATE STATIONARY (TYPE A & B)
	☐ TYPE C (3.80)	☐ ALTERNATE ROTATING (TYPE C)	☐ SINGLE SPRING (TYPE A)

ARR'G'T		DEFAULT CONFIGURATION	ALTERNATE DESIGN	FLUSH PLANS (SEE ANNEX D)
1 (3.2)		☐ 1CW-FX	☐ 1CW-FL ☐ DIST. FLUSH ☐ ALTERNATE BUSH	☐ 01 ☐ 11 ☐ 14 ☐ 23 ☐ 32 ☐ 51 ☐ 62 ☐ 02 ☐ 13 ☐ 21 ☐ 31 ☐ 41 ☐ 61
2 (3.3)	BUFFER LIQUID	○ 2CW-CW	☐ FX ☐ DIST. FLUSH ☐ TANGENTIAL LBO CONN'N	☐ 01 ☐ 13 ☐ 23 ☐ 41 ☐ 62 ☐ 75 ☐ 02 ☐ 14 ☐ 31 ☐ 52 ☐ 71 ☐ 76
	BUFFER GAS	☐ 2CW-CS	☐ 2NC-CS ☐ FX	☐ 11 ☐ 21 ☐ 32 ☐ 61 ☐ 72
3 (3.4)	BARRIER LIQUID	○ 3CW-FB	☐ 3CW-BB ☐ FX ☐ 3CW-FF ☐ TANG. LBO	☐ 01 ☐ 13 ● 53B ☐ 61 ☐ 02 ○ 32 ☐ 53C ☐ 62
	BARRIER GAS	○ 3NC-BB	☐ 3NC-FF ☐ 3NC-FB	☐ 11 ☐ 53A ☐ 54 ☐ 74

SLEEVE-SHAFT DRIVE: ● SET-SCREW ONTO SHAFT ☐ ALTERNATE (6.1.3.13) - SPECIFY

MATERIALS (REFERENCE 6.1.6 & ANNEX C)

SECONDARY SEALS	SEAL FACES	METAL BELLOWS	SPRINGS	METAL PARTS
○ FKM ☐ FFKM	○ CARBON VS SIC	○ UNS N10276 (TYPE B)	○ UNS N10276	☐ UNS S31600/ S31635
○ SPIRAL-W GASKET	☐ SIC VS SIC	○ UNS N07718 (TYPE C)	OR N06455	☐ UNS N10276
☐ NBR ☐ EPM/EPDM	☐ SS-SIC ☐ RB-SIC	☐ UNS N08020	☐ UNS S31600	☐ UNS N08020
☐ OTHER:	☐ VS	☐ OTHER:	OR S31635	☐ OTHER:

MECHANICAL SEAL DATA

- ● SEAL VENDOR: Eagle Burgmann
- ○ DATA REQUIREMENTS FORM (ANNEX G)
- ☐ SIZE/TYPE
- ☐ SEAL DRAWING NUMBER
- ☐ VENDOR'S SEAL CODE
- ☐ MODIFIED FACES FOR PUMP PERFORMANCE TEST
- ☐ ALTERNATE SEAL FOR PUMP PERFORMANCE TEST
- ☐ DYNAMIC SEALING PRESSURE RATING (3.19) ____ bar (g)
- ☐ STATIC SEALING PRESSURE RATING (3.74) ____ bar (g)
- ☐ MAXIMUM ALLOWABLE TEMPERATURE (3.39) ____ °C
- ● MINIMUM DESIGN METAL TEMPERATURE -30 °C

SEAL CHAMBER DATA (REFERENCE 6.1.2.4)

ASME B73.1 & 2 ☐ CYLINDRICAL ☐ TAPERED ☐ ISO 13709 ☐ ISO 3069-C ☐ OTHER, SPECIFY
○ BOLT-ON CHAMBER (6.1.2.5) ☐ SEAL CHAMBER FLUSH PORT REQ'D ☐ SEAL CHAMBER VENT REQ'D
○ FLOATING THROAT BUSH ☐ FIXED THROAT BUSH ☐ CHAMBER HEATING/COOLING ☐ H ☐ C

PUMP DATA

PUMP DESIGN ○ MANUFACTURER ____ ○ MODEL ____ ○ FRAME/SIZE ____ ○ CASE MATERIAL
PUMP OPERATING PRESSURE ● SUCTION PRESS. (RATED) 1.60 bar(ga) ● DISCHARGE PRESSURE 90.00 bar (g)
SEAL CHAMBER ○ NORMAL ____ bar (ga) ○ MIN / MAX (3.41) ____ / ____ bar (ga) ○ MSSP (3.43) ____ bar (g)
SHAFT ○ DIA. ____ mm ○ SHAFT SPEED ____ r/min SHAFT DIRECTION (FROM DRIVER): ○ CW ○ CCW

FLUID DATA - (FOR QUENCH, BUFFER AND BARRIER FLUID DATA, SEE PAGE 2)

PUMPED STREAM

- ● TYPE OR NAME Gasoil CONC'N ____ %
- ○ DISSOLVED CONTAMINANT ● H_2S ____ ml/m³ ○ WET
- ○ Cl_2 ____ ml/m³ ○ OTHER ____ @ ____ ml/m³
- ● SOLID CONTAMINANT
- ○ CONCENTRATION (MASS FRACTION) 1 ppm m/m
- ● PUMPING TEMPERATURE
- MIN 30 °C NORMAL 60 °C MAX 80 °C
- ○ RELATIVE DENSITY (TO WATER @ 25°C) AT REF. TEMP.
- @ NORMAL TEMP ____ @ MAX TEMP ____
- ○ ABSOLUTE VAPOR PRESSURE AT REFERENCE TEMP.
- NORMAL TEMP ____ bar MAX TEMP ____ bar
- ○ ATMOSPHERIC BOILING POINT. ____ °C
- ● VISCOSITY @ NORMAL PUMPING TEMP. 2.261 Pa.s

- ● HAZARDOUS ● FLAMMABLE ○ ____
- ○ FLUID SOLID @ AMBIENT
- ○ SOLIDIFIES @ ____ °C POUR POINT ____ °C
- ○ PUMPED STREAM SOLIDIFIES UNDER SHEAR
- ○ PUMPED STREAM CONTAINS AGENTS THAT POLYMERIZE
- SPECIFY AGENTS ____ @ TEMP ____ °C
- ○ PUMPED STREAM CAN PLATE OUT OR DECOMPOSE:
- SPECIFY CONDITIONS ____
- ○ PUMPED STREAM IS REGULATED FOR FUGITIVE OR
- OTHER EMISSIONS. REGULATION LEVEL ____ ml/m³
- ○ SPECIAL PUMP CLEANING PROCEDURES
- SPECIFY; ____
- ○ ALTERNATE PROCESS FLUIDS & CONCENTRATION
- (INCL. COMMISIONING) ____

FLUSH FLUID If flush fluid is pumpage, then flush fluid data is not required.

- ● TYPE OR NAME (25) CONC'N ____ %
- ● SEAL VENDOR REVIEW REQUIRED
- ○ FLUID TEMPERATURE
- MIN ____ °C NORMAL ____ °C MAX ____ °C
- ○ RELATIVE DENSITY (TO WATER @ 25°C) AT REF. TEMP.
- @ NORMAL TEMP ____ @ MAX TEMP ____

- ○ ABSOLUTE VAPOR PRESSURE AT REFERENCE TEMP.
- NORMAL TEMP ____ bar MAX TEMP ____ bar
- ○ ATMOSPHERIC BOILING POINT. ____ °C
- ○ VISCOSITY @ NORMAL PUMPING TEMP. ____ Pa.s
- ☐ FLOW RATE REQ'D MAX/MIN ____ / ____ l/min
- ☐ PRESSURE REQ'D MAX/MIN ____ / ____ bar (ga)

Proiect nr./Project no.	Nr. Document/Document no.	Denumire document / Document name
		DATA SHEET - PUMP 06-P1

08.05.24

08.05.2024

LUKOIL OIL COMPANY	HDS (HPM) Feed Pump	Tag Name: 06-P1

MECHANICAL SEAL DATA SHEET FOR CENTRIFUGAL & ROTARY PUMPS S.I. UNITS

Rev

(FLUID DATA, UTILITIES, ACCESSORIES, & INSP./TEST.)

○ INDICATES DATA COMPLETED BY PURCHASER | | BY SEAL VENDOR |○| BY SEAL VENDOR OR PURCHASER

|○| ○ DEFAULT SELECTION

FLUID DATA - (QUENCH, BUFFER AND BARRIER FLUID DATA, LIQUID AND GAS)

QUENCH MEDIUM

|○| TYPE OR NAME _____

|○| SUPPLY TEMPERATURE MAX/MIN ____ / ____ °C

| | FLOW RATE REQ'D MAX/MIN ____ / ____ l/min

BUFFER/BARRIER MEDIUM

|○| TYPE OR NAME _____

○ PURCHASER SELEC'N ■ SEAL VENDOR SELEC'N

○ SEAL VENDOR REVIEW | | PURCHASER REVIEW

| | FLOW RATE REQ'D MAX/MIN. ____ / ____ l/min

| | COOLING/HEATING REQUIRED (+ OR -) ____ Kw

|○| SUPPLY PRESSURE MAX/MIN. ____ / ____ bar (ga)

|○| FLUID OPERATING TEMPERATURE

MIN ____ °C NORMAL ____ °C MAX ____ °C

|○| RELATIVE DENSITY (TO WATER @ 25°C) AT REF. TEMP.

@ NORMAL TEMP ____ @ MAX TEMP ____

|○| ABSOLUTE VAPOR PRESSURE AT REFERENCE TEMP.

NORMAL TEMP ____ bar MAX TEMP ____ bar

|○| ATMOSPHERIC BOILING POINT (LIQUID) ____ °C

|○| VISCOSITY @ NORMAL TEMP (LIQUID) ____ Pa.s

|○| SPECIFIC HEAT CAPACITY @ CONSTANT PRESSURE

FOR LIQUID @ NORMAL TEMPERATURE ____ J/Kg.K

SITE AND UTILITIES

○ CONTROL VOLTAGE 230 V PHASE 1 HERTZ 50

● HAZARDOUS AREA Zone 1 (2G GR Group IIB Temp class T3

● DESIGN AMBIENT MIN./MAX. -29 / +40.5 °C

○ COOLING H_2O SUPPLY TEMP. ____ °C ○ Cl_2 ____ ml/m³

○ COOLING H_2O PRESS. NORM./DES. ____ / ____ bar (ga)

○ EXPLOSIVE AREA CLASS (DIRECTIVE 94/9/EC) ____

ACCESSORIES (CLAUSES 8 AND 9)

GENERAL

● JOINT USER/VENDOR LAYOUT OF EQUIPMENT (8.1.4)

○ SPECIAL REQUIREMENTS FOR HAZARDOUS SERVICE

○ SPECIAL CLEANING AND DECONTAMINATION REQ'TS

● UTILITY MANIFOLD CONNECTIONS REQUIRED (8.4.4)

○ TYPE AND SPEC. OF HEAT TRACING (8.6.5.8)

○ THERMAL RELIEF VALVES REQUIRED (9.8.3)

COOLING SYSTEM

○ HEAT EXCHANGER SUPPLIER

|○| WATER COOLED |●| AIR COOLED ○ ASME B31.3

|○| EQUIPMENT REFERENCE/CODE

○ COOLING WATER LINES SUPPLIER

○ TUBING ○ GALVANISED PIPING (8.4.2)

|○| COOLING WATER FLOW RATE ____ l/min

○ SIGHT FLOW INDICATORS (8.4.3) ○ OPEN ○ CLOSED

PLAN 11, 12, 13, 31 AND 41 SYSTEMS

○ CONNECTING LINES SUPPLIER

○ TUBING ○ PIPING (8.5.2.1)

○ RESTRICTION ORIFICE NIPPLE IN FLUSH LINE (8.5.2.3)

○ CYCLONE SEPARATOR SUPPLIER

PLAN 52 AND 53 SYSTEMS

|○| STANDARD (FIG D.26) |○| ALTERNATE (FIG D.27)

| | DIMENSIONAL VARIATIONS TO STANDARD (FIG D.26)

| | DIMENSIONAL VARIATIONS TO ALTERNATE (FIG D.27)

|●| ALTERNATE FABRICATION STANDARD

○ PRIMARY EQUIPMENT SUPPLIER

|○| SUPPLIER REFERENCE/CODE

○ CONNECTING LINES SUPPLIER

○ TUBING ○ PIPING (8.5.4.4.9)

PLAN 52 AND 53 SYSTEMS CONTINUED

● EQUIPMENT SUPPORT SUPPLIER PUMP MFR.

● FILLING SYSTEM SUPPLIER PUMP MFR.

○ ASME CODE STAMP REQUIRED

|○| RESERVOIR CAPACITY (8.5.4.3.1) ____ l

|○| NLL TO GLAND PLATE HEIGHT (8.5.4.2.3) ____ m

| | PRESSURE CASING MAWP (3.40) ____ bar (ga) @ ____ °C

|○| SET PRESSURE RANGE, MAX/MIN ____ / ____ bar (ga)

|○| SYSTEM HOLD-UP PERIOD (PLANS 53B & 53C) ____ DAYS

PRESSURE SWITCH (8.5.4.2.7) TO ACTIVATE ON;

|●| RISING PRESSURE (ARR 2) SET @ ____ bar (ga)

|●| FALLING PRESSURE (ARR 3) SET @ ____ bar (ga)

|○| HIGH LEVEL ALARM REQUIRED (8.5.4.2.8)

○ H/Q CURVE FOR INTERNAL CIRCULATING DEVICE (8.6.2.1)

○ TEST BASED H/Q CURVE FOR INTERNAL CIRC. DEVICE

○ EXTERNAL CIRCULATING PUMP (8.6.3.1)

PLAN 72 AND 74 SYSTEM

○ EQUIPMENT SUPPLIER

○ HIGH FLOW ALARM SWITCH (8.6.6.5)

PLAN 75 AND 76 SYSTEM

○ EQUIPMENT SUPPLIER

○ HIGH LEVEL ALARM SWITCH FOR PLAN 75 (8.6.5.3)

○ TEST CONNECTION (8.6.5.4)

INSTRUMENTATION

● USER SPECIFICATION REFERENCE FOR INSTRUMENTATION/CONTROLS

PRESSURE GAUGES (9.4);

● OIL FILLED PRESSURE GAUGES (9.4.3)

PRESSURE SWITCHES (9.5.2); ● TRANSMITTER (9.5.2.3)

LEVEL SWITCHES (9.5.3);

○ HYDROSTATIC ○ CAPACITANCE ○ ULTRASONIC

LEVEL INDICATORS (9.6) ● TRANSMITTER (9.5.3.2)

○ WELD PAD ○ EXTERNAL, REMOVABLE (9.6.2)

FLOW INDICATORS (9.7); ● TRANSMITTER (9.7.2)

INSPECTION AND TESTING

● PURCHASER PARTICIPATION IN INSPECTION & TEST

SPECIFY; **Yes. The Beneficiary will assist performance tests (FAT).**

○ INSPECTOR'S CHECK LIST (10.1.7 & ANNEX E)

○ OPTIONAL QUALIFICATION TESTING REQ'D (10.3.1.1.2)

○ PURCHASER APPROVAL REQUIRED FOR WELDED CONNECTION DESIGNS, (6.1.6.10.5.4)

○ HARDNESS TEST (10.2.14) REQUIRED FOR;

● 100% INSPECTION OF ALL WELDS (6.1.6.10.5.1) USING;

● MAGNETIC PARTICLE ● LIQUID PENETRANT

● RADIOGRAPHIC ○ ULTRASONIC

|○| MODIFIED FACES FOR PUMP TEST (10.3.5.2.1) (SEE PAGE 1, LINE 31)

|○| ALTERNATE SEAL PUMP TEST (10.3.5.2.2) (SEE PAGE 1, LINE 26)

Proiect nr./Project no.	Nr. Document/Document no.	Denumire document / Document name
		DATA SHEET - PUMP 06-P1

08.05.24 08.05.2024

Annex 1, Spare parts

Part	Number of spare parts					
	Start-up			Normal maintenance		
Cartridge b, e				1		
Element b, f				1		
Rotor c, g				1		
Case a						
Head (case cover and stuffing box)						
Bearing bracket a						
Shaft (with key)				1		
Impeller				1		
Wear rings (set) h	1			1		
Bearings, complete (rolling element, radial) a, i	1			1		
Bearings, complete (rolling element, thrust) a, i	1			1		
Bearings, complete (hydrodynamic, radial) a, i	1			1		
Bearing pads only (hydrodynamic, radial) a, i	1			1		
Bearing pads only (hydrodynamic, radial) a, i	1			1		
Bearings, complete (hydrodynamic, thrust) a, i	1			1		
Bearing pads only (hydrodynamic, thrust) a, i	1			1		
Mechanical seal / packing d, h, i	1			1		
Shaft sleeve h	1			1		
Gaskets, shims, O-rings (set) h	1			1		
Add for vertical pump				NA		
Bowls				NA		
Spiders or spider bushings (set)				NA		
Bearings, bushings (set)				NA		
Add for high speed integral gear:						
Gear box				NA		
Diffuser and cover				NA		
Splined shaft				NA		
Gear box housing				NA		
Oil pump, internal				NA		
Oil pump, external				NA		
Oil filter				NA		

Notes
a Horizontal pumps only
b Vital-service pumps are generally unspared, partially spared or multistage. When a vital machine is down, production loss or violation of environmental permits results.
c Essential-service pumps are required for operation and have an installed spare. A production loss occurs only if main and spare fail simultaneously.
d Cartridge-type mechanical seals include sleeve and gland.
e Cartridge consists of assembled element plus discharge head, seal(s) and bearing housing(s).
f Element consist of assembled rotor plus stationary hydraulic parts [diffuser(s) or volute(s)].
g Rotor consists of all rotating parts attached to the shaft, except the half-coupling.
h Normal-wear parts (see 5.1.1).
i Per pump set.

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07.05.2024