

DATA SHEET

FOR

**FEED DRIER REGENERANT PUMPS
(10P001A/B)**

		Propane Dehydrogenation (PDH) Project						
		DSH for Feed Drier Regenerant Pumps (10P001A/B)						
							Rev.: 00	
		Doc. No.: 1229-10-RE-DSH-001						
Page No.	Internal Issue	Change Index During Formal Issues						Reason of Latest Change
		First Issue	Second Issue	Third Issue	Fourth Issue	Fifth Issue	Sixth Issue	
	Rev. 0A	Rev.00	Rev.01	Rev.02	Rev.03	Rev.04	Rev.05	
1		✓						
2		✓						
3		✓						
4		✓						
5		✓						
6		✓						
7		✓						

1	Note	APPLICABLE TO: PROPOSAL	APPLICABLE NTL/INTNTL STANDARD:				API-610		Rev	
2		FOR					UNIT	10		
3		SITE					SERVICE	Feed Drier Regenerant Pumps		
4		NO. REQ	2	PUMP SIZE			TYPE	OH6	No. STAGES	1
5		MANUFACTURER					MODEL	SERIAL NO.		
6		LIQUID CHARACTERISTICS								
7			Units	Maximum	Normal	Minimum	Note	SERVICE :	CONTINUOUS	
8		LIQUID TYPE OR NAME :	Hydrocarbon				Max & min values refer only to the property listed	PUMPS OPERATE IN:		
9		VAPOR PRESSURE :	bar a		15.47			CORROSION DUE TO : (6.12.1.9)		
10		RELATIVE DENSITY :			0.461			EROSION DUE TO : (6.12.1.9)		
11		SPECIFIC HEAT :	kJ/(kg-K)		2.93			H2S CONCENTRATION (ppm) : (6.12.1.12)		
12		VISCOSITY :	cP		0.08			CHLORIDE CONCENTRATION (ppm) :		
13	4, 5	OPERATING CONDITIONS (6.1.2)							PARTICULATE SIZE (DIA IN MICRONS)	
14			Units	Maximum	Rated	Normal	Minimum	PARTICULATE CONCENTRATION (PPM)		
15		NPSHa Datum:	C.L. Impeller							
16		PUMPING TEMPERATURE :	°C			45				
17		FLOW :	m³/h		17.5	15.9				
18		DISCHARGE PRESSURE:(6.3.2)	bar a		34.85					
19		SUCTION PRESSURE :	bar a	32.21	15.61					
20		DIFFERENTIAL PRESSURE :	bar		19.24					
21		DIFFERENTIAL HEAD :	m		426.10					
22		NPSH _A :	m		1.90					
23		HYDRAULIC POWER :	kW							
24	1	SITE AND UTILITY DATA								
25		LOCATION:				COOLING WATER :				
26		OUTDOOR UNHEATED				INLET RETURN DESIGN				
27		MOUNTED AT :	GRADE	● TROPICALISATION REQD		TEMP °C				
28		ELECTRIC AREA CLASSIFICATION:	6.1.22		ZONE	PRESS. bar g				
29		GROUP			TEMP CLASS	SOURCE				
30		SITE DATA :				COOLING WATER CHLORIDE CONCENTRATION:				
31		ELEVATION (MSL) :	m		BAROMETER :	bar		INSTRUMENT AIR :		
32		RANGE OF AMBIENT TEMPS:MIN / MAX				/ °C		MAX		
33		RELATIVE HUMIDITY: MIN / MAX				/ %		MIN		
34		UNUSUAL CONDITIONS:				DUST & FUMES				
35		SANDSTORM,TUNDER & LIGHTENING								
36		UTILITY CONDITIONS :								
37		ELECTRICITY :	DRIVERS	HEATING	CONTROL	SHUTDOWN				
38		VOLTAGE	400							
39		PHASE	3							
40		HERTZ	50							
41		PERFORMANCE				DRIVER (7.1.5)				
42	6, 7	PROPOSAL CURVE NO.				RPM	Driver Type			
43		As Tested Curve No.					GEAR			
44		IMPELLER DIA.: RATED				MAX. MIN.	VARIABLE SPEED REQUIRED			
45		RATED POWER				kW	EFFICIENCY (%)			
46		RATED CURVE BEP FLOW (at rated impeller dia)				m³/h	SOURCE OF VARIABLE SPEED			
47		MIN FLOW : THERMAL				m³/h	OTHER			
48		PREFERRED OPERATING REGION (6.1.11)				to	MANUFACTURER			
49		ALLOWABLE OPERATING REGION				to	NAMEPLATE POWER			
50		MAX HEAD @ RATED IMPELLER				m	NOMINAL RPM			
51		MAX POWER @ RATED IMPELLER				(6.8.9) kW	RATED LOAD RPM			
52		NPSH3 AT RATED FLOW :				m	FRAME OR MODEL			
53		CL PUMP TO U/S BASEPLATE				m	ORIENTATION			
54		NPSH MARGIN AT RATED FLOW :				m	LUBE			
55		SPECIFIC SPEED (6.1.9)				m3/h, rpm, m	BEARING TYPE:			
56		SUCTION SPECIFIC SPEED LIMIT					RADIAL			
57		SUCTION SPECIFIC SPEED				m3/h, rpm, m	THRUST			
58		MAX. ALLOW. SOUND PRESS. LEVEL REQD (6.1.14)				85 (dBA)	STARTING METHOD			
59		EST MAX SOUND PRESS. LEVEL				(dBA)	SEE DRIVER DATA SHEET			
60		MAX. SOUND POWER LEVEL REQ'D (6.1.14)					FOR STARTING METHOD SEE DOC. NO. 1229-00-EL-MSS-521 ITEM 4.5			
61		EST MAX SOUND POWER LEVEL								

1	Note	CONSTRUCTION										Rev
2	8	API PUMP TYPE: OH6 [Based on API 610 definitions]										CASING MOUNTING: IN-LINE
3												CASING TYPE: (6.3.10)
4	9	NOZZLE CONNECTIONS: (6.5.5)										OH3 BACKPULLOUT LIFTING DEVICE REQD. (9.1.2.6)
5			Size	Facing	Rating	Position					CASE PRESSURE RATING:	
6		SUCTION		RF	600	IN-LINE					MAWP : (6.3.6) bar g @ °C	
7		DISCHARGE		RF	600	IN-LINE					HYDROTEST : bar g @ °C	
8		PRESSURE CASING AUX. CONNECTIONS: (6.4.3.2)										
9			No.	Size	Type	Facing	Rating	Posn.			HYDROTEST OH PUMP AS ASSEMBLY	
10		BALANCE/LEAK OFF									SUCT'N PRESS. REGIONS DESIGNED FOR MAWP	
11		DRAIN				RF					ROTATION: (VIEWED FROM COUPLING END)	
12		VENT				RF					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	SUPPLIER								First Critical Speed Wet (Multi stage pumps only)	
18		DRAINS MANIFOLDED						YES			COMPONENT BALANCE TO ISO 1940 G1.0	
19		VENT Valve Supplied By	SUPPLIER								SHRINK FIT -LIMITED MOVEMENT IMPELLERS (9.2.2.3)	
20		VENTS MANIFOLDED						YES				
21		THREADED CONS FOR PIPELINE SERVICE & < 50°C (6.4.3.2)						NO				
22		SPECIAL FITTINGS FOR TRANSITIONING (6.4.3.3)						NO				
23		CYLINDRICAL THREADS REQUIRED (6.4.3.8)										
24		GUSSET SUPPORT REQUIRED										
25		MACHINED AND STUDDED CONNECTIONS (6.4.3.12)										
26		VS 6 DRAIN										
27		DRAIN TO SKID EDGE						YES				
28												
29		MATERIAL (6.12.1.1)										
30		APPENDIX H CLASS										
31		MIN DESIGN METAL TEMP (6.12.4.1)						-43 °C				
32		REDUCED-HARDNESS MATERIALS REQ'D (6.12.1.12.1)										
33		Applicable Hardness Standard (6.12.1.12.3)										
34		BARREL :						316 SS				
35		CASE :						316 SS				
36		DIFFUSERS										
37		IMPELLER :						316 SS				
38		IMPELLER WEAR RING :										
39		CASE WEAR RING :										
40		SHAFT:										
41		Bowl (if VS-type)										
42		Inspection Class						Level 3				
43		BEARINGS AND LUBRICATION (6.10.1.1)										
44		BEARING (TYPE / NUMBER): (6.11.4)										
45		RADIAL	SLEEVE	/								
46		THRUST	SLEEVE	/								
47		REVIEW AND APPROVE THRUST BEARING SIZE : (9.2.5.2.4)										
48												
49	3	LUBRICATION : (6.10.2.2) (6.11.3) (9.6.1)	PRESSURE LUBE									
50		PRESSURE LUBE SYSTEM TO ISO 10438-	(9.2.6.5)									
50		ISO 10438 DATA SHEETS ATTACHED										
51		Pressurized Lube Oil System mtd on pump baseplate										
52		Location of Pressurized Lube Oil System mounted on baseplate :										
53												
54		INTERCONNECTING PIPING PROVIDED BY	Supplier									
55												
56		OIL VISC. ISO GRADE	VG									
57		CONSTANT LEVEL OILER :	REQUIRED									
												REMARKS :

1	Note	INSTRUMENTATION		SEAL SUPPORT SYSTEM MOUNTING	Rev
2		SEE ATTACHED API-670 DATA SHEET	NO	SEAL SUPPORT SYSTEM MOUNTED ON PUMP BASEPLATE	
3		ACCELEROMETER (7.4.2.1)		(7.5.1.4)	YES
4		Number of Accelerometers		IDENTIFY LOCATION ON BASEPLATE	
5		Mounting Location of Accelerometers			
6				INTERCONNECTING PIPING BY	Supplier
7		PROVISION FOR MTG ONLY (6.10.2.10)			
8	10-13	Number of Accelerometers		MECHANICAL SEAL (6.8.1)	
9		Mounting Location of Accelerometers		SEE ATTACHED ISO 21049/API 682 DATA SHEET	NO
10				ADDITIONAL CENTRAL FLUSH PORT (6.8.9)	
11		FLAT SURFACE REQUIRED (6.10.2.11)		HEATING JACKET REQ'D. (6.8.11)	
12		Number of Accelerometers			
13		Mounting Location of Accelerometers		HEATING AND COOLING (6.1.17)	
14	14			COOLING REQ'D	YES
15		VIBRATION PROBES (7.4.2.2)		COOLING WATER PIPING PLAN	M
16		PROVISIONS FOR VIB. PROBES		COOLING WATER PIPING	PIPE
17		NUMBER PER RADIAL BEARING		FITTINGS	
18		NUMBER PER AXIAL BEARING		COOLING WATER PIPING MATERIALS	CS
19				COOLING WATER REQUIREMENTS:	
20		MONITORS AND CABLES SUPPLIED BY (7.4.2.4)		BEARING HOUSING	m³/h
21				HEAT EXCHANGER	m³/h
22		TEMPERATURE (7.4.2.3)		TOTAL COOLING WATER	m³/h
23		PROVISIONS FOR TEMP PROBES		HEATING MEDIUM	
24		RADIAL BEARING TEMP.		OTHER	
25		NUMBER PER RADIAL BEARING		HEATING PIPING	
26		THRUST BEARING TEMP.			
27		NUMBER PER THRUST BEARING ACTIVE SIDE		PIPING & APPURTENANCES	
28		NUMBER PER THRUST BEARING INACTIVE SIDE		MANIFOLD PIPING FOR PURCHASER CONNECTION (7.5.1.6)	
29		TEMP. GAUGES (WITH THERMOWELLS) (9.1.3.6)		VENT	YES
30		PRESSURE GAUGE TYPE		DRAIN	YES
31		Remarks		COOLING WATER	YES
32				TAG ALL ORIFICES (7.5.2.4)	YES
33				SOCKET WELD CONN ON SEAL GLAND (7.5.2.8)	NO
34					
35					
36					
37					
38					
39					
40					
41					
42					
43					
44					
45					
46					
47					
48					
49					
50					
51					
52					
53					
54					
55					
56					
57					

1	Note	SURFACE PREPARATION AND PAINT					TEST			Rev
2		MANUFACTURER'S STANDARD				NO	SHOP INSPECTION (8.1.1)			Yes
3		OTHER (SEE BELOW)				YES	PERFORMANCE CURVE			
4		SPECIFICATION NO. 1229-00-PI-ESS-406					& DATA APPROVAL PRIOR TO SHIPMENT.			YES
5							TEST WITH SUBSTITUTE SEAL (8.3.3.2.b)			
6		PUMP:					MATERIAL CERTIFICATION REQUIRED	CASING	YES	
7		PUMP SURFACE PREPARATION						(6.12.1.8) IMPELLER	YES	
8		PRIMER						SHAFT	YES	
9		FINISH COAT						OTHER		
10		For motor RAL 5010 to be used					CASTING REPAIR WELD PROCEDURE APPR REQD			YES
11		BASEPLATE:					(6.12.2.5)	(6.12.3.1)		
12		BASEPLATE SURFACE PREPARATION					INSPECTION REQUIRED FOR CONNECTION WELDS (6.12.3.4.d)			
13		PRIMER:					(6.12.3.4.e)	MAG PARTICLE	YES	
14		FINISH COAT						RADIOGRAPHY	YES	
15		DETAILS OF LIFTING DEVICES						LIQUID PENETRANT	YES	
16								ULTRASONIC	YES	
17		SHIPMENT: (8.4.1)				EXPORT	INSPECTION REQUIRED FOR CASTINGS			
18		EXPORT BOXING REQUIRED				YES		MAG PARTICLE	YES	
19		OUTDOOR STORAGE MORE THAN 12 MONTHS				YES		RADIOGRAPHY	YES	
20								LIQUID PENETRANT	YES	
21		SPARE ROTOR ASSEMBLY PACKAGED FOR:						ULTRASONIC	YES	
22		ROTOR STORAGE ORIENTATION (9.2.8.2)					HARDNESS TEST REQUIRED (8.2.2.7)			
23		SHIPPING & STORAGE CONTAINER FOR VERT STORAGE (9.2.8.3)					ADDNL SUBSURFACE EXAMINATION (6.12.1.5) (8.2.1.3)			
24								FOR		
25		N2 PURGE (9.2.8.4)				NO		METHOD		
26		SPARE PARTS					PMI TESTING REQUIRED (8.2.2.8)			YES
27		START-UP				YES	COMPONENTS TO BE TESTED			
28		NORMAL MAINTENANCE				YES				
29		WEIGHTS kg					RESIDUAL UNBALANCE TEST (J.4.1.2)			
30		ITEM No	PUMP	DRIVER	GEAR	BASE	TOTAL	NOTIFICATION OF SUCCESSFUL SHOP		
31								PERFORMANCE TEST (8.1.1.c) (8.3.3.5)	YES	
32								BASEPLATE TEST (7.3.21)		
33								HYDROSTATIC	OBSERVE	
34							HYDROSTATIC TEST OF BOWLS & COLUMN (9.3.13.2)			OBSERVE
35		OTHER PURCHASER REQUIREMENTS					PERFORMANCE TEST			OBSERVE
36		COORDINATION MEETING REQUIRED (10.1.3)				YES	TEST IN COMPLIANCE WITH (8.3.3.2)			8.3.3.2
37		MAXIMUM DISCHARGE PRESSURE TO INCLUDE					TEST DATA POINTS TO (8.3.3.3)			8.3.3.3
38		MAX RELATIVE DENSITY				YES	TEST TOLERANCES TO (8.3.3.4)			TABLE 15
39		OPERATION TO TRIP SPEED				NO	NPSH (8.3.4.3.1) (8.3.4.3.4)			OBSERVE
40		MAX DIA. IMPELLERS AND/OR NO OF STAGES				NO	NPSH-1ST STG ONLY (8.3.4.3.2)			OBSERVE
41		CONNECTION DESIGN APPROVAL (9.2.1.4)				NO	NPSH TESTING TO HI 1.6 OR ISO 9906 (8.3.4.3.3)			OBSERVE
42		TORSIONAL ANALYSIS / REPORT (6.9.2.10)				NO	TEST NPSHA LIMITED TO 110% SITE NPSHA (8.3.3.6)			YES
43		PROGRESS REPORTS				YES	RETEST ON SEAL LEAKAGE (8.3.3.2.d)			OBSERVE
44		OUTLINE OF PROC FOR OPTIONAL TESTS (10.2.5)				YES	RETEST REQUIRED AFTER FINAL HEAD ADJ (8.3.3.7.b)			OBSERVE
45		ADDITIONNAL DATA REQUIRING 20 YEARS RETENTION (8.2.1.1)					COMPLETE UNIT TEST (8.3.4.4.1)			OBSERVE
46						YES	SOUND LEVEL TEST (8.3.4.5)			OBSERVE
47		LATERAL ANALYSIS REQUIRED (9.1.3.4) (9.2.4.1.3)					CLEANLINESS PRIOR TO FINAL ASSEMBLY (8.2.2.6)			OBSERVE
48		MODAL ANALYSIS REQUIRED (9.3.9.2)				NO	LOCATION OF CLEANLINESS INSPECTION			@ SUPPLIER'S
49		DYNAMIC BALANCE ROTOR (6.9.4.4)				YES	NOZZLE LOAD TEST			OBSERVE
50		INSTALLATION LIST IN PROPOSAL (10.2.3.I)				YES	CHECK FOR CO-PLANAR MOUNTING PAD SURFACES			OBSERVE
51		VFD STEADY STATE DAMPED RESPONSE ANALYSIS (6.9.2.3)					MECHANICAL RUN TEST UNTIL OIL TEMP STABLE			OBSERVE
52						NO	4 HR. MECH RUN AFTER OIL TEMP STABLE (8.3.4.2.1)			
53		TRANSIENT TORSIONAL RESPONSE (6.9.2.4)				NO	4 HR. MECH RUN TEST (8.3.4.2.2)			OBSERVE
54		BEARING LIFE CALCULATIONS REQUIRED (6.10.1.6)				YES				
55		IGNITION HAZARD ASSMT TO EN 13463-1 (7.2.13.e)					BRG HSG RESONANCE TEST (8.3.4.7)			OBSERVE
56		CASING RETIREMENT THICKNESS DRAWING (10.3.2.3)				YES	STRUCTURAL RESONANCE TEST (9.3.9.2)			
57		FLANGES RQD IN PLACE OF SKT WELD UNIONS (7.5.2.8)					REMOVE / INSPECT HYDRODYNAMIC BEARINGS AFTER TEST			
58		INCLUDE PLOTTED VIBRATION SPECTRA (6.9.3.3)				YES	(9.2.7.5)		OBSERVE	
59		CONNECTION BOLTING (7.5.1.7)					AUXILIARY EQUIPMENT TEST (8.3.4.6)			OBSERVE
60		CADMIUM PLATED BOLTS PROHIBITED					EQUIPMENT TO BE INCLUDED IN AUXILLIARY TESTS			
61		VENDOR TO KEEP REPAIR AND HT RCDS (8.2.1.1.c)				YES	Motor			
62		VENDOR SUBMIT TEST PROCEDURES (8.3.1.1)				YES	LOCATION OF AUXILIARY EQUIPENT TEST			
63		SUBMIT INSPECTION CHECK LIST (8.1.5)				YES	SEE DOC. NO. 1229-00-EL-MSS-521 ITEM 14			
64							IMPACT TEST (6.12.4.3)	PER EN 13445		
65								PER ASME SECTION VIII		
66							REMOVE CASING AFTER TEST			

1	Note	PRESSURE VESSEL DESIGN CODE REFERENCES			Rev
2		THESE REFERENCES MUST BE LISTED BY THE MANUFACTURER			
3		CASTING FACTORS USED IN DESIGN (TABLE 3)			YES
4		SOURCE OF MATERIAL PROPERTIES			YES
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)			DEFAULT PER TABLE 10
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			DEFAULT TO TABLE 14
		ALTERNATIVE MATERIAL INSPECTIONS AND ACCEPTANCE CRITERIA (SEE TABLE 14) (8.2.2.5)			
19		TYPE OF INSPECTION	METHOD	FOR FABRICATIONS	FOR CASTINGS
20		RADIOGRAPHY		YES	YES
21		ULTRASONIC INSPECTION		YES	YES
22		MAGNETIC PARTICLE INSPECTION		YES	YES
23		LIQUID PENETRANT INSPECTION		YES	YES
24		VISUAL INSPECTION (all surfaces)		YES	YES
25		REMARKS :			
26					
27		(1) See Basic Engineering Design Questionnaire (BEDQ), Engineering Design Information (EDI) Project 9018716-A4, Sections 3 and 4.			
28		(2) Pumps shall comply with UOP Standard Specifications 5-11 and 7-12.			
29		(3) See Project Specification 533.			
30		(4) A spillback to suction source will be provided to insure satisfactory pump operation at minimum continuous flow.			
31		Pump vendor to advise minimum continuous capacity. Estimated minimum flow 9.6 m3/hr.			
32		(5) Process could have significant variation in system resistance for this service, based on a change in suction/discharge pressure. Thus			
33		a spillback has been implemented for pump protection for such scenario.			
34		(6) Motor shall have torque capability to accelerate the pump to operating speed with discharge shutoff valve open, and the discharge			
35		check valve closed against a static pressure of 20.0 barg.			
36		(7) Motor bearings shall be lubricated with a pure (dry sump) oil mist system.			
37		(8) Pump Design Pressure and Temperature is 55.3 barg and 120 °C.			
38		(9) Studded connections are not acceptable.			
39		(10) See Basic Engineering Design Questionnaire 9018716-A4 for Mechanical Seal design.			
40		(11) Seal construction: Sleeve material: 316 Austenitic Stainless Steel, Gland material: 316 Austenitic Stainless Steel,			
41		Aux seal device: Non-Sparking Fixed Throttle Bushing. See UOP Standard Specification 5-11 Section 6.8.4.			
42		(12) Unpressurized Dual type Mechanical Seal. Seal flush piping plan: API Plan 13. Auxiliary flush plan: API Plan 52.			
43		(13) Buffer Fluid: Clean, Light Oil.			
44		(14) Sight Flow Indicators shall be provided.			
45					
46					
47					
48					
49					
50					
51					
52					
53					
54					
55					
56					
57					
58					
59					