DATA SHEET

FOR

SOLVENT RECOVERY BOTTOMS PUMPS (09P007A/B)

Note								Rev
	APPLICABLE TO:	PROPOSAL		APPLICABLE NTL/INTNTL STANDARD:	API-610			
	FOR			UNIT	09			
	SITE			SERVICE	Solvent Recovery Bottoms Pumps			
	NO. REQ	2	PUMP SIZE	TYPE	OH6	No. STAGES	1	
	MANUFACTURER			MODEL		SERIAL NO.		

LIQUID CHARACTERISTICS

	Units	Maximum	Normal	Minimum
LIQUID TYPE OR NAME :	Aromatic Hydrocarbon			
VAPOR PRESSURE :	bar a		1.38	
RELATIVE DENSITY :			0.943	
SPECIFIC HEAT :	kJ/(kg-K)		1.717	
VISCOSITY :	cP		1.11	

Note: Max & min values refer only to the property listed

SERVICE : CONTINUOUS

PUMPS OPERATE IN:

CORROSION DUE TO : (6.12.1.9)

EROSION DUE TO : (6.12.1.9)

H2S CONCENTRATION (ppm) : (6.12.1.12)

CHLORIDE CONCENTRATION (ppm) :

PARTICULATE SIZE (DIA IN MICRONS)

PARTICULATE CONCENTRATION (PPM)

OPERATING CONDITIONS (6.1.2)

Note		Units	Maximum	Rated	Normal	Minimum
	NPSHa Datum:		C.L. Impeller			
	PUMPING TEMPERATURE :	°C			63	
4-6	FLOW :	m³/h		4.4	2.9	1.2
	DISCHARGE PRESSURE:(6.3.2)	bar a		7.76		
	SUCTION PRESSURE :	bar a	4.87	1.61		
	DIFFERENTIAL PRESSURE :	bar		6.15		
	DIFFERENTIAL HEAD :	m		66.60		
	$NPSH_A$:	m		2.10		
	HYDRAULIC POWER :	kW				

1 **SITE AND UTILITY DATA**

LOCATION: OUTDOOR / UNHEATED

MOUNTED AT : GRADE ● TROPICALISATION REQD

ELECTRIC AREA CLASSIFICATION: 6.1.22 ZONE

GROUP TEMP CLASS

SITE DATA :

ELEVATION (MSL) : m **BAROMETER :** bar

RANGE OF AMBIENT TEMPS:MIN / MAX / °C

RELATIVE HUMIDITY: MIN / MAX / %

UNUSUAL CONDITIONS: DUST & FUMES

SANDSTORM,TUNDER & LIGHTENING

UTILITY CONDITIONS :

ELECTRICITY :	DRIVERS	HEATING	CONTROL	SHUTDOWN
VOLTAGE	400			
PHASE	3			
HERTZ	50			

COOLING WATER :

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

SOURCE CIRCULATION COOLING WATER SYSTEM

COOLING WATER CHLORIDE CONCENTRATION: ppm

INSTRUMENT AIR : MAX bar g MIN bar g

STEAM

		DRIVERS	HEATING
TEMP °C	Max		
	Min		
PRESS. bar g	Max		
	Min		

FOR SITE AND UTILITY CONDITION REFER TO 1229-00-PR-ESS-101.

PERFORMANCE

7

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 (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 SQUIRREL CAGE, DIRECT ONLINE, TEFC, INSULATION CLASS F/B

MANUFACTURER

NAMEPLATE POWER kW

NOMINAL RPM

RATED LOAD RPM

FRAME OR MODEL

ORIENTATION HORIZONTAL

LUBE

BEARING TYPE:

RADIAL /

THRUST /

STARTING METHOD

SEE DRIVER DATA SHEET

FOR STARTING METHOD SEE DOC. NO. 1229-00-EL-MSS-521 ITEM 4.5

CONSTRUCTION

API PUMP TYPE: OH6 [Based on API 610 definitions]

NOZZLE CONNECTIONS: (6.5.5)

	Size	Facing	Rating	Position
SUCTION		RF	600	IN-LINE
DISCHARGE		RF	600	IN-LINE

PRESSURE CASING AUX. CONNECTIONS: (6.4.3.2)

	No.	Size	Type	Facing	Rating	Posn.
BALANCE/LEAK OF						
DRAIN				RF		
VENT				RF		
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): NO
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: YES

MATERIAL (6.12.1.1)

APPENDIX H CLASS:
MIN DESIGN METAL TEMP (6.12.4.1): -5 °C
REDUCED-HARDNESS MATERIALS REQ'D (6.12.1.12.1):
Applicable Hardness Standard (6.12.1.12.3):
BARREL : Killed Carbon Steel
CASE : Killed Carbon Steel
DIFFUSERS:
IMPELLER : 316 SS
IMPELLER WEAR RING :
CASE WEAR RING :
SHAFT:
Bowl (if VS-type):
Inspection Class: Level 3

BEARINGS AND LUBRICATION (6.10.1.1)

BEARING (TYPE / NUMBER): (6.11.4)
RADIAL: SLEEVE /
THRUST: SLEEVE /
REVIEW AND APPROVE THRUST BEARING SIZE : (9.2.5.2.4)

LUBRICATION : (6.10.2.2) (6.11.3) (9.6.1): PURE OIL MIST
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: IN-LINE
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
SUCT'N PRESS. REGIONS DESIGNED FOR MAWP: YES
ROTATION: (VIEWED FROM COUPLING END)
- 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 G1.0: YES
SHRINK FIT -LIMITED MOVEMENT IMPELLERS (9.2.2.3): YES

COUPLING:(7.2.3) **(7.2.13.f)**
MANUFACTURER:
MODEL:
RATING (POWER/100 RPM):
SPACER LENGTH: mm
SERVICE FACTOR:
RIGID: NO
COUPLING WITH HYDRAULIC FIT (7.2.10): NO
COUPLING BALANCED TO ISO 1940-1 G6.3 (7.2.3):
COUPLING WITH PROPRIETARY CLAMPING DEVICE (7.2.11):
COUPLING IN COMPLIANCE WITH (7.2.4):
COUPLING GUARD STANDARD PER (7.2.13.a):
Window on Coupling Guard:
NON SPARK COUPLING GUARD TO BE USED

BASEPLATE

API BASEPLATE NUMBER :
BASEPLATE CONSTRUCTION (7.3.14):
BASEPLATE DRAINAGE (7.3.1): Partial Drain Pan
MOUNTING : GROUTED
NON-GROUT CONSTRUCTION : (7.3.13) NOT REQUIRED
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

REMARKS :

Note	INSTRUMENTATION		SEAL SUPPORT SYSTEM MOUNTING		Rev
	SEE ATTACHED API-670 DATA SHEET	NO	SEAL SUPPORT SYSTEM MOUNTED ON PUMP BASEPLATE (7.5.1.4)	YES	
	ACCELEROMETER (7.4.2.1)		IDENTIFY LOCATION ON BASEPLATE		
	Number of Accelerometers				
	Mounting Location of Accelerometers		INTERCONNECTING PIPING BY	Supplier	
	PROVISION FOR MTG ONLY (6.10.2.10)		**MECHANICAL SEAL (6.8.1)**		
10-14	Number of Accelerometers		SEE ATTACHED ISO 21049/API 682 DATA SHEET	NO	
	Mounting Location of Accelerometers		ADDITIONAL CENTRAL FLUSH PORT (6.8.9)		
	FLAT SURFACE REQUIRED (6.10.2.11)		HEATING JACKET REQ'D. (6.8.11)		
	Number of Accelerometers		**HEATING AND COOLING (6.1.17)**		
	Mounting Location of Accelerometers		COOLING REQ'D	YES	
15			COOLING WATER PIPING PLAN	M	
	VIBRATION PROBES (7.4.2.2)		COOLING WATER PIPING	PIPE	
	PROVISIONS FOR VIB. PROBES		FITTINGS		
	NUMBER PER RADIAL BEARING		COOLING WATER PIPING MATERIALS	CS	
	NUMBER PER AXIAL BEARING		COOLING WATER REQUIREMENTS:		
			BEARING HOUSING	m³/h	
	MONITORS AND CABLES SUPPLIED BY (7.4.2.4)		HEAT EXCHANGER	m³/h	
	TEMPERATURE (7.4.2.3)		TOTAL COOLING WATER	m³/h	
	PROVISIONS FOR TEMP PROBES		HEATING MEDIUM		
	RADIAL BEARING TEMP.		OTHER		
	NUMBER PER RADIAL BEARING		HEATING PIPING		
	THRUST BEARING TEMP.		**PIPING & APPURTENANCES**		
	NUMBER PER THRUST BEARING ACTIVE SIDE		MANIFOLD PIPING FOR PURCHASER CONNECTION (7.5.1.6)		
	NUMBER PER THRUST BEARING INACTIVE SIDE		VENT	YES	
	TEMP. GAUGES (WITH THERMOWELLS) (9.1.3.6)		DRAIN	YES	
	PRESSURE GAUGE TYPE		COOLING WATER	YES	
	Remarks		TAG ALL ORIFICES (7.5.2.4)	YES	
			SOCKET WELD CONN ON SEAL GLAND (7.5.2.8)	NO	

Note	SURFACE PREPARATION AND PAINT		TEST		Rev
	MANUFACTURER'S STANDARD	NO	SHOP INSPECTION (8.1.1)	Yes	
	OTHER (SEE BELOW)	YES	PERFORMANCE CURVE		
	SPECIFICATION NO. 1229-00-PI-ESS-406		& DATA APPROVAL PRIOR TO SHIPMENT.	YES	
			TEST WITH SUBSTITUTE SEAL (8.3.3.2.b)		
	PUMP:		MATERIAL CERTIFICATION REQUIRED CASING	YES	
	PUMP SURFACE PREPARATION		(6.12.1.8) IMPELLER	YES	
	PRIMER		SHAFT	YES	
	FINISH COAT	RAL 7038	OTHER		
		For motor RAL 5010 to be used	CASTING REPAIR WELD PROCEDURE APPR REQD	YES	
	BASEPLATE:		(6.12.2.5) (6.12.3.1)		
	BASEPLATE SURFACE PREPARATION		INSPECTION REQUIRED FOR CONNECTION WELDS (6.12.3.4.d)		
	PRIMER:		(6.12.3.4.e) MAG PARTICLE	YES	
	FINISH COAT	RAL 7038	RADIOGRAPHY	YES	
	DETAILS OF LIFTING DEVICES		LIQUID PENETRANT	YES	
			ULTRASONIC	YES	
	SHIPMENT: (8.4.1)	EXPORT	INSPECTION REQUIRED FOR CASTINGS		
	EXPORT BOXING REQUIRED	YES	MAG PARTICLE	YES	
	OUTDOOR STORAGE MORE THAN 12 MONTHS	YES	RADIOGRAPHY	YES	
			LIQUID PENETRANT	YES	
	SPARE ROTOR ASSEMBLY PACKAGED FOR:		ULTRASONIC	YES	
	ROTOR STORAGE ORIENTATION (9.2.8.2)		HARDNESS TEST REQUIRED (8.2.2.7)		
	SHIPPING & STORAGE CONTAINER FOR VERT STORAGE (9.2.8.3)		ADDNL SUBSURFACE EXAMINATION (6.12.1.5) (8.2.1.3)		
			FOR		
	N2 PURGE (9.2.8.4)	NO	METHOD		
	SPARE PARTS		PMI TESTING REQUIRED (8.2.2.8)	YES	
	START-UP	YES	COMPONENTS TO BE TESTED		
	NORMAL MAINTENANCE	YES			
	WEIGHTS kg		RESIDUAL UNBALANCE TEST (J.4.1.2)		

ITEM No	PUMP	DRIVER	GEAR	BASE	TOTAL

OTHER PURCHASER REQUIREMENTS		NOTIFICATION OF SUCCESSFUL SHOP		
COORDINATION MEETING REQUIRED (10.1.3)	YES	PERFORMANCE TEST (8.1.1.c) (8.3.3.5)	YES	
MAXIMUM DISCHARGE PRESSURE TO INCLUDE		BASEPLATE TEST (7.3.21)		
MAX RELATIVE DENSITY	YES	HYDROSTATIC	OBSERVE	
OPERATION TO TRIP SPEED	NO	HYDROSTATIC TEST OF BOWLS & COLUMN (9.3.13.2)	OBSERVE	
MAX DIA. IMPELLERS AND/OR NO OF STAGES	NO	PERFORMANCE TEST	OBSERVE	
CONNECTION DESIGN APPROVAL (9.2.1.4)	NO	TEST IN COMPLIANCE WITH (8.3.3.2)	8.3.3.2	
TORSIONAL ANALYSIS / REPORT (6.9.2.10)	NO	TEST DATA POINTS TO (8.3.3.3)	8.3.3.3	
PROGRESS REPORTS	YES	TEST TOLERANCES TO (8.3.3.4)	TABLE 15	
OUTLINE OF PROC FOR OPTIONAL TESTS (10.2.5)	YES	NPSH (8.3.4.3.1) (8.3.4.3.4)	OBSERVE	
ADDITIONNAL DATA REQUIRING 20 YEARS RETENTION (8.2.1.1)		NPSH-1ST STG ONLY (8.3.4.3.2)	OBSERVE	
	YES	NPSH TESTING TO HI 1.6 OR ISO 9906 (8.3.4.3.3)	OBSERVE	
LATERAL ANALYSIS REQUIRED (9.1.3.4) (9.2.4.1.3)		TEST NPSHA LIMITED TO 110% SITE NPSHA (8.3.3.6)	YES	
MODAL ANALYSIS REQUIRED (9.3.9.2)	NO	RETEST ON SEAL LEAKAGE (8.3.3.2.d)	OBSERVE	
DYNAMIC BALANCE ROTOR (6.9.4.4)	YES	RETEST REQUIRED AFTER FINAL HEAD ADJ (8.3.3.7.b)	OBSERVE	
INSTALLATION LIST IN PROPOSAL (10.2.3.l)	YES	COMPLETE UNIT TEST (8.3.4.4.1)	OBSERVE	
VFD STEADY STATE DAMPED RESPONSE ANALYSIS (6.9.2.3)		SOUND LEVEL TEST (8.3.4.5)	OBSERVE	
	NO	CLEANLINESS PRIOR TO FINAL ASSEMBLY (8.2.2.6)	OBSERVE	
TRANSIENT TORSIONAL RESPONSE (6.9.2.4)	NO	LOCATION OF CLEANLINESS INSPECTION	@ SUPPLIER'S	
BEARING LIFE CALCULATIONS REQUIRED (6.10.1.6)	YES	NOZZLE LOAD TEST	OBSERVE	
IGNITION HAZARD ASSMT TO EN 13463-1 (7.2.13.e)		CHECK FOR CO-PLANAR MOUNTING PAD SURFACES	OBSERVE	
CASING RETIREMENT THICKNESS DRAWING (10.3.2.3)	YES	MECHANICAL RUN TEST UNTIL OIL TEMP STABLE	OBSERVE	
FLANGES RQD IN PLACE OF SKT WELD UNIONS (7.5.2.8)		4 HR. MECH RUN AFTER OIL TEMP STABLE (8.3.4.2.1)		
INCLUDE PLOTTED VIBRATION SPECTRA (6.9.3.3)	YES	4 HR. MECH RUN TEST (8.3.4.2.2)	OBSERVE	
CONNECTION BOLTING (7.5.1.7)				
CADMIUM PLATED BOLTS PROHIBITED		BRG HSG RESONANCE TEST (8.3.4.7)	OBSERVE	
VENDOR TO KEEP REPAIR AND HT RCDS (8.2.1.1.c)	YES	STRUCTURAL RESONANCE TEST (9.3.9.2)		
VENDOR SUBMIT TEST PROCEDURES (8.3.1.1)	YES	REMOVE / INSPECT HYDRODYNAMIC BEARINGS AFTER TEST		
SUBMIT INSPECTION CHECK LIST (8.1.5)	YES	(9.2.7.5)	OBSERVE	
		AUXILIARY EQUIPMENT TEST (8.3.4.6)	OBSERVE	
		EQUIPMENT TO BE INCLUDED IN AUXILLIARY TESTS		
		Motor		
		LOCATION OF AUXILIARY EQUIPENT TEST		
		SEE DOC. NO. 1229-00-EL-MSS-521 ITEM 14		
		IMPACT TEST (6.12.4.3) PER EN 13445		
		PER ASME SECTION VIII		
		REMOVE CASING AFTER TEST		

Note	PRESSURE VESSEL DESIGN CODE REFERENCES	Rev

THESE REFERENCES MUST BE LISTED BY THE MANUFACTURER

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

WELDING AND REPAIRS

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

ALTERNATE WELDING CODES AND STANDARDS	
WELDING REQUIREMENT (APPLICABLE CODE OR STANDARD)	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 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

ALTERNATIVE MATERIAL INSPECTIONS AND ACCEPTANCE CRITERIA (SEE TABLE 14) (8.2.2.5)

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

REMARKS :

(1) See Basic Engineering Design Questionnaire (BEDQ), Engineering Design Information (EDI) Project 9018716-A4, Sections 3 and 4.

(2) Pumps shall comply with UOP Standard Specifications 5-11 and 7-12.

(3) See Project Specification 533.

(4) A spillback to suction source will be provided to insure satisfactory pump operation at minimum continuous flow.
Pump vendor to advise minimum continuous capacity.

(5) The "Minimum Flow" is based on 40% of the lowest normal operating flow.

(6) Normal, rated and other capacities include 2.9 m^3/hr through restriction orifice (by contractor) in spillback line based on minimum flow of pump.

(7) Motor bearings shall be lubricated with a pure (dry sump) oil mist system.

(8) Pump Design Pressure and Temperature is 18.5 barg and 120 °C.

(9) Studded connections are not acceptable.

(10) See Basic Engineering Design Questionnaire 9018716-A4 for Mechanical Seal design.

(11) Mechanical seal parts and elastomeric components shall be suitable for handling aromatic hydrocarbons.

(12) Seal construction: Sleeve material: 316 Austenitic Stainless Steel, Gland material: 316 Austenitic Stainless Steel,
Aux seal device: Non-Sparking Fixed Throttle Bushing. See UOP Standard Specification 5-11 Section 6.8.4.

(13) Unpressurized Dual type Mechanical Seal. Seal flush piping plan: API Plan 31. Auxiliary flush plan: API Plan 52.

(14) Buffer Fluid: Clean, Light Oil.

(15) Sight Flow Indicators shall be provided.