

MUSTANG ENGINEERS & CONSTRUCTORS, INC.		CENTRIFUGAL PUMP PROCESS DATA SHEET		REV.	DATE	DESCRIPTION	APPV.	SHEET 1 OF 1 SPEC. NO.: PDE-404 REV. NO.: 01 PROJ. NO.: 10007 BY: PFD DATE: 1/10/2005
				A	8/19/2004	Issued for inquiry	SVP	
				01	1/10/2005	Issued for Purchase	<i>[Signature]</i>	

CLIENT: Giant Refining PROJECT: ULSD Hydrotreater LOCATION: Yorktown, VA			
NOTE: APPLICABLE TO INQUIRY () PURCHASE () AS BUILT ()			

1	SERVICE Stripper Bottoms/Reboiler Feed Pumps	ITEM NO.	G-544 A/B
2	PUMPS TO OPERATE IN (PARALLEL)	NO. MOTOR DRIVEN 2	NO. TURBINE DRIVEN
3	(SERIES) WITH	PUMP ITEM NO.	PUMP ITEM NO.
4	GEAR ITEM NO.	MOTOR ITEM NO.	TURBINE ITEM NO.
5	GEAR PROVIDED BY	MOTOR PROVIDED BY	TURBINE PROVIDED BY
6	GEAR MOUNTED BY	MOTOR MOUNTED BY	TURBINE MOUNTED BY

<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th colspan="4" style="text-align: center;">OPERATING CONDITIONS</th> </tr> <tr> <td>8</td> <td>CAPACITY, NORMAL</td> <td>1126 (GPM)</td> <td>RATED 1300 (GPM)</td> </tr> <tr> <td>9</td> <td colspan="3">OTHER</td> </tr> <tr> <td>10</td> <td>SUCTION PRESSURE MAX./RATED</td> <td>89 / 52</td> <td>(PSIG)</td> </tr> <tr> <td>11</td> <td>DISCHARGE PRESSURE</td> <td>192</td> <td>(PSIG)</td> </tr> <tr> <td>12</td> <td>DIFFERENTIAL PRESSURE</td> <td>140</td> <td>(PSI)</td> </tr> <tr> <td>13</td> <td>DIFF. HEAD</td> <td>520 (FT)</td> <td>NPSHA 13 (FT)</td> </tr> <tr> <td>14</td> <td colspan="3">TYPE OR NAME OF LIQUID Diesel</td> </tr> <tr> <td>15</td> <td colspan="3">PUMPING TEMPERATURE</td> </tr> <tr> <td>16</td> <td>NORMAL</td> <td>579 (°F) MAX.</td> <td>630 (°F) MIN. 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HEAD	520 (FT)	NPSHA 13 (FT)	14	TYPE OR NAME OF LIQUID Diesel			15	PUMPING TEMPERATURE			16	NORMAL	579 (°F) MAX.	630 (°F) MIN. (°F)	17	VAPOR PRESSURE	63.7 (PSIA)	@ 579 (°F)	18	RELATIVE DENSITY (SPECIFIC GRAVITY):			19	NORMAL	0.620	MAX MIN	20	SPECIFIC HEAT, Cp	(BTU/LB °F)		21	VISCOSITY	0.13 (cP) @	579 (°F)	22	MAX. 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ALTITUDE		(FT)	BAROMETER (PSIA)	RANGE OF AMBIENT TEMPS: MIN/MAX.		0 / 95	(°F)	RELATIVE HUMIDITY: MIN / MAX		/	(%)	UNUSUAL CONDITIONS: (2.1.23) ☐ DUST ☐ FUMES				☐ OTHER				UTILITY CONDITIONS:				STEAM:	DRIVERS	HEATING		MIN	(PSIG)	(°F)	(PSIG) (°F)	MAX	(PSIG)	(°F)	(PSIG) (°F)	ELECTRICITY:	DRIVERS	HEATING	CONTROL SHUTDOWN	VOLTAGE				HERTZ				PHASE				COOLING WATER:				TEMP. INLET	80 (°F)	MAX. RETURN	120	PRESS. NORM	40 (PSIG)	DESIGN	150 (PSIG)	MIN RETURN	30 (PSIG)	MAX ALLOW DP	10 (PSI)	WATER SOURCE				INSTRUMENT AIR: MAX/MIN PRESS		/	(PSIG)	MATERIAL				☒ API 610 APPENDIX H CLASS		S-6		☒ MIN DESIGN METAL TEMP		2°F		☐ CASING		IMPELLER		MECHANICAL SEAL OR PACKING				☐ SINGLE				☒ UNPRESSURIZED DUAL (TANDEM)				☐ PRESSURIZED DUAL (DOUBLE)				SEAL FLUSH				API SEAL FLUSH PLAN (Appendix D)			
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LINDE BOC PROCESS PLANTS LLC



A Member of the Linde AG Engineering Group

CLIENT: Giant Industries, Inc.		JOB NO.: AA13		ITEM NO.: G-544 A/B		
PLANT: Yorktown, VA		P&ID NO.:		DATA SHEET NO.: MDE-404		
SERVICE: Stripper Bottoms / Reboiler Feed Pumps		QTY REQ'D: 2 (Two)		REV: 01		
MFR: EPUMPS/FLOWSERVE		SIZE: 6HPX12C				
1 PUMP IS TO BE MANUFACTURED IN ACCORDANCE WITH		MSS-404, API 610 9th Ed.				
2 PUMP SIZE 6x10x13		TYPE OH2		NUMBER STAGES 1		
3 OPERATING CONDITIONS*						
4 LIQUID/STREAM NUMBER		NPSH AVAILABLE FT				
5 PUMPING TEMPERATURE °F		NORMAL		MAX		
6 SPECIFIC GRAVITY @ PT		CAPACITY @ PT - US GPM				
7 VAPOR PRESSURE @ PT		PSIA		DISCHARGE PRESSURE PSIG		
8 VISCOSITY @ PT CP		CP		DISCHARGE TEMPERATURE °F		
9 AMBIENT TEMPERATURE °F		MAXIMUM		MINIMUM		
10 HYDRAULIC HP		SUCTION PRESSURE PSIG		MAX		
11 UNUSUAL CONDITIONS		DIFFERENTIAL PRESSURE PSI		RATED		
		DIFFERENTIAL HEAD FT				
12 LOCATION						
13 CORROSION						
14 EROSION CAUSED BY						
15 *(SEE PDE-404 FOR OPERATING CONDITIONS)						
16 PERFORMANCE						
17 PROPOSAL CURVE NUMBER 6HPX12C-2-2		MINIMUM CONTINUOUS FLOW US GPM				
18 SPEEC RPM 3540		THERMAL		STABLE 704		
19 RATED BHP 165		ROTATION (VIEWED FR. CPLG. END)		CCW		
20 RATED HP 200		SUCTION SPECIFIC SPEED		10140		
21 MAXIMUM BHP WITH RATED IMPELLER 215		EFF. (AT RATED CAP. & RATED SUCT. PRESS.) %		64.3		
22 MAXIMUM HEAD WITH RATED IMPELLER (FT) 558.2						
23 CONSTRUCTION						
24 CASING MOUNT CL		NOZZLES		SIZE		
25		SUCTION		10"		
26		DISCHARGE		6"		
27 CASING SPLIT RADIAL		BEARINGS		RADIAL THRUST		
28 CASING TYPE SPLIT		LUBRICATION		RING OIL		
29		TYPE				
30 MAXIMUM ALLOWABLE PRESSURE 600		PSIG @ 60 °F		COUPLING		
31		PSIG & PT		THOMAS		
32 HYDROSTATIC TEST PRESS 900		PSIG		MANUFACTURER		
33 IMPELLER DIAMETER (IN.) 11.46"		TYPE		SERIES 71		
34 RATED 11.46" MAXIMUM 12.76"		MINIMUM 10"		MODEL		
35 IMPELLER MOUNT SHAFT		DRIVER HALF-COUPLING MOUNTED BY		PUMP VENDOR		
36 PACKING N/A						
37 MANUFACTURER		GLAND PLATE TAPS				
38 TYPE						
39 SIZE NUMBER OF RINGS		CASING TAPS DRAIN				
40 MECHANICAL SEAL BXHH/BXH TANDEM		WEIGHT OF PUMP AND BASE PLATE		LBS		
41 MANUFACTURER FLOWSERVE		WEIGHT OF DRIVER		LBS		
42 MODEL BX		TOTAL WEIGHT		LBS		
43 MANUFACTURER CODE						
44 API CLASS CODE		GLAND TYPE				
45		MATERIAL				
46 NOTES:						
47 1. Flow reflects one 100% unit.						
48						
49						
50						
REV:	DESCRIPTION	DATE:	BY:	CHECKED:	REVIEWED:	APPROVED:
01	Issued for Purchase	1/10/05	APF	PSG		MEL

LINDE BOC PROCESS PLANTS LLC

A Member of the Linde AG Engineering Group



CLIENT: Giant Industries, Inc.				JOB NO.: AA13		ITEM NO.: G-544 A/B	
PLANT: Yorktown, VA				P&ID NO.:		DATA SHEET NO.: MDE-404	
SERVICE: Stripper Bottoms / Reboiler Feed Pumps				QTY REQ'D: 2 (Two)		REV: 01	
MFR: EPUMPS/FLOWSERVE				SIZE: 6HPX12C			
AUXILIARY PIPING							
SEAL FLUSH PIPING PLAN MATERIAL PLAN 23 COOLING WATER PIPING PLAN MATERIAL							
AUXILIARY FLUSH PLAN MATERIAL PLAN 52 / SS TUBING				TOTAL COOLING WATER REQUIRED - USGPM 10GPM/PUMP			
SEAL FLUSH PIPING SW & SS TUBING				COOLING WATER TEMPERATURE °F			
EXTERNAL SEAL FLUSH FLUID REQUIRED				SIGHT FLOW INDICATORS REQUIRED			
GPM PSIG				GPM PSIG			
MATERIALS							
TABLE E-1 CLASS (PER API 610) S6				SHAFT		SLEEVE	
BARREL		CASE		BASE PLATE		MATERIAL TYPE Fab. Steel	
INNER CASE PARTS				API STD. 610 STANDARD BASE PLATE NUMBER			
IMPELLER				ANSI STD. B73.1 STANDARD BASE PLATE NUMBER			
CASE IMPELLER WEAR RINGS							
INSPECTIONS AND TESTS							
PERFORMANCE TEST		Yes - Non Witnessed					
HYDROSTATIC TEST		Yes - Non Witnessed					
NPSH		Yes - Non Witnessed					
				INSPECTION REQUIRED FOR NOZZLE WELDS NO			
				INSPECTION REQUIRED FOR CASTINGS NO			
SHOP INSPECTION BY LBPP							
DISMANTLE AND INSPECT AFTER TEST NO							
CASTING REPAIR PROCEDURE APPROVAL REQUIRED YES							
DRIVER DATA							
MOTOR DRIVER BY Pump Vendor				TURBINE DRIVER BY			
ITEM NUMBER MG-544 A/B		MANUFACTURER RELIANCE		ITEM NUMBER		MOUNTED BY	
HP 200		RPM 3550 FRAME 447TS		HP		RPM MATERIAL	
MANUFACTURER				TYPE			
TYPE TEFC-XEX		INSULATED F SF 1.15		INLET STEAM PSIG		°F	
ENC. CL1, DIV2, B,C,D		TEMP. RISE * T2 OR GREATER		EXHAUST PSIG			
VOLTS PHASE HERTZ		460 3 60		FULL LOAD STEAM RATE		LBS/BHP/HR	
EXTERNAL JUNCTION BOX				BEARINGS LUBE			
BEARINGS		LUBE GREASE		NOZZLES SIZE TYPE POSITION			
FULL LOAD AMPS		L.R. AMPS		INLET			
ELECT. AREA CLASSIFICATION		CL1, DIV2, B,C,D		EXHAUST			
SPACE HEATER		VOLTS		TYPE GOVERNOR			
SPECIALS							
REMARKS							

LINDE BOC PROCESS PLANTS LLC



A Member of the Linde Engineering Division

CLIENT: Giant Industries, Inc. PLANT: Giant Hydrotreater SERVICE: Stripper Bottoms / Reboiler Feed Pumps REFERENCE SPECIFICATION LINDE BOC PROCESS PLANTS: MSS-404 CLIENT: Giant - Reliance Alliance SITE: LOCATION: Yorktown, VA ☐ INDOOR ☒ OUTDOOR (w/ moderate dust) ALTITUDE: 10 Feet AMBIENT TEMP: -20/95°F AREA CLASSIFICATION ☐ NON-HAZARDOUS ☒ HAZARDOUS CLASS 1 GROUP B, C & D DIVISION 2 TEMPERATURE IDENTIFICATION: T-2 OR GREATER RATED VOLTAGE: 460 PHASE: 3 HERTZ: 60 RATED HORSEPOWER: 200 SERVICE FACTOR: 1.15 NEMA DESIGN LETTER: _____ LOCKED ROTOR KVA _____ INSULATION CLASS: F TEMPERATURE RISE BY RESISTANCE: _____ ABOVE _____ °C AMBIENT AT _____ S.F. EFFICIENCY: @50% _____ @75% _____ @100% _____ PF FACTOR: @50% _____ @75% _____ @100% _____ ☒ SINGLE SPEED MOTOR: 3550 RPM ☐ MULTI-SPEED MOTOR: ☐ ONE WINDING ☐ TWO WINDING ☐ VARIABLE TORQUE ☐ CONSTANT TORQUE ☐ CONSTANT HORSEPOWER SYNCHRONOUS SPEED: _____ AT _____ RPM CONNECTIONS ☒ STANDARD WYE ☐ WYE START, DELTA RUN ☐ EXTERNAL NEUTRAL CONNECTION SPECIAL WINDING TREATMENT ☐ NOT REQUIRED ☐ EXTRA DIP AND BAKE ☐ ENCAPSULATION ☐ VPI ☐ ABRASION RESISTANT ☐ EPOXY VARNISH OR EQUIVALENT ☐ SUITABLE FOR ADJUSTABLE SPEED DRIVE ☒ OTHER Per Giant - Reliance Alliance THERMAL PROTECTION OF WINDING ☒ NOT REQUIRED ☐ THERMISTOR, PTC TYPE ☐ WITH CONTROLLER RELAY ☐ MOUNTED ON MOTOR ☐ SHIPPED LOOSE ☐ CONTROLLER RELAY BY OTHERS ☐ THERMOSTAT WITH N.C. CONTACTS ☐ RESISTANCE TEMPERATURE DETECTORS TYPE: _____	JOB NO.: AA13 ITEM NO.: MG-544 A/B P&ID NO.: _____ DATA SHEET NO.: EDE-404 QTY REQ'D: Two (2) REV: 01 MOTOR ENCLOSURE ☐ OPEN DRIPPROOF ☒ TEFC ☒ SEVERE DUTY (MILL & CHEMICAL) ☐ EXPLOSION PROOF ☐ TENV ☐ TEAO ☒ OTHER IEEE 841 Features, Premium Efficiency MODIFICATIONS/ACCESSORIES ☐ BREATHING AND DRAIN ☐ SPACE HEATER WATTAGE _____ VOLTS _____ PHASE _____ HERTZ ☐ SEPARATE ENCLOSURE FOR TERMINATION OF HTR. LEADS ☐ LONG SHAFT, BELT DRIVE ☐ OVER SIZED TERMINATION BOX ASSEMBLY ☒ HORIZONTAL ☐ ASSEMBLY F-1 ☐ ASSEMBLY F-2 ☐ OTHER _____ ☐ VERTICAL ☐ DRIP COVER SPECIAL END MOUNTING END SHIELD ☒ NOT REQUIRED ☐ NEMA C FACE ☐ NEMA D FLANGE ☐ NEMA P FLANGE BEARINGS ☒ ANTI-FRICTION ☒ BALL ☐ ROLLER ☐ SLEEVE ☐ SPLIT ☐ SOLID LUBRICATION ☒ GREASE (w/ grease deflectors) ☒ GREASE FITTINGS ☐ PLUGS ☐ OIL ☐ RING ☐ MIST ☐ PRESSURE BEARING TEMPERATURE SENSING ☒ NOT REQUIRED ☐ LOCAL THERMOMETER ☐ TEMPERATURE SWITCH ☐ THERMOCOUPLE TYPE: _____ ☐ RESISTANCE TEMPERATURE DETECTORS TYPE: _____ TESTS ☒ ROUTINE ☐ COMPLETE ☐ WITNESSED ☒ NON-WITNESSED NOTES: 1.) Motor to be supplied and installed by pump vendor. 2.) Vertical jackscrews, grounding lug required.
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REV:	DESCRIPTION	DATE:	BY:	CHECKED:	REVIEWED:	APPROVED:
01	Issued for Purchase	1/18/05	PA PF	PSB		MBP

LINDE BOC PROCESS PLANTS LLC

A Member of the Linde Engineering Division



CLIENT: Giant Industries, Inc.		JOB NO.: AA13		ITEM NO.: G-544 A/B	
PLANT: ULSD Hydrotreater, Yorktown, VA		P&ID NO.:		DATA SHEET NO.: MSP-404	
MFR:		QTY REQ'D: 2		REV: 01	

ITEM NUMBER:	LOCATION:	SERVICE:	P&ID NUMBER:
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

11 FLUSH PLAN		RESERVOIR CONNECTIONS		AUXILIARY DEVICES	
12 PLAN 52	☒	FILL CONNECTION (FLANGED)		LEVEL GAUGE	
13 PLAN 53	☐	3/4"	☒	1"	☐
14 OTHER	☐	1 1/2"	☐	1 1/2"	☐
				TYPE: (MANUFACTURER'S STD.)	
16 RESERVOIR CAPACITY		SEAL CONNECTIONS		BULLSEYE	
17 2 GALLON	☐	1/2"	☐	FNPT	☒
18 3 GALLON	☐	3/4"	☒	SW	☐
19 4 GALLON	☒	1"	☐	FLGD	☐
20 5 GALLON	☐			TRANSPARENT	
21		VENT CONNECTION			
22 RESERVOIR MATERIAL		1/2"	☐	FNPT	☒
23 CARBON STEEL	☒	3/4"	☒	SW	☐
24 STAINLESS STEEL	☐	1"	☐	FLGD	☐
25				TYPE: (MANUFACTURER'S STD.)	
26 RESERVOIR DESIGN CONDITIONS		DRAIN CONNECTION (FLANGED)		ULTRASONIC	
27 TEMPERATURE, °F		1/2"	☐	FNPT	☐
28 -20 to 600	☒	3/4"	☒	SW	☐
29 -20 to 300	☐	1"	☐	FLGD	☒
30 PRESSURE, PSIG				DPDT	
31 400	☐	LEVEL GAUGE CONN. (MANUFACTURER'S STD.)			
32 450	☐	1/2"	☐	FNPT	☐
33 950	☒	3/4"	☐	SW	☐
34 1500	☐	1"	☐	FLGD	☐
35 COOLING COIL				TYPE:	
36 REQUIRED	☒	LEVEL SWITCH CONNECTIONS		SPDT	
37 NOT REQUIRED	☐	3/4"	☒	FNPT	☒
38		1"	☐	SW	☐
39 MATERIAL		1 1/2"	☐	FLGD	☐
40 CARBON STEEL	☐				
41 STAINLESS STEEL	☒	HIGH	☒	LOW	☐
42 OTHER	☐			PRESSURE GAUGE	
43 SPECIFY	☐	STAND		BY SUPPLIER	
44		YES	☒	NO	☐
45 SIZE (DIAMETER)		SPECIFY HEIGHT TO BOTTOM		2 1/2" DIAL	
46 3/8"	☐	OF RESERVOIR IN INCHES:		4 1/2" DIAL	
47 1/2"	☒	By Pump Vendor		SPECIFY RANGE:	
48 REMARKS: Plan 52 per Giant / Flowserve Alliance					
49					
50					
51					
52					

REV.	DESCRIPTION	DATE:	BY:	CHECKED:	REVIEWED:	APPROVED:
01	Issued for Purchase	1/18/05	PF	1/15/06		MES
02						
03						
04						