HOJA DE DATOS PARA BOMBA DE TORNILLO DOBLE (PDD)

REV.	FECHA	PÁG	DESCRIPCIÓN	ELAB	REV. APROB.	APROB. ICHQ	APROB. PSSA
0	28/12/2012	7	EMISIÓN FINAL	GXD	ZYB/XGK		
B	10/09/2012	7	INCORPORACIÓN DE COMENTARIOS	GXD	ZYB/XGK		
A	24/05/2012	7	EMISIÓN PARA COMENTARIOS	GXD	ZYB/XGK		

DERECHOS RESERVADOS

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PDVSA
PETROLERA
SINOVENSA

DESARROLLO DE LA INGENIERÍA CONCEPTUAL Y BÁSICA DEL PROYECTO DE EXPANSIÓN DE PRODUCCIÓN DE 105 MBD A 160 MBD

PDVSA
INGENIERÍA Y CONSTRUCCIÓN
HQCEC

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SCREW PUMP DATA SHEET

APPLICABLE TO: • PROPOSAL ○ PURCHASE ○ AS BUILT — ITEM TAG: 0003-P-1002A/B/C/D/E/F
CLIENT: PSSA — PLANT: DDP
SITE: MORICHAL — NO. OF PUMPS REQUIRED: FOUR (4) OPERATING AND TWO (2) SPARE
SERVICE: WDEHO FEED PUMPS — SIZE AND TYPE: HORIZONTAL TWIN-SCREW PUMP
MANUFACTURER: — SERIAL NO.:

LEYEND: ○ INDICATES INFORMATION TO BE COMPLETED BY PURCHASER — □ BY MANUFACTURER

GENERAL

NO. MOTORS DRIVEN:		OTHER DRIVER TYPE			
PUMP ITEM NO'S:	0003-P-1002A/B/C/D/E/F	PUMP ITEM NO'S			
MOTOR ITEM NO'S:		DRIVER ITEM NO'S		GEAR ITEM NO'S	
MOTOR PROVIDED BY:	pump manufacture	DRIVER PROVIDED BY		GEAR PROVIDED BY	
MOTOR MOUNTED BY:	pump manufacture	DRIVER MOUNTED BY		GEAR MOUNTED BY	
MOTOR DATA SHEET NO.:		DRIVER DATA SHEET NO.		GEAR DATA SHEET NO.	

OPERATING CONDITIONS

- CAPACITY @ PT (GPM US):
  RANGE NORMAL 1081.2 RATED 1189.3
- DISCHARGE PRESSURE (psig):
  MAXIMUM: 565 MINIMUM: 485
- SUCTION PRESSURE (psig):
  MAXIMUM: 16 MINIMUM: 3.5
- DIFFERENTIAL PRESSURE (psi):
  MAXIMUM: 561.5 MINIMUM: 469
- NPSH AVAILABLE (ft.) 8.5 (NOTE2)
- SERVICE • CONTINUOUS ○ INTERMITTENT
- HYDRAULIC HP. 390

LIQUID

- TYPE OR NAME OF LIQUID: WET DILUTED EXTRA HEAVY OIL (NOTE3)
- PUMPING TEMPERATURE (°F):
  NORMAL: 100 MAX: 120 MIN: 90
- SPECIFIC GRAVITY: NORMAL 0.953 MAXIMUM 1 MINIMUM 0.94
- SPECIFIC HEAT Btu/lb °F
- VISCOSITY (cP): 442@ 100 °F MINIMUM 640.39@ 90 °F MAXIMUM
- VAPOR PRESSURE@ P.T. (psia) 14.7@ 100 °F
- ○ CORROSIVE/EROSIVE AGENTS: sand particules / Dissolved salt
- CHLORIDE CONCENTRATION (PTB) NaCl: 689 ~ 848 PTB
- ○ H_2S CONCENTRATION (PPM)

LIQUID: ○ TOXIC • FLAMMABLE ○ OTHER

PERFORMANCE

- □ RATED CAPACITY (GPM US)
- □ NPSH REQUIRED (ft.)
- □ RATED SPEED (RPM)
- □ DISPLACEMENT (GPM)
- □ VOLUMETRIC EFFICIENCY (%)
- □ MECHANICAL EFFICIENCY (%)
- □ BHP @ MAXIMUM VISCOSITY
- □ BHP @ RELIEF VALVE SETTING
- □ MAXIMUM ALLOWABLE SPEED (RPM)
- □ MINIMUM ALLOWABLE SPEED (RPM)

SITE AND UTILITY DATA (NOTE 1)

LOCATION: ○ INDOOR • OUTDOOR ○ SUN
○ HEATED • UNHEATED ○ UNDER ROOF
• ELECTRICAL AREA CLASS 1 GROUP D DIV: 2
○ WINTERIZATION REQD • TROPICALIZATION REQD

SITE DATA :
○ RANGE OF AMBIENT TEMPS:MIN/MAX : 72 / 90 °F

UNUSUAL CONDITIONS
• DUST • FUMES • SALTY ATMOSPHERE
○ OTHER
○ UTILITY CONDITIONS

CONSTRUCTION

CONNECTIONS	SIZE	RATING	FACING	POSITION
SUCTION				
DISCHARGE				
GLAND FLUSH				
DRAINS				
VENTS				
JACKET				

PUMP TYPE:
□ INTRN'L GEAR ■ TWIN-SCREW □ VANE
□ EXTRN'L GEAR □ 3-SCREW □ PROGRESSING CAVITY

GEAR TYPE
□ SPUR ■ HELICAL
□ OTHER

ELECTRICITY	DRIVERS	HEATING	CONTROL	SHUTDOWN
VOLTAGE	4160			
HERTZ	60			
PHASE	3			

COOLING WATER	INLET	RETURN	DESIGN	MAX Δ
TEMP °F	MAX			
PRESS. (psig)	MIN			
SOURCE	N/A			

INSTRUMENT AIR PRESSURE (psig) MAX MIN

APPLICABLE SPECIFICATIONS:

- API 676 POSITIVE DISPLACEMENT PUMPS - ROTARY
- PDVSA GA-202
- OTHERS SPECIFIED IN THE MATERIAL REQUISITION

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PROGRESSIVE CAVITY PUMP DATA SHEET

CONSTRUCTION (CONTINUED)

CASING (NOTE7)

- ☐ MAXIMUM ALLOWABLE PRESSURE: _____ kPa @ ____ °F
- ☐ HYDROSTATIC TEST PRESSURE: _____ kPa @
- ☐ STEAM JACKET PRESSURE: _____ kPa @ ____ °C

ROTOR MOUNT: ☐ BTWN. BEARINGS ☐ OVERHUNG

TIMING GEARS ☐ YES ☐ NO

BEARING TYPE: ☐ RADIAL _____ ☐ THRUST ____

LUBRICATION TYPE: ■ CONSTANT LEVEL OILERS

- ☐ PUMPED FLUID ☐ RING OIL ☐ OIL MIST
- ■ EXTERNAL ■ OIL FLOOD ☐ GREASE

- ☐ LUBRICANT TYPE:
- ● MECHANICAL SEALS: pump manufacture
  - ☐ MANUFACTURER AND MODEL
  - ☐ MANUFACTURER CODE
- ■ API 610 SEAL FLUSH PLAN 32+61 (NOTE5)
- ☐ API 610 SEAL CODE
- ○ PACKING: ☐ LANTERN RING
  - ○ MFR. AND TYPE ○ NO. OF RINGS

DRIVE MECHANISM

■ DIRECT-COUPLED ☐ V-BELT ☐ GEAR

☐ COUPLING MANUFACTURER

DRIVERS

MOTOR :

- ☐ MANUFACTURER
- ☐ TYPE
- ☐ FRAME NO.
- ☐ NEMA DESIGN
- ☐ APPROVAL, LISTED OR CERTIFIED BY:
- ○ CONSTANT SPEED
- ○ VARIABLE SPEED
- ☐ HP RPM
- ● VOLTS 4000 PHASE 3
- ● HERTZ 60 SERVICE FACTOR
- ● ENCLOSURE TEFC
- ○ MINIMUM STARTING VOLTAGE
- ● STARTING METHOD Automatic
- ○ INSULATION ○ TEMPERATURE CLASS
- ☐ CONSECUTIVE STARTS
- ☐ MOTOR WINDING MATERIAL

MAIN JUNCTION BOX:

- ○ CONDUIT INPUT ☐ QUANTITY
- ☐ SIZE

SPACE HEATERS JUNCTION BOX:

- ○ CONDUIT INPUT ☐ QUANTITY
- ☐ SIZE
- ○ STEAM TURBINE

REMARKS

OTHER PURCHASER REQUIREMENTS

NAMEPLATE UNITS ● ENGLISH ○ SI

● RELIEF VALVES BY PUMP MFRG ○ INTERNAL ● EXTRNL (NOTE4)

PIPING FOR SEAL FLUSH FURNISHED BY:

● PUMP VENDOR ○ OTHERS

PIPING FOR COOLING/HEATING FURNISHED BY:

○ PUMP VENDOR ○ OTHERS

○ PROVIDE TECHNICAL DATA MANUAL

MATERIALS (NOTE6)

- ☐ CASING CS
- ☐ STATOR
- ☐ COMMON BASE PLATES
- ☐ ROTOR (S) CS
- ☐ VANES
- ☐ SHAFT
- ☐ SLEEVE (S)
- ☐ GLAND (S)
- ☐ BEARING HOUSING
- ☐ TIMING GEARS
- ○ SPECIAL MATERIAL TESTS (2.9.1.3)
- ○ LOW AMBIENT TEMP. MATERIALS TESTS (2.9.5)

QA INSPECTION AND TEST

- ● COMPLIANCE WITH INSPECTORS & TEST PLAN
- ○ CERTIFICATION OF MATERIALS
- ○ FINAL ASSEMBLY CLEARANCES
- ○ SURFACE AND SUBSURFACE EXAMINATIONS
  - ○ RADIOGRAPHY
  - ○ ULTRASONIC
  - ○ MAGNETIC PARTICLE
  - ○ LIQUID PENETRANT
- ○ CLEANLINESS PRIOR TO FINAL ASSEMBLY
- ○ HARDNESS OF PARTS, WELDS & HEAT AFFECTED ZONES
- ○ FURNISH PROCEDURES FOR OPTIONAL TESTS

TESTS	REQ'D	WIT	OBS
HYDROSTATIC	●	○	○
MECHANICAL RUN	●	●	○
PERFORMANCE	●	●	○
NPSH	●	○	○

PREPARATION FOR SHIPMENT

○ DOMESTIC ● EXPORT

● OUTDOOR STORAGE MORE THAN 6 MONTHS

WEIGHTS (kg)

☐ PUMP ☐ BASE ☐ DRIVER

☐ COUPLING ☐ ACCESSORIES

BASEPLATE

● BY PUMP MANUFACTURER ○ SUITABLE FOR EPOXY GROUT

○ EXTENDED FOR

● COMMON PLATES BY PUMP MANUFACTURER

○ DRAIN ☐ DRAIN-RIM ■ DRAIN-PAN

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PROGRESSIVE CAVITY PUMP DATA SHEET

NOTES

1 See Document "PDD-D-178-00-2111-S001" for detail.
Because no cooling water is applicable, vendor shall consider air cooling for pump bear housing and flushing plan etc., where cooling is necessary. Tropicalization is required.
2 For the value of NPSHa, the pumps shall be able to operate with 0.5%(mol) disolved gas.
3 WDEHO is a mixture of extra heavy oil, diluent(naphtha) and water 12%(V), it is flammable. The fluid containing sands.
4 External safety valves shall be supplied by vendor, the design pressure of downstream pipe is 642 Psig.
5 The mechanical seal flushing plan shall be confirmed by vendor.
6 The material shall be confirmed by vendor.
7 Pump casing drain shall be connected to the edge of baseplate with block valve.

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SCREW PUMP DATA SHEET

APPLICABLE TO: ● PROPOSAL ○ PURCHASE ○ AS BUILT — ITEM TAG: 0003-P-1102A/B/C/D/E/F
CLIENT: PSSA — PLANT: DDP
SITE: MORICHAL — NO. OF PUMPS REQUIRED: FOUR (4) OPERATING AND TWO (2) SPARE
SERVICE: DDEHO TRANSFER PUMPS — SIZE AND TYPE: HORIZONTAL TWIN-SCREW PUMP
MANUFACTURER — SERIAL NO.

LEYEND: ○ INDICATES INFORMATION TO BE COMPLETED BY PURCHASER ☐ BY MANUFACTURER

GENERAL

NO. MOTORS DRIVEN:		OTHER DRIVER TYPE			
PUMP ITEM NO'S:	0003-P-1102A/B/C/D/E/F	PUMP ITEM NO'S			
MOTOR ITEM NO'S:		DRIVER ITEM NO'S		GEAR ITEM NO'S	
MOTOR PROVIDED BY:	pump manufacture	DRIVER PROVIDED BY		GEAR PROVIDED BY	
MOTOR MOUNTED BY:	pump manufacture	DRIVER MOUNTED BY		GEAR MOUNTED BY	
MOTOR DATA SHEET NO.:		DRIVER DATA SHEET NO.		GEAR DATA SHEET NO.	

OPERATING CONDITIONS

- CAPACITY @ PT (GPM US): RANGE NORMAL 1043.6 RATED 1148
- DISCHARGE PRESSURE (psig): MAXIMUM: 258 MINIMUM: 210
- SUCTION PRESSURE (psig): MAXIMUM: 135 MINIMUM: 90
- DIFFERENTIAL PRESSURE (psi): MAXIMUM: 168 MINIMUM: 75
- NPSH AVAILABLE (ft.) 136
- SERVICE ● CONTINUOUS ○ INTERMITTENT
- HYDRAULIC HP. 108

LIQUID

- TYPE OR NAME OF LIQUID: DRY DILUTED EXTRA HEAVY OIL
- PUMPING TEMPERATURE (°F): NORMAL: 288 MAX: 300 MIN: 250
- SPECIFIC GRAVITY: NORMAL 0.88 MAXIMUM 0.941 MINIMUM 0.88
- SPECIFIC HEAT Btu/lb °F
- VISCOSITY (cP): 7.497@ 288 °F MINIMUM 13.16@ 250 °F MAXIMUM
- VAPOR PRESSURE@ P.T. (psia) 98@ 288 °F
- ○ CORROSIVE/EROSIVE AGENTS: sand particules / Dissolved salt
- CHLORIDE CONCENTRATION (PTB) NaCl: 20 PTB
- ○ H_2S CONCENTRATION (PPM)

LIQUID: ○ TOXIC ● FLAMMABLE ○ OTHER

PERFORMANCE

- ☐ RATED CAPACITY (GPM US)
- ☐ NPSH REQUIRED (ft.)
- ☐ RATED SPEED (RPM)
- ☐ DISPLACEMENT (GPM)
- ☐ VOLUMETRIC EFFICIENCY (%)
- ☐ MECHANICAL EFFICIENCY (%)
- ☐ BHP @ MAXIMUM VISCOSITY
- ☐ BHP @ RELIEF VALVE SETTING
- ☐ MAXIMUM ALLOWABLE SPEED (RPM)
- ☐ MINIMUM ALLOWABLE SPEED (RPM)

SITE AND UTILITY DATA (NOTE 1)

LOCATION: ○ INDOOR ● OUTDOOR ○ SUN
○ HEATED ● UNHEATED ○ UNDER ROOF
● ELECTRICAL AREA CLASS I GROUP D DIV: 2
○ WINTERIZATION REQD ● TROPICALIZATION REQD

SITE DATA :
○ RANGE OF AMBIENT TEMPS:MIN/MAX : 72 / 90 °F

UNUSUAL CONDITIONS
● DUST ● FUMES ● SALTY ATMOSPHERE
○ OTHER
○ UTILITY CONDITIONS

ELECTRICITY	DRIVERS	HEATING	CONTROL	SHUTDOWN
VOLTAGE	4160			
HERTZ	60			
PHASE	3			

COOLING WATER	INLET	RETURN	DESIGN	MAX Δ
TEMP °F	MAX			
PRESS. (psig)	MIN			
SOURCE	N/A			

INSTRUMENT AIR PRESSURE (psig) MAX MIN

CONSTRUCTION

CONNECTIONS	SIZE	RATING	FACING	POSITION
SUCTION				
DISCHARGE				
GLAND FLUSH				
DRAINS				
VENTS				
JACKET				

PUMP TYPE:
☐ INTRN'L GEAR ■ TWIN-SCREW ☐ VANE
☐ EXTRN'L GEAR ☐ 3-SCREW ☐ PROGRESSING CAVITY

GEAR TYPE
☐ SPUR ■ HELICAL
☐ OTHER

APPLICABLE SPECIFICATIONS:

- API 676 POSITIVE DISPLACEMENT PUMPS - ROTARY
- PDVSA GA-202
- OTHERS SPECIFIED IN THE MATERIAL REQUISITION

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PROGRESSIVE CAVITY PUMP DATA SHEET

CONSTRUCTION (CONTINUED)

CASING (NOTE5)

- ☐ MAXIMUM ALLOWABLE PRESSURE: _____ kPa @ ____ °F
- ☐ HYDROSTATIC TEST PRESSURE: _____ kPa @
- ☐ STEAM JACKET PRESSURE: _____ kPa @ ____ °C

ROTOR MOUNT: ☐ BTWN. BEARINGS ☐ OVERHUNG

TIMING GEARS ☐ YES ☐ NO

BEARING TYPE: ☐ RADIAL _____ ☐ THRUST ____

LUBRICATION TYPE: ■ CONSTANT LEVEL OILERS

- ☐ PUMPED FLUID ☐ RING OIL ☐ OIL MIST
- ■ EXTERNAL ■ OIL FLOOD ☐ GREASE

- ☐ LUBRICANT TYPE:
- ● MECHANICAL SEALS: pump manufacture
- ☐ MANUFACTURER AND MODEL
- ☐ MANUFACTURER CODE
- ■ API 610 SEAL FLUSH PLAN 11+61 (NOTE3)
- ☐ API 610 SEAL CODE
- ○ PACKING: ☐ LANTERN RING
- ○ MFR. AND TYPE _____ ○ NO. OF RINGS ____

DRIVE MECHANISM

■ DIRECT-COUPLED ☐ V-BELT ☐ GEAR

☐ COUPLING MANUFACTURER

DRIVERS

MOTOR :

- ☐ MANUFACTURER
- ☐ TYPE
- ☐ FRAME NO.
- ☐ NEMA DESIGN
- ☐ APPROVAL, LISTED OR CERTIFIED BY:
- ○ CONSTANT SPEED
- ○ VARIABLE SPEED
- ☐ HP _____ RPM
- ● VOLTS 4000 PHASE 3
- ● HERTZ 60 SERVICE FACTOR
- ● ENCLOSURE TEFC
- ○ MINIMUM STARTING VOLTAGE
- ● STARTING METHOD Automatic
- ○ INSULATION _____ ○ TEMPERATURE CLASS
- ☐ CONSECUTIVE STARTS
- ☐ MOTOR WINDING MATERIAL

MAIN JUNCTION BOX:

- ○ CONDUIT INPUT _____ ☐ QUANTITY
- ☐ SIZE

SPACE HEATERS JUNCTION BOX:

- ○ CONDUIT INPUT _____ ☐ QUANTITY
- ☐ SIZE
- ○ STEAM TURBINE

REMARKS

OTHER PURCHASER REQUIREMENTS

NAMEPLATE UNITS ● ENGLISH ○ SI

● RELIEF VALVES BY PUMP MFRG ○ INTERNAL ● EXTRNL (NOTE2)

PIPING FOR SEAL FLUSH FURNISHED BY:

● PUMP VENDOR ○ OTHERS

PIPING FOR COOLING/HEATING FURNISHED BY:

○ PUMP VENDOR ○ OTHERS

○ PROVIDE TECHNICAL DATA MANUAL

MATERIALS (NOTE4)

- ☐ CASING CS
- ☐ STATOR
- ☐ COMMON BASE PLATES
- ☐ ROTOR (S) CS
- ☐ VANES
- ☐ SHAFT
- ☐ SLEEVE (S)
- ☐ GLAND (S)
- ☐ BEARING HOUSING
- ☐ TIMING GEARS
- ○ SPECIAL MATERIAL TESTS (2.9.1.3)
- ○ LOW AMBIENT TEMP. MATERIALS TESTS (2.9.5)

QA INSPECTION AND TEST

- ● COMPLIANCE WITH INSPECTORS & TEST PLAN
- ○ CERTIFICATION OF MATERIALS
- ○ FINAL ASSEMBLY CLEARANCES
- ○ SURFACE AND SUBSURFACE EXAMINATIONS
  - ○ RADIOGRAPHY
  - ○ ULTRASONIC
  - ○ MAGNETIC PARTICLE
  - ○ LIQUID PENETRANT
- ○ CLEANLINESS PRIOR TO FINAL ASSEMBLY
- ○ HARDNESS OF PARTS, WELDS & HEAT AFFECTED ZONES
- ○ FURNISH PROCEDURES FOR OPTIONAL TESTS

TESTS	REQ'D	WIT	OBS
HYDROSTATIC	●	○	○
MECHANICAL RUN	●	●	○
PERFORMANCE	●	●	○
NPSH	●	○	○

PREPARATION FOR SHIPMENT

○ DOMESTIC ● EXPORT

● OUTDOOR STORAGE MORE THAN 6 MONTHS

WEIGHTS (kg)

☐ PUMP _____ ☐ BASE _____ ☐ DRIVER _____

☐ COUPLING ☐ ACCESSORIES

BASEPLATE

● BY PUMP MANUFACTURER ○ SUITABLE FOR EPOXY GROUT

○ EXTENDED FOR _____

● COMMON PLATES BY PUMP MANUFACTURER

○ DRAIN ☐ DRAIN-RIM ■ DRAIN-PAN

PROGRESSIVE CAVITY PUMP DATA SHEET

NOTES

1 See Document "PDD-D-178-00-2111-S001" for detail

Because no cooling water is applicable, vendor shall consider air cooling for pump bear housing and flushing plan etc., where cooling is necessary. Tropicalization is required.

2 External safety valves shall be supplied by vendor, the design pressure of downstream pipe is 429 Psig.

3 The mechanical seal flushing plan shall be confirmed by vendor.

4 The material shall be confirmed by vendor.

5 Pump casing drain shall be connected to the edge of baseplate with block valve.