PLAINTIFF'S
EXHIBIT
CHV-443

SPECIFICATION NO. EG-983-J

CENTRIFUGAL PUMPS FOR REFINERY SERVICES

SECTION B

GENERAL REQUIREMENTS

1.0 SCOPE

This Section covers general requirements related to purchasing.

2.0 PRECEDENCE

Provisions of the Pump Data Sheet and the List Sheets take precedence where contrary to this Specification.

3.0 INSTRUCTIONS TO VENDOR

3.1 (Addition to Paragraph 39 of API 610). If driver is a motor supplied by COMPANY, COMPANY may state the NEMA standard frame size for the motor on the order data sheet instead of providing a certified motor dimension drawing. When this is done, the certified pump dimension drawing shall be prepared by VENDOR on the basis of the NEMA dimensions. If driver is a turbine supplied by COMPANY, COMPANY will provide a certified turbine dimension drawing to VENDOR.

3.2 (Addition to Paragraph 42 of API 610). The quoted efficiency of the pump at its operating points shall be based upon the quoted wearing ring clearance.

3.3 (Addition to Paragraph 42 of API 610). For each pump with suction pressure of 500 psig or greater, VENDOR's proposal shall include calculations (showing method used in detail) of forces on the bearings and the B-10 life for the bearings proposed.

For multi-stage, horizontal pumps where the product of rated hp and rated rpm is greater than or equal to one million, VENDOR shall provide for COMPANY's review and approval an economic comparison, with VENDOR's recommendation between sleeve and antifriction radial bearings, including experience with each type.

For all multi-stage horizontal pumps a similar comparison is required for antifriction and tilting pad (Kingsbury or Waukesha) thrust bearings.

The above economic comparisons are not required if VENDOR recommends sleeve radial bearings or tilting pad thrust bearings for the specified service.

3.4 VENDOR shall provide for COMPANY's review and approval seal designs and flush arrangement recommendation for mechanical seals in service above 350F.

3.5 (Exception to Paragraph 43 of API 610). VENDOR's proposal shall be in strict accordance with this Specification, the Pump Data Sheet and the List Sheets.

If VENDOR wishes to take exceptions or propose alternates to this Specification, the Pump Data Sheet or the List Sheets, he shall for each deviation:

a. describe the deviation he proposed; and
b. indicate the adjustment in his proposed price and delivery.

COMPANY may elect to accept individual deviations.

4.0 GUARANTEE

(Exception to Paragraph 46 of API 610).

Irrespective of whether designs, data or information have been provided, reviewed or approved by COMPANY, VENDOR guarantees each item as originally provided and each part of such item which is altered, repaired or replaced under this guarantee, to meet the requirements of the Agreement of which this Specification is a part and to be free of defects in design, materials and workmanship for one year after the date such item is originally placed in operation or, as the case may be, such part is placed in operation (but not longer than 18 months after the date of shipment of such item or, as the case may be, alteration, repair or replacement of such part); provided the defect was not caused by the item being subjected to conditions more severe than described in this Agreement.

VENDOR shall be notified in writing or by telephone or telex confirmed in writing whenever COMPANY believes that a breach of this guarantee exists. VENDOR shall, as promptly as possible following notification by COMPANY hereunder, propose a method to achieve a satisfactory correction of the defect with the least loss of operating time to COMPANY, provided that such method need not involve premium costs (such as premium costs of overtime labor and air freight) or transportation, insurance or installation costs, except to the extent that VENDOR was required to incur such costs for the original supply of the item involved.

COMPANY may agree to VENDOR's proposed method or select another method. VENDOR shall perform the corrective work in accordance with the method selected by COMPANY, and COMPANY shall reimburse VENDOR for any difference in cost to VENDOR between the method selected and the method proposed by VENDOR.

The guarantee period for any item or part thereof shall be extended for the period that such item cannot be operated as a result of a defect covered by this guarantee in such item or in another item provided by VENDOR.

5.0 DRAWINGS

The following drawing is referenced in and is part of this specification:

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PART	A-1	A-2	A-	J-1		F-2
	C1 / C1	C1 / C1 TEFLON SEAL	C1 /	MONEL / MONEL		316 S.S. / 316 S.S. (NOTE 2)
			JY	MONEL		316 S.S.
CASE	C1	C1	C1			
			JY	MONEL		316 S.S.
IMPELLER	C1	C1	C1, B OR B	MONEL		316 S.S.
CASE WEARING RINGS	C1	C1	C1, B OR B	MONEL		STELLITE NO.1 OVER 316 S.S.
IMPELLER WEARING RINGS	C1	C1	C1, B OR B			
			JY	MONEL		316 S.S.
SHAFT	CARBON STEEL OR AISI 4140	CARBON STEEL OR AISI 4140	CARB STEE AISI	K MONEL HARDENED		STELLITE #1 OVER 316 S.S.
SHAFT SLEEVES PACKED PUMPS	12% CHR HARDENED	12% CHR HARDENED	12% HARD			
			JY	K MONEL HARDENED		316 S.S.
SHAFT SLEEVES PUMPS WITH MECHANICAL SEALS	18-8 S.S. OR CHROME PLATED STEEL	18-8 S.S. OR CHROME PLATED STEEL	18-8 OR C. PLAT STEE			
			JY	MONEL		316 S.S.
THROAT BUSHINGS	C1	C1	C1, B OR B	K MONEL HARDENED		STELLITE OVER 316 S.S.
INTERSTAGE SLEEVES (IF ANY)	C1	C1	C1 O BRON			
				MONEL		316 S.S.
INTERSTAGE BUSHINGS (IF ANY)	C1	C1	C1 O BRON	MONEL		316 S.S.
LANTERN RING	C1	C1	C1, BRASS BRONZ	MONEL		316 S.S.
GLAND WITH PACKING OR PLATE RETAINING MECHANICAL SEAL	CARBON STEEL	CARBON STEEL	C1 O CARB STEE			
			JY	K MONEL HARDENED		316 S.S. (NOTE 5)
GLAND BOLTS	CARBON STEEL	CARBON STEEL	CARB STEE	JY K MONEL HARDENED		316 S.S. (NOTE 5)
CASE STUDS	CARBON STEEL	CARBON STEEL	CARB STEE	MONEL—JACKETED TEFLON		ASBESTOS COMPOSITION
CASE GASKET	ASBESTOS COMPO-SITION	ASBESTOS COMPO-SITION	ASBI COMP SIT			
MECHANICAL SEAL (IF REQ'D SEE DATA SHEET)				INNER & OUTER SEALS		
				NI-RESISTANT CARBON		CARBON
SEAL RING	CARBON	CARBON	CARB	STELLITE		CERAMIC
MATING SEAL RING	TUNGSTEN CARBIDE-1	TUNGSTEN CARBIDE-1	TUN CAR			
			LOY	MONEL		316 S.S.
SPRINGS (NOTE 8)	18-8 S.S.	18-8 S.S.	18-	LOY MONEL		316 S.S.
COLLARS, CAGES, ETC.	18-8 S.S.	18-8 S.S.	BRZ OR I	TEFLON		TEFLON
GASKET - SEAL TO SHAFT OR SLEEVE (NOTE 8)	BUNA N, HYCAR OR VITON	TEFLON	BUN HYC VIT			
GASKET - STATIONARY SEAL RING	BUNA N, HYCAR, OR ASBESTOS COMPO-SITION	TEFLON, OR ASBESTOS COMPO-SITION	BUN HYC ASB COM SIT	TEFLON		TEFLON, OR ASBESTOS COMPOSITION
GASKET - GLAND PLATE	BUNA N, HYCAR, OR ASBESTOS COMPO-SITION	TEFLON, OR ASBESTOS COMPO-SITION (NOTE 4)	BUN HYC ASB COM SIT	MONEL-JACKETED TEFLON OR TEFLON (NOTE 4)		TEFLON, OR 316 S.S.—JACKETED ASBESTOS (NOTE 4)
CLOSE-CLEARANCE BUSHING	BRONZE	BRONZE	MON REL	MONEL		CARBON

MATERIAL	CASTINGS	FORGINGS
C1 (CAST IRON)	ASTM A 278	-
CARBON STEEL	ASTM A 216 GR. WCA OR WCB	ASTM A105 OR A1
AISI 4140 AND 8-7 ALLOY	-	AISI 4140 PER ASTM A 237
5% CHROME	ASTM A 217 GR. C 5	ASTM A182 GR. F
12% CHROME	ASTM A 351 GR. CA 15	ASTM A 182 GR.
BRASS	ASTM B62	-
BRONZE	ASTM B61	-
MONEL AND K MONEL	MONEL METAL	-
18-8 S.S. TYPE 304 SEE NOTE 2	ASTM A 351 GR. CF-8	ASTM A182 F304
18-8 S.S. TYPE 316 SEE NOTE 2	ASTM A 351 GR. CF-8M	ASTM A182 F316
ALLOY 20	ASTM A 351 EXCEPT SEE NOTE 3	ASTM A-182 EXCEPT SEE NOTE
HASTELLOY B	ASTM A-494	ASTM A-182 EXCEPT SEE NOTE
HASTELLOY C	ASTM A-494	ASTM A-182 EXCEPT SEE NOTE

NOTES

1. MINOR MATERIALS NOT IDENTIFIED (NUTS, WASHERS, KEYS, ETC., SHALL HAVE EQUAL CORROSION RESISTANCE TO PARTS IN THE SAME ENVIRONMENT WHICH ARE SPECIFIED.
2. WHEN 18-8 S.S. IS SPECIFIED WITHOUT TYPE, ANY 18-8 S.S. OR TYPE 316 MAY BE FURNISHED EXCEPT IN NITRIC ACID SERVICE WHERE TYPE 304 IS REQUIRED. WHEN MATERIAL CLASS F-1, F-2 OR G-1 IS SPECIFIED, IF PARTS MADE FROM TYPE 304 OR 316 OR ALLOY 20 ARE EXPOSED TO THE LIQUID PUMPED AND ARE TO BE FABRICATED OR HARD SURFACED BY WELDING, STABILIZED OR EXTRA LOW CARBON GRADES ARE REQUIRED:
   FOR TYPE 304, USE TYPE 304L, OR 347
   FOR TYPE 316, USE TYPE 316L OR 318
3. ALLOY 20 PARTS SHALL HAVE THE MECHANICAL PROPERTIES AND CHEMICAL COMPOSITION STATED BY ASME CODE CASE 1188.
4. UNJACKETED TEFLON IS ACCEPTABLE ONLY IF FULLY CONFINED.
5. STUDS AND NUTS OF 18-8 S.S., TYPE 316, ALLOY 20, OR HASTELLOY SHALL BE LUBRICATED WITH MOLYKOTE.
6. FOR FUMING SULFURIC ACID SERVICE, TEFLON-GLASS FIBER REQUIRED INSTEAD OF CARBON FOR SEAL RING MATERIAL IN MECHANICAL SEAL.
7. HASTELLOY BOLTING AND FORGING MATERIALS SHALL HAVE THE MECHANICAL PROPERTIES AND CHEMICAL COMPOSITIONS SPECIFIED BY ASTM A-494.
8. WHEN METAL BELLOWS SEALS ARE USED, THE BELLOWS MATERIAL SHALL HAVE A CORROSION RATE LESS THAN 2 MILS/YEAR.

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mpany of California

MATERIALS FOR CENTRIFUGAL PUMPS

San Francisco

DATE 7-1-52

APP. ENGR. J. P. H.

APPROVED R.P.H. 7/3

W.O. 10. GA-G99876-5

STANDARD DRAWING

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