



PUMP COMPANY

GENERAL OFFICE: BATTLE CREEK, MICHIGAN

REPLY TO: PL SYSTEMS, INC. 11620 CHAIRMAN DRIVE DALLAS, TX 74231

TELEPHONE: 214/341-6390

PLAINTIFF'S  
EXHIBIT

CHV-47

August 23, 1976

Standard Oil Company of Texas  
Purchase & Stores Dept.  
P.O. Box 20002  
El Paso, Texas 79998  
Attention: Mr. J. E. Bimler

Subject: Your Inquiry No: QR-EP-795  
Our Quote No: 2072

Gentlemen:

In response to your inquiry, we are pleased to submit our quotation in three (3) copies, on equipment of our manufacture and also related accessories. Descriptive literature, data sheets, curves and a price page are attached.

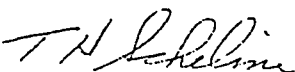
All prices shown in this proposal are net, FOB Battle Creek, Michigan and are exclusive of any Federal, State or local taxes that may be applicable. Our terms are per attached Terms of Payment. Our Standard Terms and Conditions of Sale are attached and become a part of this proposal.

The prices quoted herein, for equipment of our manufacture, are current net prices to Standard Oil Company of Texas, and are firm for acceptance for a period of thirty (30) days from date of this proposal. Prices quoted herein for equipment not of our manufacture, such as motors, turbines, gear boxes, etc., are quoted at current price levels. All price adjustments, by the auxiliary equipment manufacturer, either upward or downward, in the percentage cost of this equipment to Union Pump Company, shall be to the account of the purchaser.

To facilitate entering of an order in response to this quotation and to avoid misunderstanding at time of invoicing, it will be to our mutual benefit that your order state your acceptance of the above price adjustment clause on accessories. Without such an inclusion in your order, we will be unable to proceed until such inclusion is received.

We wish to thank you for the opportunity of submitting this quotation and trust that it may be our pleasure to work with you on this project. Should additional information be required, please do not hesitate to contact us.

Yours very truly,

  
T. H. Scheline

TS/sb  
Encl.

CENTRIFUGAL

POWER

STEAM

CHEV BB

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PUMP COMPANY

GENERAL OFFICE: BATTLE CREEK, MICHIGAN

REPLY TO: PL SYSTEMS, INC. 11620 CHAIRMAN DRIVE DALLAS, TX 74231

TELEPHONE: 214/341-6390

Union Pump Company  
Quotation No. 2072

Date: 8-23-76

Customer Inquiry No. QR-EP-795

COMMENTS AND/OR EXCEPTIONS

1. Pumps quoted are in accordance with API 610 specifications.
2. Coupling guard is included.
3. Price quoted includes Union Standard Gray Enamel Finish.

CENTRIFUGAL

POWER

STEAM

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CUSTOMER INQUIRY NO. QR-EP-795

UNION PUMP QUOTE NO. 2072

| ITEM # | PUMP SIZE AND TYPE | PUMP PRICE EACH | MOTOR HP/RPM | CURRENT MOTOR PRICE EACH | CURRENT TOTAL PRICE EACH | EST. WEIGHT EACH | EST. PUMPS (weeks) | SHIPMENT DRIVERS |
|--------|--------------------|-----------------|--------------|--------------------------|--------------------------|------------------|--------------------|------------------|
|--------|--------------------|-----------------|--------------|--------------------------|--------------------------|------------------|--------------------|------------------|

|        |            |            |         |            |            |       |       |       |
|--------|------------|------------|---------|------------|------------|-------|-------|-------|
| G-1945 | 2x3x13 VLK | \$8,099.00 | 60/3600 | \$1,585.00 | \$9,684.00 | 1980# | 32-36 | 14-16 |
|--------|------------|------------|---------|------------|------------|-------|-------|-------|

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\* Price of auxiliary equipment at time of invoicing will be the price in effect at time of shipment.

\* On

\* An additional charge of \$40.00 will be made for each supplement and/or revision to the original purchase order, after the unit has been released for production. This extra charge is to cover administrative costs only and is in addition to any other charges resulting from the change.

## TERMS OF PAYMENT

### Clause A

Clause A shall apply only to items of equipment with lead times in excess of six (6) months. Clause A terms of payment are:

- 1) Fifty percent (50%) of the total price of the items of equipment with lead times in excess of six (6) months is due and payable at mid-point of quoted lead times. Quoted lead times shall commence at date of order acceptance.
- 2) Fifty percent (50%) or dollar balance of each item of equipment is due and payable net thirty (30) days after shipment of each item of equipment. All adjustments to the original purchase price of each item of equipment shall be included in this payment. In the event the customer requests or causes a delay in shipment, payment shall be due net thirty (30) days after the customer's buyer is first notified that the item or items of equipment are ready for inspection, if applicable, or ready for shipment. If delay of shipment is caused by failure to receive drivers or other accessories timely, the remaining fifty percent (50%) defined in 2. above is due as follows:
  1. The remaining fifty percent (50%) or dollar balance of each item of equipment complete less accessory equipment shall be due net thirty (30) days from date of completion of that item of equipment.
  2. The remaining fifty percent (50%) of each accessory equipment shall be due and payable net thirty (30) days from shipment date of the accessory item. Accessory escalation, if applicable, and any other adjustments to the original purchase price of each item of accessory equipment shall be included in this payment.

### Clause B

Clause B shall apply to items of equipment with lead times of less than six (6) months. Terms of payment are net thirty (30) days after shipment of each item of equipment. In the event the customer requests



Terms of Payment (cont'd)  
February 3, 1975

or causes a delay in shipment, payment shall be due net thirty (30) days after the customer's buyer is first notified that the item or items of equipment are ready for inspection, if applicable, or ready for shipment.

If delay of shipment is caused by failure to receive drivers or other accessories timely, we shall invoice and payment shall be due as follows:

- 1) The complete purchase price of each item of equipment less accessory equipment shall be due net thirty (30) days from date of completion of the item of equipment.
- 2) The purchase price of each item of accessory equipment shall be due net thirty (30) days after shipment of each item of accessory equipment.

Accessory escalation, if applicable, and any other adjustments to the original purchase price of each item of accessory equipment shall be included in this payment.



UNION PUMP COMPANY  
BATTLE CREEK, MICHIGAN

## STANDARD TERMS AND CONDITIONS OF SALE

1. **Applicability and Description of Goods.** These standard terms and conditions of sale are applicable to all quotations made by or for Union Pump Company (Company), and particularly to the goods described on the data sheet attached hereto.

2. **Shipment.** Shipping dates are estimates based on conditions existing on the dates quotations are made, and are subject to immediate receipt and confirmation of Buyer's order. The Company shall not be liable for any delay resulting from or contributed to by any circumstances beyond the control of the Company which prevent the Company from making shipments in the usual course of business. Goods are sold f.o.b. point of shipment.

3. **Shipment in Lots.** The Company shall have the right to ship all of the goods at one time or in portions from time to time within the time of shipment herein provided.

4. **Identification, Risk of Loss.** Risk of loss of the goods shall pass to the Buyer as soon as the goods are identified under paragraph 2501 of the Uniform Commercial Code unless the Buyer requests a delay in shipment, in which case risk of loss shall pass when the Buyer is notified that the goods are ready for shipment. A breach of contract shall have no effect upon the above provisions controlling such risk of loss and paragraph 2501 of the Uniform Commercial Code shall have no effect upon a contract incorporating these standard terms and conditions of sale.

5. **Title.** Title to the goods shall remain in the Company until the Company has received full payment therefor.

6. **Warranty.** The Company warrants that its products are free from defects in material and workmanship and will have the capacities and ratings described in the Company's proposal as accepted. The terms of this warranty shall be for a period of one (1) year after the product is placed in service but not exceeding eighteen (18) months after shipment. The Company agrees to repair or replace, f.o.b. shipping point, any goods or parts thereof which during the term of the warranty are proven to violate the above warranty to an extent which would affect the reliable operation of the goods. The Company's accepted method of testing shall be determinative of the existence of any such defect. The warranty is effective only if Buyer promptly notifies the Company in writing of the defect, and promptly delivers the defective goods or parts to the factory, delivery prepaid. Liability for damage caused by such defective goods or parts shall be limited to repairing or replacing the defective goods or parts as aforesaid. This warranty shall not apply to goods which have been altered or repaired without the Company's written consent. This warranty remains in effect only if the products are used in accordance with instructions in manuals and instruction sheets furnished by the Company with regard to installation, maintenance, start-up and safety. This warranty shall not be effective if Buyer fails to adequately protect the goods from adverse environmental conditions before and after start-up and to act in accordance with instructions furnished by the Company. **NO WARRANTY IS MADE AGAINST CORROSION. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, WHETHER OF MERCHANTABILITY OR OTHERWISE, WHICH IS NOT DESCRIBED IN THE FACE HEREOF, AND NO OTHER REPRESENTATIONS OR AFFIRMATIONS OF THE COMPANY, WHETHER BY WORDS OR ACTS SHALL CONSTITUTE A WARRANTY.**

7. **Price.** For deliveries within six (6) months or less, the prices to be paid by Buyer are set forth on the attached data sheet. For deliveries beyond six (6) months, the prices quoted on the attached data sheet are subject to adjustment by the Company. In any event, prices on auxiliary equipment and accessories of other manufacturers as set forth in paragraph 13 are subject to change without notice and will be adjusted to vendor's prices in effect at time of shipment. All prices established by the Company will be in accordance with the price guidelines and regulations issued by the Price Commission and other appropriate governmental agencies.

8. **Payment.** Terms are net thirty (30) days, after Buyer is notified of actual shipment even though Buyer has not yet inspected the goods. In the event the Buyer requests or causes a delay in shipment, payment shall be due thirty (30) days after the Buyer is first notified that the goods are ready for shipment.

9. **Cancellation.** After Buyer's order has been accepted by the Company pursuant to paragraph 12 hereof, it may not be cancelled without the Company's consent. Any cancellation after acceptance is subject to terms necessary to indemnify the Company against all loss.

10. **Deferred or Delayed Deliveries.** After Buyer's order has been accepted by the Company pursuant to paragraph 12 hereof, goods already produced or in process may not be deferred beyond the originally specified delivery date without the Company's consent. Any deferment in delivery date is subject to terms necessary to indemnify the Company against all loss, including, but not limited to, storage charges and related expenses. If any order is delayed beyond the original shipping date because of Buyer's failure to provide required instructions or equipment or for convenience of Buyer, Buyer will be immediately liable for storage charges and any other expenses resulting from such delay.

11. **Supervision of Setting Up and Starting Goods.** Upon request the Company will provide a superintendent of its own selection to supervise the setting up and starting of the goods. The Buyer shall pay the Company for the services and all expenses of superintendent which are connected with such supervision. In providing a superintendent to supervise the setting up and starting of the goods, the Company accepts no responsibility for material and equipment or for the acts of men furnished by the Buyer. Except to the extent above provided in Paragraph 6, the Company will not be responsible for the performance of goods which are not set up or started by a superintendent provided by the Company.

12. **Orders Subject to Approval and Confirmation by Company.** All orders placed by the Buyer are subject to approval and written confirmation by the Company at its home office in Battle Creek, Michigan, and there shall be no contract between Buyer and the Company prior to the time of such confirmation by the Company.

13. **Auxiliary Equipment and Accessories.** To the extent that auxiliary equipment and accessories of other manufacturers (e.g. prime movers and controls) are included as a part of the quotation and data sheet attached hereto; it is understood that the Company acts only as an agent of the Buyer in making such quotations. The Company makes no warranties with respect to auxiliary equipment and accessories manufactured by others.

14. **Remedies - Incidental and Consequential Damages.** Except as provided in the other paragraphs hereof, the Company and Buyer shall have all the remedies afforded each by the Uniform Commercial Code, except that in the event of a breach or repudiation by the Company, the Buyer shall not be entitled to recover any incidental damages or consequential damages as those terms are defined in paragraph 2715 of the Uniform Commercial Code, although personal injuries shall be recoverable to the extent that the goods are "consumer goods."

15. **Authority of Agents.** No agent, employee or representative of the Company has any authority to bind the Company to any affirmation, representation or warranty concerning the goods described on the attached data sheet, and unless an affirmation, representation or warranty made by an agent, employee or representative is specifically included in the written quotation of which these standard terms and conditions of sale are a part, it shall not be enforceable by the Buyer.

16. **Interpretation, Parol Evidence.** These standard terms and conditions of sale are intended as a final expression of the Company's quotation and as a complete and exclusive statement of terms thereof. No course of prior dealings between the Company and Buyer, and no usage of the trade shall be relevant to supplement or explain any term used herein. Acceptance or acquiescence in a course of performance rendered hereunder shall not be relevant to determine the meaning of these terms and conditions of sale even though the accepting or acquiescing party has knowledge of the performance and opportunity for objection. Whenever a term defined by the Uniform Commercial Code is used herein, the definition contained in the Code is to control.

17. **Modifications.** These terms and conditions of sale may be modified or rescinded only by a written instrument signed by an officer of the Company.

18. **Waiver.** No claim or right arising out of a breach of the terms and conditions of sale can be discharged in whole or in part by a waiver or renunciation of the claim or right unless the waiver or renunciation is supported by consideration and is in writing signed by an officer of the Company and the Buyer.

19. **Time for Bringing Action.** Any action for breach of a contract arising from an order for goods by Buyer which has been accepted by the Company at Battle Creek, Michigan, must be commenced within two (2) years after the cause of action has accrued.

20. **Applicable Law.** This agreement shall be governed by the Uniform Commercial Code, and wherever the term "Uniform Commercial Code" is used, it shall be construed as meaning the Uniform Commercial Code as adopted in the State of Michigan.

21. **Assignment and Delegation.** No right or interest in the sale of goods hereunder shall be assigned by the Buyer without the written permission of the Company, and no delegation of any obligation owed, or the performance of any obligation by the Buyer, shall be made without the written permission of the Company. Any attempted assignment or delegation shall be wholly void and totally ineffective for all purposes unless made in conformity with this paragraph.

22. **Headings.** The headings to the various paragraphs of these terms and conditions of sale have been inserted for convenient reference only and shall not to any extent have the effect of modifying, amending or changing the expressed terms and provisions hereof.

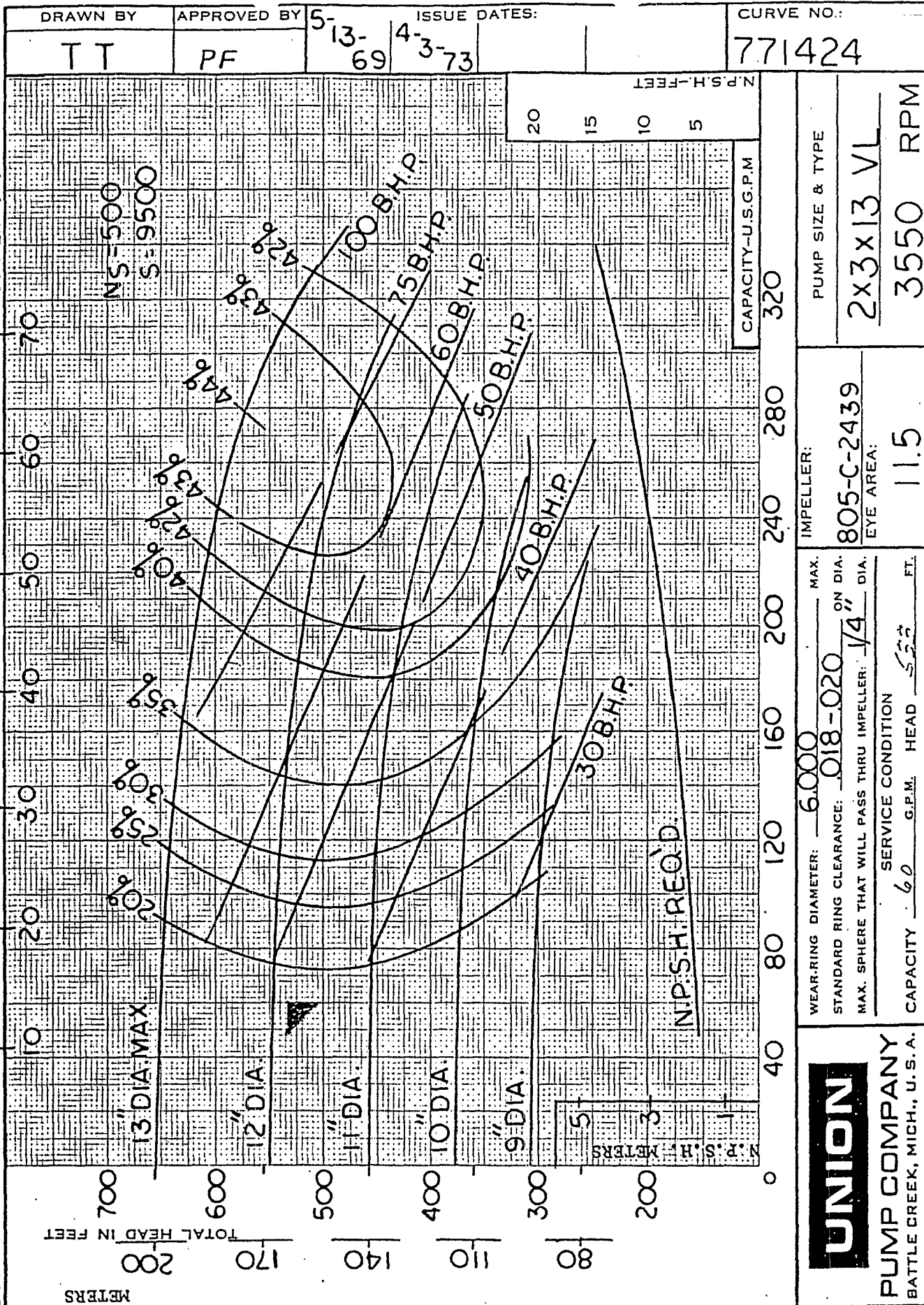
UNION PUMP COMPANY  
Battle Creek, Michigan  
March 1, 1972

CHEV BB

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CURVE 771424

E.34 METERS<sup>3</sup>/HR.



**UNION**

PUMP COMPANY  
BATTLE CREEK, MICH., U. S. A.

WEAR-RING DIAMETER: 6.000 MAX.  
STANDARD RING CLEARANCE: .018-.020 ON DIA.  
MAX. SPHERE THAT WILL PASS THRU IMPELLER: 1/4" DIA.  
SERVICE CONDITION  
CAPACITY 60 G.P.M. HEAD 52.5 FT.

IMPELLER:  
805-C-2439  
EYE AREA:

11.5

2x3x13 VL  
3550 RPM

CURVE NO.:  
771424

ISSUE DATES:

5-13-69 4-3-73

APPROVED BY  
PF

DRAWN BY  
TT

## UNILIGN PROCESS PUMP — CLASS VLK SERIES GENERAL DESCRIPTION

### GENERAL

UNILIGN by Union... a vertical in-line centrifugal pump with enclosed type impeller; designed to meet the rigid requirements of today's petroleum processing. It is the API Twin of Union's famous UNICHEM pump. It stands up on the job to save space and give important installation and maintenance cost savings.

The economical, compact UNILIGN eliminates baseplate and foundation to save valuable floor space; and provide a safer, easier-to-keep-clean working area. In-line suction and discharge nozzles allow the UNILIGN to be mounted in, and supported by the piping, doing away with bulky, costly footings. In fact, our largest unit, the 8 x 8 x 18, requires only an 18 inch square concrete block for support.

Quality built for heavy-duty use, the heavy, ribbed UNILIGN casing can withstand piping stresses and strains never before possible with bulky horizontal pumps. On applications involving high or changing temperatures this will, in almost every case eliminate pipe anchors, expansion joints and most important, worries about misalignment, the prime cause of failures with horizontals.

Designed to meet the rigid technological requirements of today's markets, the UNILIGN will end installation, maintenance and performance worries while giving years of dependable, economical service.

### CONSTRUCTION FEATURES

#### Casing:

UNILIGN casings are designed to withstand heavy pipe strains and do not require baseplates. To reduce the radial load on the impeller and to obtain added strength, the larger sizes utilize double volute casings. The confined stainless steel jacketed asbestos casing gasket is compressed until metal to metal contact is realized between the casing and the casing cover. This design assures positive alignment and eliminates the need for feeler gauges or other checking devices.

#### Casing Cover:

The UNILIGN employs a casing cover capable of utilizing packing or mechanical seals. Flush connections for mechanical seals or packing are provided in the cover, depending on application.

A steel-backed carbon throat bushing separates the stuffing box from the impeller, and allows the mechanical seal to operate at pressures above suction pressure without adding thrust load to the motor bearings. The optional water cooled casing cover provides an effective heat shield between the hot pump fluid and the motor, insuring cooler running motors.

#### Motor Support:

Motor supports for the UNILIGN are open sided with metal to metal radial fit between the casing cover and the motor providing accessibility for service and positive alignment.

The motor support is individually bolted to the cover. This feature allows the customer to change motor frames without replacing an expensive cover casting.

**UNILIGN—GROUP II**  
**STANDARD MATERIALS OF CONSTRUCTION**

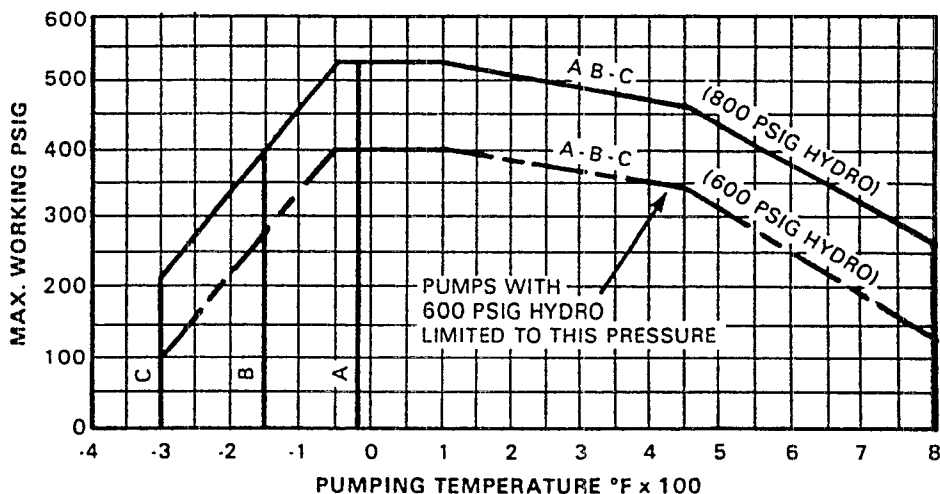
| PART NO | DESCRIPTION             | TYPE IA                                      | TYPE IB          | TYPE IC | TYPE II | TYPE III            |
|---------|-------------------------|----------------------------------------------|------------------|---------|---------|---------------------|
| 800     | Casing                  | Cast Steel                                   |                  |         | 12%Cr.  | 316 SS              |
| 802     | Casing Cover            |                                              |                  |         |         |                     |
| 805     | Impeller                | Ductile Iron                                 |                  | 12% Cr. |         |                     |
| 806     | Impeller Wear Rings     | 12% Cr.                                      |                  |         |         | 316 SS<br>Col. Ctd. |
| 808-1   | Case Wear Rings - Front | C.I.                                         | 12% Cr. Hardened |         |         | 316 SS              |
| 808-2   | Case Wear Rings - Back  |                                              |                  |         |         |                     |
| 820     | Shaft                   | 4140                                         |                  |         | 12% Cr. | 316 SS              |
| 821-1   | Impeller Nut            | 12% Cr.                                      |                  |         |         | 316 SS              |
| 847-1   | Throat Bushing          | Steel Jacketed Metallized Carbon             |                  |         |         |                     |
| 822-1   | Packing Sleeve          | 12% Cr. HARDENED                             |                  |         |         | 316 SS<br>Col. Ctd. |
| 38      | Packing                 | Braided Asbestos                             |                  |         |         |                     |
| 807-1   | Packing Gland           | Steel                                        |                  |         | 12% Cr. | 316 SS              |
| 809     | Lantern Ring            | Teflon                                       |                  |         |         |                     |
| 847-2   | Gland Bushing           | Bronze                                       |                  |         |         |                     |
| 822-2   | Seal Sleeve             | 12% Cr.                                      |                  |         |         | 316 SS              |
| 823-1   | Main Mechanical Seal    | BALANCED - Crane/ Durametallic / Borg-Warner |                  |         |         |                     |
| 807-2   | Seal Gland              | Steel                                        |                  |         | 12% Cr. | 316 SS              |
| 815-2   | Seal Gland Gasket       | Asbestos                                     |                  |         |         |                     |
| 847-3   | Throttle Bushing        | Bronze                                       |                  |         |         |                     |
| 828     | Seal Retainer           | Steel                                        |                  |         | 12% Cr. | 316 SS              |
| 847-4   | Seal Retainer Bushing   | Steel                                        |                  |         |         |                     |
| 870     | Motor Support           | C.I.                                         |                  |         |         |                     |
| 818     | Rigid Coupling          | Steel                                        |                  |         |         |                     |
| 825     | Shaft Collar            |                                              |                  |         |         |                     |
| 811-1   | Impeller Key            | 316 S.S.                                     |                  |         |         |                     |
| 811-2   | Coupling Key            | Steel                                        |                  |         |         |                     |
| 811-3   | Motor Key               |                                              |                  |         |         |                     |
| 815-1   | Casing Gasket           | Spiral Wound 304 SS Asbestos Filled          |                  |         |         |                     |
| 815-3   | Sleeve O-Ring           | Teflon                                       |                  |         |         |                     |
| 821-2   | Coupling Nut            | Steel                                        |                  |         |         |                     |
| 807-3   | Uni-Lok Gland           | Steel                                        |                  |         |         |                     |
| 807-4   | Uni-Lok Inner Gland     | Steel                                        |                  |         | 12% Cr. | 316 SS              |
| 823-2   | Uni-Lok Seal            | Union                                        |                  |         |         |                     |

## UNILIGN GROUP II CONSTRUCTION DETAILS

| DESCRIPTION                 |                     | 2 x 3 x 13        | 3 x 4 x 13 | 4 x 6 x 13 | 6 x 6 x 13 | 6 x 8 x 13     | 6 x 6 x 18 | 8 x 8 x 18 |
|-----------------------------|---------------------|-------------------|------------|------------|------------|----------------|------------|------------|
| Valve — single or double    |                     | S                 | Double     |            |            |                |            |            |
| Hydro - PSIG                |                     | 800 PSIG          |            |            |            | 600 PSIG       |            |            |
| Maximum HP and RPM          |                     | 400 HP @ 3600 RPM |            |            |            | 225HP @1750RPM |            |            |
| Shaft<br>Dia.               | At Coupling         | 1½                |            |            |            |                |            |            |
|                             | Under Sleeve        | 2-5/16            |            |            |            |                |            |            |
|                             | At Impeller         | 1¾                |            |            |            |                |            |            |
| Mechanical Seal Size        |                     | 2½                |            |            |            |                |            |            |
| Stuffing<br>Box             | I.D. x O.D. x Depth | 2¾ x 3-13/16 x 3½ |            |            |            |                |            |            |
|                             | No. Rings - Size    | 5 - ½ x ½         |            |            |            |                |            |            |
|                             | Lantern Ring Width  | ¾"                |            |            |            |                |            |            |
| Impeller Eye Area           |                     | 11.5              | 14         | 22         | 29         | 50             | 28         | 50         |
| Wear Ring Dia. Front & Rear |                     | 6                 | 6          | 7          | 7½         | 9¼             | 7½         | 9¼         |
| Std. Wear Ring Clearance *  |                     | .018              | .018       | .019       | .019       | .021           | .019       | .021       |
| Nominal Case Thickness      |                     | 7/16              | 9/16       | ¾          | ¾          | ¾              | 13/16      | ¾          |
| Retiring Constant (RC)      |                     | 31                | 44         | 50         | 50         | 62             | 69         | 75         |

\* Additional diametrical clearance is provided for materials with high galling tendencies.

### PRESSURE/TEMPERATURE LIMITS



### CASING LIFE FORMULA

To determine retiring wall thickness (minimum safe casing thickness in service) use the following formula.

$$\text{Retiring Wall Thickness} = \frac{\text{RC} \times \text{AWP}}{100 \text{ WP}}$$

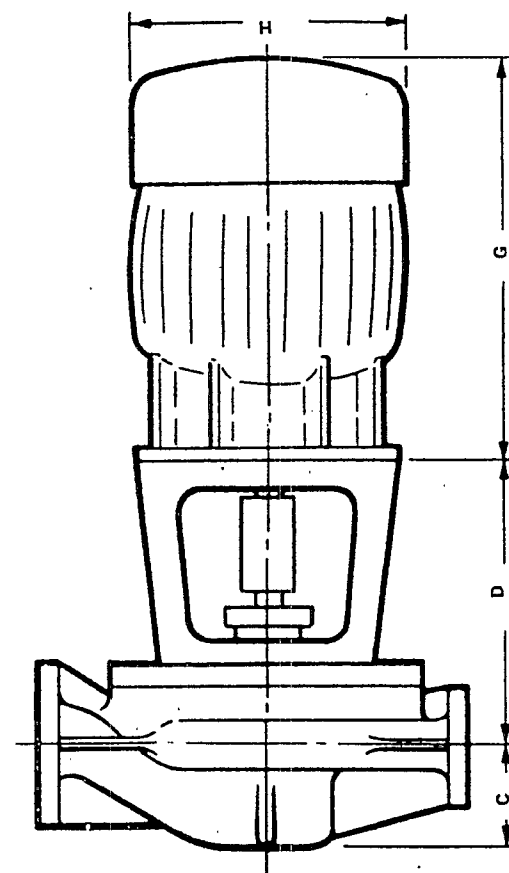
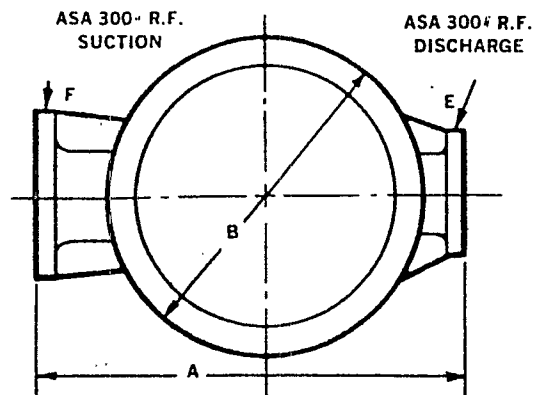
Where:

- RC = Retiring Constant from above
- AWP = Actual Working Pressure
- WP = Maximum allowable working pressure at pumping temperature from chart

| CASING MATERIAL |        |       |             |
|-----------------|--------|-------|-------------|
| Code            | ASTM # | Grade | Description |
| A               | A 216  | WCB   | Cast Steel  |
| B               | A-296  | CA-15 | 410 SS      |
| C               | A-296  | CF8M  | 316 SS      |
| C               | A-296  | CF-8  | 304 SS      |

| PART NO. | DESCRIPTION          |
|----------|----------------------|
| 807-2    | Seal Gland           |
| 815-2    | Seal Gland Gasket    |
| 823-1    | Main Mechanical Seal |
| 847-3    | Throttle Bushing     |
| 870      | Motor Support        |
| 818      | Rigid Coupling       |
| 824      | Adjusting Stud       |
| 825      | Shaft Collar         |
| 811-1    | Impeller Key         |
| 811-2    | Coupling Key         |
| 811-3    | Motor Key            |
| 815-1    | Casing Gasket        |
| 807-3    | Uni-Lok Gland        |
| 807-4    | Uni-Lok Inner Gland  |
| 823-2    | Uni-Lok Seal         |
| 828      | Shaft Spacer         |

# UNILIGN GENERAL OUTLINE DIMENSIONS



## PUMP (VLK)

| SIZE     | A(1) | B  | C      | D   | E(1) | F(1) |
|----------|------|----|--------|-----|------|------|
| 1½x2x7   | 16½  | 10 | 4-1/4  | 14½ | 1½   | 2    |
| 2x3x7    | 21½  | 12 | 4-3/4  | 14½ | 2    | 3    |
| 3x4x7    | 23   | 14 | 5-1/8  | 14½ | 3    | 4    |
| 1½x2x8½  | 17½  | 12 | 4-3/8  | 14½ | 1½   | 2    |
| 2x3x8½   | 23½  | 14 | 4-3/4  | 14½ | 2    | 3    |
| 3x4x8½   | 24   | 16 | 5-1/4  | 16½ | 3    | 4    |
| 4x6x8½   | 27   | 18 | 6      | 16½ | 4    | 6    |
| 1½x2x10½ | 19½  | 14 | 4-1/2  | 16½ | 1½   | 2    |
| 2x3x10½  | 21   | 14 | 5      | 16½ | 2    | 3    |
| 3x4x10½  | 25½  | 17 | 5-1/2  | 16½ | 3    | 4    |
| 4x6x10½  | 30½  | 19 | 6-1/8  | 16½ | 4    | 6    |
| 2x3x13   | 26   | 16 | 6      | 20  | 2    | 3    |
| 3x4x13   | 30   | 20 | 8-1/2  | 20  | 3    | 4    |
| 4x6x13   | 33   | 22 | 9      | 20  | 4    | 6    |
| 6x6x13   | 34½  | 25 | 9-1/2  | 20  | 6    | 6    |
| 6x8x13   | 39½  | 28 | 11     | 20  | 6    | 8    |
| 6x6x18   | 44   | 34 | 10     | 20  | 6    | 6    |
| 8x8x18   | 48   | 38 | 11-1/2 | 20  | 8    | 8    |
| 10x10x18 | 52   | 40 | 13     | 22  | 10   | 10   |
| 12x12x18 | 55   | 43 | 14     | 22  | 12   | 12   |

(1) These dimensions are certified correct.

## MOTOR

| Frame Series | G      | H(2) |
|--------------|--------|------|
| 140          | 12-1/2 | 8    |
| 180          | 15-3/4 | 9½   |
| 210          | 24     | 12   |
| 250          | 25-3/4 | 14   |
| 280          | 26-1/2 | 15   |
| 320          | 29     | 17½  |
| 360          | 37     | 19½  |
| 400          | 41     | 22   |
| 440          | 41     | 22   |

(2) Based on G.E.  
TEFC and XP Frame dimensions  
(For VTK refer to factory)

THIS SHEET IS PART OF SPECIFICATION NO. EG-963-J DATE 8/9/76 QUOTATION OR ORDER NO. QR-EP-795

| PURCHASER'S DATA (NOTE 3)                              |  | PUMP NUMBER | G-1945 | SUPPLIER'S DATA (NOTE 1)                               |  | PUMP NUMBER | NOTES |
|--------------------------------------------------------|--|-------------|--------|--------------------------------------------------------|--|-------------|-------|
| A. SERVICE                                             |  |             | 0-1901 | H. PUMP DESIGNATION                                    |  |             |       |
| B. LIQUID CHARACTERISTICS                              |  |             | 0-1901 | MANUFACTURED, SIZE & TYPE                              |  |             |       |
| LIQUID PUMPED                                          |  | 9F          | 11.0   | NUMBER OF STAGES                                       |  | 2-3 1/2     |       |
| SPECIFIC GRAVITY AT FLOW TEMP                          |  |             | 1.01   | SERIAL NUMBER                                          |  | Y-45        |       |
| VISCOSITY AT FLOW TEMP (CENTISTOKES) (CSM)             |  | MSA         | 41     | OPERATION AND CONSTRUCTION                             |  |             |       |
| VISCOSITY AT FLOW TEMP (CENTISTOKES) (CSM)             |  | MSA         | 1.3    | J. OPERATION AND CONSTRUCTION                          |  |             |       |
| C. CAPACITY AND PRESSURES                              |  | (NOTE 6)    | 50     | EFFICIENCY AT RATING                                   |  | 17          |       |
| GPM AT FLOW TEMP                                       |  | MSA         | 12.8   | SHIP AT RATING/DRIVER HORSEPOWER                       |  | 485 1/2     |       |
| SECT. PRESS. AT PUMP AT FLOW RATE                      |  | MSA         | 23.3   | MAX. HP FOR BID IMPELLER DIAMETER                      |  | 280.7       |       |
| DISCHARGE PRESS.                                       |  | MSA         | 245.6  | RATED RPM                                              |  | 3555        |       |
| DIFFERENTIAL HEAD                                      |  | FT          | 53.3   | ROTATION FACING PUMP COUPLING (CW) (CCW)               |  | CCW         |       |
| MAX. NET POS. HEAD                                     |  | FT          | 12     | CAS (ISIC) (100-1) (MODIFIED) (VULCIT) (DIFFER)        |  | 28.5        |       |
| D. DRIVER                                              |  | MSA         | 6.8    | HYDROSTATIC TEST PRESSURE                              |  | 350         |       |
| IMPELLER OR COUPLED SHAFT                              |  |             |        | IMPELLER DIAMETER, MATERIAL, FINISH                    |  | 35.0        |       |
| TYPE DRIVER: MOTOR OR SUPPLIER                         |  |             |        | DIAMETER OF COUPLING                                   |  | 30.0        |       |
| DRIVER DATA SHEET NO.                                  |  |             |        | WEAR RINGS - COUPLER DIAMETER OF LARGEST RING, IN.     |  | 11.5        |       |
| E. CONSTRUCTION REQUIREMENTS (NOTE 3)                  |  |             |        | DIAMETER OF COUPLING                                   |  | 11.5        |       |
| CASING SUPPORT (CENTRALIZED) (IMBACENTRALIZED) (OTHER) |  |             |        | CALCULATE SHAFT DEFLECTION (NOTE 1)                    |  | 2.4 1/2 1/2 |       |
| MECHANICAL SEAL (RED-O) (GREEN) (OTHER)                |  |             |        | STUFFING BOX - PACING - NUMBER OF RINGS/SHFT           |  | 11.5        |       |
| LANTERN RING REQUIRED                                  |  |             |        | LENGTH/L.D.                                            |  | 11.5        |       |
| CONSTRUCTION FOR OIL - MUST LUBRICATE RED-O            |  |             |        | % OF LANT. RING TO OPEN END BOX                        |  | 2 1/2       |       |
| BASE PLATE REQUIRED/DESIGNED FOR DRIVER, MAIN RIN TYPE |  |             |        | COOLING WATER REQUIRED - STUFFING BOX (YES) (NO)       |  | 11.5        |       |
| PACKING TO BE FURNISHED BY                             |  |             |        | FOOTSTEPS (YES) (NO)                                   |  | 11.5        |       |
| F. MATERIAL REQUIREMENTS (NOTE 3)                      |  |             |        | MECHANICAL SEAL - MFR. & TYPE                          |  | 11.5        |       |
| MATERIAL CLASS (NOTE 2)                                |  |             |        | FLEXIBLE COUPLING - MFR. & TYPE                        |  | 11.5        |       |
| IMPELLER                                               |  |             |        | RADIAL - TYPE (MFR. & NUMBER IF BALL)                  |  | 11.5        |       |
| CASE WEARING RINGS (FRONT & BACK)                      |  |             |        | THRUST - TYPE (MFR. & NUMBER IF BALL)                  |  | 11.5        |       |
| IMPELLER WEARING RINGS (FRONT & BACK)                  |  |             |        | TYPE OF COUPLING                                       |  | 11.5        |       |
| SHAFT                                                  |  |             |        | LUBRICATION: F-FLOD, M-RING, G-CREASE, M-PRESS, M-HIST |  | 11.5        |       |
| SHAFT SLEEVES                                          |  |             |        | COOLING WATER REQUIRED FOR LUBE OIL (YES) (NO)         |  | 11.5        |       |
| THROAT BUSHING                                         |  |             |        | K. CONNECTIONS                                         |  | 11.5        |       |
| INTERSTAGE SLEEVES                                     |  |             |        | SUCTION: STRENGTHENING                                 |  | 11.5        |       |
| INTERSTAGE BUSHINGS                                    |  |             |        | FACING                                                 |  | 11.5        |       |
| GLAND                                                  |  |             |        | MAGNETIC DISCHARGE (RED) (TOP) (SIDE)                  |  | 11.5        |       |
| GLAND BUSHES                                           |  |             |        | DISCHARGE: STRENGTHENING                               |  | 11.5        |       |
| CASE STUDS                                             |  |             |        | MAGNETIC DISCHARGE (RED) (TOP) (SIDE)                  |  | 11.5        |       |
| CASE CASTING                                           |  |             |        | MAGNETIC DISCHARGE (RED) (TOP) (SIDE)                  |  | 11.5        |       |
| MECHANICAL SEAL - SEAL RING                            |  |             |        | MAGNETIC DISCHARGE (RED) (TOP) (SIDE)                  |  | 11.5        |       |
| IMPELLER SEAL RING                                     |  |             |        | MAGNETIC DISCHARGE (RED) (TOP) (SIDE)                  |  | 11.5        |       |
| GASKETS, GASKETS, ETC.                                 |  |             |        | MAGNETIC DISCHARGE (RED) (TOP) (SIDE)                  |  | 11.5        |       |
| GASKET - SEAL TO SHAFT OR SLEEVE                       |  |             |        | MAGNETIC DISCHARGE (RED) (TOP) (SIDE)                  |  | 11.5        |       |
| GASKET - STATIONARY SEAL RING                          |  |             |        | MAGNETIC DISCHARGE (RED) (TOP) (SIDE)                  |  | 11.5        |       |
| GASKET - GLAND PLATE                                   |  |             |        | MAGNETIC DISCHARGE (RED) (TOP) (SIDE)                  |  | 11.5        |       |
| CLOSE - CLEARANCE BUSHING                              |  |             |        | MAGNETIC DISCHARGE (RED) (TOP) (SIDE)                  |  | 11.5        |       |
| INTERSECTION REQUIRED                                  |  |             |        | MAGNETIC DISCHARGE (RED) (TOP) (SIDE)                  |  | 11.5        |       |
| PERFORMANCE TEST REQUIRED                              |  |             |        | MAGNETIC DISCHARGE (RED) (TOP) (SIDE)                  |  | 11.5        |       |
| PERFORMANCE TEST TO BE WITNESSED                       |  |             |        | MAGNETIC DISCHARGE (RED) (TOP) (SIDE)                  |  | 11.5        |       |
| MPSK TEST REQUIRED                                     |  |             |        | MAGNETIC DISCHARGE (RED) (TOP) (SIDE)                  |  | 11.5        |       |
| HYDROSTATIC                                            |  |             |        | MAGNETIC DISCHARGE (RED) (TOP) (SIDE)                  |  | 11.5        |       |

| REFER TO SPECIFICATION NO. EG-1824                                                                                                                                                                                                                                                                                                                                                                                                                   |                        |   |   |   |   |   |   |   |   |    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|---|---|---|---|---|---|---|---|----|
| CODING NUMBER                                                                                                                                                                                                                                                                                                                                                                                                                                        | 1                      | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| MOTOR OR LOCATION                                                                                                                                                                                                                                                                                                                                                                                                                                    | D-1910                 |   |   |   |   |   |   |   |   |    |
| MOTOR NUMBER OR HP RANGE                                                                                                                                                                                                                                                                                                                                                                                                                             | PROCESS 11.0           |   |   |   |   |   |   |   |   |    |
| (USE RANGE FOR GENERAL SPECIFICATIONS)                                                                                                                                                                                                                                                                                                                                                                                                               | MS-1945                |   |   |   |   |   |   |   |   |    |
| A. OPERATING CONDITIONS                                                                                                                                                                                                                                                                                                                                                                                                                              |                        |   |   |   |   |   |   |   |   |    |
| 1. Response Rating (Continuous)                                                                                                                                                                                                                                                                                                                                                                                                                      | 4.0                    |   |   |   |   |   |   |   |   |    |
| 2. Service Factor                                                                                                                                                                                                                                                                                                                                                                                                                                    | 1.0                    |   |   |   |   |   |   |   |   |    |
| 3. Synchronous Speed, RPM                                                                                                                                                                                                                                                                                                                                                                                                                            | 3600                   |   |   |   |   |   |   |   |   |    |
| 4. Voltage                                                                                                                                                                                                                                                                                                                                                                                                                                           | 460                    |   |   |   |   |   |   |   |   |    |
| 5. Frequency                                                                                                                                                                                                                                                                                                                                                                                                                                         | 60                     |   |   |   |   |   |   |   |   |    |
| 6. Enclosure (Note 1)                                                                                                                                                                                                                                                                                                                                                                                                                                | 3                      |   |   |   |   |   |   |   |   |    |
| 7. Enclosure Class                                                                                                                                                                                                                                                                                                                                                                                                                                   | TEFC                   |   |   |   |   |   |   |   |   |    |
| 8. Insulation Class                                                                                                                                                                                                                                                                                                                                                                                                                                  | B                      |   |   |   |   |   |   |   |   |    |
| 9. Maximum Ambient Temperature - °C                                                                                                                                                                                                                                                                                                                                                                                                                  | 40                     |   |   |   |   |   |   |   |   |    |
| 10. NEMA Design Letter                                                                                                                                                                                                                                                                                                                                                                                                                               | *                      |   |   |   |   |   |   |   |   |    |
| 11. Material Handled by Driven Unit                                                                                                                                                                                                                                                                                                                                                                                                                  | PROCESS WATER w/AMINOL |   |   |   |   |   |   |   |   |    |
| 12. Rotation (Viewed from end opposite shaft ext.)                                                                                                                                                                                                                                                                                                                                                                                                   | V                      |   |   |   |   |   |   |   |   |    |
| 13. Mounting Type                                                                                                                                                                                                                                                                                                                                                                                                                                    | BALL BEARING           |   |   |   |   |   |   |   |   |    |
| 14. Bearing Lubrication                                                                                                                                                                                                                                                                                                                                                                                                                              | GREASE                 |   |   |   |   |   |   |   |   |    |
| 15. Winding Thermal Device (Note 3)                                                                                                                                                                                                                                                                                                                                                                                                                  | NO                     |   |   |   |   |   |   |   |   |    |
| 16. Winding Temperature Detectors (Note 3)                                                                                                                                                                                                                                                                                                                                                                                                           | NO                     |   |   |   |   |   |   |   |   |    |
| 17. Bearing Temperature Detectors (Note 3)                                                                                                                                                                                                                                                                                                                                                                                                           | NO                     |   |   |   |   |   |   |   |   |    |
| 18. Space Heaters (230 V) (Note 4)                                                                                                                                                                                                                                                                                                                                                                                                                   | NO                     |   |   |   |   |   |   |   |   |    |
| 19.                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                        |   |   |   |   |   |   |   |   |    |
| 20.                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                        |   |   |   |   |   |   |   |   |    |
| B. MANUFACTURER'S DATA                                                                                                                                                                                                                                                                                                                                                                                                                               |                        |   |   |   |   |   |   |   |   |    |
| 1. Manufacturer                                                                                                                                                                                                                                                                                                                                                                                                                                      |                        |   |   |   |   |   |   |   |   |    |
| 2. Manufacturer Type Designation                                                                                                                                                                                                                                                                                                                                                                                                                     |                        |   |   |   |   |   |   |   |   |    |
| 3. Model or Catalog No.                                                                                                                                                                                                                                                                                                                                                                                                                              |                        |   |   |   |   |   |   |   |   |    |
| 4. Full Load Speed, RPM                                                                                                                                                                                                                                                                                                                                                                                                                              |                        |   |   |   |   |   |   |   |   |    |
| 5. Full Load Current, AMP                                                                                                                                                                                                                                                                                                                                                                                                                            |                        |   |   |   |   |   |   |   |   |    |
| 6. Frame Number                                                                                                                                                                                                                                                                                                                                                                                                                                      |                        |   |   |   |   |   |   |   |   |    |
| 7. Locked Rotor KVA Code Letter                                                                                                                                                                                                                                                                                                                                                                                                                      |                        |   |   |   |   |   |   |   |   |    |
| 8. Locking Dimension Drawing Number                                                                                                                                                                                                                                                                                                                                                                                                                  |                        |   |   |   |   |   |   |   |   |    |
| 9. Shaft End Mounting Number (AFPM)                                                                                                                                                                                                                                                                                                                                                                                                                  |                        |   |   |   |   |   |   |   |   |    |
| 10. Shaft End Mounting Number (AFPM)                                                                                                                                                                                                                                                                                                                                                                                                                 |                        |   |   |   |   |   |   |   |   |    |
| 11. Efficiency at Full 1/4, 1/2 Load                                                                                                                                                                                                                                                                                                                                                                                                                 |                        |   |   |   |   |   |   |   |   |    |
| 12. Power Factor at Full, 1/4, 1/2 Load                                                                                                                                                                                                                                                                                                                                                                                                              |                        |   |   |   |   |   |   |   |   |    |
| 13.                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                        |   |   |   |   |   |   |   |   |    |
| NOTES                                                                                                                                                                                                                                                                                                                                                                                                                                                |                        |   |   |   |   |   |   |   |   |    |
| 1. DP - Dripproof; WP-1 or II - Weather Protected Type I or II; TEFC - Totally Enclosed Fan Cooled; YEFY - Totally Enclosed Force Ventilated; TEMAG - Totally Enclosed Motor-Air Cooled; XP - Explosion Proof.<br>2. H - Horizontal; V - Vertical; VH - Vertical Hollow Shaft.<br>3. TP - Built-in Thermal Protector; TS - Thermostat; TH - Thermostatic; TC - Thermostatic; RTD - Resistance Temperature Detector. See section A 8.0 Spec. EG-1824. |                        |   |   |   |   |   |   |   |   |    |

\* TO BE FILLED IN BY SUPPLIER

|                                                                       |                 |                                   |                                    |
|-----------------------------------------------------------------------|-----------------|-----------------------------------|------------------------------------|
| MOTOR DATA SHEET F02<br>MS-1945<br>GAS RECORDING NO. 2<br>ELECTRICITY |                 | P.M.O.<br>S.O.                    | PB-19-29116-0<br>PRINTED IN U.S.A. |
| SCALE: NONE<br>DATE: 8/16/68<br>ENG. DEPT.                            | DR. APP.<br>CH. | ENGR. HILL<br>APPROVED<br>8/16/68 | CHEV BB<br>27-176 (11-8-71)        |