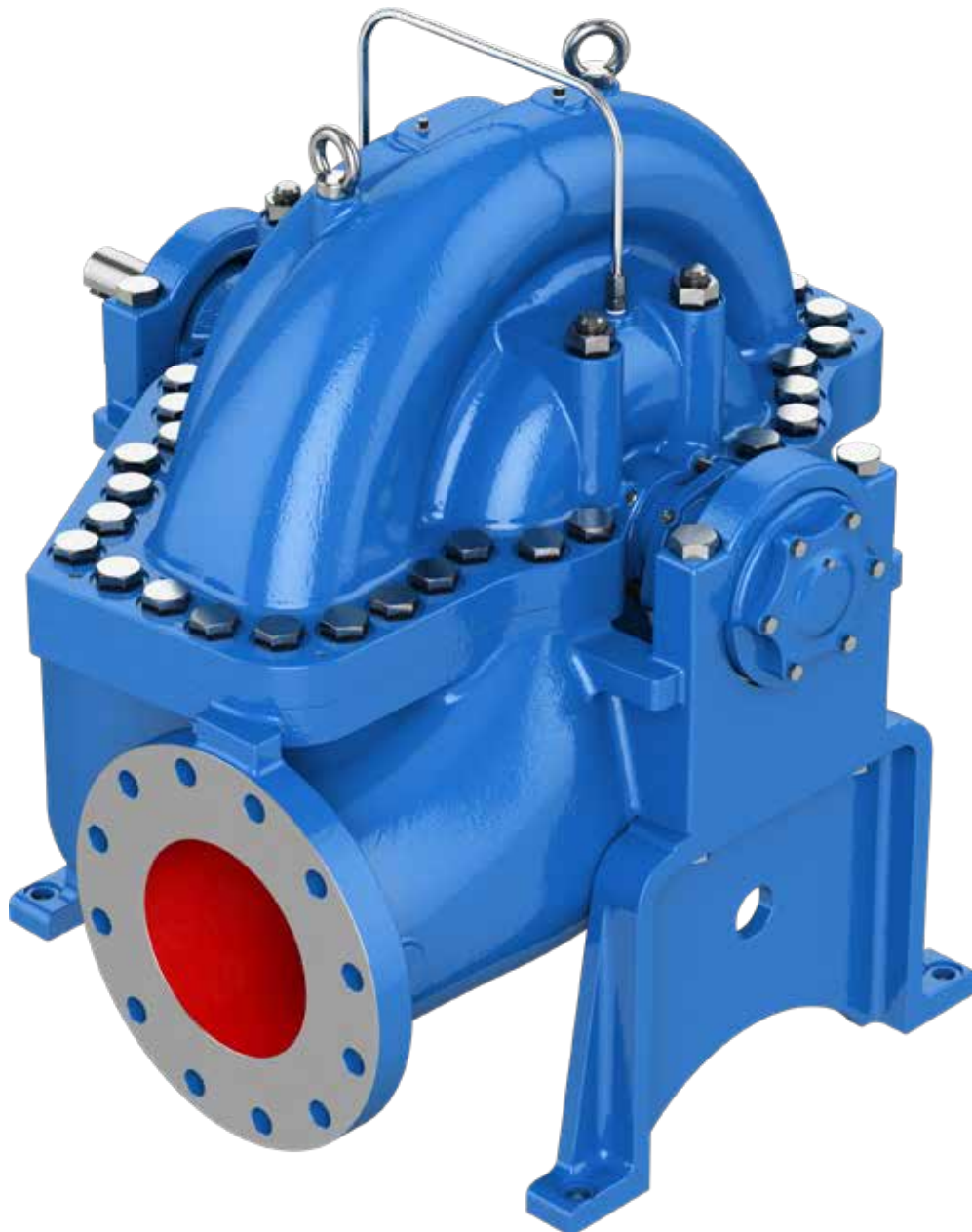


# 3316

Two Stage, Horizontally Split Case Pump

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# 3316

Two Stage, Horizontally Split Case Pumps designed for boiler feed, mine dewatering and other applications requiring moderately high heads with a wide range of service conditions

- Capacities to 681 m<sup>3</sup>/h (3,000 GPM)
- Heads to 305 m (1,000 feet)
- Temperatures to 177°C (350°F)
- Pressures to 3,792 kPa (550 PSIG)

## Design Features

### Casing

Removal of upper half permits inspection, maintenance or removal of rotating element without disturbing piping or pump-to-motor alignment

### Impellers

Hydraulically balanced – opposed for axial balance. Opposed cut-waters provide radial balance.

### Wear Rings

Easily replaced, protect against casing wear.

### Maximum Interchangeability

Reduces inventory requirements.

### Duplex Thrust Bearing

Provides high thrust capability.

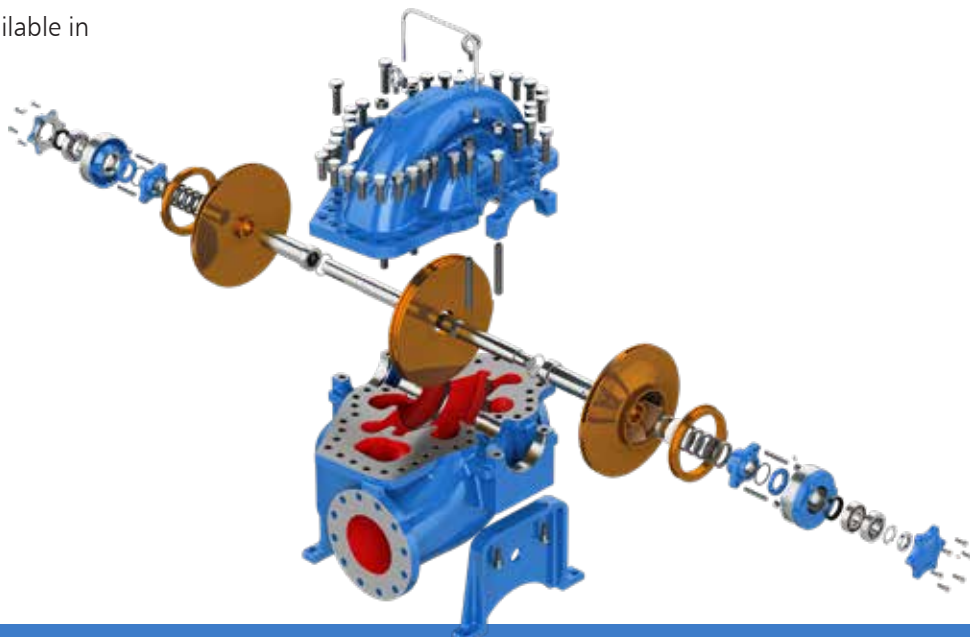
### Materials of Construction

Available in all iron or bronze fitted. Most sizes available in steel and stainless steel.



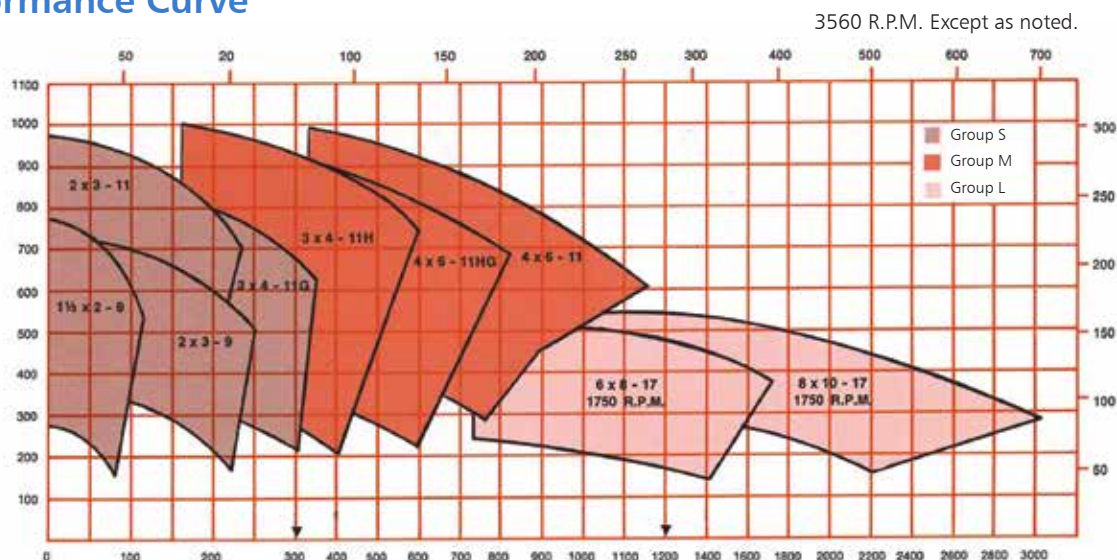
## Services

- Boiler Feed
- Mine De-Watering
- Booster
- High Pressure Process
- Condensate
- High Pressure Cleaning



# 3316

## Performance Curve



## Specifications

### Shaft

Short span keeps deflection to a minimum. Radius fillets are rolled into the shoulders at threaded portions to increase shaft fatigue strength. Radius fillets also machined into keyways to distribute stress more evenly along the shaft.

### Shaft Sleeve

Threaded against impeller hub, and free to expand or contract with temperature changes. One sleeve tightens against rotation, and is further secured by a set screw. Other sleeve is key driven. This unique locking design of sleeves permits field change of rotation without additional parts. An O-ring seal positively prevents leakage between shaft and sleeve.

### Casing Diaphragm

Forms dividing wall between stages and is renewable to maintain pump performance.

### Construction

Regularly available in bronze fitted or all iron. Most sizes available in steel and stainless steel. Other materials available upon request.

### Maximum Interchangeability

Reduces inventory requirements.

### Stuffing Box

Standard packed box has 5 rings of die-formed packing and a split lantern ring. Standard gland has tapped openings for quench or cooling liquid and a ring of packing to prevent liquid from spraying or traveling along shaft outside gland.

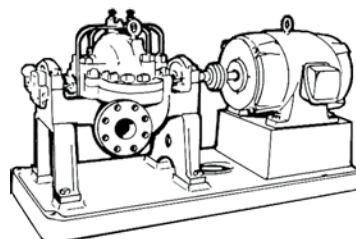
Unbalanced, balanced or double mechanical seals are available.

### Bearings

Thrust bearing is a duplex angular contact ball bearing. It carries radial load and any residual unbalanced thrust. The coupling end deep groove radial ball bearing is pressed on the shaft and is free to float axially carrying radial load only. Flood oil lubrication is standard.

### Rotation

Standard right hand construction. Left hand rotation available, rotation may be changed in field.



# 3316

## Two Stages / Horizontally Split Case Pumps Heavy Duty Design Features for Wide Range of Services

### RENEWABLE CASE WEAR RINGS

Permit easy maintenance of proper running clearances – protect against casing wear. Double lock in lower half casing to prevent rotation.

### UPPER HALF CASING

Permits inspection, maintenance or removal of complete rotating element without disturbing piping or alignment.

### OIL LUBRICATION STANDARD

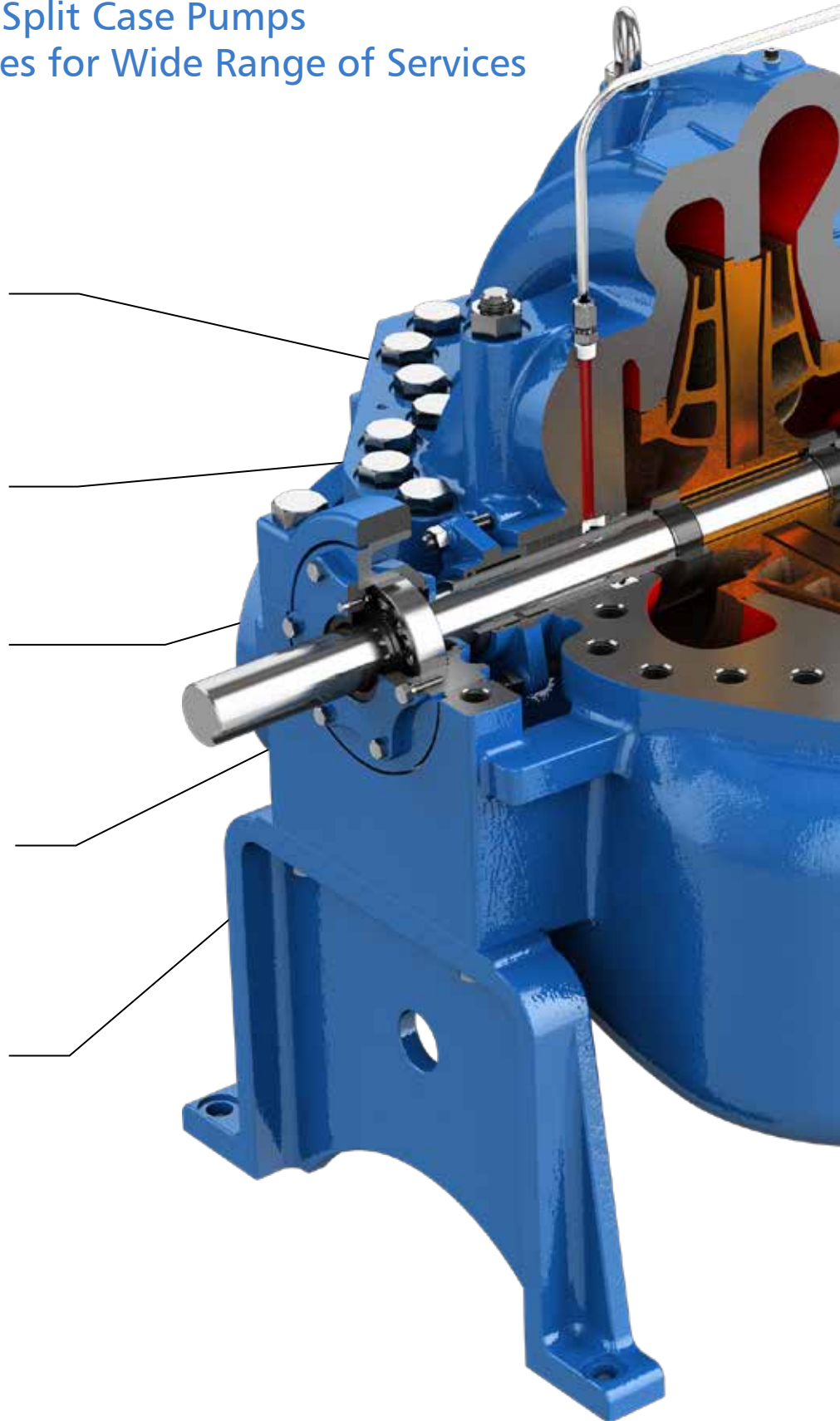
Oil level maintained by constant level oiler. Sealed against contamination.

### SHAFT SEALING FLEXIBILITY

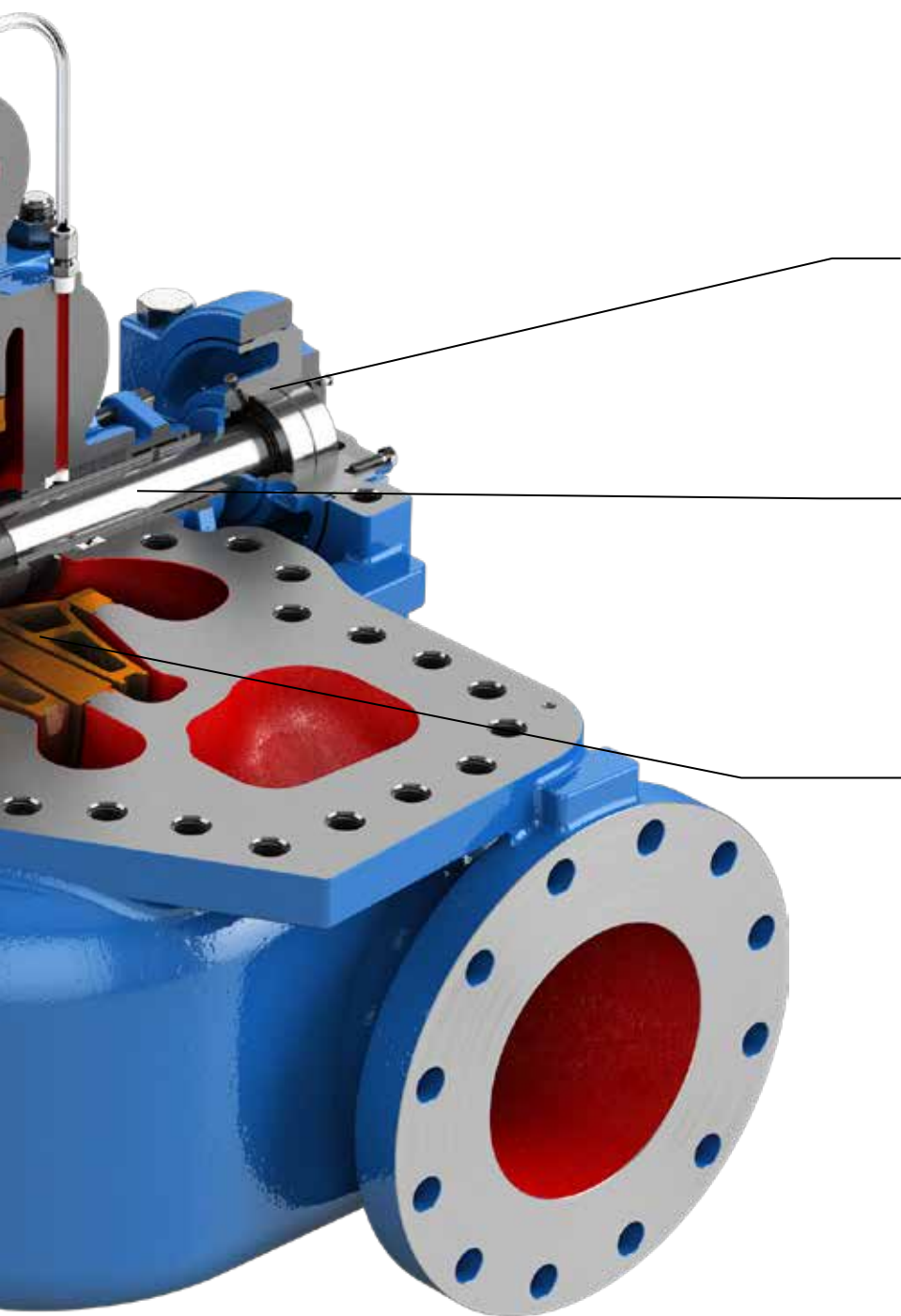
Packed stuffing box or variety of mechanical seals available. Conversion of one to the other can be accomplished in the field without machining. Equalizing piping keeps boxes at essentially suction pressure.

### STUFFING BOX BUSHING

Limits stuffing box pressure. Protects casing from wear. Easily replaceable. Secured with double lock in lower half casing.







#### HIGH THRUST CAPABILITY

With duplex thrust bearing and shaft lock nut. Provides long, trouble-free operation under the wide service conditions to which these pumps are exposed.

#### HEAVY DUTY SHAFT

Designed for toughest services. Renewable shaft sleeves fully protect shaft from pumpage.

#### HYDRAULICALLY BALANCED IMPELLERS

Axial thrust of one impeller is counter-balanced by axial thrust of other impeller. Opposed cut-waters balance radial load reaction. Load on bearings is low.

#### MAXIMUM PARTS INTERCHANGEABILITY

Not only within the line but with Goulds Model 3405 single stage pumps. Keeps spare parts inventory to a minimum.



#### OPTIONAL IMPELLER WEAR RINGS

Can be mounted on impeller without additional machining of impeller. Locked on impeller hub with stainless steel set screws.

# Parts List and Materials of Construction

| Item Number      | Part Name                            | Material                |                    |            |             |
|------------------|--------------------------------------|-------------------------|--------------------|------------|-------------|
|                  |                                      | Bronze-Fitted           | All Iron           | All Bronze | All 316SS   |
| 100              | Casing (Upper & Lower)               | Cast Iron               | Cast Iron          | Bronze     | 316SS       |
| 101              | Impeller-Suction, 1st Stage          | Bronze                  | Cast Iron          | Bronze     | 316SS       |
| 102A             | Equalizing Tubing                    | Copper                  | Steel              | Copper     | 316SS       |
| 103 <sup>1</sup> | Casing Wear Ring                     | Bronze                  | Cast Iron          | Bronze     | Nitronic 60 |
| 104              | Shaft Sleeve-Locking                 | 316SS                   | 420SS <sup>2</sup> | 316SS      |             |
| 107              | Stuffing Box Split Gland             | 316SS                   |                    |            |             |
| 112A             | Ball Bearing-Thrust                  | Steel                   |                    |            |             |
| 122              | Shaft                                | SAE 4340                |                    | 316SS      |             |
| 123              | Deflector                            | Glass-Impregnated Nylon |                    |            |             |
| 125              | Stuffing Box Bushing                 | Bronze                  | Cast Iron          | Bronze     | 316SS       |
| 126              | Shaft Sleeve                         | 316SS                   | 420SS              | 316SS      |             |
| 136              | Bearing Locknut                      | Steel                   |                    |            |             |
| 142              | Impeller Wear Ring (Not Illustrated) | Bronze                  | Cast Iron          | Bronze     | 316SS       |
| 145              | Imeller-Discharge, 2nd Stage         | Bronze                  | Cast Iron          | Bronze     | 316SS       |
| 146              | Diaphragm                            | Bronze                  | Cast Iron          | Bronze     | Nitronic 60 |
| 168              | Ball Bearing-Coupling End            | Steel                   |                    |            |             |
| 251              | Constant Level Sight Oiler           | Steel & Glass           |                    |            |             |
| 320              | Set Screw-Impeller Wear Ring         | 303SS                   |                    |            |             |
| 332A/333A        | Oil Seal                             | Synthetic Rubber        |                    |            |             |
| 351              | Casing Gasket                        | Non-Asbestos            |                    |            |             |
| 412A             | O-ring-Impeller                      | PTFE                    |                    |            |             |
| 412F             | O-ring-Shaft                         | BUNA RUBBER             |                    |            |             |

<sup>1</sup>Used when impeller is furnished without wear rings

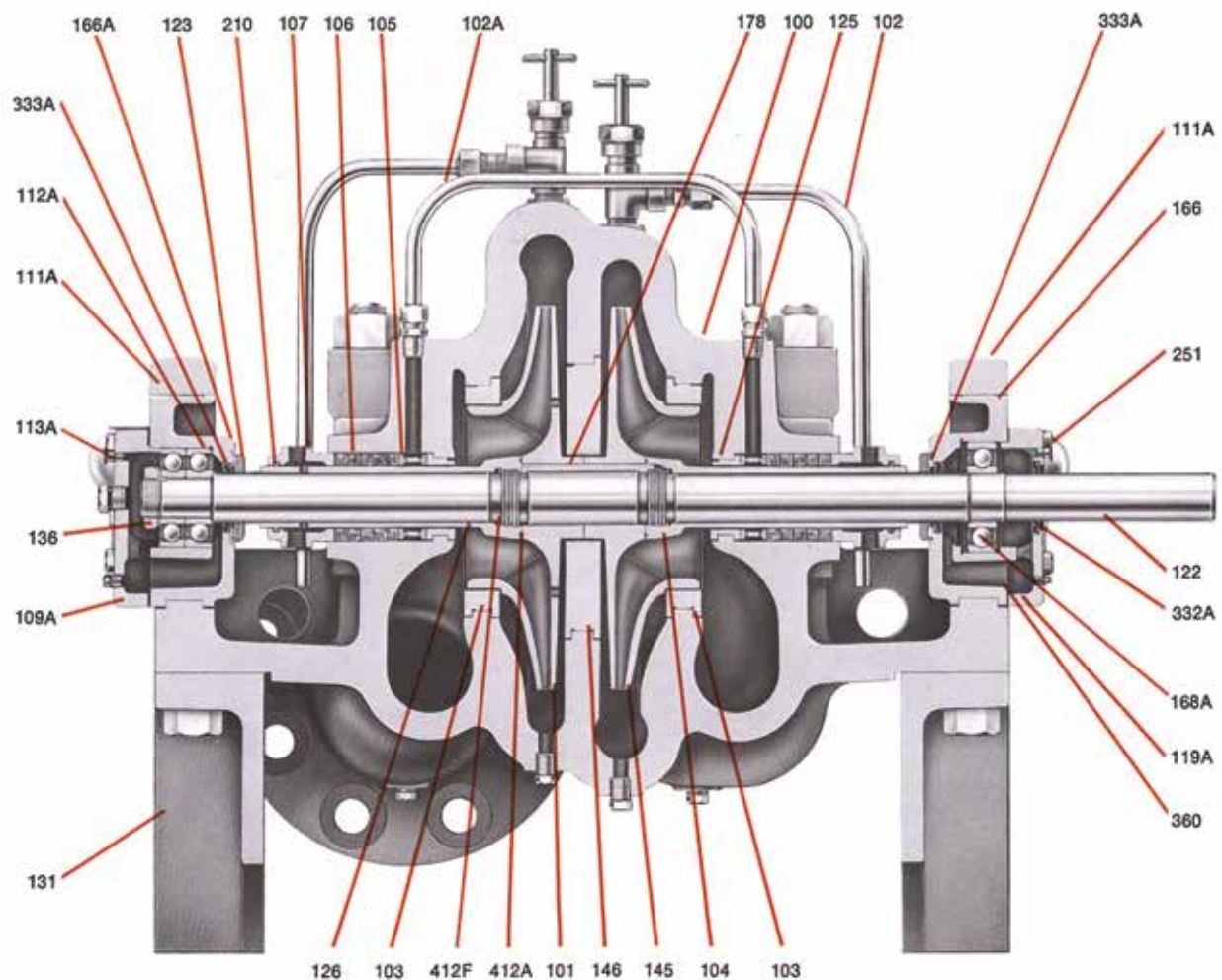
<sup>2</sup>Flame hardened to 550 BHN

## Materials of Construction

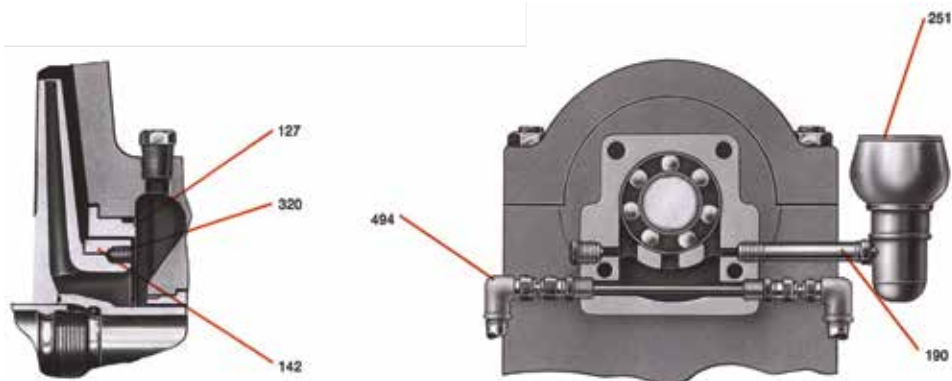
| CODE     | SPECIFICATION   |
|----------|---|
| 1000     | Cast Iron – ASTM A48 Class 25B  |
| 1001     | Cast Iron – (No ASTM code)  |
| 1003     | Cast Iron – ASTM A48 Class 30B  |
| 5445     | Bronze – ASTM B505 C89320   |
| 1101     | Bronze – ASTM B584-93A C87500   |
| 1618     | Bismuth Bronze  |
| AISI 303 | Stainless – (wrought) ASTM A582 type 303                                  |
| AISI 304 | Stainless – (wrought) ASTM A276 type 304                                  |
| 316      | Stainless – AISI 316 ASTM A744 CF-8M (cast), ASTM A276 type 316 (wrought) |
| 6956     | Colmonoy Coated 316   |
| SAE 4340 | ASTM, Gr. 4340  |

# Sectional View

## Model 3316



## Optional Constructions

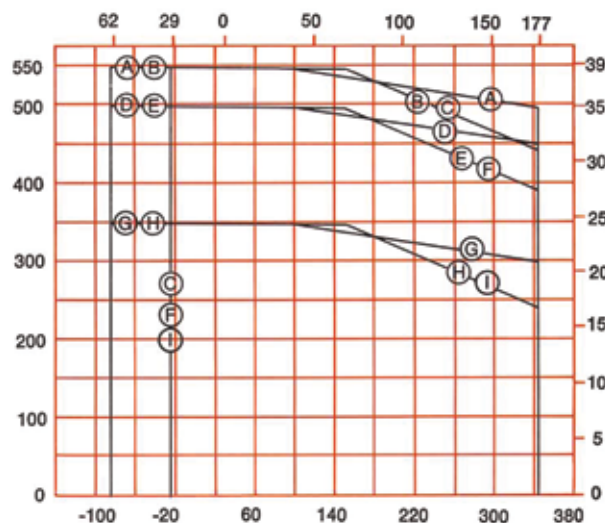


| Construction Details  |   |   |                       |                       |                       |               |                |                        |                        |                        |
|---|---|---|-----------------------|-----------------------|-----------------------|---------------|----------------|------------------------|------------------------|------------------------|
| Dimensions in inches. Metric equivalents in (mm)  |   | Group S   |                       | Group M               |                       |               |                |                        | Group L                |                        |
| † Maximum suction pressure is 240 PSIG. (1655kPa)<br>* Gland quenching recommended on hot water above 212°F (100°C) |   | 1½x2-9  | 2x3-9                 | 2x3-11                | 3x4-11G               | 3x4-11H       | 4x6-11HG       | 4x6-11                 | 6x8-17                 | 8x10-17                |
| Impeller  | Weight-Bronze Fitted Bare Pump in Lbs. (Kg)                       | 325<br>(147)                                      | 400<br>(181)          | 620<br>(281)          | 702<br>(318)          | 700<br>(318)  | 813<br>(369)   | 810<br>(367)           | 1820<br>(826)          | 2400<br>(1089)         |
|   | Weight-Bronze Impeller (Suction-1st Stage) Max. Dia. in lbs. (Kg) | 9.9<br>(4.5)                                      | 11.6<br>(5.3)         | 17.8<br>(8.1)         | 19.9<br>(9.0)         | 19.7<br>(8.9) | 23.0<br>(10.4) | 21.5<br>(9.8)          | 50.5<br>(22.7)         | 58.0<br>(26.3)         |
|   | Weight-Bronze Impeller (Disch.-2nd Stg.) Max. Dia. in lbs. (Kg)   | 9.85<br>(4.5)                                     | 11.5<br>(5.2)         | 17.5<br>(7.9)         | 19.6<br>(8.9)         | 18.4<br>(8.4) | 21.7<br>(9.8)  | 20.1<br>(9.1)          | 50.0<br>(22.7)         | 58.0<br>(26.3)         |
|   | Maximum Diameter Solids   | ⅝ <sub>2</sub><br>(4)                             | ⅞ <sub>2</sub><br>(6) | ⅝ <sub>2</sub><br>(4) | ⅝ <sub>2</sub><br>(4) | ¼<br>(6)      | ¼<br>(6)       | ⅜ <sub>2</sub><br>(12) | ⅞ <sub>2</sub><br>(15) | ⅞ <sub>2</sub><br>(21) |
| Casing  | Casing Thickness – Volute   | ¾<br>(19)   | ¾<br>(19)             | 1<br>(25)             |                       |               |                |                        | 1½<br>(29)             | 1¾<br>(32)             |
|   | Casing Thickness – Side Walls                                     | ¾<br>(16)   | ¾<br>(16)             | 1<br>(25)             |                       |               |                |                        | 1½<br>(29)             | 1½<br>(29)             |
|   | Minimum Casing Corrosion Allowance                                | ⅛<br>(3)  | ⅛<br>(3)              | ⅛ (3)                 |                       |               |                |                        | ⅛<br>(3)               | ⅛<br>(3)               |
|   | Casing Capacity – Gallons (with Pump Assembled) (liters)          | ¾<br>(3)  | 1¾<br>(7)             | 3<br>(11)             | 4<br>(15)             | 4<br>(15)     | 6¾<br>(26)     | 6¾<br>(26)             | 19<br>(72)             | 28¾<br>(109)           |
| Stuffing Box  | Stuffing Box Bore   | 2" (51)   |                       | 2 ½" (64)             |                       |               |                |                        | 3 ¼" (83)              |                        |
|   | Stuffing Box Depth (To stuff. Box Bushing)                        | 2 ⅝" (59)   |                       | 2 ⅝" (71)             |                       |               |                |                        | 3 ⅝" (86)              |                        |
|   | Stuffing Box Packing Size   | ⅝"x⅝" (8x8)                                       |                       | ⅝"x ⅝" (9.5 x 9.5)    |                       |               |                |                        |                        |                        |
|   | Stuffing Box – No. of Packing Rings                               | 5   |                       | 5                     |                       |               |                |                        | 6                      |                        |
|   | Width of Lantern Ring   | ⅝" (16)   |                       | ¾" (19)               |                       |               |                |                        | ⅞" (22)                |                        |
| Shaft   | Shaft Dia. at Impellers   | 1 ⅝" (30)   |                       | 1 ⅝" (40)             |                       |               |                |                        | 2⅜" (56)               |                        |
|   | Shaft Dia. at Shaft Sleeve  | 1 ⅞" (27)   |                       | 1 ⅞" (37)             |                       |               |                |                        | 2⅞" (52)               |                        |
|   | Shaft Dia. at Coupling End  | ⅞" (24)   |                       | 1 ⅞" (35)             |                       |               |                |                        | 1 ⅞" (49)              |                        |
|   | Outside Diameter of Shaft Sleeve                                  | 1 ⅞" (35)   |                       | 1 ⅞" (44)             |                       |               |                |                        | 2½" (63.5)             |                        |
| General   | Ball Bearing-Coupling End   | 305-S   |                       | 307-S                 |                       |               |                |                        | 310-S                  |                        |
|   | Ball Bearing – Thrust End   | 7304P-DB  |                       | 7306P-DB              |                       |               |                |                        | 7088P-DB               |                        |
|   | Bearing Centers   | 18 ¾" (476)                                       |                       | 22⅞" (581)            |                       |               |                |                        | 28⅞" (721)             |                        |
|   | Maximum Shaft H.P. Per 100 RPM (kW)                               | 2.57 (1.9)  |                       | 9.7 (7.2)             |                       |               |                |                        | 27.1 (20.2)            |                        |
| Press. Temp. Limits   | † Maximum Total Working Pressure                                  | See Pressure – Temperature Capability             |                       |                       |                       |               |                |                        |                        |                        |
|   | Maximum Test Pressure   | 150% of Maximum Working Pressure at 100°F. (38°C) |                       |                       |                       |               |                |                        |                        |                        |
|   | Max. Liquid Temp. without Cooling and Quenching                   | 250°F (121°C)                                     |                       |                       |                       |               |                |                        |                        |                        |
|   | Max. Liquid Temp. with Quenching Gland and Bearing Cooling        | 350°F (117°C)                                     |                       |                       |                       |               |                |                        |                        |                        |

## Pressure and Temperature Capability

| CODE FOR PRESSURE – TEMPERATURE CHART |       |                             |
|---------------------------------------|-------|-----------------------------|
| Group                                 | Curve | Casing Material             |
| M                                     | A     | 316SS A744 – CF8M           |
|                                       | B     | Bronze 93A – C87500         |
|                                       | C     | Cast Iron ASTM A48 Class 30 |
|                                       | D     | 316SS A744 – CF8M           |
| S                                     | E     | Bronze 93A – C87500         |
|                                       | F     | Cast Iron ASTM A48 Class 30 |
|                                       | G     | 316SS A744 – CF8M           |
| L                                     | H     | Bronze 93A – C87500         |
|                                       | I     | Cast Iron ASTM A48 Class 30 |

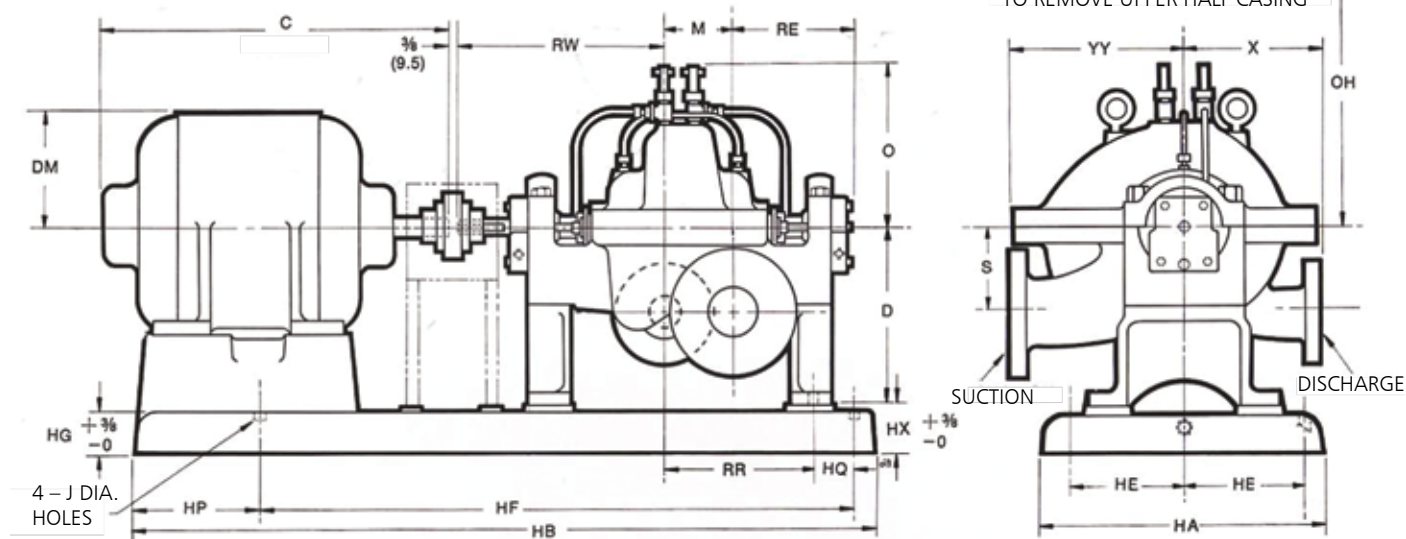
NOTES: Maximum suction pressure: 240 PSIG  
Ratings shown reflect pump limitations only. User should insure that connecting piping including mating flanges are adequate for anticipated service.  
Suction and discharge flanges drilled to match 300 lb. steel, bronze and 250 lb. AISI cast iron.





# Dimensions

All dimensions in inches and (mm). Not to be used for construction.  
Right hand rotation illustrated.

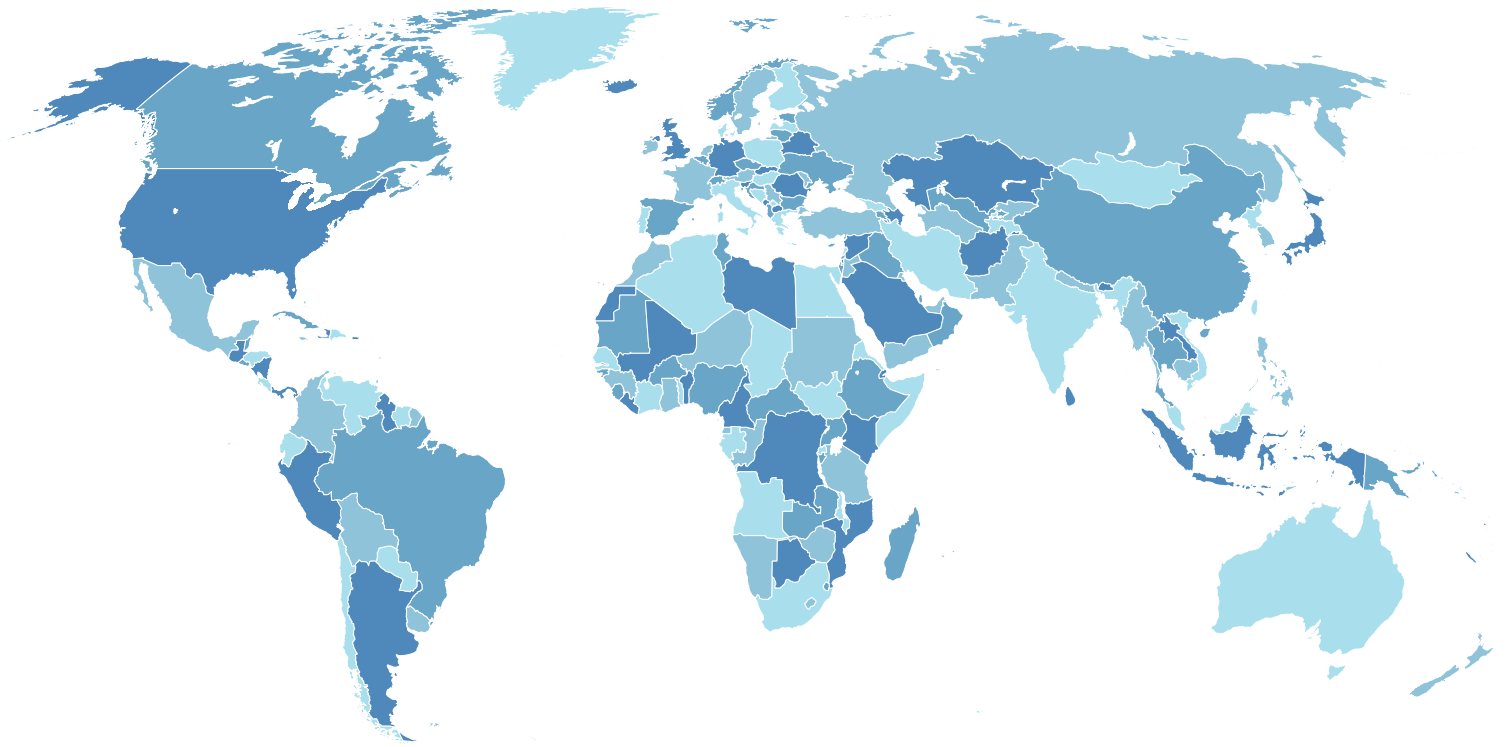


| DIMENSIONS DETERMINED BY PUMP |             |            |              |           |           |     |           |           |           |           |           |          |          |                  |
|-------------------------------|-------------|------------|--------------|-----------|-----------|-----|-----------|-----------|-----------|-----------|-----------|----------|----------|------------------|
| Group                         | Disch. Size | Suct. Size | Casing Class | O         | OH        | D   | X         | YY        | S         | RR        | RW        | M        | RE       | Weight Lbx. (Kg) |
| S                             | 1½ (38)     | 2 (51)     | 9            | 9½ (241)  | 15¼ (387) | 11½ | 8¼ (210)  | 10½ (257) | 4½ (117)  | 9½ (249)  | 13½ (351) | 3½ (89)  | 8½ (227) | 325 (147)        |
|                               | 2 (51)      | 3 (76)     | 9            | 10 (254)  | 15¼ (400) | 11½ | 8¼ (222)  | 11¼ (286) | 5½ (140)  | 9½ (252)  | 13½ (348) | 4½ (111) | 9½ (230) | 400 (181)        |
| M                             | 2 (51)      | 3 (76)     | 11           | 11¼ (286) | 17¼ (451) | 16  | 10 (254)  | 12¼ (311) | 4½ (114)  | 12 (305)  | 17 (432)  | 5 (127)  | 9¼ (248) | 620 (281)        |
|                               | 3 (76)      | 4 (102)    | 11           | 11¼ (298) | 18¼ (464) | 16  | 11 (279)  | 13 (330)  | 5½ (140)  | 12 (305)  | 17 (432)  | 6 (152)  | 8¼ (222) | 700 (318)        |
|                               | 4 (102)     | 6 (152)    | 11           | 12½ (318) | 19 (483)  | 16  | 11½ (292) | 16 (406)  | 6½ (165)  | 12½ (321) | 16½ (416) | 7½ (181) | 8½ (206) | 810 (367)        |
| L                             | 6 (152)     | 8 (203)    | 17           | 17¼ (438) | 26¼ (667) | 22  | 16 (406)  | 20½ (521) | 9 (229)   | 16½ (252) | 18½ (475) | 9½ (249) | 9¼ (235) | 1820 (826)       |
|                               | 8 (203)     | 10 (254)   | 17           | 18¼ (467) | 27¼ (695) | 22  | 17½ (445) | 23½ (597) | 10¼ (260) | 16½ (422) | 18¼ (464) | 11 (279) | 8½ (216) | 2400 (1089)      |

| DIMENSIONS DETERMINED BY MOTOR AND BEDPLATE |              |                   |                              |             |               |              |               |              |           |              |             |
|---|--------------|-------------------|------------------------------|-------------|---------------|--------------|---------------|--------------|-----------|--------------|-------------|
| Group                                       | Bedplate No. | Bedplate No.      | C                            | HA          | HB            | HE           | HF            | HG           | J         | HP           | HX          |
| S   | 1            | 143T thru 215T    | 12½ to 19½<br>(318) to (495) | 18<br>(457) | 43½<br>(1105) | 7%<br>(200)  | 38½<br>(978)  | 2½<br>(63.5) | ¾<br>(19) | 3¾<br>(95)   | 3<br>(76)   |
|   | 2            | 154T thru 266T    | 22½ to 27<br>(572) to (686)  |             | 50½<br>(1283) |              | 39¼<br>(997)  |              |           | 10<br>(254)  |             |
|   | 3            | 324TS thru 265T   | 27 to 34<br>(686) to (864)   | 23<br>(584) | 54½<br>(1384) | 10¼<br>(260) | 42¾<br>(1086) | 3½<br>(89)   |           | 10½<br>(267) | 4<br>(102)  |
|   | 4            | 404TST thru 405TS | 34 to 35½<br>(864) to (902)  |             | 57¼<br>(1454) |              | 44¾<br>(1137) |              |           | 11¼<br>(286) |             |
| M   | 1            | 182T thru 266T    | 14½ to 27<br>(368) to (686)  | 24<br>(610) | 57¼<br>(1454) | 10½<br>(267) | 50<br>(1270)  | 3½<br>(89)   | ⅞<br>(22) | 5¾<br>(146)  | 4<br>(102)  |
|   | 2            | 324T thru 365T    | 27 to 34<br>(686) to (864)   |             | 61<br>(1549)  |              | 48¼<br>(1226) |              |           | 11¼<br>(286) |             |
|   | 3            | 404TS thru 447TS  | 34 to 46½<br>(864) to (1181) | 26<br>(660) | 69¾<br>(1772) | 11½<br>(292) | 53½<br>(1359) | 4<br>(102)   |           | 14¾<br>(375) | 4½<br>(114) |
| L   | 1            | 254T thru 365T    | 22½ to 34<br>(572) to (864)  | 33<br>(838) | 68<br>(1727)  | 14¾<br>(375) | 55¼<br>(1403) | 4½<br>(114)  | 1<br>(25) | 11<br>(279)  | 5<br>(127)  |
|   | 2            | 404TS thru 447TS  | 34 to 46½<br>(864) to (1181) |             | 76½<br>(1943) |              | 59⅝<br>(1519) |              |           | 14⅞<br>(379) |             |
|   | 3            | 447T              | 48<br>(1218)                 |             | 79½<br>(2019) |              | 61¾<br>(1568) |              |           | 16<br>(406)  |             |

# Notes

# Notes



Visit [www.ittproservices.com](http://www.ittproservices.com) & [www.gouldspumps.com](http://www.gouldspumps.com) to  
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