

VSC[®]/VSCS[®] Pumps

Technical Brochure

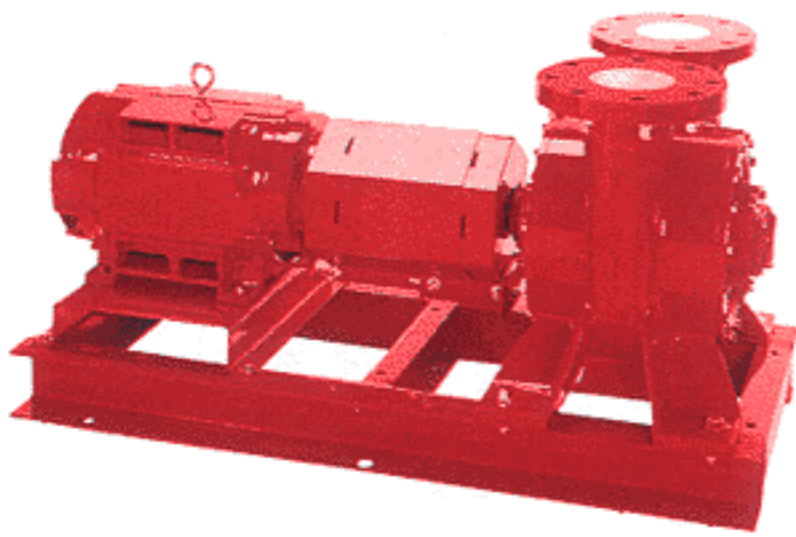


Table of Contents

| | |
|---------------------------------|----|
| Useful Pump Formulas | 2 |
| Performance Curves | 3 |
| Floor Cost Savings | 4 |
| Materials of Construction | 6 |
| Mechanical Seals | 7 |
| Static Flange Loadings | 8 |
| Pump Dimensions | 9 |
| VSC/VSCS Specifications | 12 |

Useful Pump Formulas

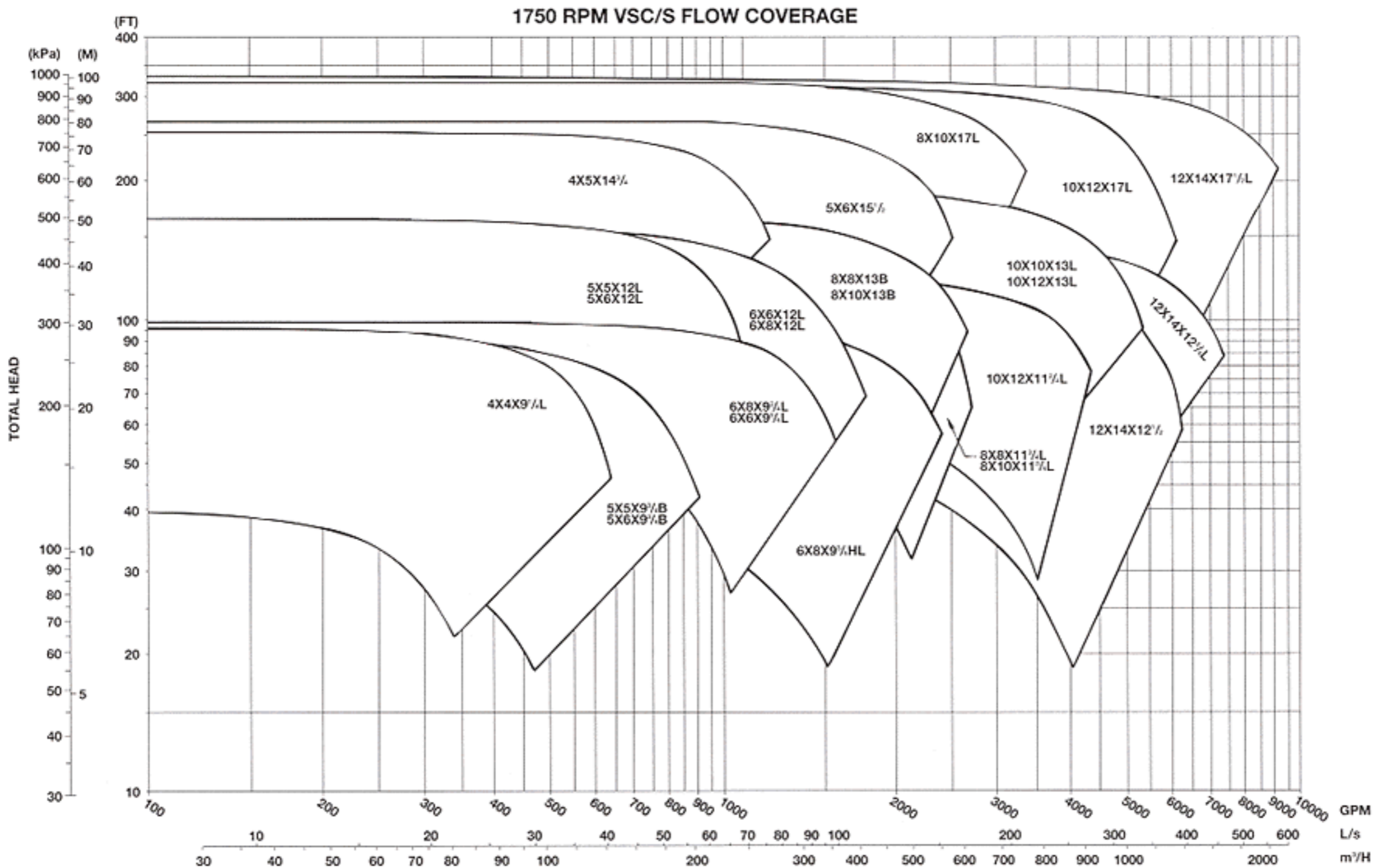
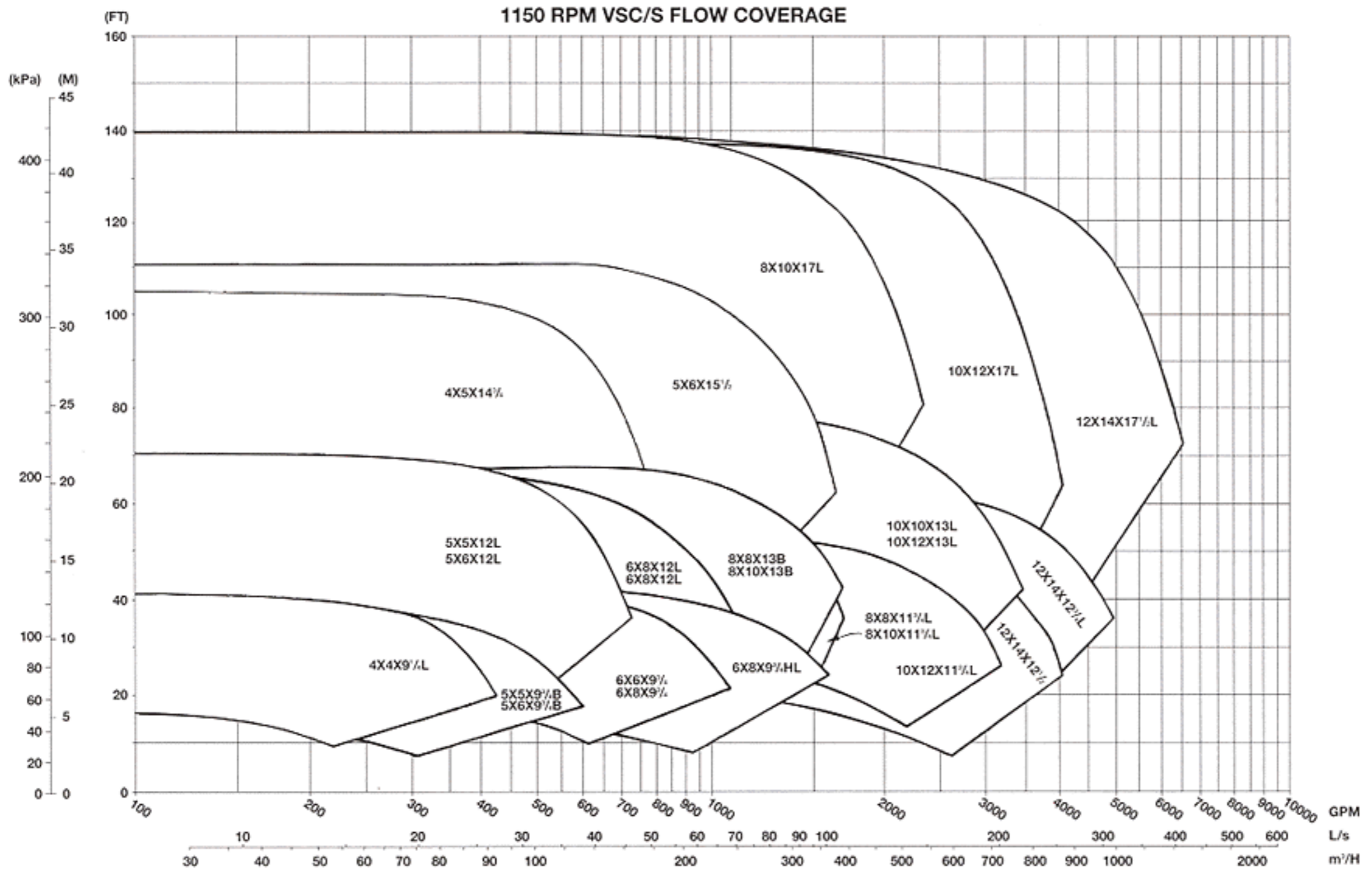
$$\begin{aligned} \text{Pressure (PSI)} &= \frac{\text{Head (Feet)} \times \text{Specific Gravity}}{2.31} \\ \text{Head (Feet)} &= \frac{\text{Pressure (PSI)} \times 2.31}{\text{Specific Gravity}} \\ \text{Vacuum (Inches of Mercury)} &= \frac{\text{Dynamic Suction Lift (Feet)} \times .883}{\text{Specific Gravity}} \\ \text{Horsepower (Brake)} &= \frac{\text{GPM} \times \text{Head (Feet)} \times \text{Specific Gravity}}{3960 \times \text{Pump Efficiency}} \\ \text{Horsepower (Water)} &= \frac{\text{GPM} \times \text{Head (Feet)} \times \text{Specific Gravity}}{3960} \\ \text{Efficiency (Pump)} &= \frac{\text{Horsepower (Water)}}{\text{Horsepower (Brake)}} \times 100 \text{ Per Cent} \\ \text{NPSH (Available)} &= \text{Positive Factors} - \text{Negative Factors} \end{aligned}$$

Affinity Laws: Effect of change of speed or impeller diameter on centrifugal pumps.

| | GPM Capacity | Ft. Head | BHP |
|--------------------------|---|--|--|
| Impeller Diameter Change | $Q_2 = \frac{D_2}{D_1} Q_1$ | $H_2 = \left(\frac{D_2}{D_1}\right)^2 H_1$ | $P_2 = \left(\frac{D_2}{D_1}\right)^3 P_1$ |
| Speed Change | $Q_2 = \frac{\text{RPM}_2}{\text{RPM}_1} Q_1$ | $H_2 = \left(\frac{\text{RPM}_2}{\text{RPM}_1}\right)^2 H_1$ | $P_2 = \left(\frac{\text{RPM}_2}{\text{RPM}_1}\right)^3 P_1$ |

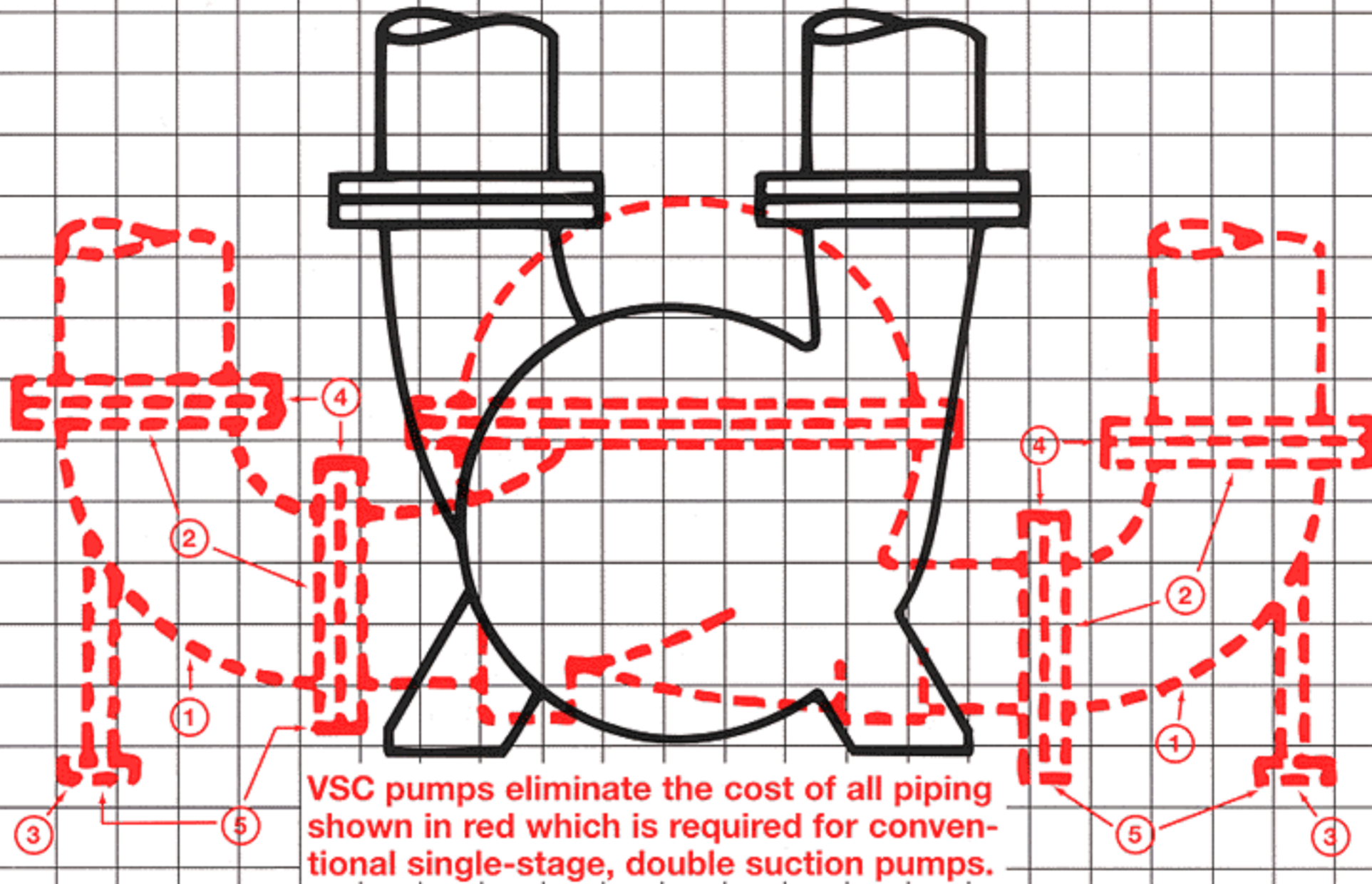
Where Q = GPM, H = Head, P = BHP, D = Impeller Dia., RPM = Pump Speed

60 Hertz Performance Curves



VSC/VSCS Series

FLOOR SPACE SAVINGS FOR A VSC/VSCS PUMP AS COMPARED TO A HORIZONTAL SPLIT CASE PUMP.



ESTIMATED ADDITIONAL INSTALLED COSTS FOR HORIZONTAL SPLIT CASE SINGLE-STAGE DOUBLE-SUCTION PUMPS

| ITEM | DESCRIPTION | 4" PIPE | 6" PIPE | 8" PIPE | 10" PIPE |
|------|--|----------|----------|-----------|-----------|
| 1 | Two 90° long radius butt weld elbows | \$ 24.00 | \$ 62.00 | \$ 115.00 | \$ 207.00 |
| 2 | Four welding neck flanges | 71.00 | 107.00 | 199.00 | 311.00 |
| 3 | Materials for fabricating two pipe supports | 14.00 | 17.00 | 24.00 | 38.00 |
| 4 | Time for welding four flanges to elbows, gapping and setting flange | 8 hrs | 9.6 hrs | 12.6 hrs | 15.8 hrs |
| 5 | Time for locating and welding two pipe supports; positioning and bolting two elbow assemblies. | 1.9 hrs | 2.1 hrs | 2.6 hrs | 2.8 hrs |
| 6 | Total labor time | 10 hrs | 11.7 hrs | 15.2 hrs | 18.6 hrs |
| 7 | Labor @ \$35.00 per hr | \$350.00 | \$409.00 | \$532.00 | \$651.00 |
| 8 | Total estimated additional installed cost over B&G VSC Pump | \$459.00 | \$595.00 | \$870.00 | \$1207.00 |

FLOOR SPACE SAVED WITH B&G VSC PUMPS

| PIPE SIZE | AREA FOR CONVENTIONAL PUMPS | AREA FOR VSC PUMPS | AREA SAVED WITH VSC PUMPS |
|-----------|-----------------------------|--------------------|---------------------------|
| 4" | 16 sq. ft. | 10 sq. ft. | 6 sq. ft. |
| 6" | 19 sq. ft. | 12 sq. ft. | 7 sq. ft. |
| 8" | 24 sq. ft. | 15 sq. ft. | 9 sq. ft. |
| 10" | 32 sq. ft. | 20 sq. ft. | 12 sq. ft. |

COST SAVINGS IN FLOOR SPACE WITH B&G VSC PUMPS

| PIPE SIZE | AVERAGE FLOOR SPACE SAVED WITH VSC PUMPS | SAVINGS WITH VSC PUMPS \$115.00* PER SQ. FT. |
|-----------|--|--|
| 4" | 6 sq. ft. | \$ 690.00 |
| 6" | 7 sq. ft. | 805.00 |
| 8" | 9 sq. ft. | 1,035.00 |
| 10" | 12 sq. ft. | 1,380.00 |

The above estimated additional installed costs for conventional single-stage, double-suction pumps are conservative. Actual cost differentials will depend upon locale and piping practices employed.

* Based on average construction costs per sq. ft. of various buildings as supplied by Dodge Construction Statistic for 2002.

2002 Price of Labor Estimated

VSC/VSCS Series

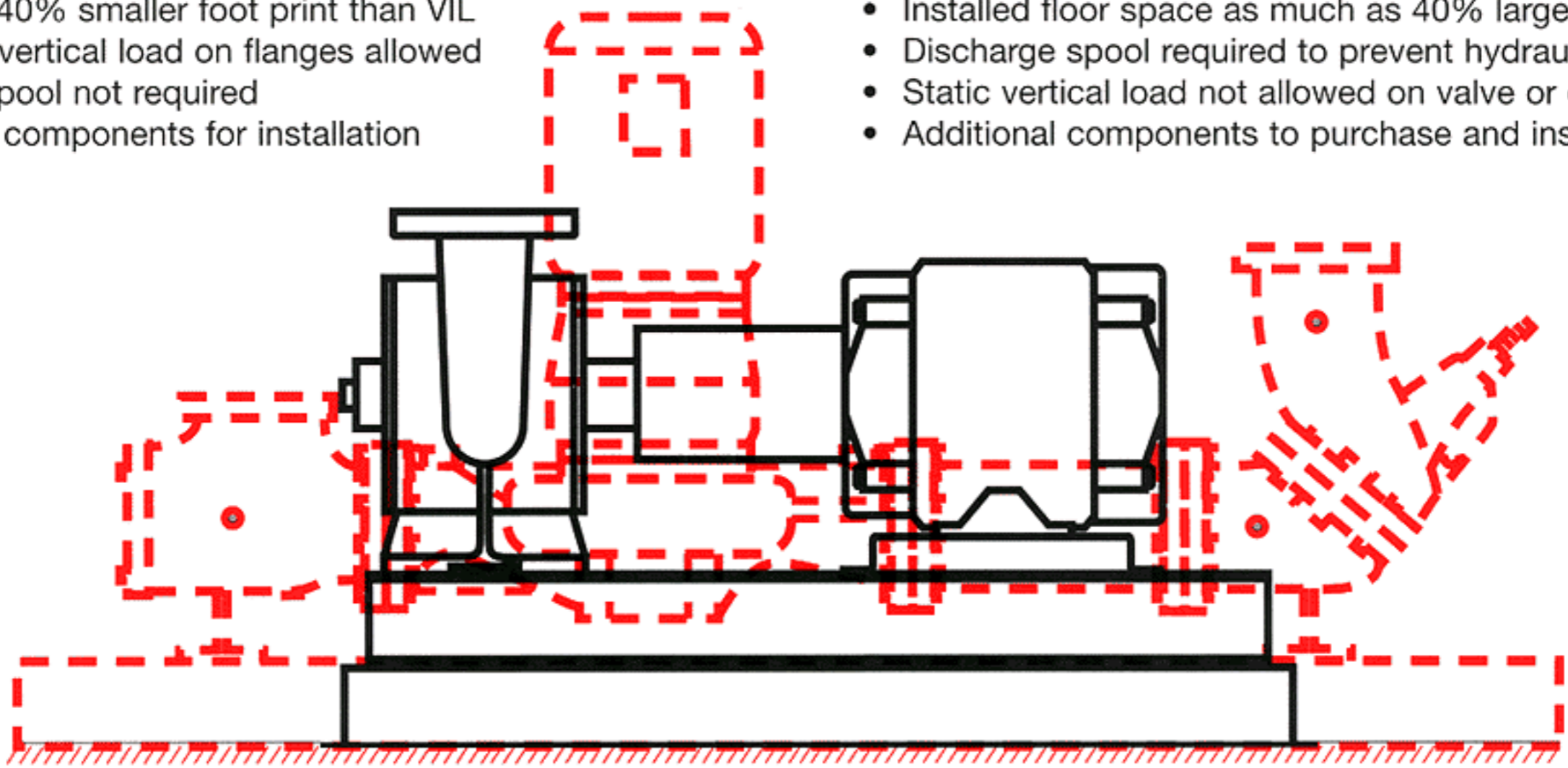
FLOOR SPACE SAVINGS FOR A VSC PUMP AS COMPARED TO A VERTICAL IN-LINE PUMP.

Series VSC Floor Space – 13 sq. ft.

- Up to 40% smaller foot print than VIL
- Static vertical load on flanges allowed
- Pipe spool not required
- Fewer components for installation

Vertical In-Line Floor Space – 21 sq. ft.

- Installed floor space as much as 40% larger
- Discharge spool required to prevent hydraulic noise
- Static vertical load not allowed on valve or diffuser
- Additional components to purchase and install



ESTIMATED ADDITIONAL INSTALLED COSTS FOR VERTICAL IN-LINE PUMPS

| ITEM | DESCRIPTION | 4" PIPE | 5" PIPE | 6" PIPE | 8" PIPE | 10" PIPE |
|------|--|------------|------------|------------|------------|------------|
| 1 | Suction Diffuser | \$277.00 | \$ 380.00 | \$ 409.00 | \$ 777.00 | \$1,030.00 |
| 2 | Triple Duty Valve | 404.00 | 504.00 | 602.00 | 1,073.00 | 1,534.00 |
| 3 | Spool Piece | 111.00 | 156.00 | 172.00 | 204.00 | 406.00 |
| 4 | Materials for fabricating two pipe supports | 14.00 | 16.00 | 17.00 | 24.00 | 38.00 |
| 5 | Time for locating and welding two pipe supports; positioning and bolting two pump accessories. | 1.9 hrs | 2.0 hrs | 2.1 hrs | 2.6 hrs | 2.8 hrs |
| 6 | Labor @ \$35.00 per hr | 67.00 | 70.00 | 74.00 | 91.00 | 98.00 |
| 7 | Additional floor space cost | 127.00 | 69.00 | 276.00 | 943.00 | 748.00 |
| 8 | Total estimated additional installed cost over B&G VSC Pump | \$1,000.00 | \$1,195.00 | \$1,550.00 | \$3,112.00 | \$3,854.00 |

| PUMP SIZE | AREA FOR VERTICAL IN-LINE PUMP | AREA FOR VSC PUMP | PERCENT AREA SAVED WITH VSC PUMPS | FLOOR SPACE COST SAVINGS WITH VSC PUMPS \$115.00* PER SQ. FT. |
|-----------|--------------------------------|-------------------|-----------------------------------|---|
| 4" | 8.1 sq. ft. | 7.0 sq. ft. | 14% | \$127.00 |
| 5" | 10.2 sq. ft. | 9.6 sq. ft. | 6% | \$ 69.00 |
| 6" | 13.8 sq. ft. | 11.4 sq. ft. | 17% | \$276.00 |
| 8" | 20.7 sq. ft. | 12.5 sq. ft. | 40% | \$943.00 |
| 10" | 26.2 sq. ft. | 19.7 sq. ft. | 25% | \$748.00 |

* Based on average construction costs per sq. ft. of various buildings as supplied by Dodge Construction Statistic for 2002.

The above estimated additional installed costs for vertical in-line pumps are conservative. Actual cost differentials will depend upon locale and piping practices employed.

2002 Price of Labor Estimated

VSC/VSCS Construction Materials

STANDARD SEAL CONFIGURATION

| PART NAME | STANDARD CONSTRUCTION | ASTM NO. |
|---------------------------------|-----------------------------|-------------------|
| Casing | Cast iron | A159 Class G3000 |
| Volute cover plate (Outboard) | Cast iron | A159 Class G3000 |
| Volute cover plate (Inboard) | Cast iron | A159 Class G3000 |
| Impeller | Bronze | B584 Alloy C87500 |
| Shaft | 18-8 Stainless | A276 Type 304 |
| Shaft Collar | Bronze | B16 Alloy C36000 |
| Impeller nut | Bronze | B16 Alloy C36000 |
| Bearing housing (radial/thrust) | Cast iron | A159 Class G3000 |
| Bearing (Radial/thrust)** | Grease lubricated | |
| Bearing cover (radial/thrust) | Cast iron | A159 Class G2500 |
| Gasket | Cellulose fiber/SBR | |
| Shaft seal/seat (standard) | Buna/Carbon/Ceramic | Type 21*** |
| Shaft seal/seat (optional) | Buna/Carbon/Ceramic | Type 2/52 |
| | EPR/Carbon/Tungsten Carbide | Type 2/52 |
| Wear ring (optional) | Bronze | B584 Alloy C93200 |

STUFFING BOX CONSTRUCTION

| PART NAME | STANDARD CONSTRUCTION | ASTM NO. |
|---------------------------------|----------------------------------|-------------------|
| Casing | Cast iron | A159 Class G3000 |
| Volute cover plate (Outboard) | Cast iron | A159 Class G3000 |
| Volute cover plate (Inboard) | Cast iron | A159 Class G3000 |
| Impeller | Bronze | B584 Alloy C87500 |
| Shaft | Carbon steel | A108 Grade 1144 |
| Shaft sleeve | 18-8 Stainless* | A269 Type 304 |
| Shaft sleeve collar | Carbon steel | SAE 1018 |
| Impeller nut | Bronze | B16 Alloy C36000 |
| Bearing housing (radial/thrust) | Cast iron | A159 Class G3000 |
| Bearing (radial/thrust)** | Grease lubricated | |
| Bearing cover (radial/thrust) | Cast iron | A159 Class G2500 |
| Gasket | Cellulose fiber | |
| Shaft seal/seat | | |
| Single seal (-S) | Carbon/Tungsten Carbide standard | Durametallic RO |
| Double seal (-D) (optional) | EPR/Carbon/Ceramic | Durametallic RO |
| Wear ring (optional) | Bronze | B584 Alloy C93200 |

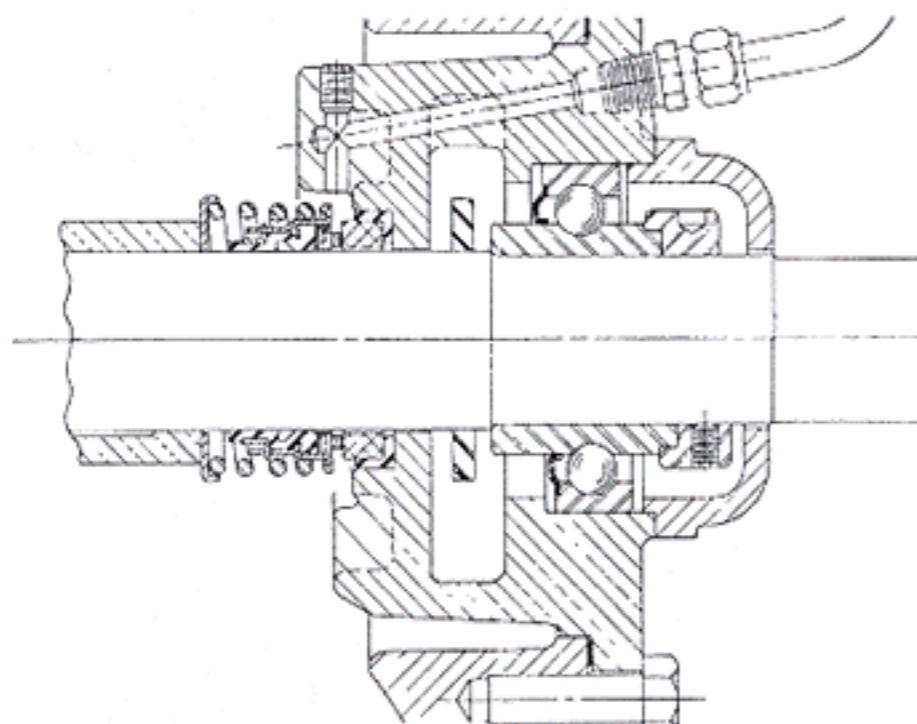
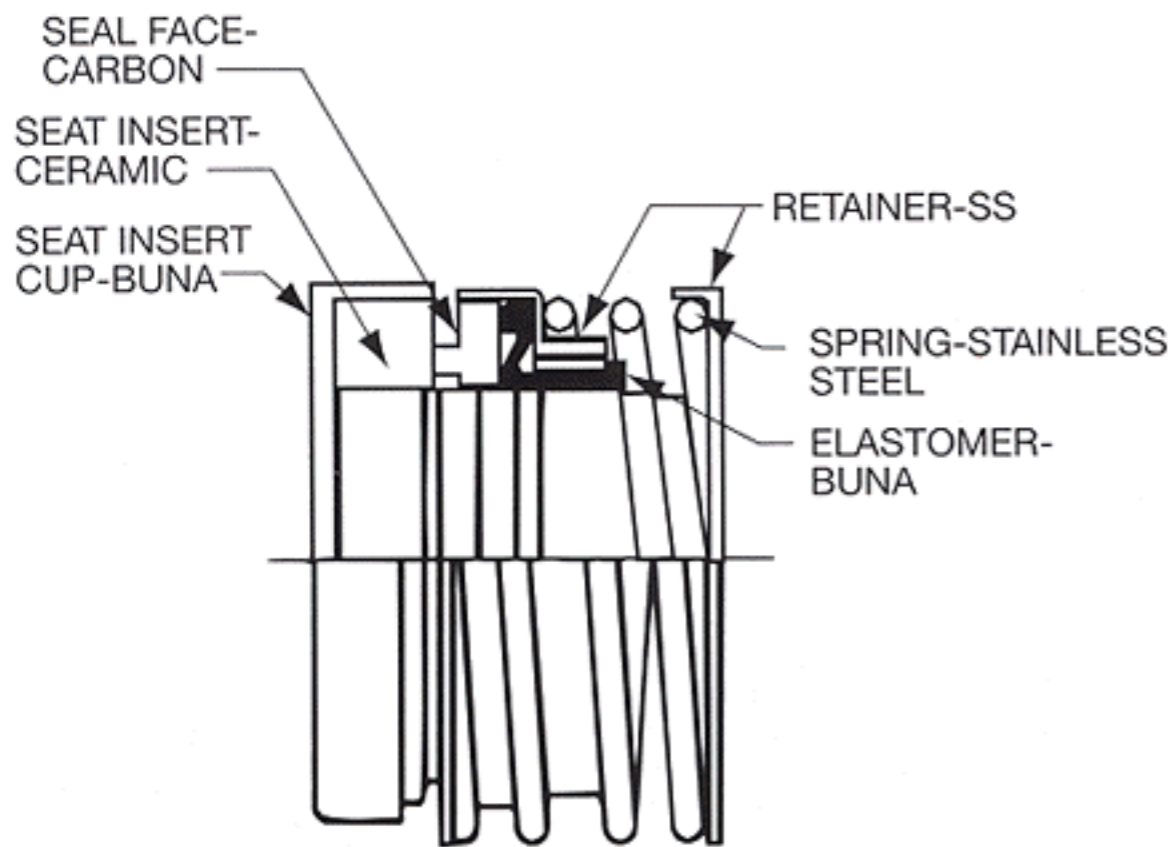
* Bronze for 12x14x17¹/₂L and 12x14x17¹/₂B ASTM B505 Alloy C93200

** Wide inner ring type (except 10x12x17, 12x14x12¹/₂)

*** Type 2/52 is standard on sizes 10x12x17L, 12x14x12³/₄L, 12x14x17¹/₂L and 12x14x17¹/₂B.

Engineering Data VSC/VSCS Series

MECHANICAL SEALS



Shown with optional John Crane Type 2 seal

Seal drawing courtesy John Crane

SELECTION GUIDE

Standard Size VSC/VSCS Series

Type 21*, Carbon/Ceramic, Buna elastomer, 316 S.S. spring. Temperature range -20° to 225°F . PH limitation 7-9. Ideally suited for open or closed systems with relatively clean liquid and few abrasives.

Also available in Carbon/Tungsten Carbide, EPR elastomers construction. Temperature range -20 to 250°F . PH limitation 7-11.

VSC/VSCS-F

Standard configuration pump, Type 21*, Buna elastomer, Carbon/Ceramic seal supplied with an external flush to the seal faces. Temperature range -20 to 225°F , PH limitation 7-9. Best suited for fluid environments containing moderate amounts of abrasives. Ideal for cooling tower applications.

VSC/VSCS-S

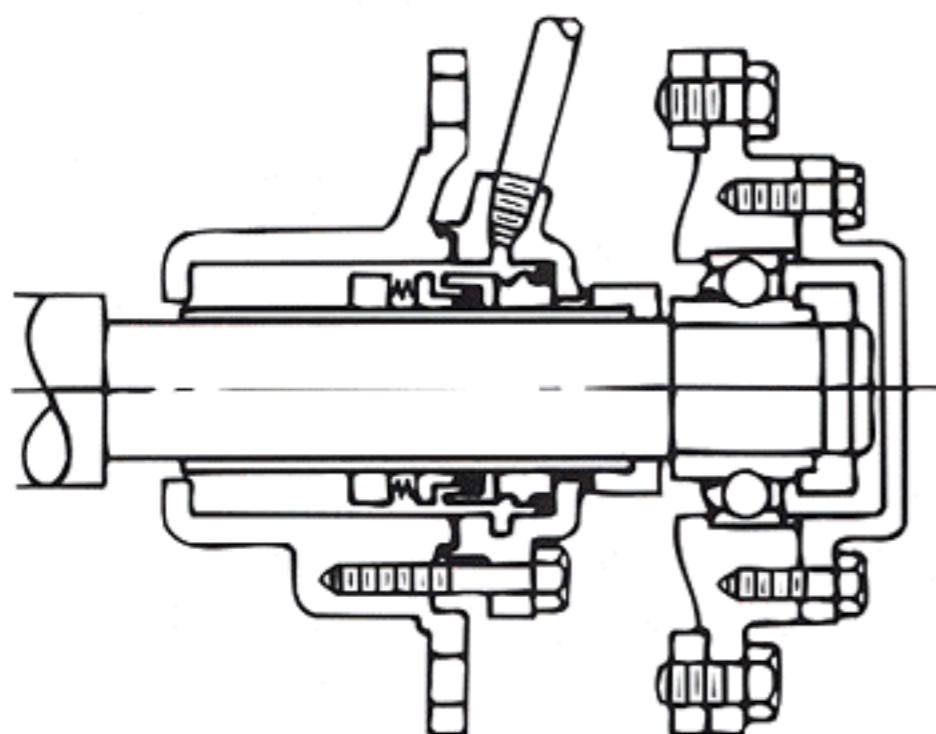
Stuffing box configuration pump utilizes a Durametallc RO, Carbon/Tungsten Carbide with an external flush to the seal faces. Elastomers are EPR (ethylene propylene rubber) and wetted metal parts 316 S.S. Temperature range -20 to 300°F^{**} , PH limitations 7-11. For use on open or closed systems where temperature or pressure requirements exceed the limits of the standard seal.

NOTE: Refer to product submittals for individual temperature and pressure capabilities.

* Type 2/52 is standard on sizes 10x12x17L, 12x14x12³/₄L, 12x14x17¹/₂L and 12x14x17¹/₂B.

** For operating temperatures above 250°F a cooled flush is recommended for optimum seal life. On closed systems cooling is accomplished by inserting a small heat exchanger in the flush line to cool the seal flushing liquid.

Flush-line Filters and Sediment Separators are available on special request.



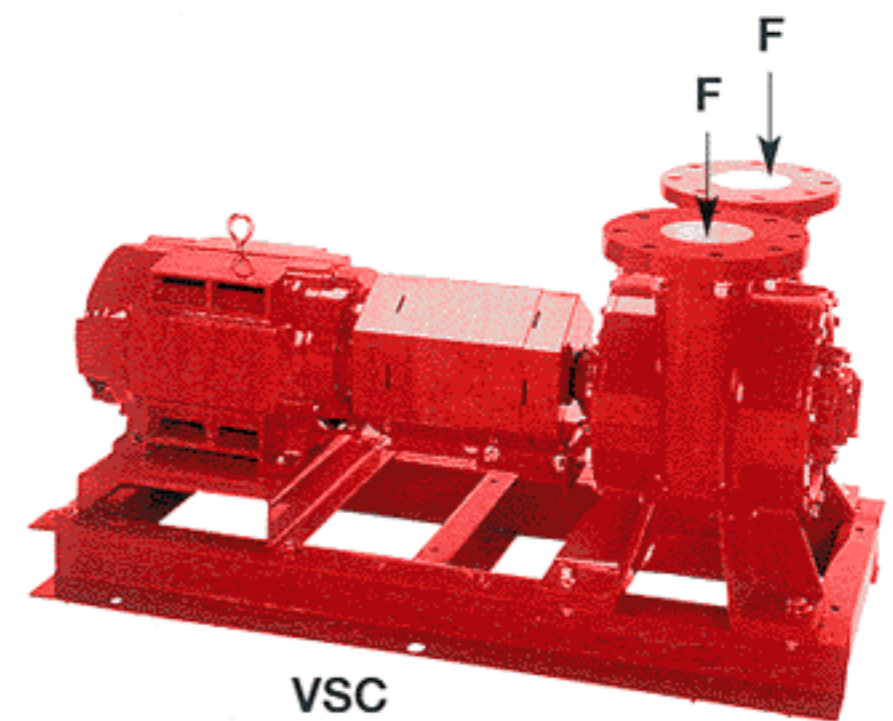
Engineering Data VSC/VSCS Series

ALLOWABLE STATIC FLANGE LOADINGS

The orientation of the nozzles on the VSC/VSCS Series Pumps permits static loads which can be supported without impairing pump operation.

The following schedule gives the maximum vertical static forces (downward) which we know from experience and judgment can be tolerated.

| VSC PUMPS | VSCS PUMPS | FORCE (F) IN POUNDS ON EACH VERTICAL FLANGE |
|--|---|---|
| 4x4x9 ¹ / ₄ L | — | 2,000 |
| 5x5x9 ³ / ₄ B | 5x6x9 ³ / ₄ B | 2,750 |
| 5x5x12B & L | 5x6x12B & L | 2,200 |
| 6x6x9 ³ / ₄ B & L | 6x8x9 ³ / ₄ B & L | 3,300 |
| 6x8x9 ³ / ₄ H & HL | 6x8x9 ³ / ₄ H & HL | 4,800 |
| 6x6x12L | 6x8x12L | 3,600 |
| 8x8x10 ¹ / ₂ | 8x10x10 ¹ / ₂ | 5,000 |
| 8x8x13B | 8x10x13B | 5,000 |
| — | 4x5x14 ³ / ₄ | 2,900 |
| — | 5x6x15 ¹ / ₂ | 4,000 |
| 10x10x13B & L | 10x12x13B & L | 6,200 |
| — | 8x10x17L | 5,700 |
| — | 10x12x11 & 11 ³ / ₄ L | 7,500 |
| — | 10x12x17 & L | 6,800 |
| — | 12x14x12 ¹ / ₂ | 8,100 |
| — | 12x14x12 ³ / ₄ L | 8,100 |
| — | 12x14x17 ¹ / ₂ B & L | 9,000 |



- a. The VSC/VSCS Series Pumps must be installed, with the baseplate completely grouted in accordance with Bell & Gossett and Hydraulic Institute Standards.
- b. No external moments or transverse forces should be applied to the nozzles of the VSC/VSCS Series Pumps.

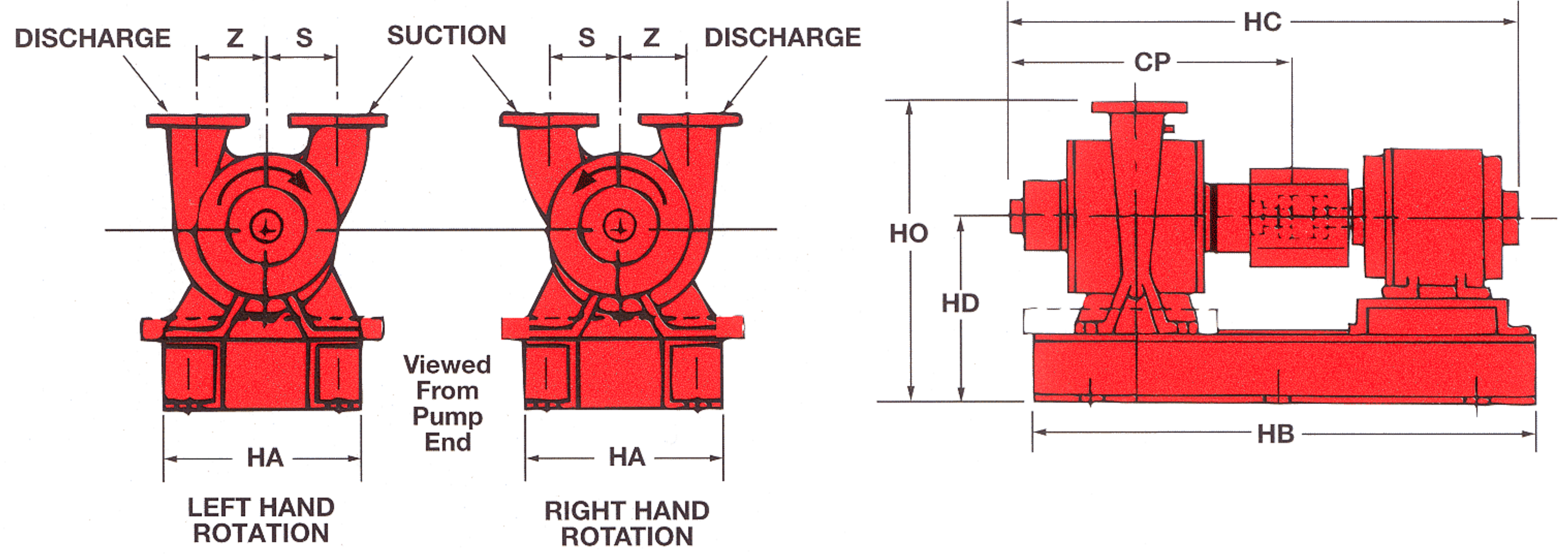
Should the schedule of maximum vertical static forces (F) be exceeded, or the above limitations not be considered, malfunction of the pump and shorter life of the wearing parts will occur.

DIMENSIONS

Dimensions subject to change without notice. Do not use for construction purposes.

NOTE: Flanges are 125# ANSI Standard.
Optional 250# ANSI rating is available.

Right hand rotation is furnished unless otherwise specified.



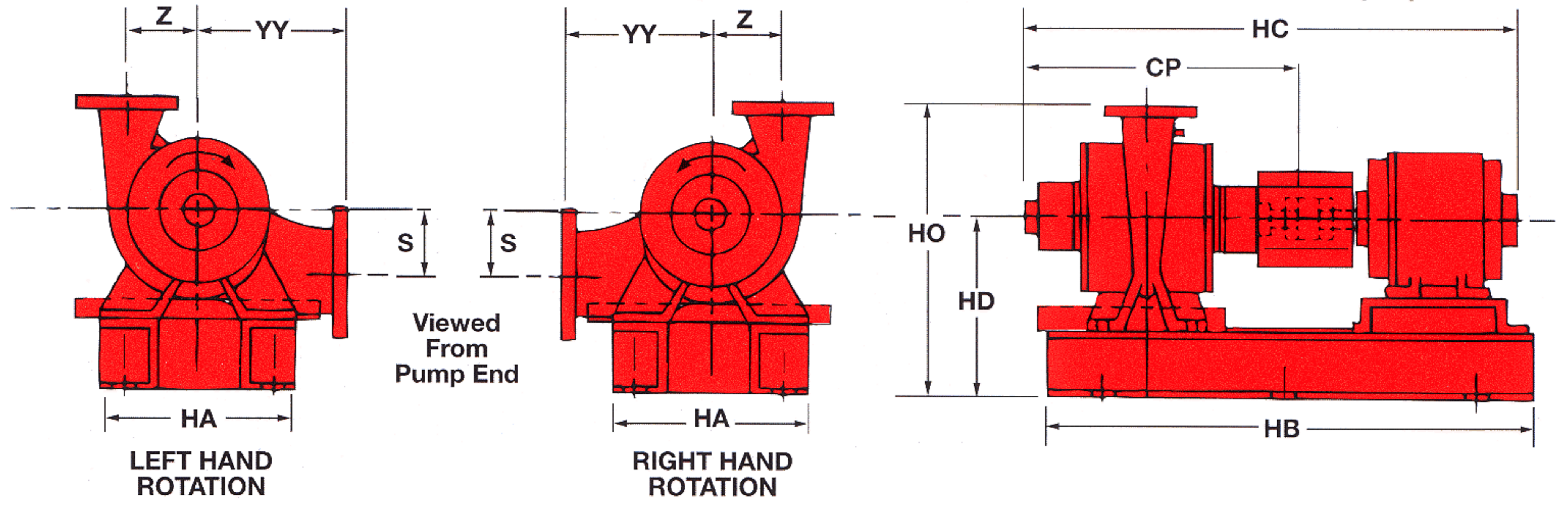
| PUMP SIZE | MOTOR FRAME | STANDARD MECHANICAL SEAL CONSTRUCTION PUMP MODEL VSC, VSC-F | | | | | | | | STUFFING BOX CONSTRUCTION VSC-PF, VSC-S & VSC-D | | | | | | | |
|-----------------------------|--------------|--|-------------|--------------|--------------|-------------|-------------|------------|------------|--|-------------|--------------|--------------|-------------|-------------|------------|------------|
| | | DIMENSIONS IN INCHES (MM) | | | | | | | | DIMENSIONS IN INCHES (MM) | | | | | | | |
| | | CP | HA | HB | HC MAX. | HD | HO | S | Z | CP | HA | HB | HC MAX. | HD | HO | S | Z |
| 4x4x9 1/4 L | 182T-184T | 19(483) | 19 1/2(495) | 38 1/8(972) | 40 1/8(1019) | 13 1/4(337) | 22 3/4(578) | 6(152) | 6(152) | 25 1/4(641) | 19 1/2(495) | 38 1/8(972) | 46 3/8(1178) | 13 1/4(337) | 22 3/4(578) | 6(152) | 6(152) |
| | 43 3/8(1102) | | | 43 3/8(1102) | 49 5/8(1260) | | | | | | | 43 3/8(1102) | 49 5/8(1260) | | | | |
| | 48 1/8(1222) | | | 48 1/8(1222) | 54 3/8(1375) | | | | | | | 48 1/8(1222) | 54 3/8(1375) | | | | |
| 4x4x9 1/4 L 3500 RPM | 254T-256T | 19(483) | 19 1/2(495) | 43 3/8(1102) | 49 7/8(1267) | 13 1/4(337) | 22 3/4(578) | 6(152) | 6(152) | 25 1/4(641) | 19 1/2(495) | 43 3/8(1102) | 56 1/8(1426) | 13 1/4(337) | 22 3/4(578) | 6(152) | 6(152) |
| | 49 5/8(1260) | | | 50 3/4(1289) | 49 5/8(1260) | | | | | | | 57(1448) | | | | | |
| | 54 1/8(1375) | | | 54 1/8(1375) | 60 3/8(1534) | | | | | | | 60 3/8(1534) | | | | | |
| | 56 3/8(1432) | | | 56 3/8(1432) | 62 5/8(1591) | | | | | | | 62 5/8(1591) | | | | | |
| 5x5x9 3/4 B | 182T-184T | 19(483) | 19 1/2(495) | 38 1/8(972) | 40 1/8(1019) | 13 1/4(337) | 23 3/4(603) | 7 1/4(184) | 7 1/4(184) | 25 1/4(641) | 19 1/2(495) | 38 1/8(972) | 46 3/8(1178) | 13 1/4(337) | 23 3/4(603) | 7 1/4(184) | 7 1/4(184) |
| | 43 3/8(1102) | | | 43 3/8(1102) | 49 5/8(1260) | | | | | | | 43 3/8(1102) | 49 5/8(1260) | | | | |
| | 49 5/8(1260) | | | 49 5/8(1260) | 56 1/8(1426) | | | | | | | 49 5/8(1260) | 56 1/8(1426) | | | | |
| 5x5x9 3/4 B 3550 RPM | 284TS | 19(483) | 19 1/2(495) | 49 5/8(1260) | 49 1/4(1251) | 14 1/4(362) | 24 3/4(629) | 7 1/4(184) | 7 1/4(184) | 25 1/4(641) | 19 1/2(495) | 49 5/8(1260) | 55 1/2(1410) | 13 1/4(337) | 23 3/4(603) | 7 1/4(184) | 7 1/4(184) |
| | 286TS | | | | 50 3/4(1289) | | | | | | | | 57(1448) | | | | |
| | 324TS | | | | 52 5/8(1337) | | | | | | | | 58 7/8(1495) | | | | |
| | 326TS | | | | 54 1/8(1375) | | | | | | | | 60 3/8(1534) | | | | |
| | 364TS | | | | 55 3/4(1416) | | | | | | | | 62(1575) | | | | |
| | 365TS | | | | 56 3/8(1432) | | | | | | | | 62 5/8(1591) | | | | |
| | 404TS-405TS | | | | 58 5/8(1489) | | | | | | | | 64 7/8(1648) | | | | |
| | 444TS | | | | 58 5/8(1489) | | | | | | | | 64 7/8(1648) | | | | |
| 5x5x12 B 5x5x12 L | 213T-215T | 19(483) | 19 1/2(495) | 43 3/8(1102) | 43 3/8(1102) | 13 1/4(337) | 24 3/4(629) | 8(203) | 8(203) | 25 1/4(641) | 19 1/2(495) | 43 3/8(1102) | 49 5/8(1260) | 13 1/4(337) | 24 3/4(629) | 8(203) | 8(203) |
| | 254T-256T | | | | 49 7/8(1267) | | | | | | | 56 1/8(1426) | | | | | |
| | 284T-286T | | | | 52 1/8(1324) | | | | | | | 58 3/8(1483) | | | | | |
| | 324T-326T | | | | 55 5/8(1413) | | | | | | | 61 7/8(1572) | | | | | |
| 6x6x9 3/4 B 6x6x9 3/4 L | 213T-215T | 22 3/4(578) | 26(660) | 53 3/4(1365) | 48 1/8(1222) | 15 1/2(394) | 27(686) | 8(203) | 8(203) | 30 3/8(772) | 26(660) | 55 3/4(1416) | 55 3/8(1407) | 15 1/2(394) | 27(686) | 8(203) | 8(203) |
| | 254T-256T | | | | 53 3/8(1362) | | | | | | | 61 1/4(1556) | | | | | |
| | 284T-286T | | | | 55 7/8(1419) | | | | | | | 63 1/2(1613) | | | | | |
| | 324T | | | | 58(1473) | | | | | | | 65 5/8(1667) | | | | | |
| 6x6x9 3/4 B 3550 RPM | 286TS | 22 3/4(578) | 26(660) | 53 3/4(1365) | 54 1/2(1384) | 15 1/2(394) | 27(686) | 8(203) | 8(203) | 30 3/8(772) | 26(660) | 53 3/4(1365) | 62 1/8(1578) | 15 1/2(394) | 27(686) | 8(203) | 8(203) |
| | 324TS | | | | 56 3/8(1432) | | | | | | | 64(1626) | | | | | |
| | 326TS | | | | 57 7/8(1470) | | | | | | | 65 1/2(1664) | | | | | |
| | 364TS | | | | 59 1/2(1511) | | | | | | | 67 1/8(1705) | | | | | |
| | 365TS | | | | 60 1/8(1527) | | | | | | | 67 3/4(1721) | | | | | |
| | 404TS | | | | 62 3/8(1584) | | | | | | | 70(1778) | | | | | |
| | 405TS | | | | 63 7/8(1622) | | | | | | | 71 1/2(1816) | | | | | |
| 444TS | 68 1/4(1734) | 75 7/8(1927) | | | | | | | | | | | | | | | |
| 6x8x9 3/4 H 6x8x9 3/4 HL | 213T-215T | 21 3/4(552) | 26(660) | 53 7/8(1368) | 47 1/8(1197) | 15 1/2(394) | 28(711) | 8 1/4(210) | 8 1/4(210) | 28 11/16(729) | 26(660) | 53 7/8(1368) | 54 1/8(1375) | 15 1/2(394) | 28(711) | 8 1/4(210) | 8 1/4(210) |
| | 254T-256T | | | | 52 5/8(1337) | | | | | | | 59 5/8(1514) | | | | | |
| | 284T-286T | | | | 54 7/8(1394) | | | | | | | 61 3/4(1568) | | | | | |
| | 324T-326T | | | | 58 3/8(1483) | | | | | | | 65 3/8(1661) | | | | | |
| 6x6x12 L | 215T | 22 3/4(578) | 26(660) | 53 7/8(1368) | 48 1/8(1222) | 15 1/2(394) | 28(711) | 8 3/4(222) | 8 3/4(222) | 30 3/8(772) | 26(660) | 53 7/8(1368) | 55 3/4(1416) | 15 1/2(394) | 28(711) | 8 3/4(222) | 8 3/4(222) |
| | 254T-256T | | | | 53 5/8(1362) | | | | | | | 61 1/4(1556) | | | | | |
| | 284T-286T | | | | 55 7/8(1419) | | | | | | | 63 1/2(1613) | | | | | |
| | 324T-326T | | | | 59 3/8(1508) | | | | | | | 67(1702) | | | | | |
| | 364TS | | | | 59 1/2(1511) | | | | | | | 67 1/8(1705) | | | | | |
| 8x8x10 1/2 8x8x11 3/4 L | 254T-256T | 23 15/16(608) | 26(660) | 53 7/8(1368) | 54 7/8(1394) | 15 1/2(394) | 29 1/2(749) | 8 1/2(216) | 8 1/2(216) | 31 9/16(802) | 26(660) | 53 7/8(1368) | 62 1/2(1588) | 15 1/2(394) | 29 1/2(749) | 8 1/2(216) | 8 1/2(216) |
| | 284T-286T | | | | 57(1448) | | | | | | | 64 5/8(1641) | | | | | |
| | 324T-326T | | | | 60 5/8(1540) | | | | | | | 68 1/4(1734) | | | | | |
| | 364TS-365TS | | | | 61 1/4(1556) | | | | | | | 68 7/8(1749) | | | | | |
| 8x8x13 B | 256T | 23 15/16(608) | 26(660) | 53 3/4(1368) | 54 7/8(1394) | 17(432) | 31(787) | 9 1/2(241) | 9 1/2(241) | 31 9/16(802) | 26(660) | 53 3/4(1368) | 62 1/2(1588) | 17(432) | 31(787) | 9 1/2(241) | 9 1/2(241) |
| | 284T-286T | | | | 57(1448) | | | | | | | 64 5/8(1641) | | | | | |
| | 324T-326T | | | | 60 5/8(1540) | | | | | | | 68 1/4(1734) | | | | | |
| | 364TS-365TS | | | | 61 3/8(1559) | | | | | | | 69(1753) | | | | | |
| | 404TS | | | | 59 1/4(1505) | | | | | | | 71 1/4(1810) | | | | | |
| 10x10x13 10x10x13 L | 286T | 27 7/8(695) | 32(813) | 71(1803) | 60 1/2(1537) | 20(508) | 37(940) | 11(279) | 11(279) | 35 5/8(905) | 32(813) | 71(1803) | 68 3/4(1746) | 20(508) | 37(940) | 11(279) | 11(279) |
| | 324T-326T | | | | 64(1626) | | | | | | | 72 1/4(1835) | | | | | |
| | 364T-365T | | | | 64 3/4(1645) | | | | | | | 75 1/8(1908) | | | | | |
| | 364TS-365TS | | | | 68 1/2(1740) | | | | | | | 73(1854) | | | | | |
| | 404TS-405TS | | | | 74 7/8(1902) | | | | | | | 76 3/4(1949) | | | | | |
| | 444TS-445TS | | | | 66 7/8(1699) | | | | | | | 83 1/8(2111) | | | | | |

DIMENSIONS

NOTE: Flanges are 125# ANSI Standard.
Optional 250# ANSI rating is available.

Right hand rotation is furnished unless otherwise specified.

Dimensions subject to change without notice. Do not use for construction purposes.



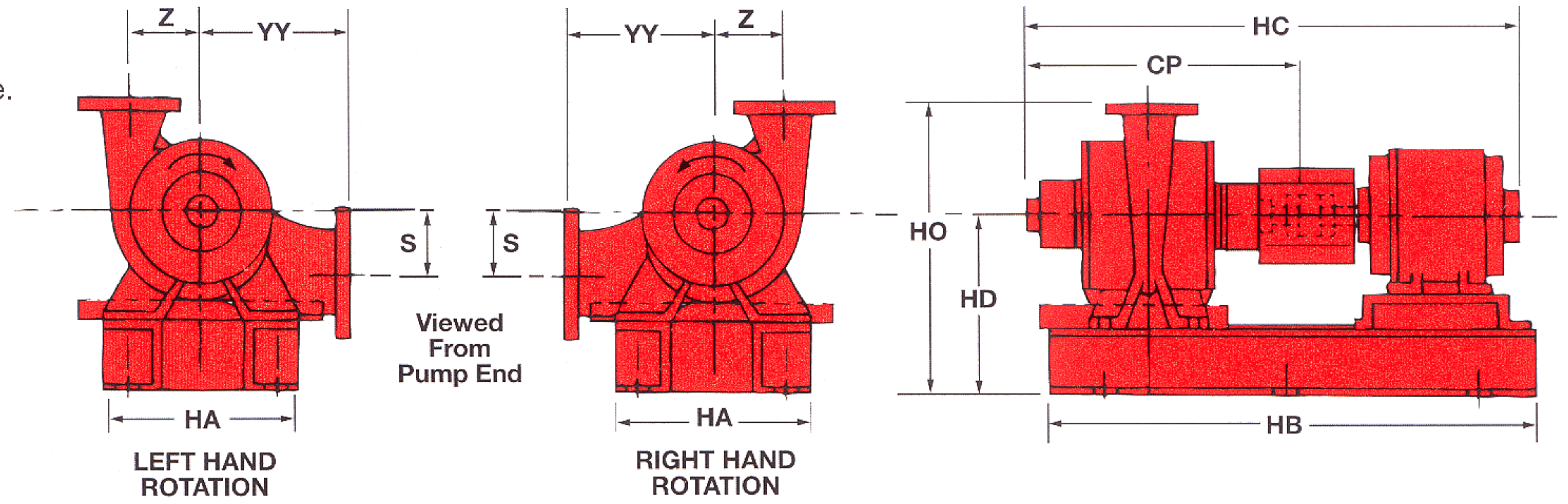
| PUMP SIZE | MOTOR FRAME | STANDARD MECHANICAL SEAL CONSTRUCTION PUMP MODEL VSCS, VSCS-F | | | | | | | | | STUFFING BOX CONSTRUCTION VSCS-PF, VSCS-S & VSCS-D | | | | | | | | | | | | | | | |
|--|--|--|---------------------------------------|---------------------------------------|---------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|---|--------------------------------------|---------------------------------------|---------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|---------------------------------------|---------------------------------------|--------------------------------------|----------|---------------------------------------|---------|--------------------------------------|
| | | DIMENSIONS IN INCHES (MM) | | | | | | | | | DIMENSIONS IN INCHES (MM) | | | | | | | | | | | | | | | |
| | | CP | HA | HB | HC MAX. | HD | HO | S | YY | Z | CP | HA | HB | HC MAX. | HD | HO | S | YY | Z | | | | | | | |
| 4x5x14 ³ / ₄ | 254T-256T | 22 ³ / ₄ (578) | 26(660) | 53 ³ / ₈ (1365) | 55 ⁵ / ₈ (1413) | 17(432) | 30(762) | 6(152) | 15(381) | 9(229) | 30 ³ / ₈ (772) | 26(660) | 53 ³ / ₄ (1365) | 61 ¹ / ₄ (1556) | 17(432) | 30(762) | 6(152) | 15(381) | 9(229) | | | | | | | |
| | 284T-286T | | | | 55 ⁷ / ₈ (1419) | | | | | | | | 63 ¹ / ₂ (1613) | | | | | | | | | | | | | |
| | 324T-326T | | | | 59 ³ / ₈ (1508) | | | | | | | | 67(1702) | | | | | | | | | | | | | |
| | 364TS-365TS | | | | 60 ¹ / ₈ (1527) | | | | | | | | 67 ³ / ₄ (1721) | | | | | | | | | | | | | |
| | 404TS | | | | 59 ¹ / ₄ (1505) | | | | | | | | 70(1778) | | | | | | | | | | | | | |
| 5x6x9 ³ / ₄ B | 182T-184T | 19(483) | 19 ¹ / ₂ (495) | 38 ¹ / ₄ (972) | 40 ¹ / ₈ (1019) | 13 ¹ / ₄ (337) | 23 ³ / ₄ (603) | 3(76) | 13(330) | 7 ¹ / ₄ (184) | 25 ¹ / ₄ (641) | 19 ¹ / ₂ (495) | 38 ¹ / ₄ (972) | 46 ³ / ₈ (1178) | 13 ¹ / ₄ (337) | 23 ³ / ₄ (603) | 3(76) | 13(330) | 7 ¹ / ₄ (184) | | | | | | | |
| | 213T-215T | | | | 43 ³ / ₈ (1102) | | | | | | | | 49 ⁵ / ₈ (1260) | | | | | | | | | | | | | |
| | 254T-256T | | | | 43 ³ / ₈ (1102) | | | | | | | | 49 ⁵ / ₈ (1260) | | | | | | | | | | | | | |
| 5x6x9 ³ / ₄ B 3550 RPM | 284TS | 19(483) | 19 ¹ / ₂ (495) | 49 ⁵ / ₈ (1260) | 49 ¹ / ₄ (1251) | 13 ¹ / ₄ (337) | 23 ³ / ₄ (603) | 3(76) | 13(330) | 7 ¹ / ₄ (184) | 25 ¹ / ₄ (641) | 19 ¹ / ₂ (495) | 49 ⁵ / ₈ (1260) | 55 ¹ / ₂ (1410) | 13 ¹ / ₄ (337) | 23 ³ / ₄ (603) | 3(76) | 13(330) | 7 ¹ / ₄ (184) | | | | | | | |
| | 286TS | | | | 50 ³ / ₄ (1289) | | | | | | | | 57(1448) | | | | | | | | | | | | | |
| | 324TS | | | | 52 ⁵ / ₈ (1337) | | | | | | | | 57 ⁷ / ₈ (1470) | | | | | | | | | | | | | |
| | 326TS | | | | 54 ¹ / ₈ (1375) | | | | | | | | 60 ³ / ₈ (1533) | | | | | | | | | | | | | |
| | 364TS | | | | 55 ³ / ₄ (1416) | | | | | | | | 62(1575) | | | | | | | | | | | | | |
| | 365TS | | | | 56 ³ / ₈ (1432) | | | | | | | | 62 ⁵ / ₈ (1591) | | | | | | | | | | | | | |
| | 404TS | | | | 58 ⁵ / ₈ (1489) | | | | | | | | 64 ⁷ / ₈ (1648) | | | | | | | | | | | | | |
| 5x6x12B 5x6x12L | 213T-215T | 19(483) | 19 ¹ / ₂ (495) | 38 ¹ / ₄ (968) | 43 ³ / ₈ (1102) | 13 ¹ / ₄ (337) | 24 ³ / ₄ (629) | 2(51) | 12 ⁷ / ₈ (327) | 8(203) | 25 ¹ / ₄ (641) | 19 ¹ / ₂ (495) | 43 ³ / ₈ (1102) | 49 ⁵ / ₈ (1260) | 13 ¹ / ₄ (337) | 24 ³ / ₄ (629) | 2(51) | 12 ⁷ / ₈ (327) | 8(203) | | | | | | | |
| | 254T-256T | | | | 43 ³ / ₈ (1102) | | | | | | | | 49 ⁵ / ₈ (1260) | | | | | | | | | | | | | |
| | 284T-286T | | | | 49 ⁵ / ₈ (1260) | | | | | | | | 58 ³ / ₈ (1483) | | | | | | | | | | | | | |
| | 324T-326T | | | | 49 ⁵ / ₈ (1260) | | | | | | | | 58 ³ / ₈ (1483) | | | | | | | | | | | | | |
| 5x6x15 ¹ / ₂ | 254T-256T | 23 ¹ / ₁₆ (608) | 26(660) | 53 ³ / ₄ (1365) | 54 ⁷ / ₈ (1394) | 17(432) | 30(762) | 4 ⁹ / ₁₆ (116) | 17 ³ / ₄ (451) | 10 ¹ / ₂ (267) | 31 ⁹ / ₁₆ (802) | 26(660) | 53 ³ / ₄ (1365) | 62 ¹ / ₂ (1588) | 17(432) | 30(762) | 4 ⁹ / ₁₆ (116) | 17 ³ / ₄ (451) | 10 ¹ / ₂ (267) | | | | | | | |
| | 284T-286T | | | | 57(1448) | | | | | | | | 64 ⁵ / ₈ (1641) | | | | | | | | | | | | | |
| | 324T-326T | | | | 60 ⁵ / ₈ (1540) | | | | | | | | 68 ¹ / ₄ (1734) | | | | | | | | | | | | | |
| | 364TS-365TS | | | | 61 ³ / ₈ (1559) | | | | | | | | 69(1753) | | | | | | | | | | | | | |
| | 404TS | | | | 59 ¹ / ₄ (1505) | | | | | | | | 72 ³ / ₄ (1848) | | | | | | | | | | | | | |
| | 405TS-444TS | | | | 32(813) | | | | | | | | 71(1803) | 69 ¹ / ₂ (1765) | | | | | | 20(508) | 33(838) | 32(813) | 71(1803) | 77 ¹ / ₈ (1559) | 20(508) | 33(838) |
| | 6x8x9 ³ / ₄ B 6x8x9 ³ / ₄ L | | | | 213T-215T | | | | | | | | 22 ³ / ₄ (578) | 26(660) | | | | | | 53 ³ / ₄ (1365) | 48 ¹ / ₈ (1222) | 15 ¹ / ₂ (394) | 27(686) | 3(76) | 15(381) | 8(203) |
| 254T-256T | | 53 ⁵ / ₈ (1362) | 61 ¹ / ₄ (1556) | | | | | | | | | | | | | | | | | | | | | | | |
| 284T-286T | | 55 ⁷ / ₈ (1419) | 63 ¹ / ₂ (1613) | | | | | | | | | | | | | | | | | | | | | | | |
| 324T | | 58(1473) | 65 ⁵ / ₈ (1667) | | | | | | | | | | | | | | | | | | | | | | | |
| 6x8x9 ³ / ₄ B 3550 RPM | 286TS | 22 ³ / ₄ (578) | 26(660) | 53 ³ / ₄ (1365) | 54 ¹ / ₂ (1384) | 15 ¹ / ₂ (394) | 27(656) | 3(76) | 15(381) | 8(203) | 30 ³ / ₈ (772) | 26(660) | 53 ³ / ₄ (1365) | 62 ¹ / ₈ (1578) | 15 ¹ / ₂ (394) | 27(686) | 3(76) | 15(381) | 8(203) | | | | | | | |
| | 324TS | | | | 56 ³ / ₈ (1432) | | | | | | | | 64(1626) | | | | | | | | | | | | | |
| | 326TS | | | | 57 ⁷ / ₈ (1470) | | | | | | | | 65 ¹ / ₂ (1664) | | | | | | | | | | | | | |
| | 364TS | | | | 59 ¹ / ₂ (1511) | | | | | | | | 67 ¹ / ₈ (1705) | | | | | | | | | | | | | |
| | 365TS | | | | 60 ^{1/₈(1527)} | | | | | | | | 67 ³ / ₄ (1721) | | | | | | | | | | | | | |
| | 404TS | | | | 62 ³ / ₈ (1584) | | | | | | | | 70(1778) | | | | | | | | | | | | | |
| | 405TS | | | | 63 ⁷ / ₈ (1622) | | | | | | | | 71 ¹ / ₂ (1816) | | | | | | | | | | | | | |
| | 444TS | | | | 32(813) | | | | | | | | 71(1803) | 68 ¹ / ₄ (1734) | | | | | | 19(483) | 30 ¹ / ₂ (775) | 32(813) | 71(1803) | 75 ⁷ / ₈ (1927) | 19(483) | 30 ¹ / ₂ (775) |
| 6x8x9 ³ / ₄ H 6x8x9 ³ / ₄ HL | 213T-215T | 21 ³ / ₄ (552) | 26(660) | 53 ³ / ₄ (1365) | 47 ¹ / ₈ (1197) | 15 ¹ / ₂ (394) | 28(711) | 5(127) | 16(406) | 8 ¹ / ₄ (210) | 28 ¹ / ₁₆ (729) | 26(660) | 53 ³ / ₄ (1365) | 54 ¹ / ₈ (1375) | 15 ¹ / ₂ (394) | 28(711) | 5(127) | 16(406) | 8 ¹ / ₄ (210) | | | | | | | |
| | 254T-256T | | | | 52 ⁵ / ₈ (1337) | | | | | | | | 59 ⁵ / ₈ (1514) | | | | | | | | | | | | | |
| | 284T-286T | | | | 54 ⁷ / ₈ (1394) | | | | | | | | 61 ³ / ₄ (1568) | | | | | | | | | | | | | |
| | 324T-326T | | | | 58 ³ / ₈ (1483) | | | | | | | | 65 ³ / ₈ (1661) | | | | | | | | | | | | | |
| 6x8x12L | 215T | 22 ³ / ₄ (578) | 26(660) | 53 ³ / ₄ (1365) | 48 ¹ / ₈ (1222) | 15 ¹ / ₂ (394) | 28(711) | 2 ¹ / ₂ (64) | 15(381) | 8 ³ / ₄ (222) | 30 ³ / ₈ (772) | 26(660) | 53 ³ / ₄ (1365) | 55 ³ / ₄ (1416) | 15 ¹ / ₂ (394) | 28(711) | 2 ¹ / ₂ (64) | 15(381) | 8 ³ / ₄ (222) | | | | | | | |
| | 254T-256T | | | | 53 ⁵ / ₈ (1362) | | | | | | | | 61 ¹ / ₄ (1556) | | | | | | | | | | | | | |
| | 284T-286T | | | | 55 ⁷ / ₈ (1419) | | | | | | | | 63 ¹ / ₂ (1613) | | | | | | | | | | | | | |
| | 324T-326T | | | | 59 ³ / ₈ (1508) | | | | | | | | 67(1702) | | | | | | | | | | | | | |
| | 364TS | | | | 59 ¹ / ₂ (1511) | | | | | | | | 67 ¹ / ₈ (1705) | | | | | | | | | | | | | |
| 8x10x10 ¹ / ₂ 8x10x11 ³ / ₄ L | 254T-256T | 23 ¹ / ₁₆ (608) | 26(660) | 53 ³ / ₄ (1365) | 54 ⁷ / ₈ (1394) | 15 ¹ / ₂ (394) | 29 ¹ / ₂ (749) | 4 ¹ / ₂ (114) | 17(432) | 8 ¹ / ₂ (216) | 31 ⁹ / ₁₆ (802) | 26(660) | 53 ³ / ₄ (1365) | 62 ¹ / ₂ (1588) | 15 ¹ / ₂ (394) | 29 ¹ / ₂ (749) | 4 ¹ / ₂ (114) | 17(432) | 8 ¹ / ₂ (216) | | | | | | | |
| | 284T-286T | | | | 57(1448) | | | | | | | | 64 ⁵ / ₈ (1641) | | | | | | | | | | | | | |
| | 324T-326T | | | | 60 ⁵ / ₈ (1540) | | | | | | | | 68 ¹ / ₄ (1734) | | | | | | | | | | | | | |
| | 364TS-365TS | | | | 61 ¹ / ₄ (1556) | | | | | | | | 68 ⁷ / ₈ (1749) | | | | | | | | | | | | | |
| 8x10x13B | 256T | 23 ¹ / ₁₆ (608) | 26(660) | 53 ³ / ₄ (1365) | 54 ⁷ / ₈ (1394) | 17(432) | 31(787) | 5 ¹ / ₂ (140) | 17(432) | 9 ¹ / ₂ (241) | 31 ⁹ / ₁₆ (802) | 26(660) | 53 ³ / ₄ (1365) | 62 ¹ / ₂ (1588) | 17(932) | 31(787) | 5 ¹ / ₂ (140) | 17(432) | 9 ¹ / ₂ (241) | | | | | | | |
| | 284T-286T | | | | 57(1448) | | | | | | | | 64 ⁵ / ₈ (1641) | | | | | | | | | | | | | |
| | 324T-326T | | | | 60 ⁵ / ₈ (1540) | | | | | | | | 69 ¹ / ₄ (1759) | | | | | | | | | | | | | |
| | 364TS-365TS | | | | 61 ³ / ₈ (1559) | | | | | | | | 69(1753) | | | | | | | | | | | | | |
| | 404TS | | | | 59 ¹ / ₄ (1505) | | | | | | | | 71 ¹ / ₄ (1810) | | | | | | | | | | | | | |
| 10x12x11 10x12x11 ³ / ₄ L | 256T | 23 ¹ / ₁₆ (608) | 26(660) | 53 ³ / ₄ (1365) | 54 ⁷ / ₈ (1394) | 18 ¹ / ₂ (470) | 34 ¹ / ₂ (876) | 4 ¹ / ₂ (114) | 18(457) | 10(254) | 31 ⁹ / ₁₆ (802) | 26(660) | 53 ³ / ₄ (1365) | 62 ¹ / ₂ (1588) | 18 ¹ / ₂ (470) | 34 ¹ / ₂ (876) | 4 ¹ / ₂ (114) | 18(457) | 10(254) | | | | | | | |
| | 284T-286T | | | | 57(1448) | | | | | | | | 64 ⁵ / ₈ (1641) | | | | | | | | | | | | | |
| | 324T-326T | | | | 60 ⁵ / ₈ (1540) | | | | | | | | 68 ¹ / ₄ (1734) | | | | | | | | | | | | | |
| | 364TS-365TS | | | | 61 ³ / ₈ (1559) | | | | | | | | 69(1753) | | | | | | | | | | | | | |
| | 404TS-405TS | | | | 59 ¹ / ₄ (1505) | | | | | | | | 72 ³ / ₄ (1848) | | | | | | | | | | | | | |
| 10x12x13 10x12x13L | 286T | 27 ³ / ₈ (695) | 32(813) | 71(1803) | 60 ¹ / ₂ (1537) | 20(508) | 37(940) | 6 ¹ / ₂ (165) | 21(533) | 11(279) | 35 ⁵ / ₈ (905) | 32(813) | 68 ³ / ₄ (1746) | 20(508) | 37(940) | 6 ¹ / ₂ (165) | 21(533) | 11(279) | | | | | | | | |
| | 324T-326T | | | | 64(1626) | | | | | | | | 72 ¹ / ₄ (1835) | | | | | | | | | | | | | |
| | 364T-365T | | | | 66 ⁷ / ₈ (1699) | | | | | | | | 75 ¹ / ₈ (1908) | | | | | | | | | | | | | |
| | 364TS-365TS | | | | 64 ³ / ₄ (1645) | | | | | | | | 73(1854) | | | | | | | | | | | | | |
| | 404TS-405TS | | | | 68 ¹ / ₂ (1740) | | | | | | | | 76 ³ / ₄ (1949) | | | | | | | | | | | | | |
| | 444TS-445TS | | | | 74 ⁷ / ₈ (1902) | | | | | | | | 83 ¹ / ₈ (2111) | | | | | | | | | | | | | |

DIMENSIONS

Dimensions subject to change without notice. Do not use for construction purposes.

NOTE: Flanges are 125# ANSI Standard.
Optional 250# ANSI rating is available.

Right hand rotation is furnished unless otherwise specified.



| PUMP SIZE | MOTOR FRAME | DIMENSIONS IN INCHES (MM) | | | | | | | | |
|--|---------------------------------------|---|-------------|--------------|---------------------------------------|---|--|--|-------------|--|
| | | CP | HA | HB | HC MAX. | HD | HO | S | YY | Z |
| 8x10x17 Stuffing Box Only | 284T-286T | 31 ⁹ / ₁₆ (802) | 32 (813) | 71 (1803) | 64 ⁵ / ₈ (1641) | 20 (508) | 39 (991) | 5 ¹ / ₂ (140) | 21 (533) | 11 ⁷ / ₈ (302) |
| | 324T-326T | | | | 68 ¹ / ₄ (1734) | | | | | |
| | 364T-365T | | | | 71 ¹ / ₈ (1807) | | | | | |
| | 364TS-365TS | | | | 69(1753) | | | | | |
| | 404TS-405TS | | | | 72 ³ / ₄ (1848) | | | | | |
| 444TS-445TS | 79 ¹ / ₈ (2010) | | | | | | | | | |
| 8x10x17L Standard Mechanical Seal Only | 286T | 23 ¹⁵ / ₁₆ (608) | 32 (813) | 71 (1803) | 57(1448) | 20 (508) | 39 (991) | 5 ¹ / ₂ (140) | 21 (533) | 11 ⁷ / ₈ (302) |
| | 324T-326T | | | | 60 ⁵ / ₈ (1540) | | | | | |
| | 364T-365T | | | | 63 ¹ / ₂ (1613) | | | | | |
| | 365TS | | | | 61 ³ / ₈ (1559) | | | | | |
| | 404T-405T | | | | 65 ¹ / ₈ (1554) | | | | | |
| | 404TS-405TS | | | | 71 ¹ / ₂ (1816) | | | | | |
| 444TS-445TS | 68 ¹ / ₈ (1730) | | | | | | | | | |
| 10x12x17 Stuffing Box Only | 326T | 36 ¹ / ₈ (918) | 32 (813) | 71 (1803) | 72 ³ / ₄ (1848) | 21 ¹ / ₂ (546) | 40 ¹ / ₂ (1029) | 7 (178) | 21 (533) | 12 ³ / ₁₆ (310) |
| | 364T-365T | | | | 75 ⁵ / ₈ (1921) | | | | | |
| | 404T-405T | | | | 80 ¹ / ₄ (2038) | | | | | |
| | 444T | | | | 85 ³ / ₈ (2169) | | | | | |
| | 404TS-405TS | | | | 77 ¹ / ₄ (1962) | | | | | |
| | 444TS-445TS | | | | 83 ³ / ₈ (2124) | | | | | |
| | 250 HP 1800 RPM | 36 (914) | * | * | | | | | | |
| 300 HP 1800 RPM | | | | | | | | | | |
| 10x12x17L Standard Mechanical Seal Only | 326T | 29 ¹ / ₈ (740) | 32 (813) | 71 (1803) | 65 ³ / ₄ (1670) | 21 ¹ / ₂ (546) | 40 ¹ / ₂ (1029) | 7 (178) | 21 (533) | 12 ³ / ₁₆ (310) |
| | 364T-365T | | | | 68 ⁵ / ₈ (1743) | | | | | |
| | 404T-405T | | | | 73 ¹ / ₄ (1861) | | | | | |
| | 444T | | | | 78 ³ / ₈ (1991) | | | | | |
| | 404TS-405TS | | | | 70 ¹ / ₄ (1784) | | | | | |
| | 444TS-445TS | | | | 76 ⁵ / ₈ (1946) | | | | | |
| | 250 HP and Larger | Consult Factory | | | | | | | | |
| 12x14x12 ¹ / ₂ Stuffing Box Only | 284T-286T | 36 ¹ / ₈ (918) | 32 (813) | 71 (1803) | 69 ¹ / ₄ (1759) | 21 ¹ / ₂ (546) | 39 ¹ / ₂ (1003) | 6 ³ / ₄ (171) | 21 (533) | 10 ⁷ / ₈ (276) |
| | 324T-326T | | | | 72 ³ / ₄ (1848) | | | | | |
| | 364TS-365TS | | | | 73 ¹ / ₂ (1867) | | | | | |
| | 404TS-405TS | | | | 77 ¹ / ₄ (1962) | | | | | |
| | 444TS-445TS | | | | 83 ³ / ₈ (2124) | | | | | |
| 12x14x12 ³ / ₄ L Standard Mechanical Seal Only | 324T-326T | 29 ¹ / ₈ (740) | 32 (813) | 71 (1803) | 65 ³ / ₄ (1670) | 21 ¹ / ₂ (546) | 39 ¹ / ₂ (1003) | 6 ³ / ₄ (171) | 18 (457) | 10 ⁷ / ₈ (276) |
| | 364T-365T | | | | 68 ⁵ / ₈ (1743) | | | | | |
| | 404T | | | | 71 ³ / ₄ (1822) | | | | | |
| | 364TS-365TS | | | | 66 ¹ / ₂ (1689) | | | | | |
| | 404TS-405TS | | | | 70 ¹ / ₄ (1784) | | | | | |
| | 444TS-445TS | 76 ⁵ / ₈ (1946) | | | | | | | | |
| 250 HP and Larger | Consult Factory | | | | | | | | | |
| 12x14x17 ¹ / ₂ B 12x14x17 ¹ / ₂ L | 365T | 34 (864) | 36 (914) | 81 (2057) | 73 ¹ / ₂ (1867) | 23 ¹ / ₂ (597) | 45 ¹ / ₄ (1149) | 7 ³ / ₄ (197) | 25 (635) | 13 ¹ / ₂ (343) |
| | 404T-405T | | | | 78 ¹ / ₈ (1984) | | | | | |
| | 444T-445T | | | | 85 ¹ / ₄ (2165) | | | | | |
| | 444TS-445TS | | | | 81 ¹ / ₂ (2070) | | | | | |
| | 250 HP and Larger | Consult Factory | | | | | | | | |

* Varies with motor manufacturer.

Typical Specifications

DIVISION 15- MECHANICAL Section 15540 - HVAC Pumps and Specialties

1.00 PART 1 - GENERAL

1.01 DESCRIPTION OF WORK:

Provide pumps for heating, chilled water, and dual temperature water systems including all related appurtenances for a complete and operating systems.

1.02 SECTION INCLUDES:

Double Suction, Vertical Split Case Pumps (Base Mounted)

1.03 RELATED DOCUMENTS:

Drawings and general provisions of the Contract, including General and supplementary Conditions and Division 1 Specification Sections, apply to these Sections.

- Section *** - Alignment of Rotating Equipment
- Section *** - Cast-in-Place Concrete
- Section *** - Mechanical General Requirements
- Section *** - Supports, Anchors, and Sleeves
- Section *** - Motors and Starters
- Section *** - Drives
- Section *** - Mechanical Identification
- Section *** - Vibration Isolation
- Section *** - Piping Insulation
- Section *** - Equipment Installation
- Section *** - Hydronic Piping and Specialties
- Section *** - Testing, Adjusting, and Balancing
- Section *** - Meters and Gauges
- Section *** - Electrical

1.04 QUALITY ASSURANCE:

- A. All equipment or components of this specification section shall meet or exceed the requirements and quality of the items herein specified, or as denoted on the drawings.
- B. Ensure pump operation at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate to ANSI/HI 9.6.3.1 - 1997 standards for Preferred Operating Region (POR) unless otherwise approved by the engineer. The pump NPSH shall conform to the ANSI/HI 9.6.1 - 1998 standards for *Centrifugal and Vertical Pumps for NPSH Margin*.
- C. Ensure pump pressure ratings are at least equal to system's maximum operating pressure at point where installed, but not less than specified.
- D. Equipment manufacturer shall be a company specializing in manufacture, assembly, and field performance of provided equipment with a minimum of five- (5) years experience.
- E. Equipment provider shall be responsible for providing certified equipment start-up and, when noted, an in the field certified training session. New pump start-up shall be for the purpose of determining pump alignment, lubrication, voltage, and amperage readings. All proper electrical connections, pump's balance, discharge and suction gauge readings, and adjustment of head, if required. A copy of the start-up report shall be made and sent to both the contractor and to the Engineer.

1.05 PRODUCT HANDLING:

- A. Protection: Use all means necessary to protect equipment before, during, and after installation.
- B. Replacement and Repair: All scratched, dented, and otherwise damaged units shall be repaired or replaced as directed by the Architect Engineer.

1.06 REGULATORY REQUIREMENTS:

- A. Conform to Health/Life Safety Code for Public Schools
- B. Conform to International Mechanical Code
- C. Conform to BOCA National Building Code
- D. Conform to State Plumbing Code
- E. Conform to National Electric Code NFPA 70
- F. Conform to Accessibility Code
- G. Conform to applicable ANSI/HI standards
- H. Products: Listed and classified motors by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

1.07 SUBMITTAL:

- A. Submit each item in this article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Submit manufacturer's installation instructions under provisions of General Conditions and Division 1.
- C. Product Data including certified performance curves and rated capacities of selected models, weights (shipping, installed, and operating), furnished specialties, and accessories. Indicate pump's operating point on curves.
- D. Hanging and support requirements should follow the recommendations in the manufacturer's installation instructions.

1.08 OPERATION AND MAINTENANCE DATA:

- A. Submit Operation and Maintenance information under provisions of Division 15 "Mechanical General Requirements" and the provisions of the General Conditions and Division 1.
- B. Operation and Maintenance Data: Include installation instructions, assembly views, lubrication instructions, and replacement parts lists.
- C. Under provisions of commissioning documentation; testing of pumps, as well as training of owner's operation and maintenance personnel may be required in cooperation with the commissioning consultant.

1.09 DELIVERY, STORAGE, AND HANDLING:

Store materials in clean, dry place and protect from weather and construction traffic. Handle carefully to avoid damage.

1.10 WARRANTY:

Provide a minimum one- (1) year warranty on materials and installation under provision of Section 15010.

1.11 EXTRA MATERIALS:

Provide one (1) set of mechanical seals for each model type of primary pump scheduled.

2.00 PART 2 - PRODUCTS

The specifying engineer reserves the right to specify a primary supplier / lead spec manufacturer on all supplied schedule and specification documents. These primary suppliers have lead their respective industry in research and development and their products have had proven track records in the field. These primary suppliers, in the opinion of this engineering firm, produce a superior product to the alternately listed manufacturers. The contractor may choose to supply equivalent equipment as manufactured by the alternately specified manufacturer. This alternately specified equipment will be supplied on a deduct alternate basis and based on the approval of the supplied alternate manufacturer's submittals.

The use of a primary supplier and deduct alternates protects the specifying engineer's design concept, but allows for a check-and-balance system to protect the post-commissioning owner.

2.01 DOUBLE SUCTION, VERTICALLY SPLIT CASE PUMPS (BASE MOUNTED):

A. Manufacturer:

Contractor shall furnish and install new double suction vertically split case pumps for HVAC systems as indicated on the drawings. Pumps shall be model VSC or VSCS as manufactured by **Bell & Gossett** under base bid. Equivalent units manufactured by the **Flowserve Corporation** or **Ingersoll-Rand** may be substituted as deduct alternates. Horizontal split case pumps may also be substituted as deduct alternates if horizontal split case pumps can meet the design criteria and be made to fit in the space allotted for the vertical split case pumps. Pumps shall meet types, sizes, capacities, and characteristics as scheduled on the Equipment Schedule drawings.

B. Double Suction, Vertical Split Case Pumps (Base Mounted):

1. The pumps shall be long coupled, base mounted, single stage, double suction, vertical split case design, in cast iron bronze fitted construction specifically designed and guaranteed for quiet operation. Suitable standard operations at 225° F and 175 psig working pressure or optional operations at up to 250° F and 300 psig working pressures. Working pressures shall not be de-rated at temperatures up to 250° F. The pump internals shall be capable of being serviced without disturbing piping connections or electrical motor connections.
2. A cast iron bearing housing shall supply support for a heavy-duty regreaseable ball bearing, with provisions for purging or flushing through the bearing surface. The bearing design shall absorb both radial and thrust loads and keep the rotating element in proper axial alignment. Bearings shall be capable of being inspected and repaired by removal of only a bearing cover plate and shall be regreaseable without removal of the bearings from the bearing housing.
3. The impeller shaft shall be a solid 18-8 stainless steel shaft** with a bronze shaft collar and shall have a maximum length to diameter ratio not to exceed 9 to 1.
4. Pump shall be equipped with a pair of internally flushed mechanical seal assemblies installed in enlarged seal chambers. Seal assemblies shall be a John Crane #21** having Buna elastomers, stainless steel hardware, carbon primary ring and a stationary ceramic mating ring. Seals shall be capable of being inspected and repaired without removal of the rotating assembly.
5. Impeller shall be of the enclosed double suction type made of bronze, and hydraulically balanced to ANSI/HI 9.6.4.5 - 2000, figure 9.6.4.15B, balance grade G6.3 keyed to the shaft and secured by a slight press fit and suitable lock-nut arrangement.
6. A center drop-out type coupling, capable of absorbing torsional vibration, shall be employed between the pump and motor. Coupler shall allow for removal of pump's rotating element without disturbing pump volute or movement of the pump's motor and electrical connections. On variable speed applications the coupler sleeve should be constructed of an EPDM material to maximize performance life.
7. The coupling shall be shielded by a dual rated ANSI B15.1, Section 8 and OSHA 1910.219 compliant coupling guard and contain viewing windows for inspection of the coupling.
8. Pump volute shall be of a cast iron design with an integrally cast vertical pump discharge and an integrally cast vertical pump suction (VSC) or horizontal pump suction (VSCS). Vertical flanges shall be capable of supporting a minimum 2000 lb static load when the pump base is solidly mounted and grouted to a concrete base. Volute flanges shall be rated for 175 psig drilled for 125# ANSI companion flanges. (Optional 300 psig working pressures are available and are 250# flange drilled). Volute shall have integrally cast support feet, gauge ports at nozzles, and vent and drain ports.
9. Motors shall meet scheduled horsepower, speed, voltage, and enclosure design. Pump and motors shall be factory aligned and shall be realigned after installation. Motors shall be non-overloading at any point on the pump curve and shall meet NEMA specifications and conform to the standards outlined in EPACT 92.
10. Base plate shall be of structural steel or fabricated steel channel configuration fully enclosed at sides and ends, with securely welded cross members and fully open grouting area (for field grouting). The minimum base plate stiffness shall conform to ANSI/HI 1.3.5 - 2000 for *Horizontal Baseplate Design* standards.
11. Pump rotation shall be right-hand or left-hand as viewed from the pump end and in respect to the discharge flange.
12. The pump(s) vibration limits shall conform to Hydraulic Institute ANSI/HI 9.6.4.4 - 2000 for recommended acceptable unfiltered field vibration limits (as measured per ANSI/HI. 9.6.4.4 - 2000, Figure 9.6.4.12) for pumps with rolling contact bearings.
13. The seismic capability of the pump shall allow it to withstand a horizontal load of 0.5g, excluding piping and/or fasteners used to anchor the pump to mounting pads or to the floor, without adversely affecting pump operation.
14. Each pump shall be factory tested and name-plated before shipment.

*Carbon steel shaft with bronze sleeves on the following pumps: VSCS 8x10x17; VSCS 10x12x17; VSCS 10x12x17L; VSCS 12x14x12½; VSCS 12x14x12¾AL; VSCS 12x14x17½B; VSCS 12x14x17½L.

**Type 2/52 on the following pumps: VSCS 10x12x17L; VSCS 12x14x12¾AL; VSCS 12x14x17½B; VSCS 12x14x17½L.



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