| F 722A | MANUFACTURER'S PUBLISHED PERFORMANCE CURVE | June-93 |
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| F 722C | PUMP AND SYSTEM HEAD CURVE WITH STATIC ELEVATION CHANGE | |
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F 731.2A  NON-CLOG DRY PIT CENTRIFUGAL PUMP WITH MAGNETIC OR HYDRAULIC VARIABLE SPEED DRIVE
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F 732.5A  SURGE RELIEF VALVE
F 732.6A  SEWAGE AIR RELIEF VALVE
F 732.8A  CONTROL DIAGRAM
F 735.9A  DEWATERING SUMP PUMP
F 738.6  PRESSURE GAUGE AND SWITCH WITH DIAPHRAGM SEAL
Manufacturer's Published Performance Curve
(Courtesy of Fairbanks Morse Pumps)
Figure F722A
System Head Curve
Figure 722B
Pump and System Head Curve with Static Elevation Change
Figure F722C
System Head Curve with Changing "C" Coefficient and Static Elevation
Figure 722D
Pump and System Curve
Figure F722E
4 (3+1) Combination
Pump System Characteristics
Figure 722F
System Head Curve

1. Single Force Main C = 120
2. Single Force Main C = 150
3. Dual Force Main C = 120
4. Dual Force Main C = 150

FLOW (x1,000 gpm)

TDH (ft)
Pump Performance Curves for Different Size Impellers
Figure F722H
Pump Performance Curve
Impeller #675
Figure F7221
INLINE STORAGE BASIN

FROM COLLECTION SYSTEM

STORAGE BASIN

TO PUMPING PLANT

BYPASS STORAGE BASIN

FROM COLLECTION SYSTEM

MH

OVERFLOW TO BASIN

DRAIN FROM BASIN

MH

STORAGE BASIN

SLUICE GATE

PUMPING PLANT

Storage Basins
Figure F724A
Elevation - Inline Storage Basin
Figure F724B
Elevation - By Pass Storage Basin
Figure F724C
The Dimension D is generally the diameter of the suction bell measured at the inlet. This dimension may vary depending upon pump design. Refer to the pump manufacturer for specific dimensions.

**Multiple Pump Pits**
(Courtesy of Hydraulic Institute Standards)
Figure F725A
Sump Dimensions, Plan View
(Courtesy Hydraulic Institute Standards)
Figure 725A

Sump Dimensions, Elevation View
(Courtesy Hydraulic Institute Standards)
Figure 725B
Recommended Sump Dimensions in Inches

Note: Recommended value of Y equals approximately 3D for most bell designs.

Sump Dimensions
(Courtesy of Hydraulic Institute Standards)
Figure F725C
NPSH Available is a function of the system in which the pump operates. It is the excess pressure of the liquid in feet absolute over its vapor pressure as it enters at the pump suction. Fig. 4 shows four typical suction systems with the NPSH Available formulas applicable to each. It is important to correct for the specific gravity of the liquid and to convert all terms to units of "feet, absolute" in using the formulas.

4a SUCTION SUPPLY OPEN TO ATMOSPHERE
-with Suction Lift

\[ \text{NPSH}_A = P_b - (V_p + L_s + h_t) \]

4b SUCTION SUPPLY OPEN TO ATMOSPHERE
-with Suction Head

\[ \text{NPSH}_A = P_b + L_h - (V_p + h_t) \]

4c CLOSED SUCTION SUPPLY
-with Suction Lift

\[ \text{NPSH}_A = \rho - (L_s + V_p + h_t) \]

4d CLOSED SUCTION SUPPLY
-with Suction Head

\[ \text{NPSH}_A = \rho + L_h - (V_p + h_t) \]

\( P_b \) = Barometric pressure, in feet absolute.
\( V_p \) = Vapor pressure of the liquid at maximum pumping temperature, in feet absolute.
\( \rho \) = Pressure on surface or liquid in closed suction tank, in feet absolute.

\( L_s \) = Maximum static suction lift in feet.
\( L_h \) = Minimum static suction head in feet.
\( h_t \) = Friction loss in feet in suction pipe at required capacity.

Calculation of System Net Positive Suction Head
Available for Typical Auction Conditions
Figure F725D

- P_b = Barometric pressure, in feet absolute.
- V_p = Vapor pressure of the liquid at maximum pumping temperature, in feet absolute.
- \( \rho \) = Pressure on surface or liquid in closed suction tank, in feet absolute.
- L_s = Maximum static suction lift in feet.
- L_h = Minimum static suction head in feet.
- h_t = Friction loss in feet in suction pipe at required capacity.
1. LIFTING HANDLE
2. JUNCTION CHAMBER WITH WATERTIGHT CABLE ENTRIES
3. ANTI-FRICTION BEARINGS
4. SHAFT
5. STATOR WITH TEMPERATURE SENSING THERMISTORS
6. ROTOR
7. STATOR HOUSING LEAKAGE SENSOR
8. BRG. TEMPERATURE THERMISTOR
9. SHAFT SEAL
10. OIL CHAMBER
11. VOLUTE
12. NON-CLOG IMPELLER
13. COOLING JACKET
14. SLIDING BRACKET
15. AUTOMATIC DISCHARGE CONNECTION

Electrical Submersible Sewage Pump
(Courtesy of Flygt Pump Co.)
Figure F731.1A
Cross Section of Mixed Flow Sewage Pump
(Courtesy of Worthington Pump Inc.)
Figure F731.1B
Non-Clog (Submersible) Centrifugal Pump for Wet Well Installation
Figure F731.1D
Non-Clog Dry Pit Centrifugal Pump with Magnetic or Hydraulic Variable Speed Drive
Figure F731.2A
Non-Clog Dry Pit Centrifugal Pump
with Constant Speed Motor or Variable Frequency Drive
Figure F731.2B
Cross-Section of Torque-Flow (Recessed Impeller)
(Courtesy of Wemco)
Figure F731.4A
Typical Sluice Gate
(Courtesy of Rodney Hunt Company)
Figure F732.1B
Eccentric valve design and DeZURIK quality construction combines to offer many performance features including:

1. CORROSION RESISTANT BEARINGS — Heavy duty bearings resist corrosion to prevent binding and assure lasting easy valve operation without lubrication. These rugged bearings are furnished as standard and at no extra charge in the bonnet and body of all valves. See page 10 for complete listing.

2. BOLTED BONNET — All valves have a rugged bolted bonnet for maximum strength. If maintenance is ever required, disassembly is easy.

3. RESILIENT PLUG FACINGS FOR DEAD-TIGHT SHUTOFF — All valves are available with a variety of resilient plug facings that provide dead-tight shutoff without the use of sealing lubricants. Even if small solids are trapped between the plug and seat, the resilient facing provides tight shutoff and prevents seat damage. All-metal plugs are also available for high temperature or throttling applications where dead-tight shutoff is not required.

4. WIDE CHOICE OF BODY MATERIALS — DeZURIK offers the most complete line of eccentric body materials to meet the requirements of a broad range of applications.

5. HIGH FLOW CAPACITY — Clean interior design and straight through flow allow high maximum flow capacity with minimum pressure drop. See page 6 for complete sizing data.

6. LONG-LIFE STEM SEAL — Multiple packing rings in 4"-34" valves (and up to 72" on application) provide a reliable seal that seldom, if ever, requires adjustment or replacement, even when the valve is operated continuously. As shown here, the packing and packing gland are accessible without disassembly of the valve.

7. CHOICE OF END STYLES — A complete choice of end styles includes screwed, flanged, mechanical joint, bell and Victaulic. See page 10 for a complete list of end styles.

8. CORROSION RESISTANT NICKEL-IRON BEAT — Welded-in nickel seats are standard in all 3"-32" cast iron valves, 3"-20" Ni-fused valves, and in 2"-3" carbon steel valves. Unlike iron or nickel alloy iron seats, the thick welded nickel overlay provides excellent resistance to corrosion and damage and prolongs the life of resilient plug facings.

9. TIGHT SHUTOFF WITH PRESSURE IN EITHER DIRECTION — DeZURIK offers another first in eccentric valves. Improved resilient plug design provides drip-tight shutoff on wet service applications up to the full pressure rating of the valve with pressure in either direction. See page 7 for complete information.

10. WIDE SIZE RANGE — DeZURIK offers the broadest eccentric line with 26 standard sizes from 1/2" through 72". See page 10 for a complete listing.

11. LOW COST — Another DeZURIK plus is economy. You don’t pay extra for features like corrosion resistant bearings and nickel seats. DeZURIK quality also means added performance that cuts maintenance costs.

MANUAL ACTUATORS
DeZURIK actuators also have quality and performance built-in as shown by these handwheel actuator features.

12. TOTALLY ENCLOSED — Enclosed and sealed construction protects moving parts from damage or corrosion. Continual lubrication is not required for operation ease.

13. CORROSION RESISTANT BEARINGS — Heavy duty, corrosion resistant actuator bearings provide lasting, easy valve operation and overall reliability.

14. HEAVY DUTY CONSTRUCTION — Rugged actuator castings, gears and shafts also add to reliability by assuring permanent alignment of moving parts for smooth, easy operation.

LOW COST — A wide range of actuator sizes (shown on page 15) assures you of the most economical actuator for your application.

DeZURIK eccentric action and resilient plug facings assure lasting dead-tight shutoff. As the eccentric plug rotates 90 degrees from open to closed, it moves into a raised eccentric seat.

In the open position, the segmented plug is out of the flow path. Flow is straight through, flow capacity is high. As the plug closes, it moves toward the seat without scraping the seat or body walls so there is no plug binding or wear. Flow is still straight through, making the throttling characteristic of this valve ideal for gasses, liquids and slurries.

In the closed position, the plug makes contact with the seal. When furnished with a resilient facing, the plug is pressed firmly into the seat for dead-tight shutoff. Eccentric plug and seat design assure lasting shutoff because the plug continues to be pressed against the seat until firm contact is made.

Eccentric Plug Valve
(Courtesy of DeZurik)
Figure F732.2A
OPERATION
Helical springs 24 hold disc 10 closed. When system pressure rises above set pressure on the springs, disc 10 moves freely open, raising the piston inside cylinder 33, allowing oil from reservoir 20 to enter below the piston. When disc 10 closes, it does so at a slow controlled rate regulated by control valve 35. During opening, as the system pressure drops below the surge valve setting, disc 10 starts control closing (due to oil resistance) pushing the cylinder piston downwards, forcing oil from the bottom of the cylinder chamber 33. Control valve 35 regulates the flow of oil being displaced, thereby controlling the closing speed. Restrict the control valve for slower closing; open control valve wide for faster closing. We recommend slow closing speed while testing, and gradually increased closing speed to suit the system.

Surge Relief Valve
(Courtesy of APCO)
Figure F732.5A
Sewage Air Relief Valve
(Courtesy of APCO)
Figure F732.6A
Control Diagram
Figure F732.8A
Dewatering Sump Pump
Figure F735.9A
Pressure Switch
WITH SNUBBER

1/4" SCH. 80 STAINLESS STEEL NIPPLE, TYP.

1/4" STAINLESS STL. BALL VALVE, TYP.
DIAPHRAGM SEAL WITH STN. STL. BOLTS AND
STAINLESS STEEL DIAPHRAGM AND LOWER HOUSING, AMETEK-U.S. GAUGE,
TYPE SG. ASHCROFT.
TYPE 101, OR EQUAL, TYP

1" SCH. 80 GALV. STL.
NIPPLE, TYPICAL.

1-1/4" xi" 300 LB. GALV. STL. BUSHING.

1-1/4" 3000 LB. F.S. HALF COUPLING, WELD TO PIPE,
OR 1/4" TAPPED CONN. WHERE CJ. OR DUCTILE IRON
COAT WITH EPOXY
OR COAL TAR ENAMEL

NOTE:
SEE SPECIFICATIONS, SECTIONS 15130 AND 16050.

1" 300 LB. GALV.
M.J. TEE

PRESSURE GAUGE (MIN.
3/2" DIA., CALIBRATED IN APPLICABLE UNITS)
WITH SNUBBER

CONNECTION FOR OIL FILL

1" 300 LB. 90° GALV.
M.J. ELBOW, TYP

1" CAST IRON ECC.
PLUG VALVE

3/16

Pressure Gauge and
Switch with Diaphragm Seal
Figure F738.6