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TECHNICAL INFORMATION
Bulletin

NUMBER 100

CAN (BARREL) GENERAL DESIGN

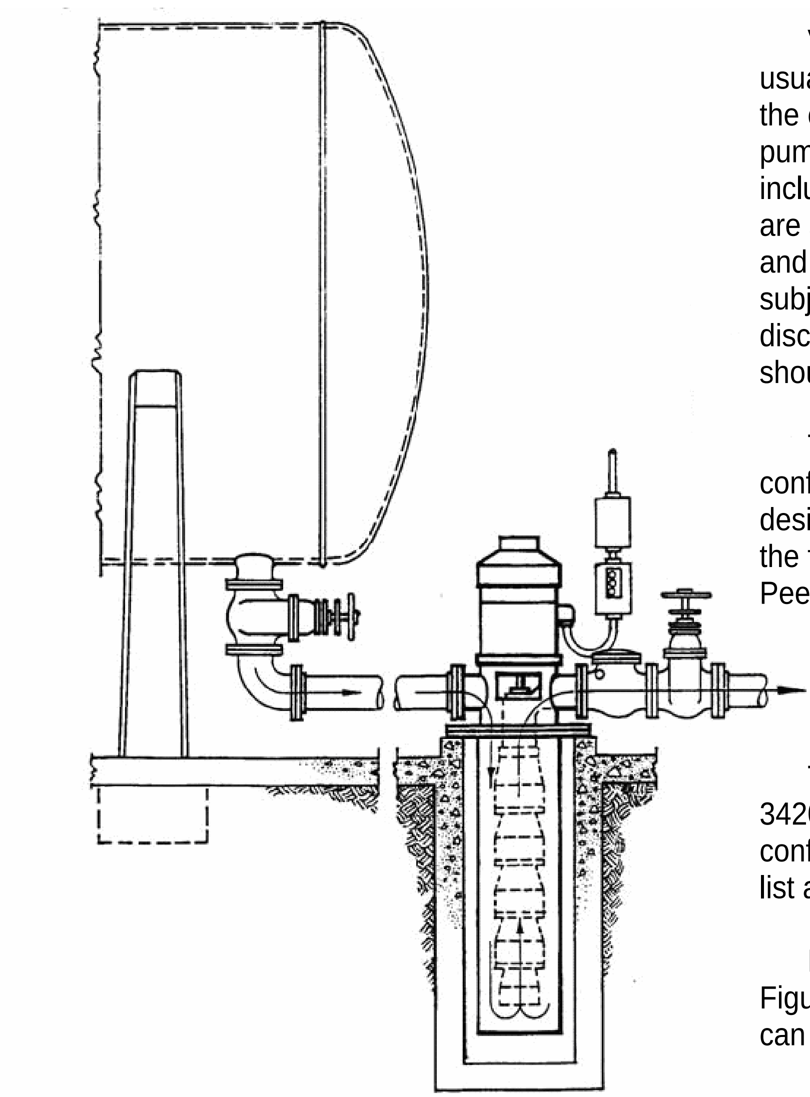


FIGURE 1

Vertical pumps used for booster service are usually installed in a can (barrel). By definition, the can is receptacle for conveying the liquid to the pump. Because the whole bowl assembly is included in the can, as show on figure 1, the bowls are subjected to the difference of the bowl (inside) and suction (outside) pressures. The can is subjected to the suction pressure. The pump discharge head is sealed to atmosphere but it should be provided with valve for air release.

There are many possible design configurations. Most of the time the pump is designed to suit the job pipe arrangement. See the following pages with figures 2 to 6 of typical Peerless Pump design configurations.

The Sales Manual Hydro-Line sections 3410, 3420, and 3445 show some of these configurations in more detail including pump parts list and overall pump and can dimensions.

Figure 7 shows multiple can installation. Figures 8 and 9 show submersible motor in a can installation.

*Can or barrel is used alternatively by Hydraulic Institute

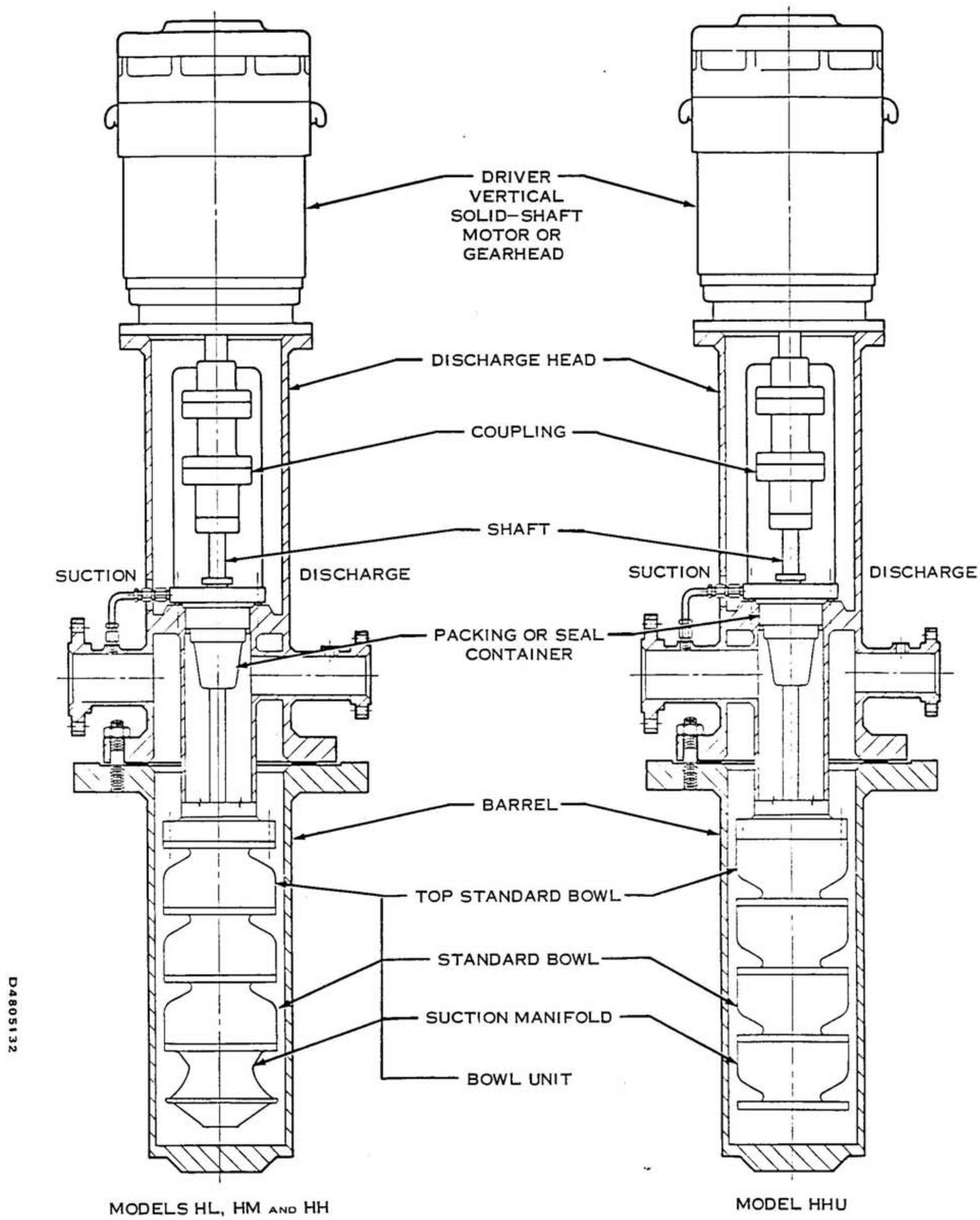


FIGURE 2. Typical Hydro-line Pumps

Mechanical seal and spacer-type coupling shown. Pumps equipped with packing use a coupling with no spacer.

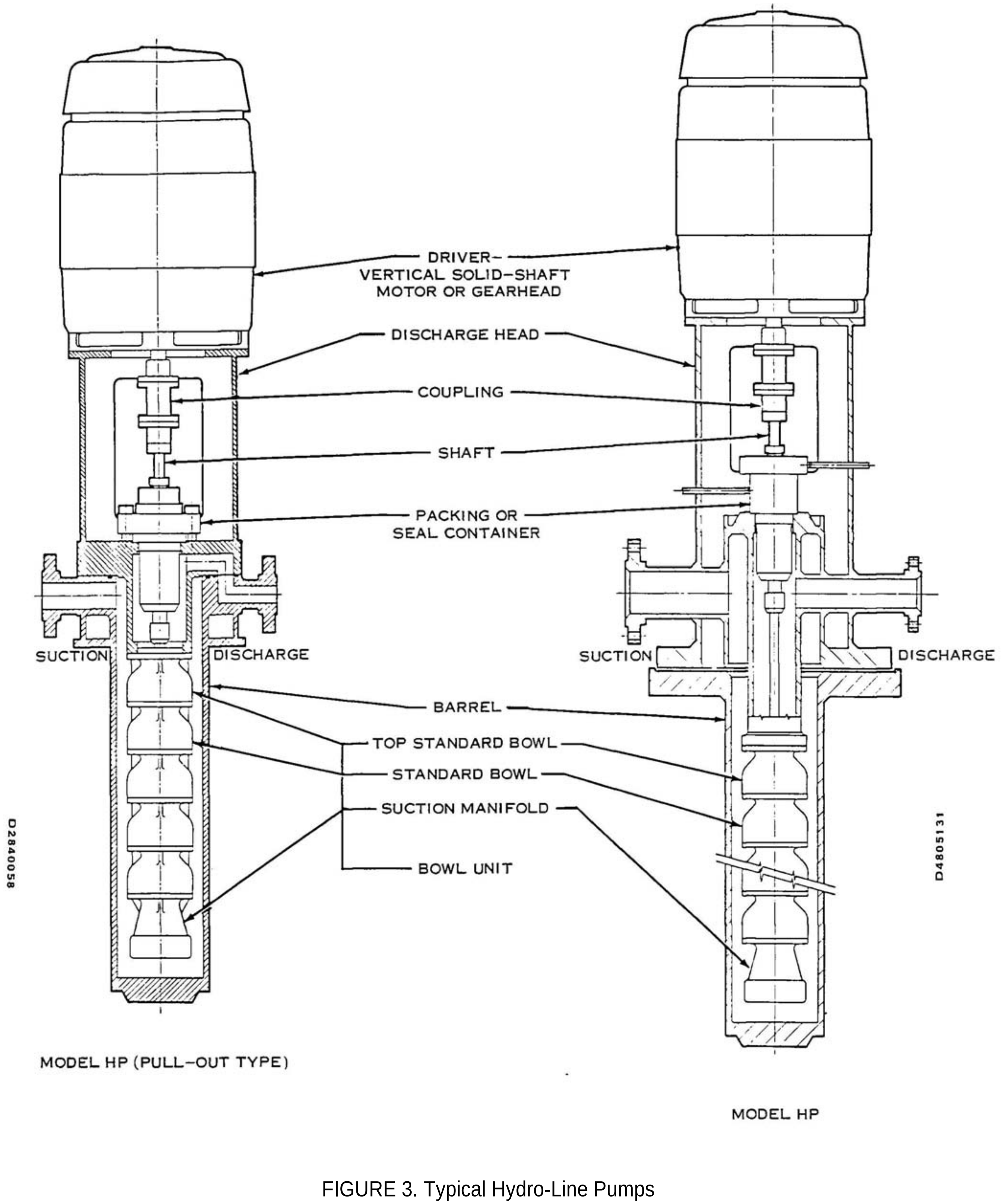
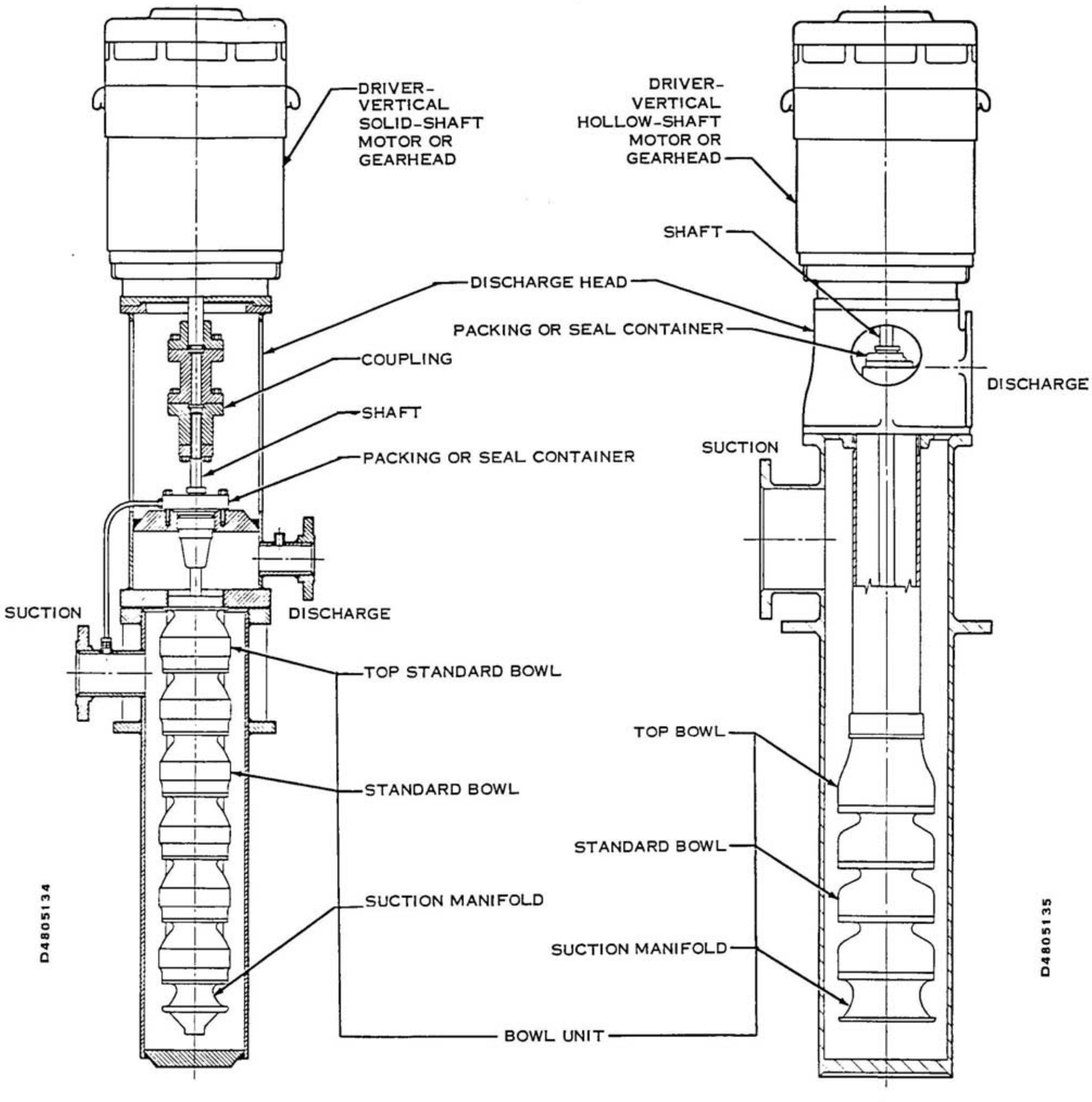


FIGURE 3. Typical Hydro-Line Pumps

Mechanical seal and spacer-type coupling shown. Pumps equipped with packing use a coupling with no spacer.

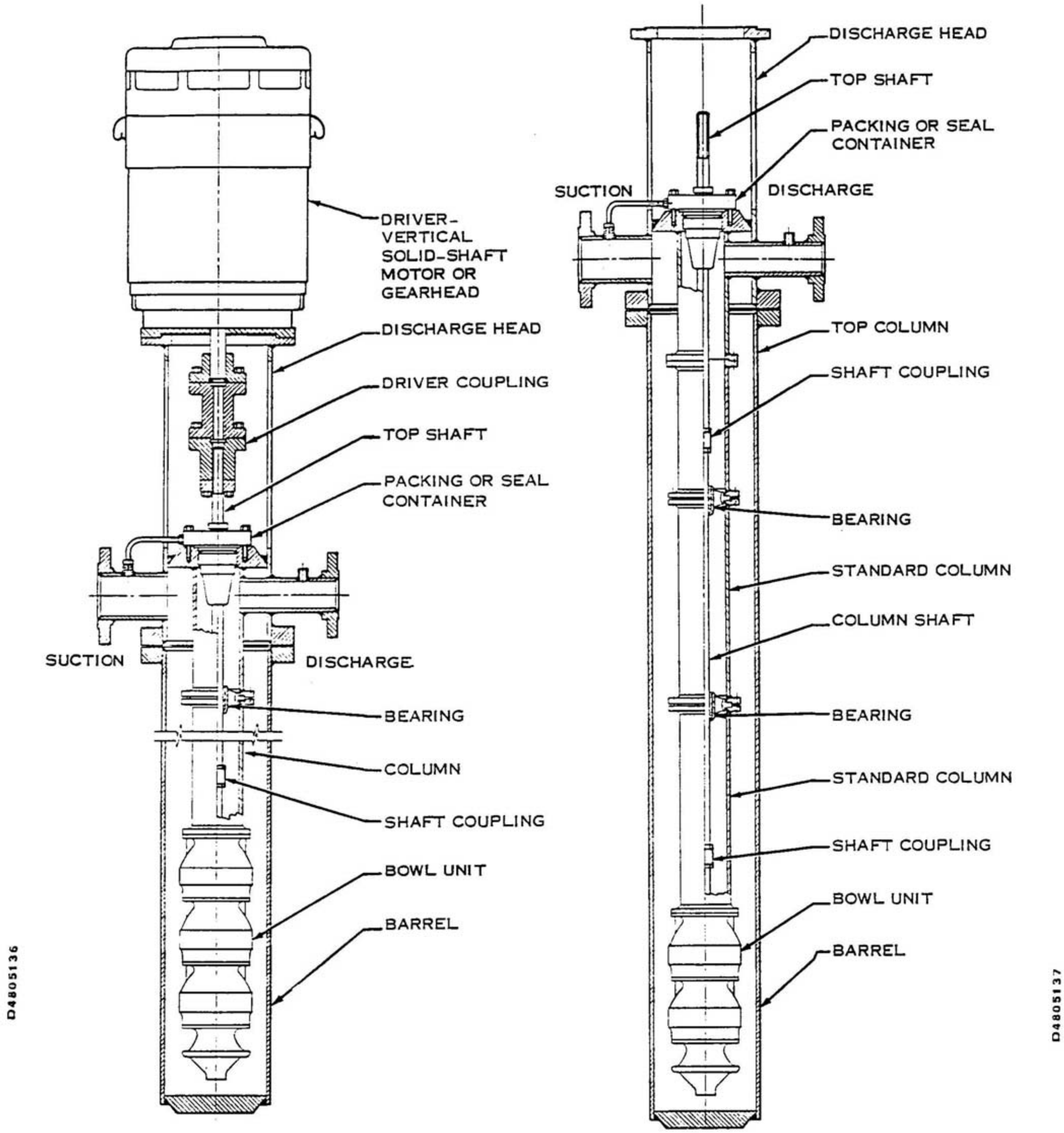


MODEL HE

MODEL HF

Other variations of Model HE are similar to Model HL except that vertical hollow-shaft motor and threaded coupling are used.

FIGURE 4. Typical Hydro-Line Pumps



ONE COLUMN. TOP SHAFT COUPLED TO IMPELLER SHAFT. ONE BEARING RETAINER.

MORE THAN ONE COLUMN. COLUMN SHAFT AND TOP SHAFT COUPLED TO IMPELLER SHAFT. TWO BEARING RETAINERS. DRIVER NOT SHOWN.

FIGURE 5. Typical Hydro-Line Pumps with column between discharge head and bowl unit. Mechanical seal and spacer-type coupling shown. Pumps equipped with packing use a coupling with no spacer.

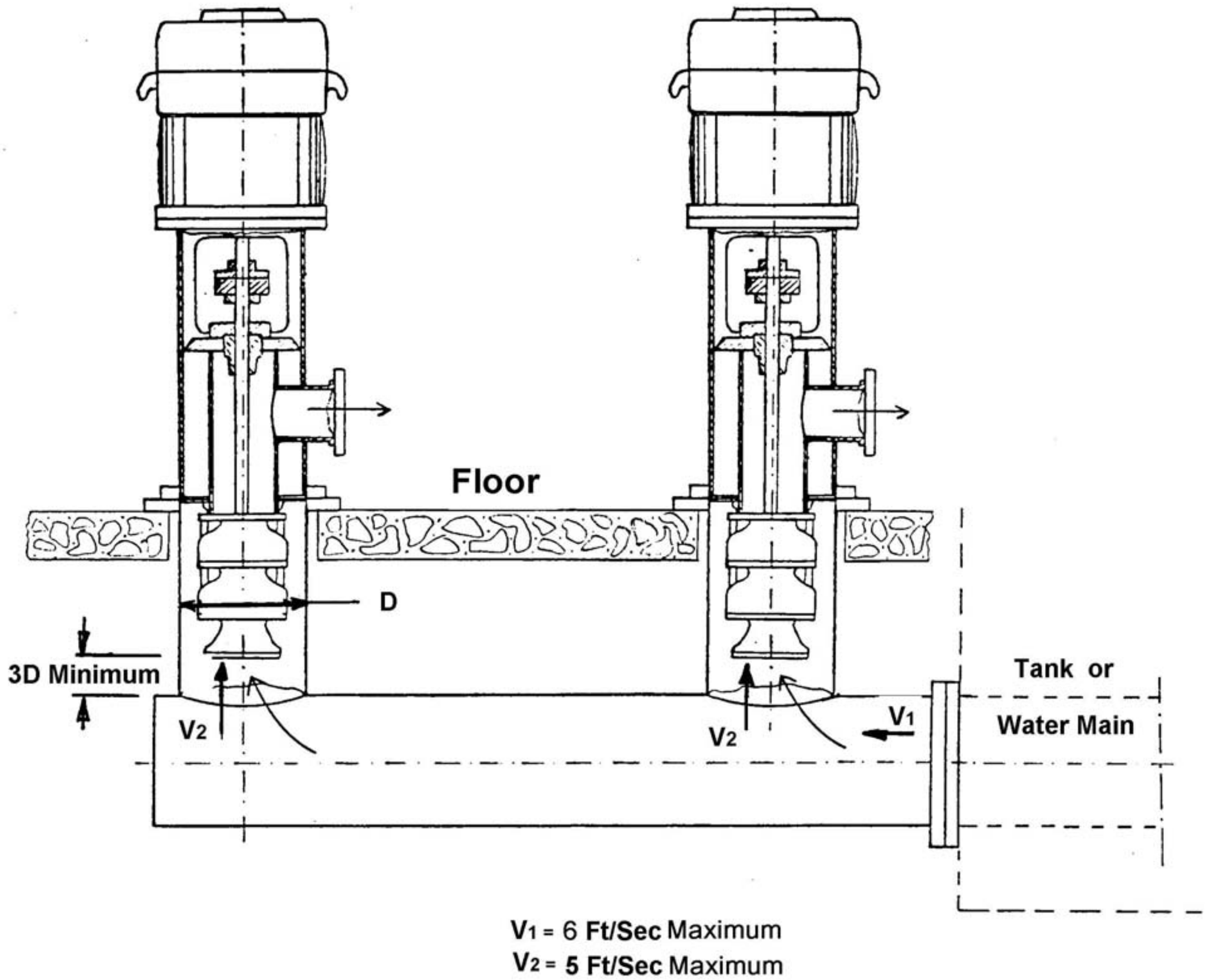


FIGURE 7. Multiple Can Installations

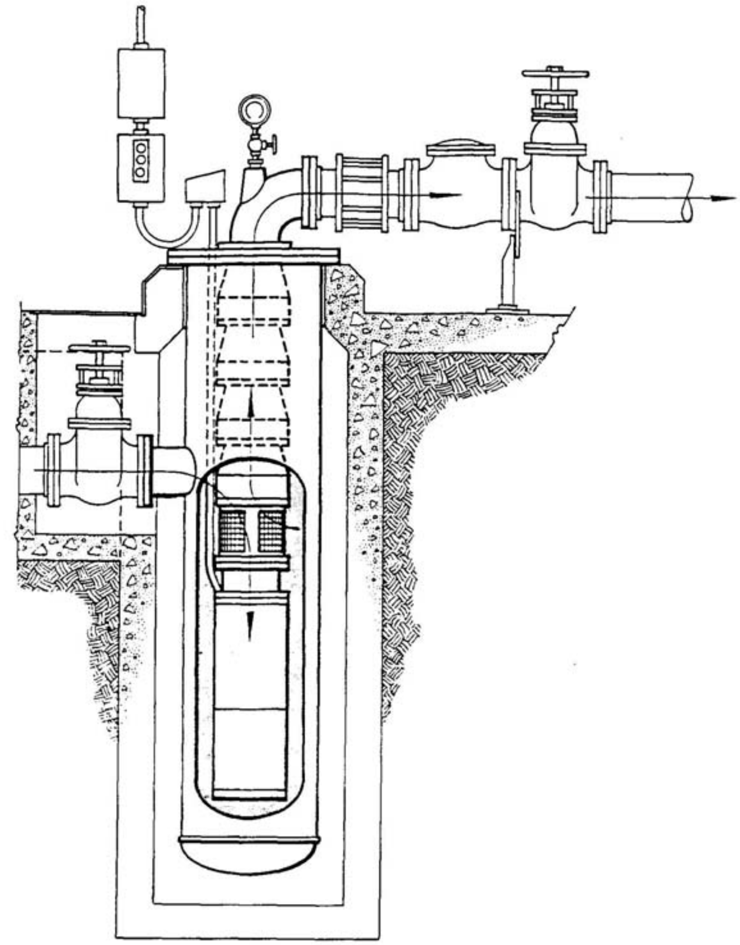


FIGURE 8. Submersible can pump installation

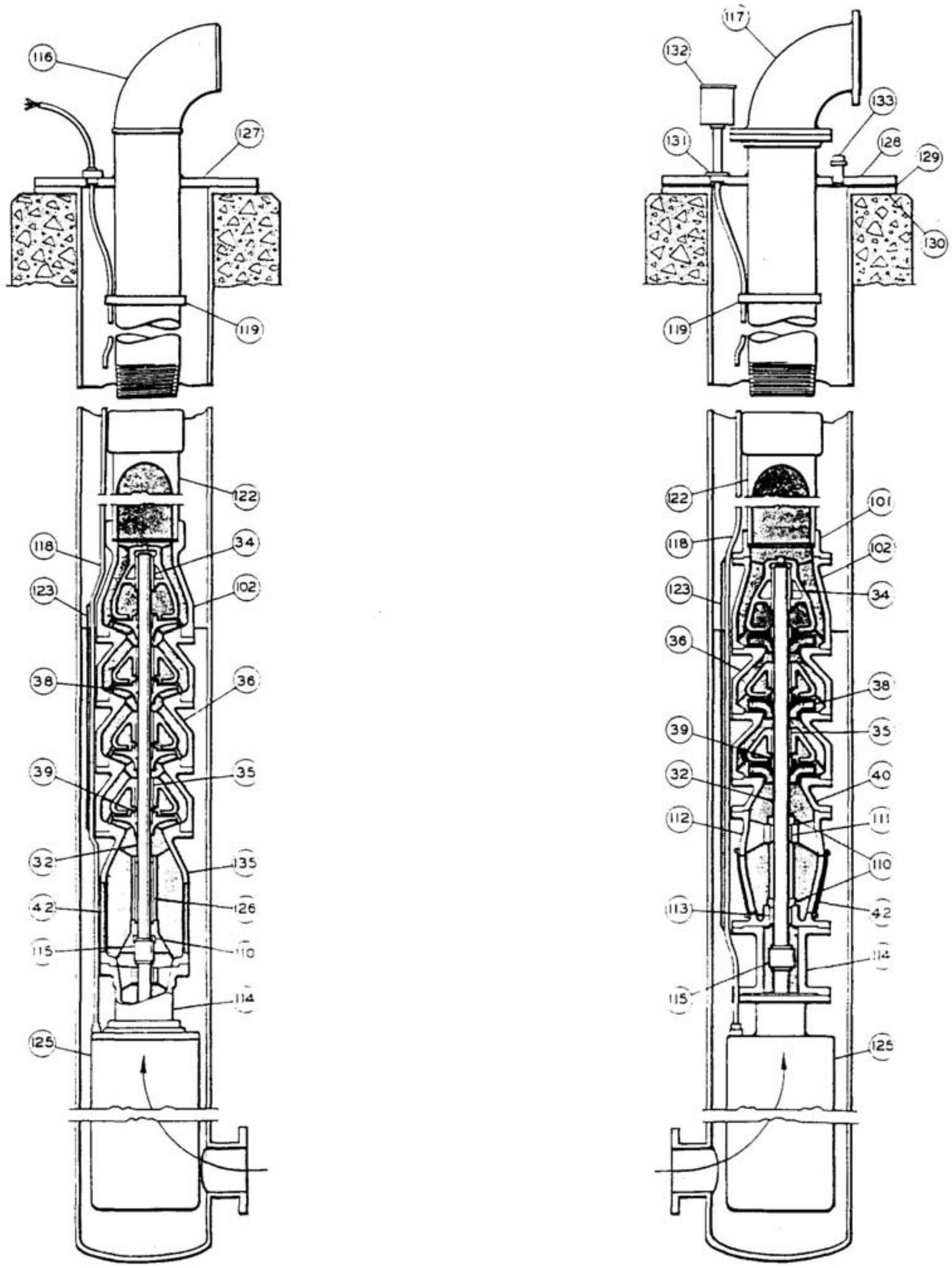


FIGURE 9. Submersible can pumps

DESIGN PARAMETERS

There are a number of factors that can influence the can design. However, there are some design guidelines for successful installation which should be sued where possible.

Flow Velocity

Can inside diameter should be selected so the annular velocity in the area between the bowl assembly outside diameter and the can inside diameter does not exceed 4 to 5 ft/sec. Liquids containing solids require 3 ft/sec minimum velocity.

Diameter

Approximately 1.2 to 1.5 bowl or suction bell (case) diameter whichever is larger. Can diameter is selected in conjunction with flow velocity above.

Length

The length of the can is defined by the length of the pump assembly and NPSH required.

Hydraulic losses

The hydraulic losses (He) between the can inlet flange and pump suction bell, figure 11, are available from the following curves 2826482 to 85 (Sales Manual, section 3410) for our typical pump and can design configurations. In case the can size or pump is different than those on the curves, the following approximate formula (from Vertical Pumps by J. Diemas) can be used:

$$He = (K \times Vc^2) / 2g$$

Where K = 3.5
Vc = annular velocity in can, ft/sec
g = 32.17 ft/sec

These losses will affect not only pump's head but also NPSH available at impeller eye. In critical NPSH applications Vc should be less than 3 ft/sec.

Location of pump suction bell opening with reference to can suction pipe inlet

A minimum distance of 2 can diameters from can suction pipe inlet center line to pump suction bell, figure 12. For additional information, see Hydraulic Institute Standards 9.8.

Distance of pump suction bell to bottom of can 0.5 bell diameters.

It is recommended for all Hydro-line pumps to have a vortex suppressor. In this case, the distance to be adjusted, if needed, to accommodate the vortex suppressor. The distance between the vortex suppressor and the bottom of the can to be approximately 0.125 bell diameters. In general, vortex suppressor would improve any pump installation intake flow conditions.

NPSH available (figure 11)

$$NPSH = Ha - Hvpa + Hs - Hf$$

Where Ha = absolute pressure on the surface of the liquid where the pump takes suction in feet; in open system it is equal to atmospheric pressure
Hvpa = vapor pressure in feet
Hs = elevation from impeller eye to fluid level in feet; it is negative if the fluid level is bellow the impeller eye
Hf = friction and entrance head losses in suction piping in feet

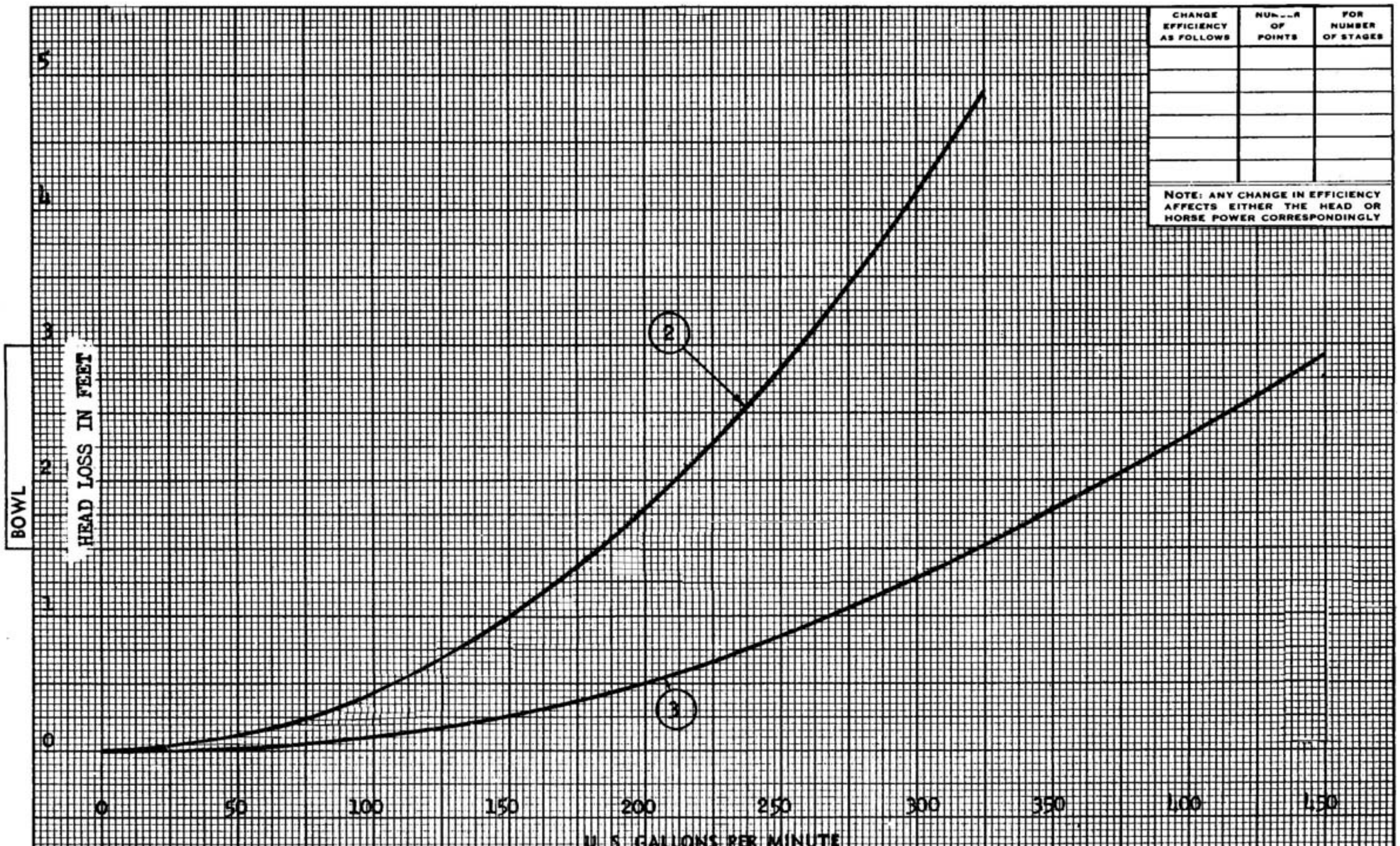
Design features of can (figure 12)

If the can and pump discharge column are long and the can suction pipe inlet is located close to the bottom of the pump, the impact of the fluid jet could impose sufficient force to deflect the column. Use of baffle plate in front of the pump column or bowl unit is recommended.

A splitter along the inside of the can helps in preventing vortex formation.

IMPORTANT NOTE

The information contained herein is for general information only. Please consult the Peerless Pump Application Department for design details of a specific application, giving pump design head, flow, liquid temperature, specific gravity, vapor pressure, NPSHa and mechanical details of proposed installation. Peerless Pump will provide recommendations for pump ordering purposes.



HYDRAULIC PERFORMANCE	CURVE NO.	HYDROLINE	TAKEN FROM
GUARANTEED AT THE DESIGNATED POINT ONLY AND IS CONTINGENT ON WELL PROPERLY FURNISHING PUMP WITH NON-AERATED OR NON-GASEOUS WATER FREE FROM ABRASIVES. PUMP BOWLS MUST BE PROPERLY ADJUSTED FOR THE HEAD AT WHICH THEY OPERATE AND MUST BE SUBMERGED.			
	2	6LB - 2 x 3 x 8	
	3	7LB - 3 x 4 x 10	

PEERLESS PUMP

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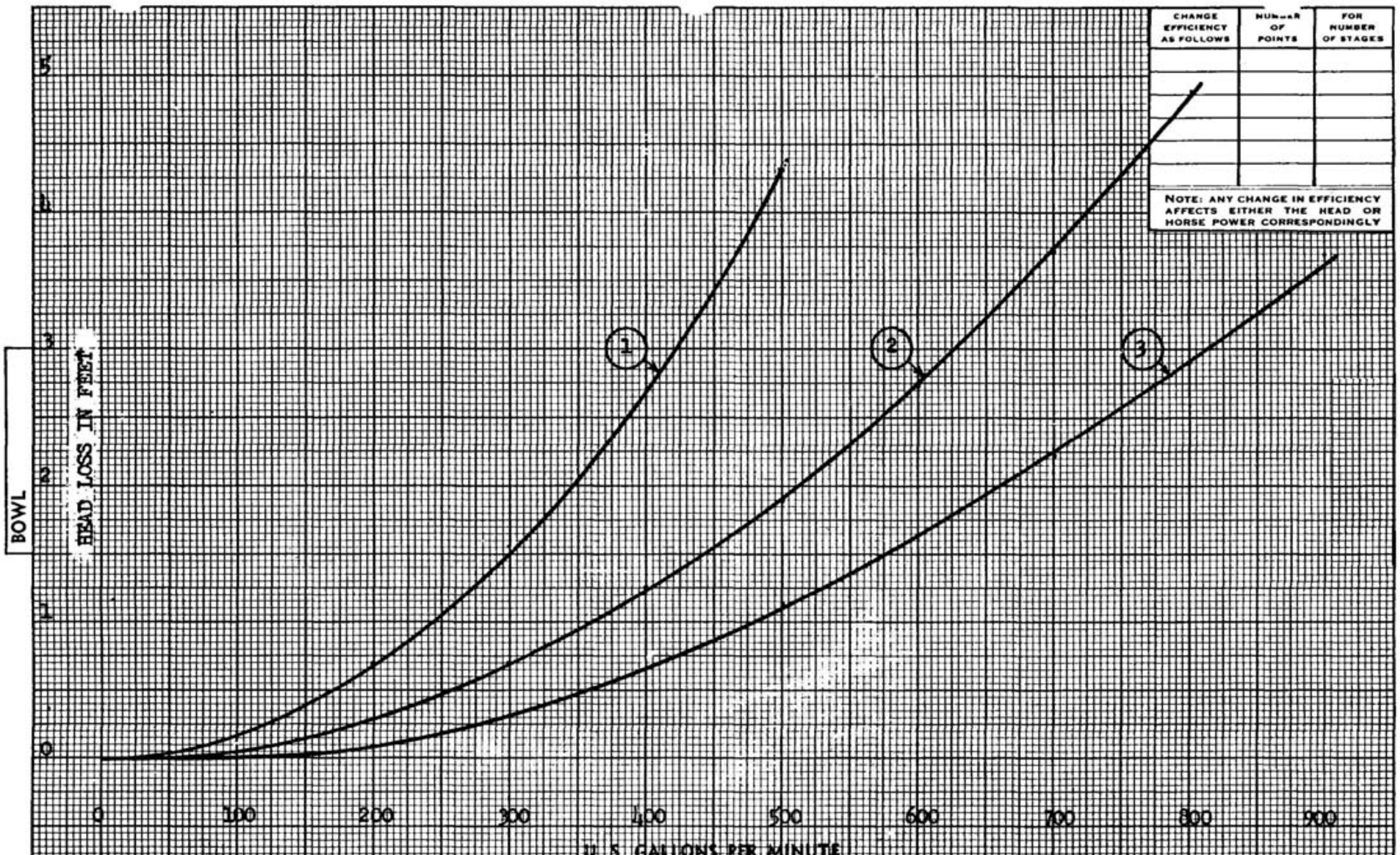
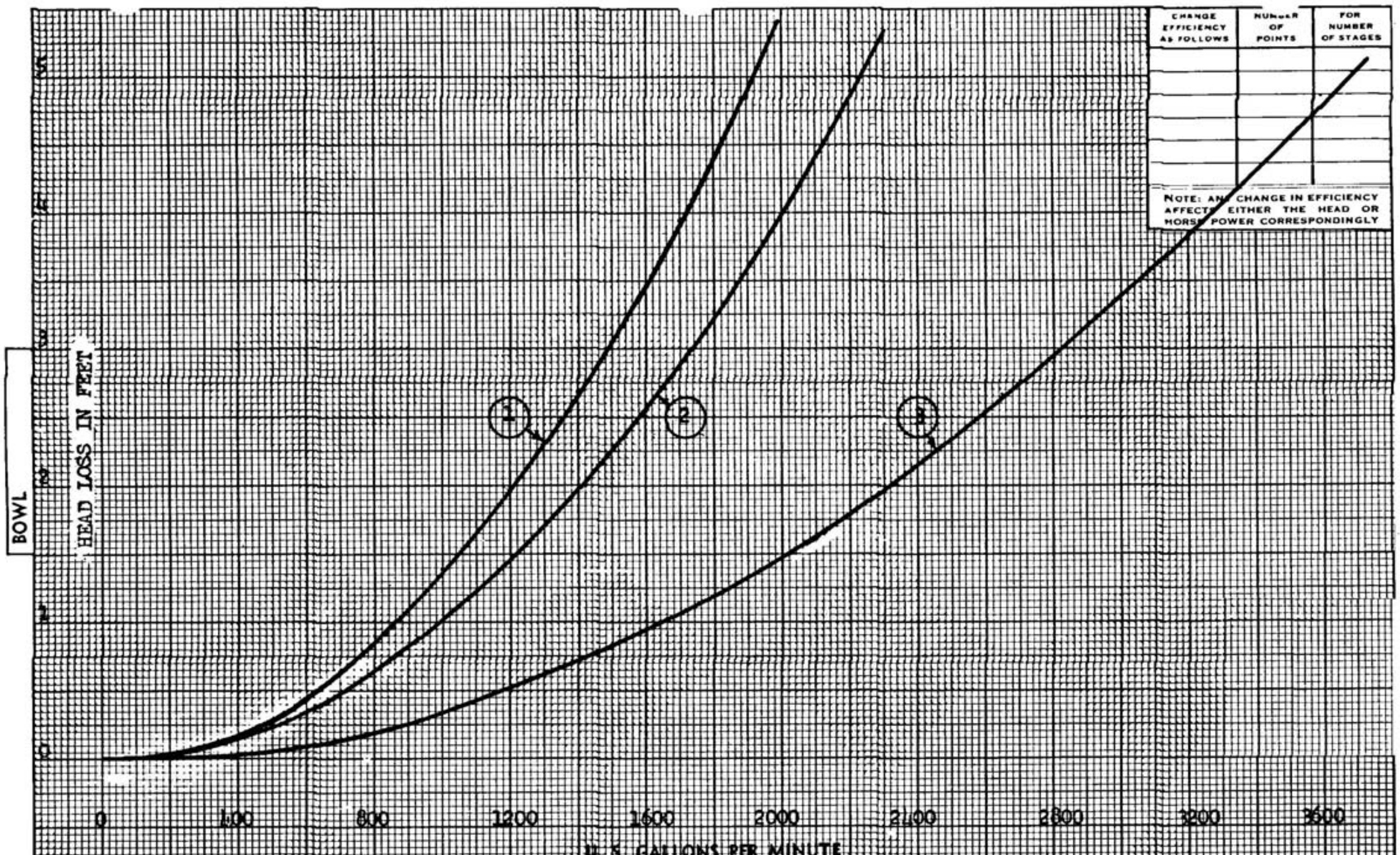
Head loss between suction flange and bowl assembly suction manifold in hydrolines.

SHEET NO. 2826482

TIP 100



HYDRAULIC PERFORMANCE	CURVE NO.	HYDROLINE	TAKEN FROM		Head loss between suction flange and bowl assembly suction manifold in hydrolines.
GUARANTEED AT THE DESIGNATED POINT ONLY AND IS CONTINGENT ON WELL PROPERLY FURNISHING PUMP WITH NON-AERATED OR NON-GASEOUS WATER FREE FROM ABRASIVES. PUMP BOWLS MUST BE PROPERLY ADJUSTED FOR THE HEAD AT WHICH THEY OPERATE AND MUST BE SUBMERGED.	1	8LB - 3 x 4 x 10		PEERLESS PUMP Peerless Pump Company Indianapolis, IN 46207-7026	
	2	8LB - 4 x 6 x 10			
	3	9LA - 4 x 6 12			SHEET NO. 2826483



HYDRAULIC PERFORMANCE

GUARANTEED AT THE DESIGNATED POINT ONLY AND IS CONTINGENT ON WELL PROPERLY FURNISHING PUMP WITH NON-AERATED OR NON-GASEOUS WATER FREE FROM ABRASIVES. PUMP BOWLS MUST BE PROPERLY ADJUSTED FOR THE HEAD AT WHICH THEY OPERATE AND MUST BE SUBMERGED.

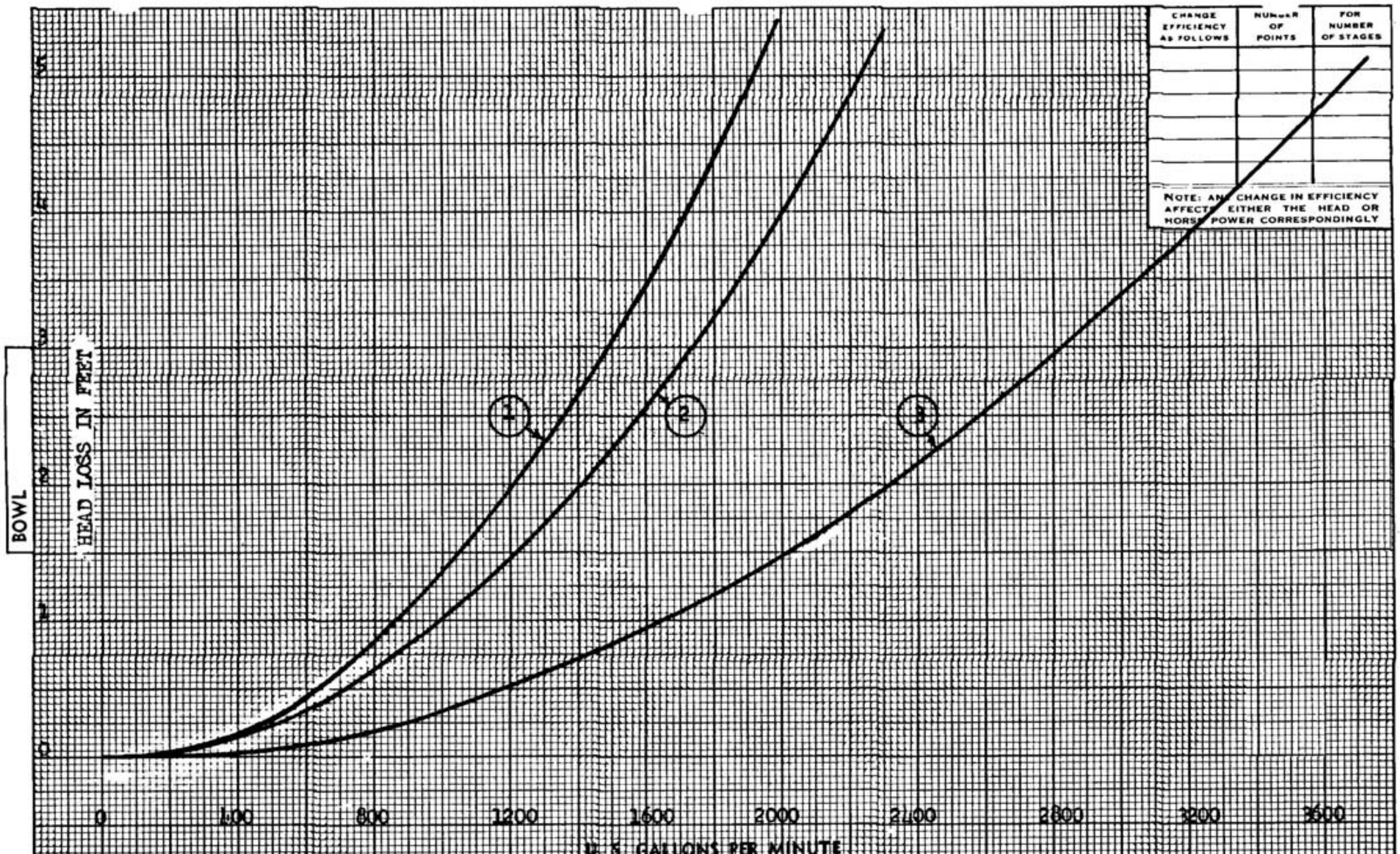
CURVE NO.	HYDROLINE		TAKEN FROM
1	14LC	6 x 8 x 18	
2	14MC	8 x 10 x 18	
3	14HXB	10 x 12 x 20	

PEERLESS PUMP

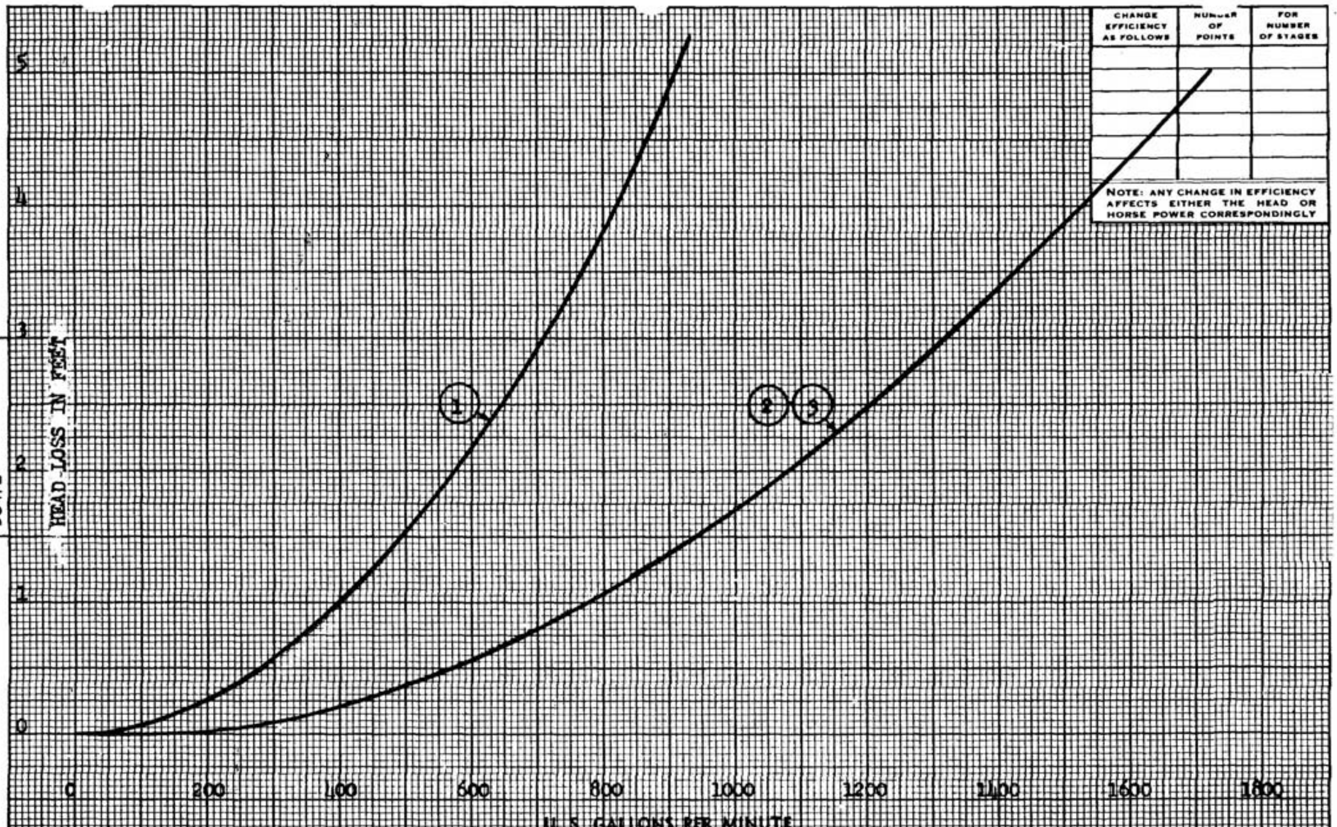
Peerless Pump Company
Indianapolis, IN 46207-7026

Head loss between suction flange and bowl assembly suction manifold in hydrolines.

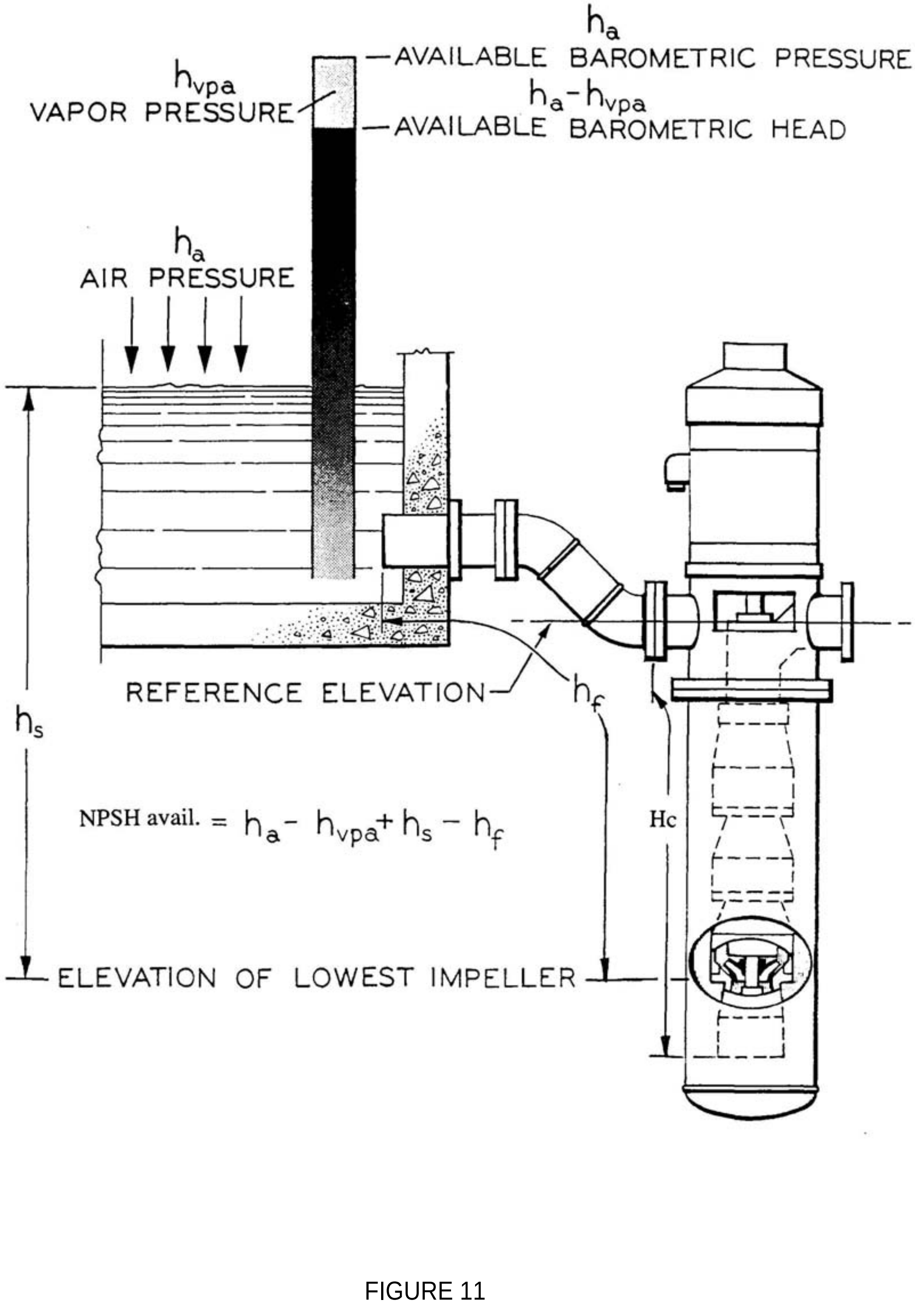
SHEET NO. 2826485



HYDRAULIC PERFORMANCE	CURVE NO.	HYDROLINE		TAKEN FROM		
GUARANTEED AT THE DESIGNATED POINT ONLY AND IS CONTINGENT ON WELL PROPERLY FURNISHING PUMP WITH NON-AERATED OR NON-GASEOUS WATER FREE FROM ABRASIVES. PUMP BOWLS MUST BE PROPERLY ADJUSTED FOR THE HEAD AT WHICH THEY OPERATE AND MUST BE SUBMERGED.	1	14LC	6 x 8 x 18		PEERLESS PUMP Peerless Pump Company Indianapolis, IN 46207-7026	Head loss between suction flange and bowl assembly suction manifold in hydrolines.
	2	14MC	8 x 10 x 18			
	3	14HXB	10 x 12 x 20			SHEET NO. 2826485



HYDRAULIC PERFORMANCE	CURVE NO.	HYDROLINE		TAKEN FROM		
GUARANTEED AT THE DESIGNATED POINT ONLY AND IS CONTINGENT ON WELL PROPERLY FURNISHING PUMP WITH NON-AERATED OR NON-GASEOUS WATER FREE FROM ABRASIVES. PUMP BOWLS MUST BE PROPERLY ADJUSTED FOR THE HEAD AT WHICH THEY OPERATE AND MUST BE SUBMERGED.	1	10MA	4 x 6 x 12		PEERLESS PUMP Peerless Pump Company Indianapolis, IN 46207-7026	Head loss between suction flange and bowl assembly suction manifold in hydrolines.
	2	12LB	6 x 8 x 16			
	3	12MB	6 x 8 x 16			SHEET NO. 2826484



h_a
AVAILABLE BAROMETRIC PRESSURE
h_{vpa}
VAPOR PRESSURE
$h_a - h_{vpa}$
AVAILABLE BAROMETRIC HEAD
h_a
AIR PRESSURE
REFERENCE ELEVATION
h_f
h_s
NPSH avail. = $h_a - h_{vpa} + h_s - h_f$
Hc
ELEVATION OF LOWEST IMPELLER

FIGURE 11

Suction Location for Hydro-Line Pumps

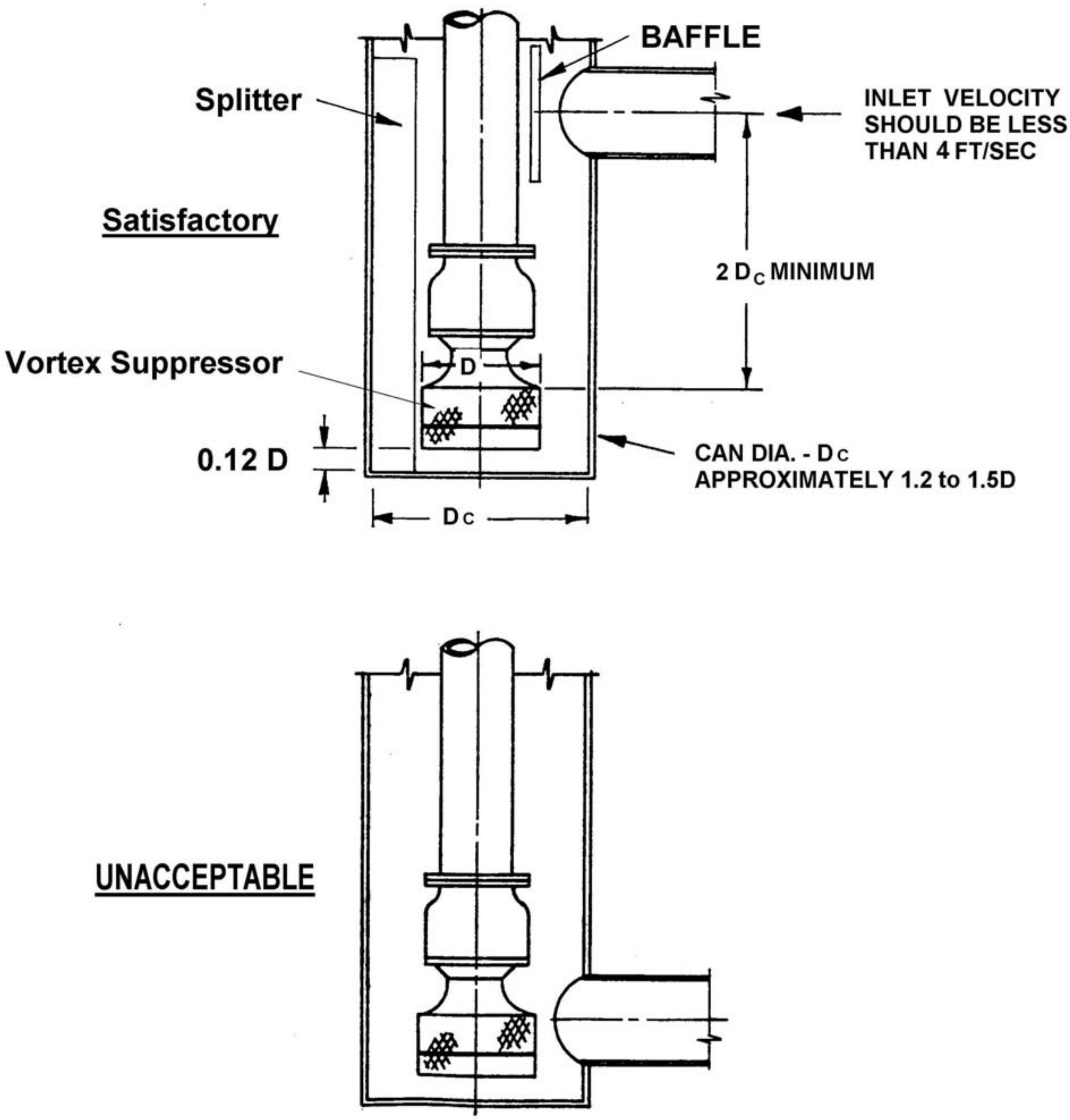


FIGURE 12