

Changes shown by ↕

**THE FOLLOWING PARAGRAPH NUMBERS REFER TO API-610, EIGHTH EDITION,
AUGUST 1995, WHICH IS A PART OF THIS PRACTICE**

SECTION 1 - GENERAL

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|---|---------|--|
| | 1.1 | SCOPE |
| R | 1.1.1 | <p>a. (Exception) This practice covers centrifugal pumps.</p> <p>b. All requirements specified in this practice are additions to those of API-610, unless specifically noted as exceptions. Paragraph numbers in this practice which do not appear in API-610 are new paragraphs.</p> <p>c. An asterisk (*) indicates that a decision by the Purchaser is required or that additional information is furnished by the Purchaser.</p> <p>Note: A bullet (•) is shown in API-610 indicating that a Purchaser's decision is required.</p> <p>d. Vendor Qualification. Pumps rated over 500 hp (375 kW), pumps handling liquids at -50°F (-45°C) or lower and pumps with a discharge pressure above 500 psig (35 barg) shall be supplied by vendors qualified by experience to manufacture the units proposed. To qualify, the vendor must have manufactured, at the proposed point of manufacture, at least two units of comparable power, speed, pressure, temperature and pumped fluid which have been operating satisfactorily for at least one year each.</p> |
| I | * 1.1.3 | <p>a. Proposals to provide any of the pump types listed in Table 1.1 of API-610 shall be submitted to Purchaser for approval by the Owner's Engineer.</p> <p>b. (Exception) Proposals for vertical in-line pumps for services greater than 1000 USGPM (110 m³/hr), 500 ft (150 meters) or 300°F (150°C) or requiring drivers over 150 BHP (112 kW) shall be submitted to the Purchaser for approval of the Owner's Engineer.</p> |
| C | * 1.1.4 | (Exception) Proposals to furnish pumps or mechanical seals that do not meet all requirements of this practice, based on specific non flammable, non hazardous service conditions, shall be submitted to Purchaser for approval by the Owner's Engineer. |
| | 1.5 | REFERENCED PUBLICATIONS |
| I | | a. Table 1 lists the practices, standards, and code which shall be used with this practice. |
| I | * | b. Table 2 lists the practices, code, and standards which shall be used with this practice as specified by the Purchaser. |

TABLE 1

PRACTICES	
IP 2-1-1	Plant Noise Design Criteria
IP 10-1-3	Shaft Sealing Systems for Centrifugal and Rotary Shaft Pumps
IP 10-11-1	Sizing of Drivers and Transmissions for Compressors, Fans and Pumps
IP 18-12-1	Positive Material Identification
IP 20-1-1	Inspection of Equipment and Materials
STANDARDS AND CODE	
API Standard	
610	Centrifugal Pumps for Petroleum, Heavy Duty Chemical, and Gas Industry Services
ANSI Standard	
B16.11	Forged Steel Fittings, Socket Welding, and Threaded
ASME Code	
B31.3	Process Piping
ASTM Standards	
A 395	Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures
B 111 / B 111M	Copper and Copper-Alloy Seamless Condenser Tubes and Ferrule Stock

TABLE 2

PRACTICES			
IP 3-3-12	Oil Mist Lubrication Systems	IP 16-9-1	Low Voltage A-C Motors up to 200 HP (150 kW)
IP 3-12-5	Compact and Extended Body Steel Gate Valves	IP 16-9-2	A-C Motors: Medium Voltage and Low Voltage Over 200 HP (150 kW)
IP 3-16-1	Flanged Joints, Gaskets, and Bolting	IP 18-4-1	Postweld Heat Treatment of Equipment Handling Alkaline Solutions
IP 10-7-1	General Purpose Steam Turbines	IP 18-10-1	Additional Requirements for Materials
IP 10-10-2	General Purpose Gear Units		
CODE AND STANDARDS			
ASME Code			
Section VIII	Pressure Vessels, Division 1		
ASTM Standards			
B 169 / B 169M	Aluminum Bronze Plate, Sheet, Strip and Rolled Bar		
B 171 / B 171M	Copper-Alloy Plate and Sheet for Pressure Vessels, Condensers and Heat Exchangers		

SECTION 2 - BASIC DESIGN

	2.1	GENERAL
R	2.1.9	Pump Suction Specific Speed (S) shall not exceed 12,000 (calculated using rotative speed in rev/min, flow in GPM, and NPSH in feet). See Par. 1.4.49 .
O,C	2.1.11	a. The head curve for the pump shall be continuously rising from the rated capacity point to the shutoff point. The pump head at shutoff shall be at least 110% of the head at the rated capacity point.
S	*	b. The pump head at shutoff shall not exceed 120% of the head at the rated capacity point without approval of the Owner's Engineer.
		c. Pumps for parallel operation shall have equal head rise (within 1% as measured on the performance test) to shutoff.
	*	d. Low capacity, high head pumps may be exempt from the requirements of 2.1.11.a and 2.1.11.b above with approval of the Owner's Engineer.
	*	e. (Exception) Proposals to use orifices as a means of providing a continuous rise to shutoff shall be submitted to the Purchaser for approval by the Owner's Engineer.
E,I	2.1.14	(Exception) Noise . Pump vendors shall furnish noise emission data for the quoted equipment with their proposal per IP 2-1-1 .
R,C	2.1.17	Application of pump cooling water shall be as follows:
		a. Pumps with non-pressurized bearing lubrication, and pumping temperatures under 400°F or 200°C shall be designed to operate continuously without use of cooling . Bearing oil temperatures shall not exceed those of Par. 2.9.2.3 , and shall assume no credit for motor cooling air. Cooling water may be used for cooling seal flush liquid to assure proper mechanical seal operation.
		b. Pumps with pressurized lubrication or pumping temperatures over 400°F or 200°C may utilize cooling water only where required for cooling of bearing oil, seal chambers, or seal flush liquid. Pumps with non pressurized lubrication and pumping temperatures over 400°F or 200°C shall be furnished with bearing housing water jackets. Water jacket connections shall be plugged unless cooling is required.
I	* 2.1.29	Pump and auxiliaries shall be suitable for outdoor installation in the climatic zone specified .
	2.2	PRESSURE CASINGS
I	* 2.2.3	If more than 1/8 in. (3 mm) corrosion allowance is required in cast iron and carbon steel casings, it will be specified.
S	2.2.4	Components and sections of vertically suspended, multistage horizontal and double case pumps including seal chambers which are normally subjected to suction pressure shall be designed to permit, as a minimum, a hydrostatic test pressure equal to the casing maximum allowable working pressure .



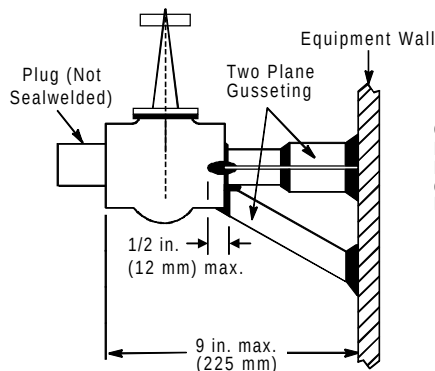
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2.3 NOZZLE AND PRESSURE CASING CONNECTIONS

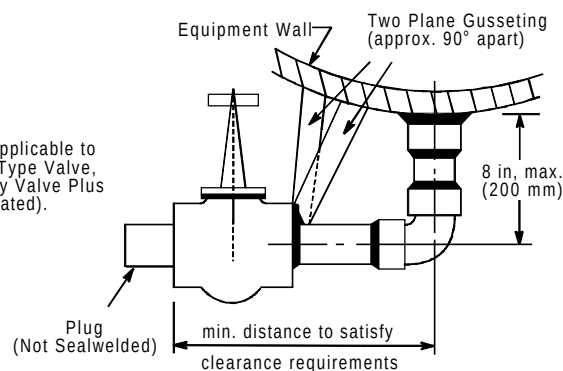
2.3.1 CASING OPENING SIZES

- I * 2.3.1.2 a. (Exception) Connections for the liquid barrier/buffer of dual seals shall be at least **3/4 in. nominal pipe size** regardless of pump size.
- S b. **Valved vent and drain connections** shall be **braced** and supplied with threaded, non-seal welded round head plugs per ANSI B16.11.
- S,R c. **Bracing design** shall be as follows:



100101

General Note:
Bracing Detail Applicable to
Extended Body Type Valve,
or Compact Body Valve Plus
Nipple (as illustrated).



Acceptable Bracing Design for
Equipment Only Where Pipe Bend Necessary.

- Gusseting material** for welded gussets shall be of the same nominal chemistry as the connected parts except that carbon steel may be used for gusseting P-1, P-3, P-4, and P-5 materials.
- Connections shall be braced in two planes** with gussets having a minimum thickness of 3/16 in. (5 mm), minimum width 3/4 in. (19 mm) as shown above.
- Gusset attachment welds to a pressure boundary shall be postweld heat treated (PWHT) whenever:** (1) PWHT is required for all welds, based on service conditions (see 2.11.3.7.4.4); (2) PWHT is required in the alloy steel component to which the attachment is to be made, based on **ASME B31.3 PWHT criteria for butt welds in alloy steel materials** - whether or not butt welds are used in the assembly.
- Proposals to use clamped or bolted gusset designs** shall be submitted to Purchaser for approval by the Owner's Engineer.
- Bracing design for piping connections requiring double block valves** shall be submitted to Purchaser for approval by the Owner's Engineer.

2.3.3 PRESSURE CASING CONNECTIONS

M 2.3.3.4 (Exception) Auxiliary connections less than NPS 1 (25 mm) to the seal gland shall be threaded.

- R 2.3.3.7 a. (Exception) **Tapped openings** not connected to piping shall be **plugged** with round head plugs furnished in accordance with the requirements of **ANSI B16.11**. The plugs shall meet the material requirements of the casing. **Plugs requiring removal** for maintenance or operation **shall not be seal welded**. **Plugs NOT requiring removal shall be seal welded** in accordance with **Par. 2.3.3.7b**. Plastic plugs are not permitted.
- b. **Seal welding of all threaded plugs** and connections shall be as follows:
- Connections requiring seal welding shall be made up **without the use of sealing compounds or PTFE tape**. All cutting oil used shall be removed prior to assembly. After the joint has been tightened to **full thread engagement**, the seal welding shall cover **all exposed threads or 1/4 in. (6 mm) minimum**.
 - Seal welding shall be done with electrodes not to exceed 1/8 in. (3.2 mm) in diameter, using an amperage in the low range to avoid distortion of the connection or part being welded.