

**THE FOLLOWING PARAGRAPH NUMBERS REFER TO API-617, SIXTH EDITION,
FEBRUARY 1995 WHICH IS A PART OF THIS PRACTICE**

SECTION 1 - GENERAL

- I 1.1 SCOPE
- a. (Exception) This practice covers special purpose centrifugal compressors.
 - b. All requirements specified in this practice are additions to those of **API-617** unless specifically noted as exceptions. Paragraph numbers in this practice which do not appear in **API-617** are new paragraphs.
 - c. **An asterisk (*)** indicates that a decision by the Purchaser is required or that additional information is furnished by the Purchaser.

Note: A bullet (•) is shown in **API-617** indicating that a Purchaser's decision is required.
 - d. **Vendor Qualification.** Compressor systems shall be supplied by **vendors qualified by experience in manufacturing the units proposed.** To qualify, the vendor must have manufactured at the proposed point of manufacture, at least two compressors of comparable speed, power rating, and discharge pressure for a gas of comparable characteristics. These compressors must have been in service for at least one year and be performing satisfactorily.

Alternatively, the vendor may satisfy this **experience requirement on an individual component and service condition basis.** Experience need not be concentrated in a single compressor, but may be spread through several operating compressors. To qualify, each of these compressors must have been in service for at least one year and be performing satisfactorily.

The critical areas relative to service conditions which must be demonstrated to the satisfaction of the Owner's Engineer include, but are not limited to the following:
 - 1. Pressure
 - 2. Molecular weight
 - 3. Volumetric capacity
 - 4. Power rating
 - 5. Speed
 - 6. Temperature**The critical areas relative to mechanical design** which must be demonstrated to the satisfaction of the Owner's Engineer include, but are not limited to the following:
 - 1. Sealing system
 - 2. Bearing design and loading
 - 3. Number of stages and staging arrangement
 - 4. Casing size and design
 - 5. Casing joint design
 - 6. Rotor dynamics
 - 7. Impellers - structural design and performance
 - 8. Material selection
 - 9. Power transmission component design and arrangement
 - e. In the area of component mechanical design, the vendor must show that each component has operated under the same conditions as those of the proposed compressor.
 - f. Compressors manufactured under a license agreement shall carry the **licenser's written guarantee.**
 - g. Where the vendor qualification requirement of **Par. 1.1d** prevents the application of the latest technology, the vendor shall submit a **second alternative proposal** incorporating such features for evaluation by the Owner's Engineer. The proposal shall specifically identify the undemonstrated features and state their advantages.

- I 1.5 REFERENCED PUBLICATIONS
- Table 1** lists the practices and standard which shall be used with this practice.
 - Table 2** lists the practices and standard which shall be used with this practice **as specified** by the Purchaser.

TABLE 1

PRACTICES	
IP 2-1-1	Plant Noise Design Criteria
IP 10-11-1	Sizing of Drivers and Transmissions for Compressors, Fans, and Pumps
IP 10-12-1	Vibration, Axial-Position, and Bearing-Temperature Monitoring Systems for Compressors and Drivers
IP 10-14-1	Lube and Seal Oil Systems for Machinery
IP 18-12-1	Positive Material Identification
IP 20-1-1	Inspection of Equipment and Materials
STANDARD	
API Standard 617	Centrifugal Compressors for Petroleum, Chemical, and Gas Industry Services

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TABLE 2

PRACTICES	
IP 3-3-3	Flushing and Drain Piping for Centrifugal and Rotary Gas Compressors
IP 3-16-1	Flanges, Gaskets, Bolting and Fittings
IP 10-7-2	Special Purpose Steam Turbines
IP 10-8-1	Combustion Gas Turbines
IP 10-10-1	High Speed, Special Purpose Gear Units
IP 15-1-2	Instruments for Compressors and Drivers
IP 15-7-1	Electrical Circuit Design for Instruments
IP 15-7-2	Protective Systems
IP 15-11-1	Instrument Control Panels
IP 16-9-1	Low Voltage A-C Motors up to 200 HP (150 kW)
IP 16-9-2	A-C Motors: Medium Voltage and Low Voltage Over 200 HP (150 kW)
IP 18-10-1	Additional Requirements for Materials
STANDARD	
ASTM Standard A 488 / A 488M	Steel Castings, Welding, Qualifications of Procedures and Personnel

SECTION 2 - BASIC DESIGN

- ♦ 2.1 GENERAL
- O,C 2.1.3
- Compressors** shall be **guaranteed** for head, capacity, and satisfactory performance at all specified operating points and further shall be guaranteed for power at the normal operating point (see API Figure 1).
 - For constant-speed compressors**, the specified capacity shall be guaranteed with the understanding that the head shall be within +5% and -0% of that specified; the power shall not exceed stated power by more than 4%. These tolerances are not additive. See **Par. 4.3.6.1.4**.
 - For compressors handling side loads or for two or more process compression stages (sections) driven by a single driver, the performance of each process compression stage (section) shall be guaranteed in accordance with **2.1.3a, b, & c**.



	Special Purpose Centrifugal Compressors		IP 10-3-1	
			Page 3 of 8	
	(This practice is appropriate for attachment to Inquiry or Purchase Document)		Rev. 1	March 1998

O	* 2.1.4	a. The volume capacity at the surge point shall not exceed the specified percentage of normal capacity at normal speed, and normal (unthrottled) suction conditions. The rise in pressure ratio from normal capacity to the surge point at normal speed shall not be less than that specified.
		b. The head developed at 115% of normal capacity at normal speed shall be not less than approximately 85% of the head developed at the normal operating point.
R,M	2.1.9	a. Compressors and auxiliaries shall be suitable for outdoor installation .
	*	b. Compressors and auxiliaries shall be winterized for the climatic zone specified.
E	2.1.10	Noise. Compressor vendors shall submit noise emission data for the quoted machine with their proposal per IP 2-1-1 .
O	2.1.17	Compressors shall be run-in on air. Vendor shall provide air performance curves, operating guidelines, and any additional features required for this "run-in."
R	2.1.19	The following spare parts shall be furnished for and delivered with each centrifugal compressor: a. Rotor b. A fully instrumented set of bearings (including radial and thrust) c. Shaft seals d. Renewable labyrinths for all internal close clearance points If two or more centrifugal compressors are duplicates, a single set of spares will suffice.
	2.3	INTERSTAGE DIAPHRAGMS AND INLET GUIDE VANES
R	* 2.3.6	When flushing is specified , width of diffuser passages at no point shall be less than the width of the narrowest impeller gas passage.
O	2.3.7	If an entering sidestream flow exceeds 15% of the total flow to the impeller, the entrance passage shall minimize the disturbance at the impeller inlet. In this instance, entrance through a standard spaced diaphragm section is prohibited. Providing extra space between adjacent wheels is an acceptable method of introducing sidestreams.
	2.4	CASING CONNECTIONS
	2.4.2	MAIN PROCESS CONNECTIONS
O,R	2.4.2.2	(Exception) Flanges shall be per IP 3-16-1 .
	2.4.3	AUXILIARY CONNECTIONS
I	* 2.4.3.2	If stage flushing (to individual impellers) is specified, the compressor vendor shall provide the following: 1. Individual stage drains 2. Flanged liquid injection connections with recessed spray nozzle seats to each stage (individual impellers).
	2.6	ROTATING ELEMENTS
M	2.6.2	Coupling hubs shall be removable and nonkeyed (tapered bore, hydraulically fitted) .
R	2.6.11	Impellers shall be designed to limit the maximum stress at maximum continuous speed to a value of 70% of the material yield strength.
R	2.6.15	Pressure tap connection shall be provided with a plugged valve to permit gas sampling and pressure measurement.
O,R	2.6.16	A shunt from the compressor discharge shall be provided to: a. The division wall labyrinth on back-to-back impeller configurations when discharge pressure exceeds 1000 psig (69 barg). b. The balance piston labyrinth on straight-through impeller configurations when discharge pressure exceeds 1500 psig (103 barg). The shunt shall enter at least two teeth away from the high pressure side of the labyrinth.
R	* 2.6.18	When flushing is specified, the impeller gas passage width at the periphery shall be 3/8 in. (10 mm) minimum.