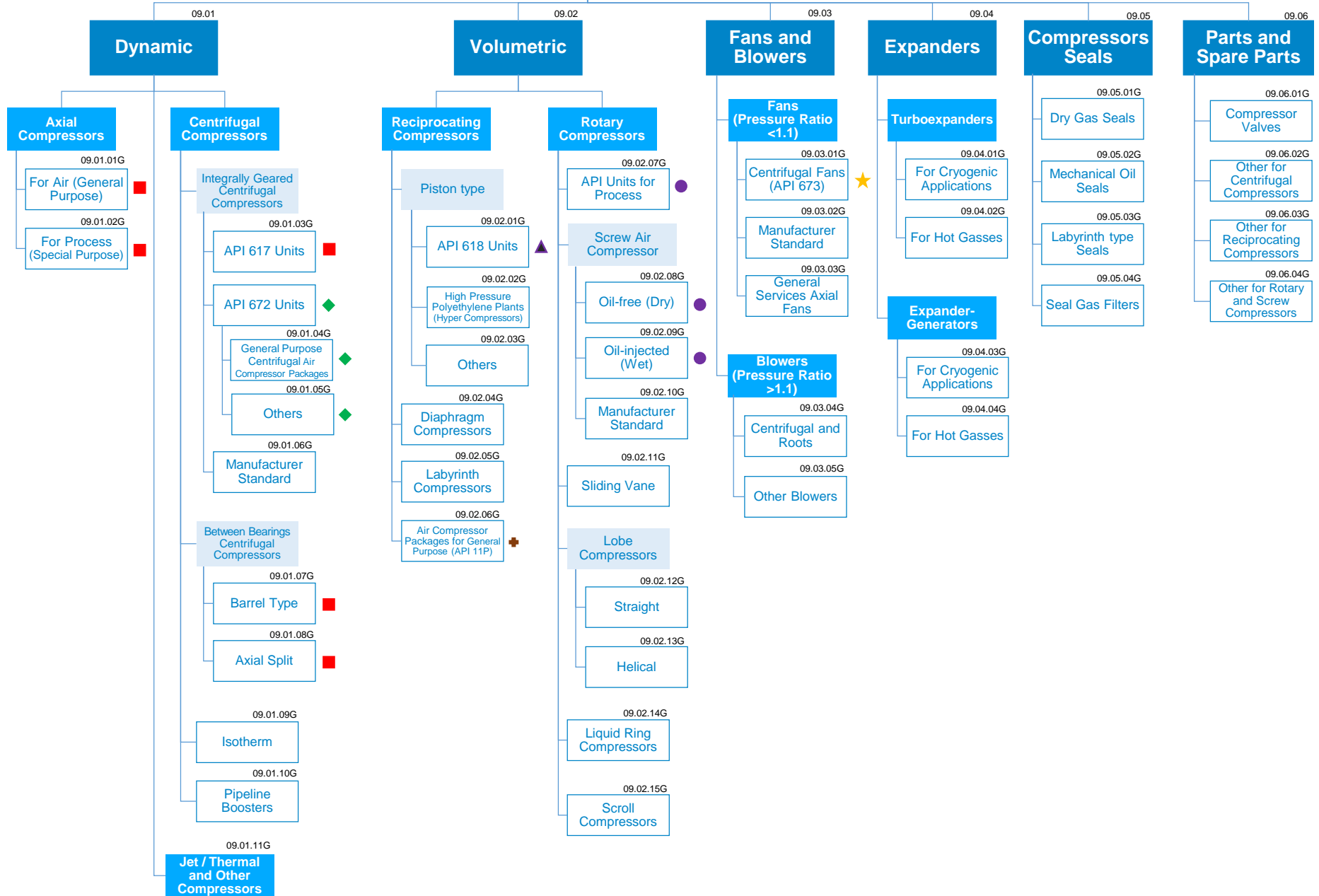


Compressors

Main API International Standards applicable to Categories

- API 617 ■
- API 618 ▲
- API 619 ●
- API 672 ◆
- API 673 ★
- API 11P ⊕



Compressors

Compressors are machines that increase the pressure (“compress”) of a gas, reducing its volume. They have for gases the same function that pumps have for liquids.

Compressors have four main applications: general service, refrigeration, oil and gas production and transportation, gas processing.

The compressors market is very mature, and its competition is very concentrated, in particular as far as centrifugal compressors are concerned.

MAIN RATIONALES BEHIND THE STANDARD CATEGORIZATION

Dynamic Compressors

- The choice of the “Dynamic” family name was made to be “parallel” between pumps and compressors, to reflect the parallelism that occurs between these two product Groups - as a matter of fact they are often under the responsibility of the same Rotating Equipment Procurement or Engineering departments in the Buyers’ organizations.
- In Axial Compressors the air flows parallel to the rotating axis. Typically the main compressor producers (MAN, Dresser Rand, ...) can also deliver both this type of compressors and centrifugal compressors, while smaller players are more focused.
- Inside Integrally Geared Compressors, both API 617 and API 672 are standards for compressors for the petroleum, chemical, and gas industries, however, API 672 focuses on packaged compressors.
- Between Bearings Compressors are divided into Axial Split (sometimes called axially split or horizontally split) and Barrel Type (sometimes called radially split), which are differentiated based on the type of casing.
- Isotherm (or isothermal) Centrifugal Compressors are often used for air or oxygen applications, but can also be used in petrochemical plants. They are specific machines able to compress a gas without changing its temperature, and are delivered by a few players.
- Pipeline Boosters are used to ensure that the gas that travels in a pipeline remains pressurized. Compressor stations have specific requirements of efficiency and reliability, therefore the producers make dedicated product lines for these compressor types, which are not delivered by all players.
- Subsea compressors require a very specific technology: the first one was installed in September 2015 in a Statoil Field (Åsgard) – in this Standard Categorization they are comprised under Group 20 (“Subsea Equipment”)
- Despite being a type of ejector, Jet Compressors have been classified under this family due to their function of using a high-pressure gas to increase the pressure of another lower pressure gas (by mixing the two and discharging at an in-between pressure).

Volumetric Compressors

- The choice of the “Volumetric” family name was made to be “parallel” between pumps and compressors.
- Reciprocating Compressors were divided into three main categories / nodes:
 - Piston Compressors:
 - API 618 is the most relevant standard for Piston Compressors;
 - Hyper Compressors are high pressure piston compressors for low density polyethylene (LDPE) plants.
 - Diaphragm Compressors: similar to piston, but the gas is compressed by a flexible membrane and they are produced by different players;
 - Labyrinth Type (or labyrinth piston) Compressors: piston compressors with a labyrinth sealing system.
- Rotary Compressors divided into five main categories / nodes, which define the competition:
 - Screw Air Compressors, Sliding Vane Compressors, Lobe Compressors, Liquid Ring Compressors, and Scroll Compressors.

Fans and Blowers

- The differentiation between Fans and Blowers lies in the pressure ratio, which is up to 1.1 for Fans and greater than 1.1 for blowers. This definition is commonly accepted in the market (for example, they are defined in this way by the American Society of Mechanical Engineers – ASME).
- Within Fans, the most relevant API standard (API 673) was differentiated, as well as Axial Fans (their manufacturers tend to be different from those of centrifugal fans).

Expanders

- Expanders are used to expand a pressure gas and may use the energy produced to drive a generator or a compressor (which may in other cases be absorbed through a “braking liquid”).
 - Not all players can deliver both expander-generators and the other types of expanders and, within each of these nodes, not all expanders work at any temperature.

Compressor Seals

- The rotating shaft of centrifugal compressors needs seals to prevent gas leakages where the shaft exits the compressor casing. Compressor Seals are divided into three sub-categories:
 - Mechanical Oil Seals: also called “Wet Seals”, they work through the principle of a barrier fluid (oil forced into the seal at a higher pressure than the process gas);
 - Dry Gas Seals: non-contacting seals, typically used in harsher environments;
 - Labyrinth type Seals: prevent leakage through a tortuous path.
- The technologies used to produce these seals are different from each other, and this defines the competition.

Parts and Spare Parts

- As for Pumps, parts and spare parts for new Compressors are often supplied by the original vendor, but they may in some cases be supplied by specialized actors that focus on spare parts and maintenance. They were therefore detailed in specific categories.
- Specialized Vendors supply Valves for Compressors, which have been separated in a specific Category.