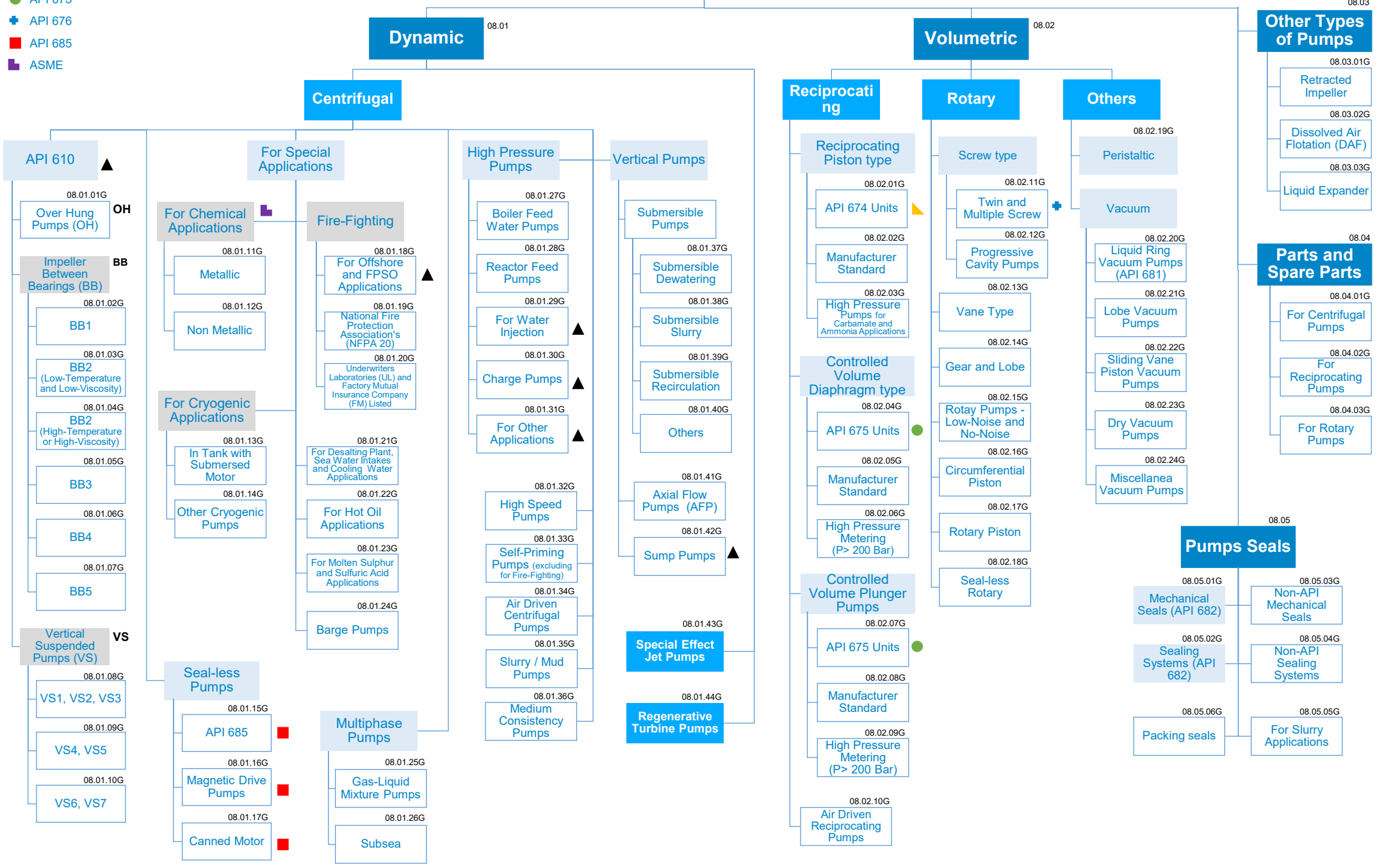


- ▲ API 610
- ▲ API 674
- API 675
- API 676
- API 685
- ASME

# Pumps



# Pumps

Pumps are devices used to move fluids through some form of mechanical action.

Pumps have many industrial applications, including power (mainly for water applications e.g. boiler feed), water and sewage, chemicals (including abrasive and corrosive fluids) and metals and mining (dewatering and slurry applications).

In Oil&Gas in particular, most pumps are engineered (meaning built on specifications), and their application varies from critical process applications to auxiliary activities as fire-fighting systems.

The main distinction among pumps is defined by the type of mechanical action they apply to the fluid; the most relevant families being Dynamic (Centrifugal) and Volumetric (Reciprocating and Rotary) Pumps.

## MAIN RATIONALES BEHIND THE STANDARD CATEGORIZATION

### Dynamic Pumps

- 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
- API 610 is the most relevant standard for centrifugal pumps in Oil&Gas, thus deserving a dedicated categorization. Among them:
  - Players differentiate not only based on the types of pumps they produce, but also on their coverage of the capacity / prevalence spectrum. Anyway, categorization was based on pumps models that are the most relevant differentiating factor
  - Over Hung Pumps (OH) represent the biggest volume in the market, but have a lower differentiation in producers, they were therefore not divided into sub-categories
  - Between Bearing Pumps (BB) have the highest unit value and most diverse competitive arena, they were therefore split among sub-categories:
    - BBs were categorized according to “atomic” level of the API categorization, with BB2 also split according to temperature and viscosity. This split is recurrent also in Oil&Gas vendor lists, as not many players can cover the entire range
  - VS were grouped according to the similarities among products, which drive the competition
    - VS1, VS2 and VS3; VS4 and VS5; VS6 and VS7
- Other centrifugal pumps are differentiated by the type of application, when that determines the underlying competition, under the Special Applications node (e.g. very specific players deliver Cryogenic Pumps or High Pressure Pumps), even if there might be some overlap with other categories (e.g. Reactor Feed Pumps are usually BB5)
  - Fire-Fighting pumps for onshore applications were considered as all included in either the category 08.01.19G National Fire Protection Association’s (NFPA 20) or 08.01.20G Underwriters Laboratories (UL) and Factory Mutual Insurance Company (FM) Listed
    - Most pumps used for these applications are regulated under one of these standards, also for compliance reasons on the End User’s side

- The main differentiation of pumps for Chemical Applications was defined by the material, as these pumps are usually less “engineered” (by that meaning built on specification) than Oil&Gas Pumps
- Vertical submersible pumps are usually utilized in water applications
  - For example, dewatering and slurry applications are typical of the mining industry
- High Pressure Centrifugal Pumps specify the most critical applications: Boiler Feed Water Pumps, Reactor Feed Pumps, For Water Injection and Charge Pumps
- Special Effect are a kind of pumps that still uses kinetic force to move a fluid, but they apply it through “special” means that are different from the typical centrifugal pump
- Regenerative Turbine pumps differentiate from centrifugal because in the latter the fluid only travels through a centrifugal impeller once, while in a turbine it takes many trips through the vanes

### Volumetric Pumps

- The choice of the “Volumetric” family name was made to be “parallel” between pumps and compressors
- Volumetric Pumps have been divided into three “nodes” Reciprocating Pumps, Rotary Pumps and Others (mainly represented by Vacuum Pumps)
- Reciprocating pumps are delivered by both large conglomerates that make also centrifugal pumps and some very focused players
- High pressure metering pumps are used in process applications where the liquids to be metered might be corrosive, toxic or flammable and temperatures extremely high
- The most relevant standards for Oil&Gas have been differentiated in the categorization, which are API 674 for Piston Pumps, API 675 for Diaphragm and Plunger and API 676 for Screw Types
- Under Screw Pumps, Progressive Cavity is a neutral name to define a set of pumps that are sometimes called Mono Screw, Single Screw, Eccentric Screw, etc.

- Among Vacuum Pumps a relevant distinction is that among wet and dry pumps:
  - A wet pump uses low vapor pressure oil in the pumping mechanism (for example oil is used to lubricate and seal the sliding joints between vanes and casing in a vane pump)
  - A dry pump on the contrary have no gas sealing fluid (but some may have lubricated gears/bearings)

### Other Types of Pumps

- Other types of pumps are particular pumps usually linked to a very specific application (e.g. Liquid Expanders for cryogenic applications)

### Parts and Spare Parts

- Parts and spare parts for new pumps 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

### Pumps Seals

- Mechanical Seals are a component of pumps (machine elements made to seal the passage point of the rotating shaft), with a very specific market dynamic dominated by four large players, (John Crane, Eagle Burgmann, Flowserve and AES) which make up the large majority of this market. Of the four largest players, three are focused on seals
- The purchase decision of the seal is oftentimes linked to the pump (may be seen as a “package”)
- While the large players can deliver most seals categories, a many of the smaller players focus on one or two categories