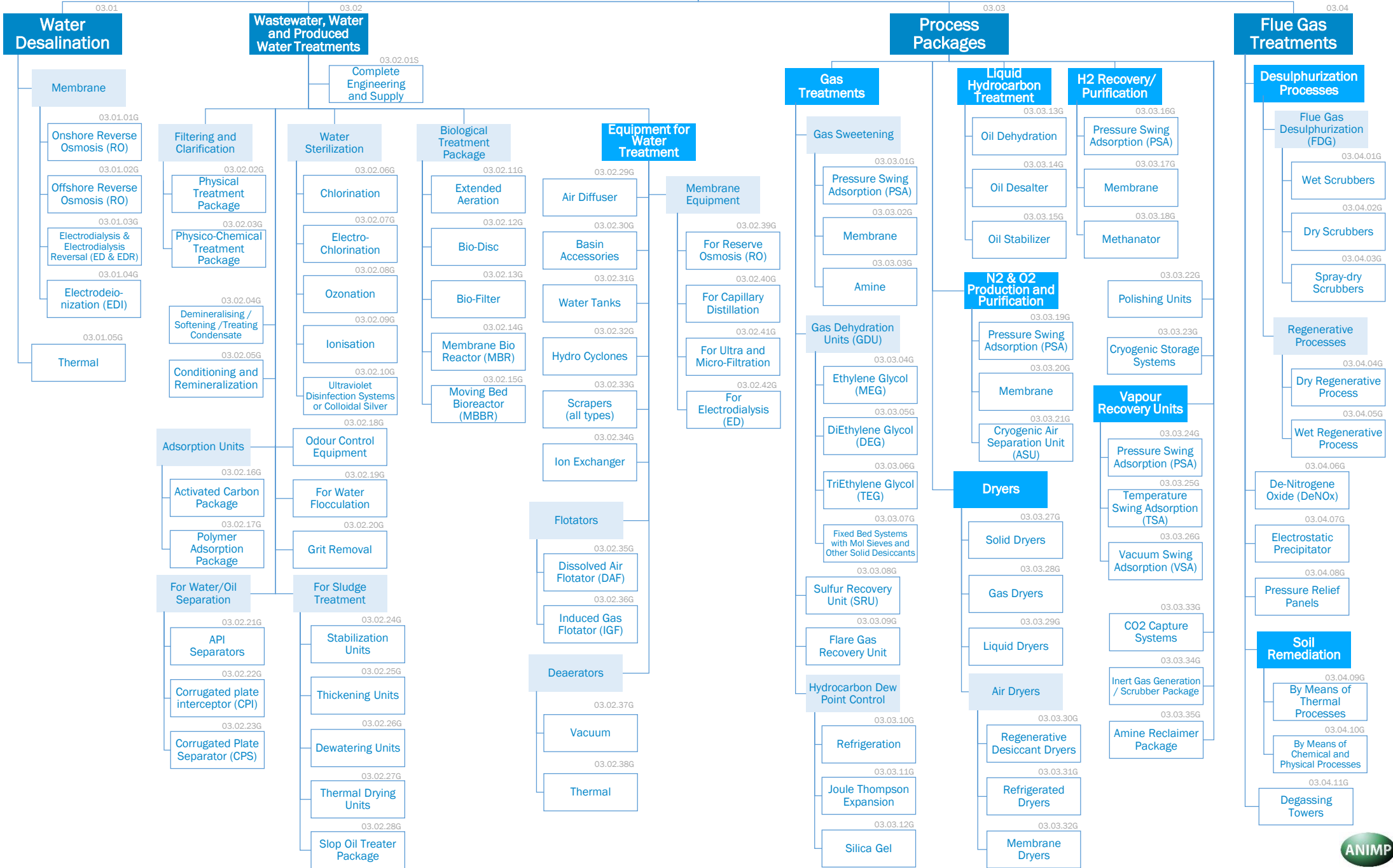
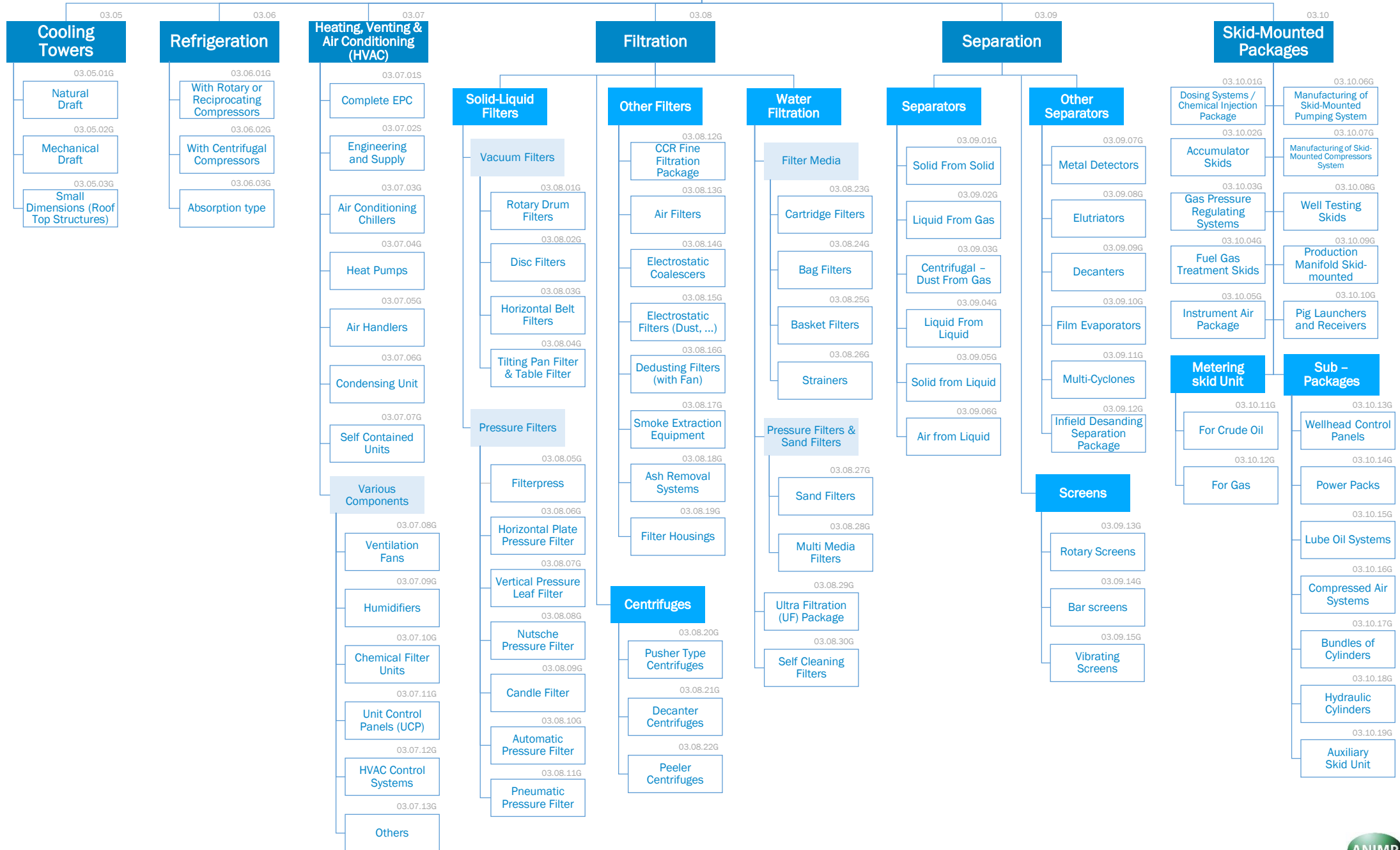


# 03 Packages (1/2)



# Packages (2/2)



# Packages

Packages are multidisciplinary and process-oriented items that are defined by their functionality. Packages have critical interfaces with the rest of the plant, thus are often highly co-engineered along the value chain and may have long lead times.

What really defines a Package is its composition. No single component - pump, compressor, valve or anything else - prevails over the others, they are all equally important for the functioning of the Package as a whole.

## MAIN RATIONALES BEHIND THE STANDARD CATEGORIZATION

On a family level the priority has been given to the different fields of application of each system, whilst on a category level to the characteristics of the single systems (type of treatment, process, type of filtration, ...).

### Water Treatment

- In this family four main sub-families were identified: desalination, water and wastewater treatment, water filtration and equipment.
- This split exist due to the different market competition across them.

Notes:

- Water filtration is this family rather than in Filtration & Separation as priority was given to the scope of filtration in this case.
- Thermal Desalination includes Multi-Stage Flash Distillation (MSF), Multiple-Effect Distillation (MED) and Vapour Compression Desalination (VC).
- Advanced wastewater treatment technologies to purify and recycle virtually all of the wastewater produced, with no discharge of any kind of pollutants into the environment (Zero Discharge regulation).
- 03.02.32G Scrapers (All types) also includes Flight scrapers and Chain scrapers.

### Process Packages

- The two layer division of direct and indirect fired and then by medium heated is made to give more depth to the categorization.
- The division by fluid or gas heated is based on the fact that they require very different temperatures and pressures and thus different construction competences.

Notes:

- 03.03.22G Polishing Units includes Adsorbent and Catalyst polishing units.

### Flue Gas Treatments

- Waste incineration and many other industrial processes generate flue gases. These often contain pollutants such as sulfur oxides (SO<sub>2</sub> + SO<sub>3</sub>), hydrochloric acid (HCl), hydrofluoric acid (HF) as well as heavy metals and dioxins. These flue gases need to be treated as they are highly damaging for the environment.
- The most common way of removing pollutants is by using Scrubbers, DeNO<sub>x</sub> systems and Electrostatic Precipitators, hence the ordering of the categories.

### Cooling Towers

- There are many ways to classify cooling towers, the most common is based on the type of air induction into the tower: natural draft (normal or fan assisted) and mechanical (induced or forced) draft cooling towers.
- Other types of existing classification are: by use (HVAC vs industrial), by build (Package type vs Field erected type), by heat transfer method (Wet vs Dry) and by air-to-water flow (Counterflow vs Crossflow).
- One of the reasons for so many differentiating factors is that Cooling towers vary in size, ranging from small roof-top units to very large hyperboloid structures that can reach heights of over 100m.

Notes:

- The choice to differentiate Natural vs Mechanical draft was made according to market competition.
- Small Dimensions cooling towers were included in this family rather than HVAC as priority to the Cooling Tower grouping was given.
- Wood, FRP and Concrete structure Cooling Towers can be classified as mechanical induced draft and are therefore included in 03.05.02G.

### Refrigeration

- These were included due to their use in gas turbines, a major piece of equipment in the Oil&Gas and power generation industries. It is common for them to need replacement, but they are more complex than a simple spare part, therefore they have their own category.
- The division is based on the three most common types of chamber.

### Heating, Venting & Air Conditioning (HVAC)

- HVAC is an important part of residential structures, small as well as large industrial and office buildings, onboard vessels, and in marine environments, where safe and healthy building conditions are regulated with respect to temperature and humidity, using fresh air from outdoors.

Notes:

- Other Various Components refers to any component of an HVAC system that hasn't been listed in the above categories. This category exists because there are multiple components in HVAC systems, but including every single one would unnecessarily expand the categorization. Therefore we have only included the main ones and added this category to guarantee that none are left out.

### Filtration

- Pressure Filters, with the exception of the Rotary Drum Pressure Filter, are semi-continuous type machines that enter a wash and cake discharge mode at the end of the filtration cycle.
- Vacuum filters are more commonly used in the chemical, food and pharma industries, but also find wide application in the energy one.

Notes:

- 03.08.12G is mostly used for diesel fuel exhausts. Particulate filter (DPF) technology with the use of fuel additives as regeneration aids is a relatively new technology for low-emissions diesel engines.

### Separation

- Since the separation techniques are very diverse several sub-families have been highlighted.

Notes:

- Decanter Centrifuges include horizontal and vertical types.
- 03.09.12G also includes Inlet Sand Catcher Packages, they have been grouped together due to their similar function and similar market competition.

### Skid-Mounted Packages

- Packages can be permanently mounted in a frame or on a pallet/rails in order to be easily and securely transported and used as a unit. In some cases such units (e.g. fire-fighting Skid units) may also be temporarily placed onto a vehicle to equip it for a specific task.

Notes:

- Sub-Packages are included in this family as the suppliers of small packages (with specific functionalities) and that are part of larger packages.

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