The two major categories of chemical cleaning are pre-operational chemical cleaning—part of pre-commissioning or commissioning activities—and post-operational or maintenance chemical cleaning, which is part of regular shut down work.

Pre-operational
Pre-operational chemical cleaning is performed to remove any foreign material remaining from construction activities during either the pipe or system fabrication. Major considerations in the pre-operational phase include mill scale, corrosion products, weld scale, oil, grease, sand, dirt, temporary protective coatings, and other construction debris.

Post-operational
Post-operational cleaning is performed for a number of reasons, including reduced heat transfer, reduced flow, safety (e.g., H₂S, pyrophoric iron, LELs, ammonia, etc.), reduced surface area (e.g., catalyst), access to full inspection, and more.

Hydratight offers numerous methods to chemically clean your system:

Fill and Soak Method
This method is used when circulation is not feasible, e.g., heat exchangers, vessels, boilers, etc. The system is filled with a chemical cleaning solution and drained after a predetermined period of time.

Fill and Circulate Method
This method is often used for internal surface cleaning of large volume vessels and pipes. The system is filled with a chemical cleaning solution, which is then circulated by a pump. This is the most common chemical cleaning method in the industry.

Cascading Cleaning Method
When large volume vessels are not designed to sustain full liquid levels, the cascading method is the best cleaning option. Adding chemicals at the top of the vessel and maintaining a liquid level at the bottom is commonly used in tower cleaning.
Further details can be obtained from your local Hydratight representative or via the website hydratight.com.

### Two-Phase Flow Cleaning Method
Two-phase flow cleaning can be applied to reduce the cost and amount of waste generated. Several different patterns can be used in two-phase flow.

### Slug Flow Cleaning Method
This method is specially designed for pipeline cleaning. The method involves a slug of liquid chemicals sent between two separator pigs.

### Boiler Boil Outs
For a safe and efficient start up of steam generating equipment, it is recommended to remove any organic matter from the internal surfaces by performing a caustic boil out.

### Foam Cleaning Method
Instead of using a large volume of chemical solution, this method uses a gas mixed with undiluted chemicals and a foaming agent. It is applicable for systems that are characterised by a large volume to surface area ratio. Foam cleaning offers the same or very similar results while significantly reducing the amount of chemicals used and waste generated.

### Nozzle Cleaning Method
Nozzle cleaning is another method used with large volume to surface area ratios. Instead of filling the entire system with costly chemicals, one or more 360° rotating head nozzles may be used to spray the walls of the vessel, keeping the volume of chemicals used relatively low.

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Two-Phase Flow Diagram