

MSF PLANT LAYOUT

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Summary

MSF plants can be built in a number of configurations. The process can be of the brine recirculation or of the seawater once-through type. The once-through type leads to a number of advantages. The design of an MSF plant can also vary considerably. More and more, the single-tier evaporator arrangement is being used, simplifying operation and maintenance. The cross-tube installation of the condensers is also widely applied, but the long-tube version is built in exceptional cases only. Floating desalination plants are used in cases of emergency.

1. General Conditions for the Site Layout

The timely completion of a number of engineering tasks is a decisive factor for the success, in terms of time and costs, of the entire planning implementation and execution of a seawater desalination plant:

- Detailed time schedules with all activities concerning the planning, purchasing and installation;
- Binding agreements on the basic design documentation with final flow charts and design rules for the equipment;
- Piping specification, and piping and instrumentation diagrams;
- Explanatory documents on the application for approval according to the relevant local statutes;
- Safety analyses;
- Layout plans.

Layout plans can include the site layout as well as the plant layout. The site layout

determines the arrangement of the individual systems within the plant site (for this, flow charts of the fluids and main equipment drawings are needed), whereas the integration of the sub-components listed in piping and instrumentation diagrams, such as apparatuses, pumps, valves and instruments, belong to the plant layout.

For larger plants it was former practice to produce a layout model before drawing up a site layout (also known as general arrangement plan or site plan), but in recent years it has become usual to generate 3D views of all details of the arrangement with the aid of CAD systems. These views can be explored dynamically, and give the observer an extremely realistic impression of the future structure (see Figure 1).

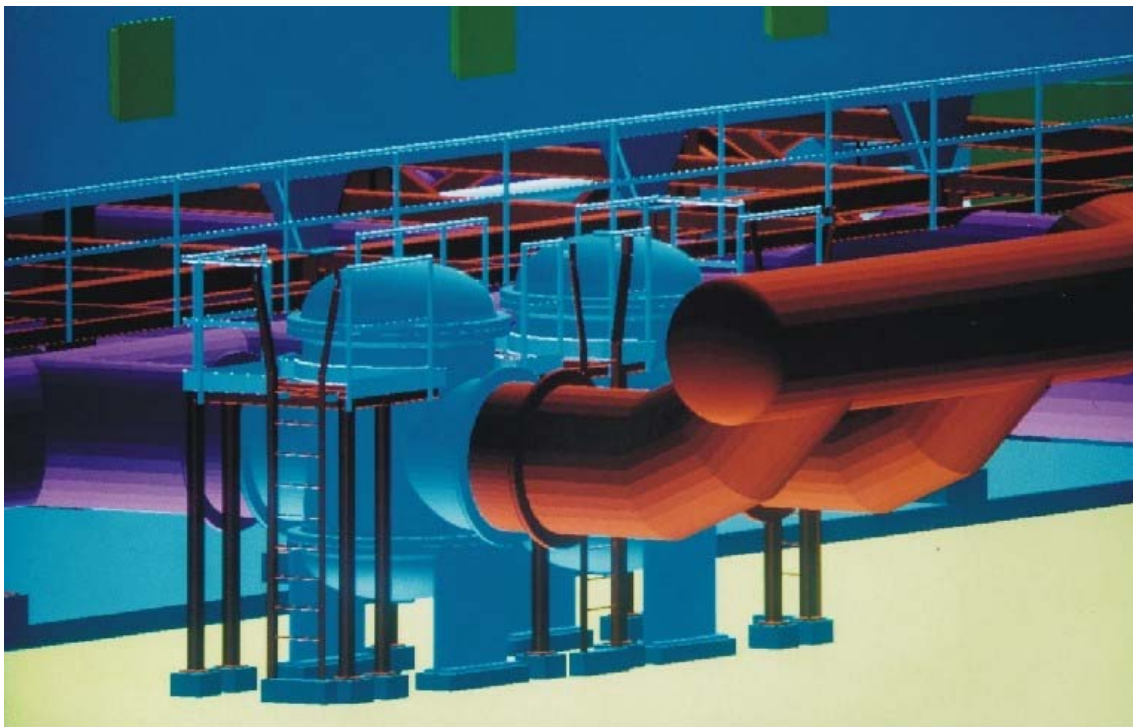


Figure 1. 3D planning view of the make-up water filters of an MSF seawater desalination plant. (Photo courtesy of Fisia)

In site layout drawings (plot plans) the outlines of the equipment, building, apparatus racks and pipe bridges, and their distances apart, are dimensioned by the distances between their centerlines. The distances are selected so that sufficient space remains between the individual pieces of equipment, and also between them and the corresponding racks and building limits, for

- The piping and valve installation to be executed at a later stage;
- The girders and supports of steel and concrete structures as well as building platforms which still have to be dimensioned, as the static calculation will not have been performed at this stage;
- The location of ancillary equipment;
- Installation, operation, maintenance and repair, including access with the relevant heavy machinery.

The layout should not be made too generous, however, since the investment costs would then become too high. In order to satisfy these requirements it is generally also necessary to produce various details and pipeline studies at the same time.

Plot plans are often drawn up in the scale of 1:50. Where there are several platforms or building levels, plan views are needed for the additional height sections. For larger desalination plants, several sheets are needed to depict the entire plant site. The site is subdivided by a three-dimensional coordinate system using x and y on the plant's site level in the plan view, together with z as the height coordinate. In this manner, each point of the plant can be accurately described and identified by specifying its coordinates.

Common plot plans and plant layout drawings are usually only used for important parts of the installation. These plans must be drawn in the scale of 1:25 to take account of the necessary structural details. Smaller pipes, such as vent and drainage lines, are not shown here for reasons of clarity.

The detailed piping diagram is chosen for small plants as well as the largest of plants, in the form of isometric views (isometric drawings).

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