

ELECTRODIALYSIS PLANT LAYOUT

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Keywords : brine disposal, direct current, Feed water, Pretreatment, Stack

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Summary

There are a number of criteria and constraints which affect the selection of an Electrodialysis (ED) plant site, e.g. land availability, proximity to feed water source, electricity source, ecological-environmental conditions and adequate brine disposal site. (In certain cases the cost of brine disposal might become a significant factor in desalted water cost). In contrast to desalination plants, ED plants, as well as other membrane plants, do not require heavy steel constructions or heavy concrete foundations.

1. Introduction

The appropriate selection of the site for the ED plant as well as a proper design of the layout is essential to achieve reliability, good performance and low cost of the product water from the plant. This chapter describes practical topics that should be considered in the design and erection of the plant.

2. Criteria for Selection of ED Plant Site

Various criteria exist for selection of locations for Electrodialysis (ED) plants, these being at times mutually complementary and at times conflicting. The priority of certain criteria for a given site should always be determined in relation to other criteria for that particular site.

Criteria for the selection of ED plant locations are described below, a number of them being relevant for other desalination processes as well.

2.1. Proximity to Feed Water Source

Construction of an ED plant in close proximity to the source of feed water – borehole, river, sea, seashore, etc.

2.2. Proximity to Electricity Source

Location of the ED plant near power lines having the required capacity for the given process. Where the ED plant is constructed at a distance from the source of electricity there will be a need for additional investments in the plant.

2.3. Proximity to Water Consumption Centers

Location of the ED plant near water consumption centers will ensure proper water supply, with no dependence on distant water sources. This will also ensure that operators run the plant in the most efficient manner.

2.4. Proximity to Main Water Supply Transmission Lines

Location of the ED plant near main local, regional or national transmission lines will save investments in long desalinated water pipelines and will facilitate integration of the desalination plant with the regional water supply system.

2.5. Proximity to Brine Disposal Site

The problem of brine disposal can be a serious one from the ecological-environmental point of view, and solving the problem can be costly. If it is possible to construct the ED plant near the sea or a lake, or near a suitable area for evaporation or other disposal treatment, investments can be saved and a reliable solution found to the problem.

2.6. Proximity to Regional Operation Center

Location of the plant near an existing or planned operation center can provide improved operating services to a number of facilities, including units other than desalination plants. The common services might include manpower, spare parts, chemicals and control centers. Since the operating costs can be divided among a number of plants, the costs borne by the desalination plant will be proportionately lower than for an independent plant.

2.7. Land Availability

Constraints exist in many areas regarding availability of land for construction of ED plants. In built-up areas having a high population density, the cost of land is high, increasing the investment and the cost of desalinated water. National and regional plans should include allocation of suitable areas for erection of desalination plants.

2.8. Ecological-Environmental Constraints

As is the case with any desalination plants, environmental constraints, resulting from storage of chemicals, noise, and odors, need to be factored in while selecting locations for ED plants.

3. Equipment Installed at ED Plant Sites

Equipment installed at ED plant sites includes:

- ED stacks;
- Pretreatment systems, including chemical storage facilities;
- Pipeline connection to feed water source or borehole on the site premises;
- Piping for brine disposal;
- Electricity system for supply from main power grid;
- Power supply system in the plant – starter boards, control boards;
- Post-treatment, pH correction and decarbonation systems;
- Piping for desalinated water supply to consumers;
- Raw water and product water storage facilities.

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