# TRANSPORT

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## ANALYSIS OF CHARACTERISTICS AND OPERATIONAL FEATURES OF ALFA-LAVAL FRESH WATER GENERATORS

## АНАЛІЗ ХАРАКТЕРИСТИК ТА ОСОБЛИВОСТЕЙ ЕКСПЛУАТАЦІЇ ОПРІСНЮВАЛЬНИХ УСТАНОВОК ALFA-LAVAL

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In recent years, the expediency of obtaining fresh water directly on the vessel due to desalination of sea water is not in doubt. Fresh water generators are installed on all types of vessels. However, desalination plants are not always selected in the best way. They are either not economical enough, and at the same time, the low-potential heat source is not fully used on the ship, or, on the contrary, are unnecessarily complicated for the sake of a small saving in fuel consumption. This is mainly explained by the lack of information on the economics of desalination in different operating conditions of the vessel and the lack of a single methodology for determining economics.

The economics of desalination deserve detailed consideration. In accordance with this, the method of determining the optimal economic indicators of desalination plants is considered below.

Alfa-Laval Corporation is one of the world's leading manufacturers of marine desalination plants of various types, capacities and purposes. Consider the nomenclature of desalination plants offered in the catalogs of this manufacturer [1].

AQUA Blue is a single-stage desalination plant of the evaporation-vacuum type. The optimized design minimizes the number of pipelines and allows the installation of smaller seawater pumps, which reduces energy consumption. AQUA Blue uses vacuum distillation to transform seawater into high-quality fresh water for domestic and technological processes. By ensuring a constant supply of desalinated water and quality control, it eliminates the need for bunker water. AQUA Blue is designed for unattended operation and fully automatic control. It is suitable for installation on ships and drilling rigs, as well as in remote coastal locations.

The AQUA Blue series covers the capacity range from 10 to 60 m3/day, depending on the temperature of the coolant and the temperature of the cooling water. The AQUA Blue desalination unit is suitable for any temperature of water from the engine cooling jacket from 55 to 95 °C with a cooling water temperature from -2 to 36 °C.

The Alfa Laval JWP-C Series desalination plant is designed to convert seawater into fresh water by vacuum distillation for shipboard domestic users. It is installed on ships and drilling rigs. The desalination plant is designed for automatic operation with continuous control of the quality of fresh water. Advantages include high quality fresh water and low dissolved solids (salinity). Fresh water from the plant can be used directly to feed steam boilers. A long service life is ensured by corrosion-resistant materials (for example, titanium plates of heat exchangers)

The analysis of the selected types of desalination plants showed that with small initial costs, all desalination plants have a high profitability – at the level of 100-250% (fig.1), while for other types of equipment implemented for the purpose of fuel saving, ranges of 20-30% are typical [2, p. 298].

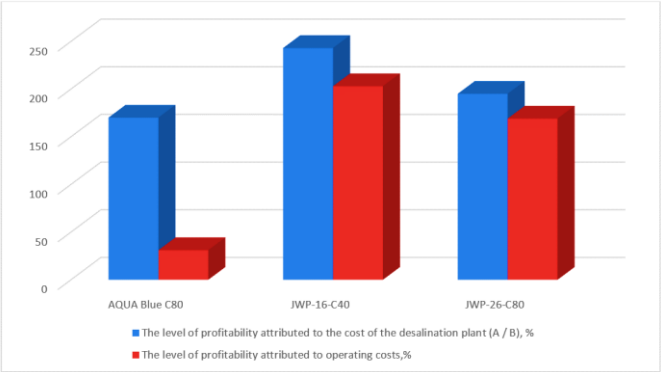


**Fig. 1. The level of profitability**

It can be seen that when using the most modern AQUA Blue C80 desalination plant, the initial capital investment is higher, and the level of profitability due to higher depreciation and repair costs is lower – however, these parameters do not take into account the convenience of operation, which is associated with the complete automation of the desalination process, compared to other, more old types of installations. The question of finding a compromise and the optimal choice between operating costs and initial capital investments is a very broad issue that has many nuances related to the types of vessels and types of power plants used. For the considered type of equipment that plays a ship-supporting role, it is optimal to take this ratio as the same as that adopted for the power plant as a whole.

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