

COMPARATIVE CHARACTERISTICS OF NUCLEAR POWER PLANT STEAM GENERATORS OF DIFFERENT TYPES AND DESIGNS

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Reliability, technogenic safety, energy efficiency, and energy and resource conservation are the main strategic components of modern nuclear energy.

System analysis of technological processes, designs, and technical characteristics of modern and prospective steam generators of nuclear power plants of various types is one of the components aimed at ensuring high requirements for the functional characteristics of power units nuclear .

Currently, both horizontal and vertical single-shell steam generator designs are successfully used in modern nuclear power plants with water coolant in various countries.

For nuclear power plants with pressurized water reactors (PWR), this can be achieved by using powerful vertical steam generators, which, compared to horizontal steam generators, allow for a more rational arrangement of equipment of the first circuit in the reactor compartment of the nuclear. The main disadvantages of powerful vertical single-shell steam generators are the complexity of the design, large masses, and large overall dimensions.

These disadvantages are largely eliminated in direct-flow vertical steam generators with water coolant in heat exchange tubes. Transition to a direct-flow scheme and the consequent abandonment of separation devices significantly simplifies the design of these vertical steam generators, improves their mass and dimensional characteristics, and facilitates transportation.

Thus, in terms of all the main characteristics, vertical steam generators with water coolant in the inter-tube space are significantly inferior to vertical direct-flow steam generators with water coolant in the tubes, and therefore, they are not very promising for nuclear power plant units with high unit capacity.

References:

1. O. Yefimov, M. Pylypenko, T. Potanina, et al. Materials and decision support systems in the nuclear power industry. / O. Yefimov, M. Pylypenko, T. Potanina, V. Kavertsev, T. Yesypenko, T. Harkusha, T. Berkutova. / Riga, Latvia, European Union: – LAMBERT Academic Publishing – 2020. – 135 p.
2. Issues for Nuclear Power Plants Steam Generators / Lucia Bonavigo and Mario DeSalve // Steam Generator Systems: Operational Reliability and Efficiency. – London: – IntechOpen – 2011. – P. 326-392.
3. Riznic J. Steam Generators for Nuclear Power Plants / Jovica Riznic. // – Boston, Great Britain: – Woodhead Publishing – 2017. – 670 p.
4. Assessment and Management of Ageing of Major Nuclear Power Plant Components Important to Safety: Steam Generators / M. Brezina, A. Drexler, L. Hongyun and others. / International Atomic Energy Agency. – Vienna: – Vienna International Centre – 2011. – 273 p.