# CLASSIFICATION OF NUCLEAR REACTORS

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Depending on the characteristic features, nuclear reactors are classified by purpose, neutron energy spectrum, moderator type, coolant and design.

1. By purpose, reactors are divided into power, research, transport, industrial and multi-purpose. In addition to the specified division, in some special literature there is also a division by narrow purpose, for example, ship, experimental, military, space, etc. The requirements for power reactors are determined primarily by the efficiency of the thermodynamic cycle, in connection with which it is desirable to increase the parameters of this cycle.

2. By the energy spectrum of neutrons, which determine the main part of the fission of fuel nuclei, reactors are distinguished on thermal, fast and intermediate neutrons. Thermal neutron reactors are the most widely used power reactors today. They require the lowest specific load of nuclear fuel per one fissile isotope.

3. By type of neutron moderator, thermal neutron reactors are divided into light water, heavy water and graphite. The most compact are reactors with a neutron moderator in the form of ordinary water. When using a neutron moderator in the form of ordinary water, only enriched uranium is needed, because ordinary water not only slows down neutrons well, but also absorbs them.

4. According to the type of coolant and its state of aggregation, reactors are divided into water-cooled, gas-cooled, liquid metal and organic. Due to radiation and thermal instability, organic coolants are used very limitedly. Ordinary water has become the most widespread coolant.

5. According to the structure of the core, reactors are distinguished into heterogeneous and homogeneous. In heterogeneous reactors, nuclear fuel, neutron moderator and coolant are spatially separated. Unlike heterogeneous reactors, homogeneous reactors use a homogeneous mixture of nuclear fuel and moderator in the form of a suspension or liquid solution, which simultaneously plays the role of a coolant. Almost all power reactors operating today are heterogeneous.

6. According to the design, reactors are divided into vessel and channel. In vessel reactors, the coolant pressure is carried by the entire reactor vessel. In channel reactors, contact between the coolant and the neutron moderator is impossible due to their incompatibility.

7. Water-cooled reactors are divided into boiling and pressurized water reactors. This primarily applies to reactors cooled by ordinary water, both vessel and channel. Most vessel reactors are pressurized water reactors, while channel reactors are mostly boiling water reactors.

8. According to the degree of reproduction of new nuclear fuel, reactors are divided into converters, where new nuclear fuel is reproduced in quantities smaller than that burned, and breeders, where new nuclear fuel is reproduced in quantities larger than that burned.