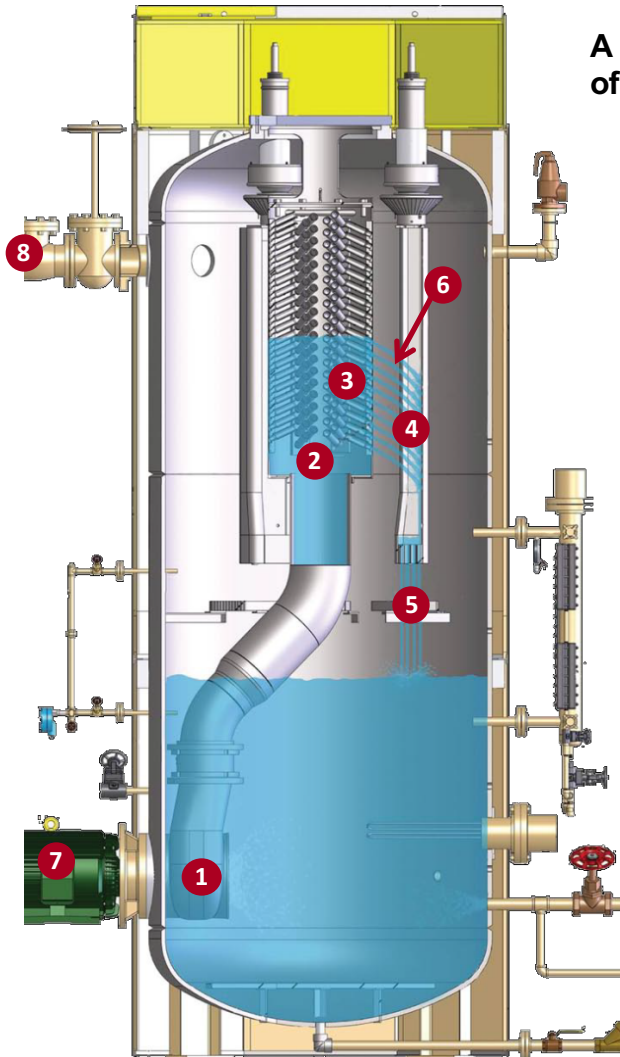


# HVJ Electrode Boiler - Operation



A jet-type electrode boiler utilizes the conductive and resistive properties of water to carry electric current and generate steam:

The boiler circulation pump (1) delivers water to the nozzle header (2) where the water flows through the nozzles (3) to impact the energized electrodes (4) and counter-electrodes (5).

These water streams (6) serve as resistive conductors, allowing electric current to pass from the electrodes to the nozzle header. The electric resistance of the water generates heat directly in the water, vaporizing a portion of the water to generate steam.

The steam output from the boiler is regulated by controlling the flow rate of water through the circulation pump to the nozzle header. A VFD adjusts the speed of the motor (7) that powers the circulation pump, so that a greater or smaller number of nozzles are supplied with water, and thus, a greater or smaller amount of water contacts energized electrodes. The higher the flow rate of water that hits the electrodes, the higher the rate that steam is generated inside the boiler.

The VFD control reacts according to the pressure inside the pressure vessel – modulating the circulation pump speed to maintain the boiler set-point pressure. If the boiler pressure falls below set-point, the VFD speeds up to increase the steam production rate until it reaches the set-point pressure.

A secondary control loop prevents the boiler from drawing more than the desired kilowatts when the steam requirements exceed the kilowatt limiting set-point. A third control loop modulates a control valve (8) to regulate the release of steam from the boiler