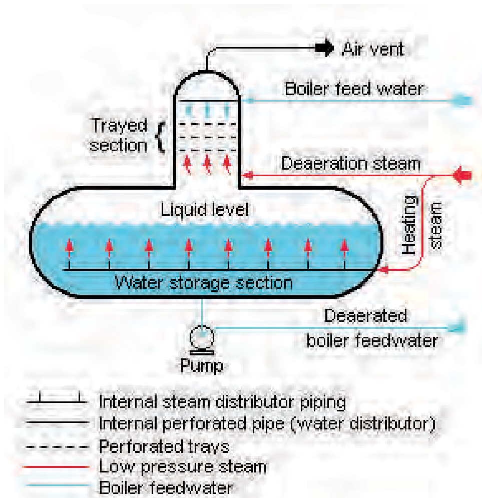
DEAERATOR

In general, a deaerator is a device that is used for the removal of oxygen and other dissolved gases from the feed-water to steam generators. The deaerator is part of the feed-water heating system. It is usually situated between the last low pressure heater and feed-water booster pumps. In particular, dissolved oxygen in the steam generator can cause serious corrosion damage by attaching to the walls of metal piping and other metallic equipment and forming oxides. Furthermore, dissolved carbon dioxide combines with water to form carbonic acid that causes further corrosion.

Scan this code To access the Pakman product selection application and select this product.

Scan this code to receive a 3D product file.

More info about this product.



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In the deaerator, the condensate is heated to saturated conditions usually by the steam extracted from the steam turbine. The extraction steam are mixed in the deaerator by a system of spray nozzles and cascading trays between which the steam percolates. Any dissolved gases in the condensate are released in this process and removed from the deaerator by venting to the atmosphere or to the main condenser. Directly below the deaerator is the feed-water storage tank, in which a large quantity of feed-water is stored at near saturation conditions. In the turbine trip event, this feed-water can be supplied to steam generators to maintain the required water inventory during transient. The deaerator and the storage tank is usually located at a high elevation to ensure an adequate net positive suction head (NPSH) at the inlet to the feedwater pumps. NPSH is used to measure how close a fluid is to saturated conditions. Lowering the pressure at the suction side can induce cavitation. This arrangement minimizes the risk of cavitation in the pump.

PACKMAN DEAERATOR Properties

DEAERATORs are devices that reduce the amount of oxygen in the water for the steam boiler feeder. They are used for pre-heating the water entering the steam boiler.

PACKMAN DEAERATORs have two main components, one is storage tank with a pre-heating input and another is a tower with a lattice tray to accelerate the separation of gases in the inlet water.

The Storage tank specification:

- Reservoir storage tank is horizontal cylindrical.
- The tank heads is designed and manufactured in accordance with the ASME standard.
- Hydrostatic test is performed on the tank up to 6 bar pressure.
- The head type of the reservoir is the Torispherical type.
- The tank has man-hole and hand-hole which is suitable for pressure vessels.

- The tank has a steam inlet for preheating.
- The base of the tank is in the form of a saddle.
- The sheet is made of steel grade SA36.
- The level of the reservoir is controlled by the LI and control lever with magnetic sensors.
- The tank has the nozzles needed to operate the DEAERATOR.
- Welding of the reservoir is carried out with submerged arc welding.
- The tank has suitable hooks for transportation.

The Tower specification

- Towers are designed and built according to ASME SEC. VIII, DIV.1.
- Towers are analyzed for seismic loading based on EARTHQUAKE DESIGN CODE.
- Hydrostatic test is carried out on the tower to 6 bar.
- The pressure design is 3.5 bar and the pressure is 0.5 bar.
- Tower made of stainless steel plate with a grade of 304L.
- The tower has stainless steel lattice trays to remove additional gases.
- The tower should have a separate hook for transportation.

Specifications of the equipments installed on the device and pre-heating line:

- Magnetic level control with four sensors for disconnecting and connecting water and steam inlet solo valves
- Water inlet solo valve-220V
- Steam inlet solo valve-220V
- Water thermometer with a temperature rating of 0-120 ° C
- Water manometer with a diameter of 150mm and a rating of 0-4bar
- Relief valve with 15PSI setting point and 5-35bar working pressure
- Suitable drain valve for the tank
- Steam pressure line for reducing the inlet vapor pressure (including flange needle, filter, and a flanged vapor pressurizer device with a converter, flanges and related fittings)
- Overflow trap for the tipping of the reservoir to the condensate (Overflow Trap)
- Vacuum Breaker
- Completely electrical wired pane

Product Selection

Deaerators are particularly desirable when steam pressures exceed 50 psi. For lower steam pressures, deaerator or a Thermal feed heating assembly may be suitable. Large spread out steam systems with surging returns may require additional storage or a split tank system. High make-up requirements especially dictate the use of a deaerator. Pressurized deaerators must be selected when blend temperatures exceed 180° F.

Horsepower refers to total system boiler capacity served by the deaerator. This capacity determines the size of the heating assembly, the openings, the overflow, the transfer pumps as well as the standard tank. The DEAERATOR capacity is based on the volume of water to be heated, the water temperature rise and the steam pressure available. High temperature returns over 227° do not need to be heated and should be admitted under the water line.

In order to determine the capacity of the deaerator, boiler capacity should be determined. The deaerator is sized for the boiler capacity in pph. The manufacturer designed the DEAERATOR suitable for the boiler capacity. If someone needs to select the deaerator capacity by self, the following formulation could be needed.

Product Capacity Calculation & Selection:

Step 1: Determine Inlet Water Properties

Using the Steam Property Calculator, properties are determined using Inlet Water Pressure and the selected second parameter (Temperature, Specific Enthalpy, Specific Entropy, or Quality):

Step 2: Determine Inlet Steam Properties

Using the Steam Property Calculator, properties are determined using Inlet Steam Pressure and the selected second parameter (Temperature, Specific Enthalpy, Specific Entropy, or Quality):

Step 3: Determine Feed water and Vented Steam Properties

Step 4: Determine Feed water and Vented Mass Flows and Total Outlet Energy Flows

Vented Steam Mass Flow = Vent Rate * Feed water Mass Flow

Total DA Mass Flow = Vented Steam Mass Flow + Feed water Mass Flow

Total Outlet Energy Flow = [Feed water Specific Enthalpy * Feed water Mass Flow] + [Vented Steam Specific Enthalpy * Vented Steam Mass Flow]

Step 5: Determine Inlet Water and Steam Mass Flows

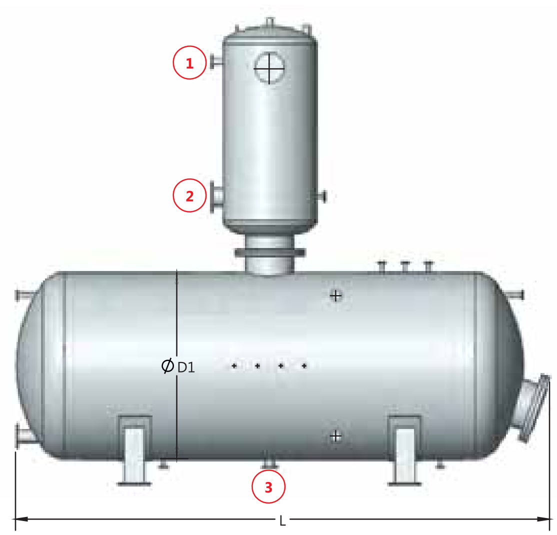
The inlet mass flows are determine based on an energy and mass flow balance:

Minimum Inlet Energy Flow = Inlet Water Specific Enthalpy * Total DA Mass Flow

Additional Energy Flow Needed = Total Outlet Energy Flow - Minimum Inlet Energy Flow

Inlet Steam Mass Flow = Additional Energy Flow Needed / (Inlet Steam Specific Enthalpy - Inlet Water Specific Enthalpy)

Inlet Water Mass Flow = Total DA Mass Flow - Inlet Water Mass Flow



Model	Capacity (grain)	Diameter	Height/Length	Total height	Water inlet	Steam Inlet	Steam Outlet	Type
PDR-10	10000	955	3000	2880	1,1/4"	3"	4"	Tower
PDR-18	18000	1200	2650	3500	1,1/2"	5"	4"	Tower
PDR-30	30000	1200	3300	3820	1,1/2"	5"	5"	Tower
PDR-50	50000	1592	4500	4200	2"	6"	6"	Tower
PDR-75	75000	1592	4830	4400	2"	6"	6"	Tower
PDR-110	110000	1910	5300	5200	3"	8"	6"	Tower
PDR-150	150000	1100	2300	1580	1"	3"	3"	Tower
PDR-5	5000	1200	2350	1700	1,1/4"	4"	4"	Spray Type
PDR-10	10000	1200	3300	1700	1,1/2"	6"	4"	Spray Type
PDR-18	18000	1200	4200	1700	1,1/2"	6"	5"	Spray Type
PDR-25	25000	1592	4200	2100	1,1/2	6"	5"	Spray Type
PDR-30	30000	1750	4600	2300	2"	10"	6"	Spray Type
PDR-50	50000	955	3000	2880	1,1/4"	3"	4"	Spray Type
PDR-70	70000	1200	2650	3500	1,1/2"	5"	4"	Spray Type

- The measures and weights might be different from final product by less than 10%