



Feedwater Deaerating Plant

Deaerating Dome NDR

Feedwater Tank SW

Description

The feedwater deaerating plant, consisting of the feedwater tank SW and the deaerator dome NDR, removes dissolved gases such as oxygen, carbon dioxide and other non-condensable gases from boiler feedwater and make-up water.

For the operation of steam boilers with high thermal load on the heating surfaces boiler feedwater that is treated and conditioned according to TRD 611, EN 12952 part 12 or EN 12953 part 10 must be used.

The boiler feedwater must be free of hardening constituents in order to prevent the formation of scale on the boiler heating surfaces. The presence of dissolved oxygen and carbon dioxide causes severe corrosion of metal boiler parts. The feedwater deaerating plant is custom designed for each application and meets essential thermodynamic requirements to achieve optimal performance.

Function

The make-up water and return condensate enters the tray-type deaerator dome NDR that is fitted with a series of tray compartments to provide maximum spilling. Heating steam is fed into the deaerator dome from below. The make-up water and return condensate are deaerated and flow directly into the feedwater tank, which is flanged to the deaerator dome. The feedwater tank, which is heated by means of a steam injector, heats up the feedwater to 107 °C.

The solubility of gases in water can be described by Henry's and Dalton's law of absorption which states that gas solubility in a solution decreases as the gas partial pressure above the solution decreases. This means that the gas solubility in a solution decreases as the temperature of the solution rises and approaches saturation temperature. The make-up water and return condensate is distributed over the series of trays and comes in direct contact with the heating steam. This process reduces the solubility of oxygen and carbon dioxide and removes these gases from the feedwater. The released gases work their way to the top of the vessel where they are vented from the deaerator dome via the vent line.

We recommend a temperature-controlled heating system for warming up a cold feedwater tank. From 70 °C feedwater temperature a pressure-controlled heating steam supply must be used. Due to the fact that the feedwater temperature is above 100 °C enough net positive suction head (NPSH) is required to ensure that the weight of the column of water in the line exerts enough pressure at the pump suction to prevent the formation of steam bubbles and therefore the water from cavitating.

The installation reduces the oxygen content down to 0.02 mg/l.

Design

Deaerator dome NDR:

Made from stainless steel grade 1.4571, permanently mounted trickling trays, welding seams pickled and passivated, connecting flange for feedwater tank made from S234JRG2 (St37-2), without accessories.

Feedwater tank SW, version A:

Made from S235JRG2 (St37-2), manhole DN 500, PN 6, steam injector made from stainless steel grade 1.4571, removable steam injector available at extra cost, connecting flange for deaerator dome made from S235JRG2 (St37-2), without accessories, plastic lining available at extra cost.

Feedwater tank SW, version B:

Made from stainless steel grade 1.4571, manhole DN 500, PN 6, stainless steel plated cover, steam injector made from stainless steel grade 1.4571, removable steam injector available at extra cost, connecting flange for deaerator dome made from S235JRG2 (St37-2), stainless steel grade 1.4571 at extra cost, without accessories.

Accessories (valves, sensors) available at extra cost.

Other designs and special versions available upon request.

Technical Data

Service pressure

0.5 barg

Service temperature

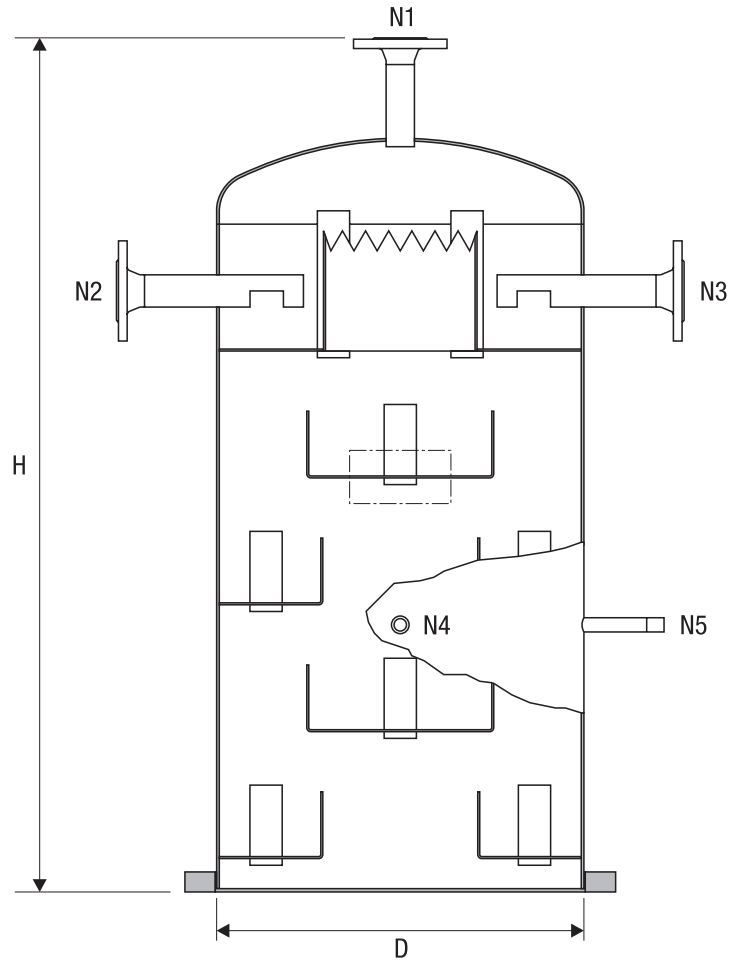
111 °C

Capacity

0.5 m³/h up to 70 m³/h
> 70 m³/h on request

Technical Data

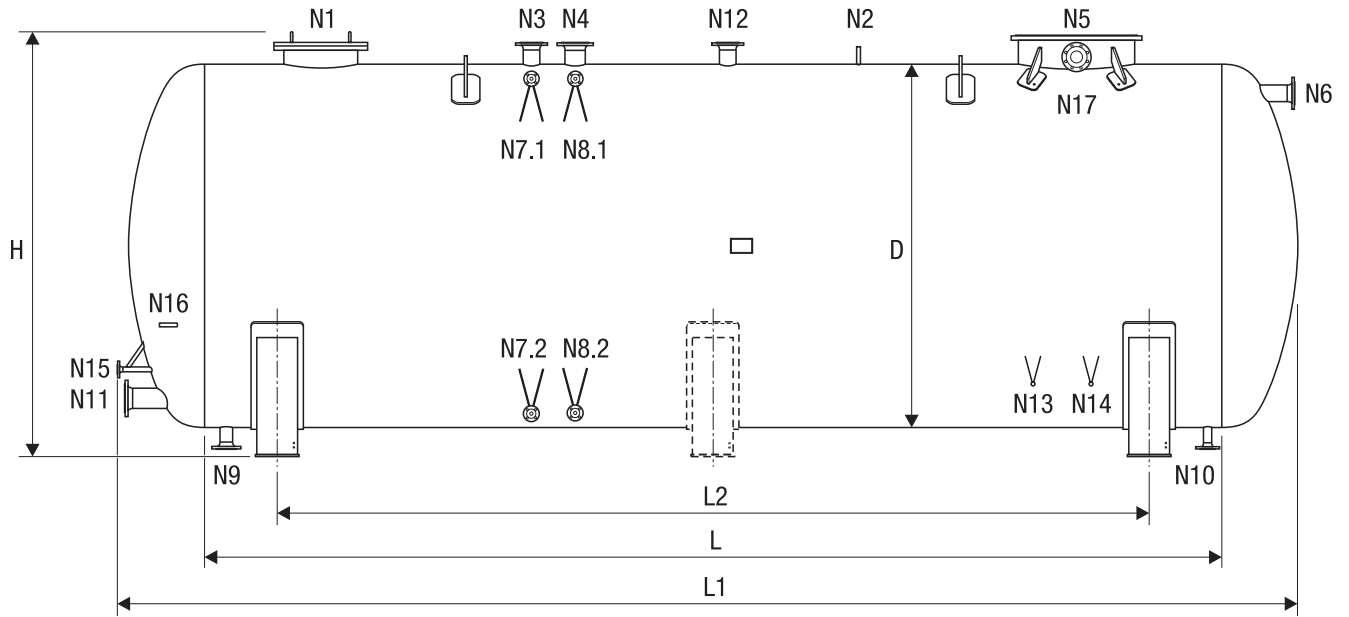
Deaerator Dome NDR



| Type NDR | | 250 | 350 | 450 | 550 | 650 | 800 |
|------------------------------|---------------------|---------|---------|---------|---------|----------|-----------|
| Capacity | [m ³ /h] | 0.5-1.6 | 1.7-3.0 | 3.1-5.0 | 5.1-8.0 | 8.1-11.0 | 11.1-15.0 |
| D | [mm] | 250 | 350 | 450 | 550 | 650 | 800 |
| H | [mm] | 1129 | 1243 | 1263 | 1283 | 1802 | 1831 |
| Neck standpipe | [mm] | | | | | | |
| Gas vent N1 | DN | 15 | 20 | 25 | 32 | 32 | 40 |
| Condensate inlet N2 | DN | 25 | 40 | 40 | 65 | 80 | 100 |
| Make-up water inlet N3 | DN | 15 | 20 | 25 | 32 | 40 | 40 |
| Pressure gauge connection N4 | G | ½ | | | | | |
| Sensing line N5 | G | ½ | | | | | |
| Weight | [kg] | 50 | 70 | 115 | 130 | 215 | 360 |

| Type NDR | | 900 | 1000 | 1200 | 1400 | 1600 | 1800 |
|------------------------------|---------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Capacity | [m ³ /h] | 15.1-19.0 | 19.1-24.0 | 24.1-33.0 | 33.1-40.0 | 40.1-50.0 | 50.1-80.0 |
| D | [mm] | 900 | 1000 | 1200 | 1400 | 1600 | 1800 |
| H | [mm] | 1850 | 1870 | 2323 | 2473 | 2979 | 3124 |
| Neck standpipe | [mm] | | | 800 | 800 | 800 | 1000 |
| Gas vent N1 | DN | 50 | 50 | 65 | 65 | 80 | 80 |
| Condensate inlet N2 | DN | 100 | 100 | 150 | 150 | 200 | 200 |
| Make-up water inlet N3 | DN | 40 | 40 | 50 | 50 | 50 | 50 |
| Pressure gauge connection N4 | G | ½ | | | | | |
| Sensing line N5 | G | ½ | | | | | |
| Weight | [kg] | 440 | 480 | 670 | 1400 | 1700 | 2200 |

Technical Data
Feedwater Tank SW



| Type SW | | 1 | 2 | 3 | 4 | 6 | 8 | 10 | 16 | 22 | 30 | 40 | 50 | 70 |
|-------------------------|-------------------|---|-----------|------|------|------|------|------|------|------|------|------|------|-------|
| Volume | [m ³] | 1 | 2 | 3 | 4 | 6 | 8 | 10 | 16 | 22 | 30 | 40 | 50 | 70 |
| D | [mm] | 800 | 1000 | 1200 | 1200 | 1600 | 1600 | 1600 | 2000 | 2000 | 2500 | 2500 | 2500 | 2900 |
| L | [mm] | 2000 | 2500 | 2500 | 3000 | 3000 | 4000 | 5000 | 5000 | 7000 | 6000 | 8000 | 8000 | 10000 |
| L1 | [mm] | 2700 | 3140 | 3200 | 3704 | 3750 | 4900 | 5850 | 6000 | 8050 | 7050 | 9400 | 9350 | 11502 |
| L2 | [mm] | 1500 | 1900 | 1900 | 2200 | 2000 | 2620 | 3200 | 4000 | 5000 | 5000 | 3000 | 3500 | 4500 |
| H | [mm] | 1150 | 1350 | 1600 | 2000 | 1600 | 1950 | 1950 | 2350 | 2350 | 2850 | 2850 | 3250 | 3250 |
| Manhole N1 | DN | 400, PN 6 | 500, PN 6 | | | | | | | | | | | |
| Pressure sensor N2 | G | if required ½ | | | | | | | | | | | | |
| Safety valve N3 | DN | sizing in accordance with required heating capacity | | | | | | | | | | | | |
| Vacuum breaker N4 | DN | sizing in accordance with required heating capacity | | | | | | | | | | | | |
| Deaerator dome N5 | DN | 250 | 350 | 350 | 450 | 550 | 550 | 650 | 800 | 1000 | 800 | 800 | 800 | 1000 |
| Overflow N6 | DN | sizing in accordance with flowrate | | | | | | | | | | | | |
| Water level N7 | DN | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| Measuring pot N8 | DN | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| Feedwater N9 | DN | 25 | 32 | 40 | 50 | 65 | 80 | 80 | 100 | 125 | 125 | 150 | 200 | 250 |
| Drain N10 | DN | 25 | 25 | 32 | 32 | 32 | 40 | 40 | 40 | 40 | 50 | 50 | 50 | 80 |
| Heating steam inlet N11 | DN | sizing in accordance with required heating capacity | | | | | | | | | | | | |
| Stand-by N12 | DN | 40 | 40 | 50 | 50 | 50 | 80 | 8 | 80 | 80 | 100 | 100 | 100 | 150 |
| Thermometer N13 | G | ½ | | | | | | | | | | | | |
| Injection N14 | G | 3/8 | | | | | | | | | | | | |
| Heating-up N15 | DN | 20 | 20 | 25 | 25 | 25 | 25 | 25 | 25 | 40 | 40 | 40 | 40 | 40 |
| Thermostat N16 | G | sizing in accordance with required mechanical heating-up controller | | | | | | | | | | | | |
| Heating steam inlet N17 | DN | sizing in accordance with required heating capacity | | | | | | | | | | | | |
| Weight | [kg] | 395 | 570 | 780 | 950 | 1280 | 1350 | 1630 | 3300 | 3300 | 3860 | 9400 | 9600 | 10100 |

All connections flanged PN 16 to EN 1092, unless indicated otherwise.

Third support required for tanks from a cylindrical shell length of 5 m.

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Please note:

The chloride content of the make-up water and return condensate must not exceed 50 mg/l (conductivity 250 µS/cm).
The shut-off valve at the vent outlet and the vent line must be made from stainless steel.

When ordering please state:

GESTRA Feedwater Deaerating Plant
Capacity of the boiler plant
Quantity of make-up water
Temperature of make-up water
Quantity of return condensate
Temperature of return condensate
Available steam pressure
Service pressure of deaerating plant
Make-up water control electric / pneumatic
Pressure control mechanical / electric / pneumatic
Feedwater tank made from steel / stainless steel
Complete installation with accessories yes / no
Partial system with accessories yes / no
Partial system
Special design yes / no
Please enter data and cross out portion not applicable.

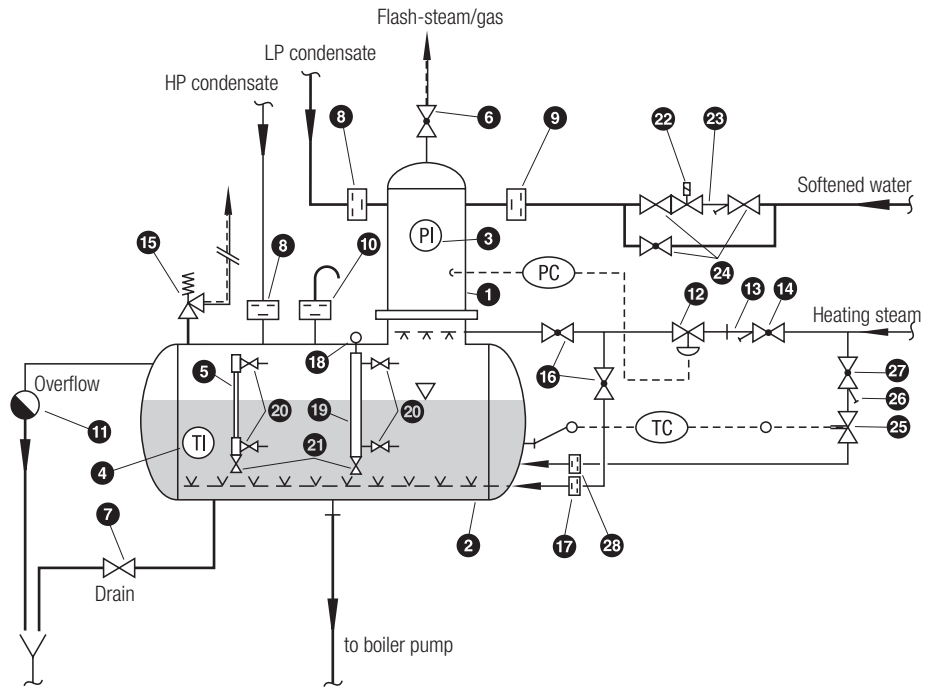
For more information see our folder "GESTRA Specification Texts".

Pressure Equipment Directive (PED)

These products comply with the requirements of the Pressure Equipment Directive PED 97/23/EC and the AD 2000 Bulletin, taking the conformity assessment into account. Applicable with fluids of group 1 and 2. With CE marking, except for equipment according to section 3.3. For more information refer to our PED Declaration of Conformity.

Supply in accordance with our general terms of business.

Schematic layout



Key

- | | |
|---------------------------------|--|
| 1 Deaerator dome NDR | 15 Full-lift spring-loaded safety valve GSV... |
| 2 Feedwater tank SW | 16 Isolating valve GAV... |
| 3 Pressure gauge | 17 Non-return valve RK... |
| 4 Bimetal dial thermometer | 18 Level electrode NRG..., NRG... |
| 5 Water level indicator | 19 Measuring pot |
| 6 Isolating valve GAV... | 20 Isolating valve GAV... |
| 7 Isolating valve GAV... | 21 Drain valve GAV... |
| 8 Non-return valve RK... | 22 Solenoid valve |
| 9 Non-return valve RK... | 23 Strainer GSF... |
| 10 Non-return valve RK... | 24 Isolating valve GAV... |
| 11 Float trap UNA... | 25 Temperature controller |
| 12 Pressure reducing valve 5801 | 26 Strainer GSF... |
| 13 Strainer GSF... | 27 Isolating valve GAV... |
| 14 Isolating valve GAV... | 28 Non-return valve RK... |

GESTRA AG

Münchener Straße 77, 28215 Bremen, Germany
Telefon +49 421 3503-0, Telefax +49 421 3503-393
E-mail info@de.gestra.com, Web www.gestra.de

