

GESTRA Steam Systems

Product Range C

Feedwater Deaerating Plant Deaerating Dome NDR Feedwater Tank SW

**NDR
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 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.

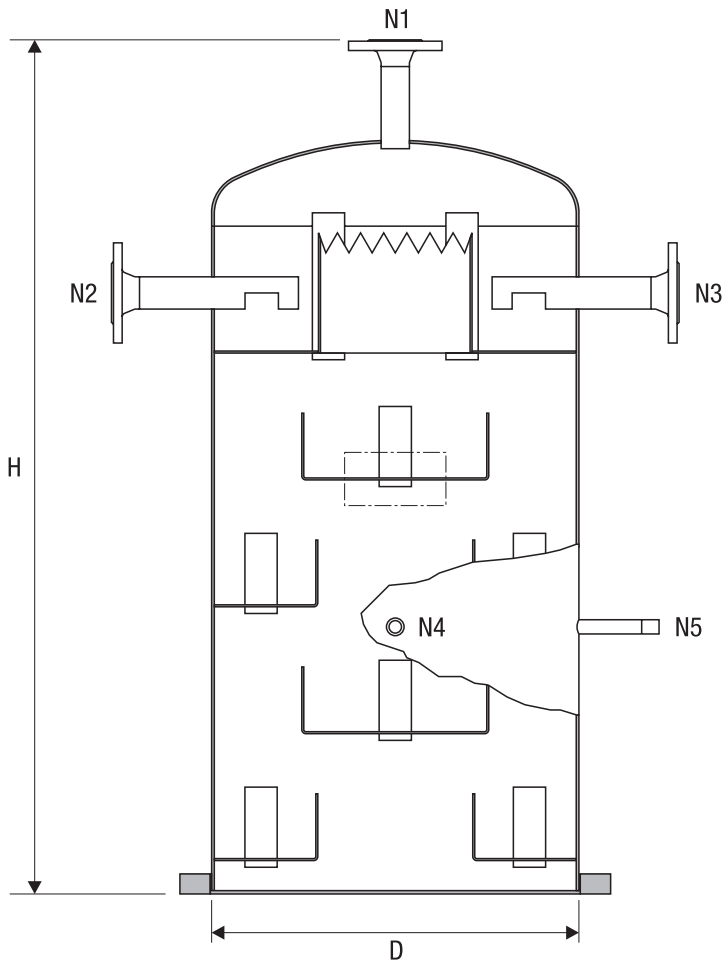
Technical Data

Service pressure
0.5 barg

Service temperature
111 °C

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

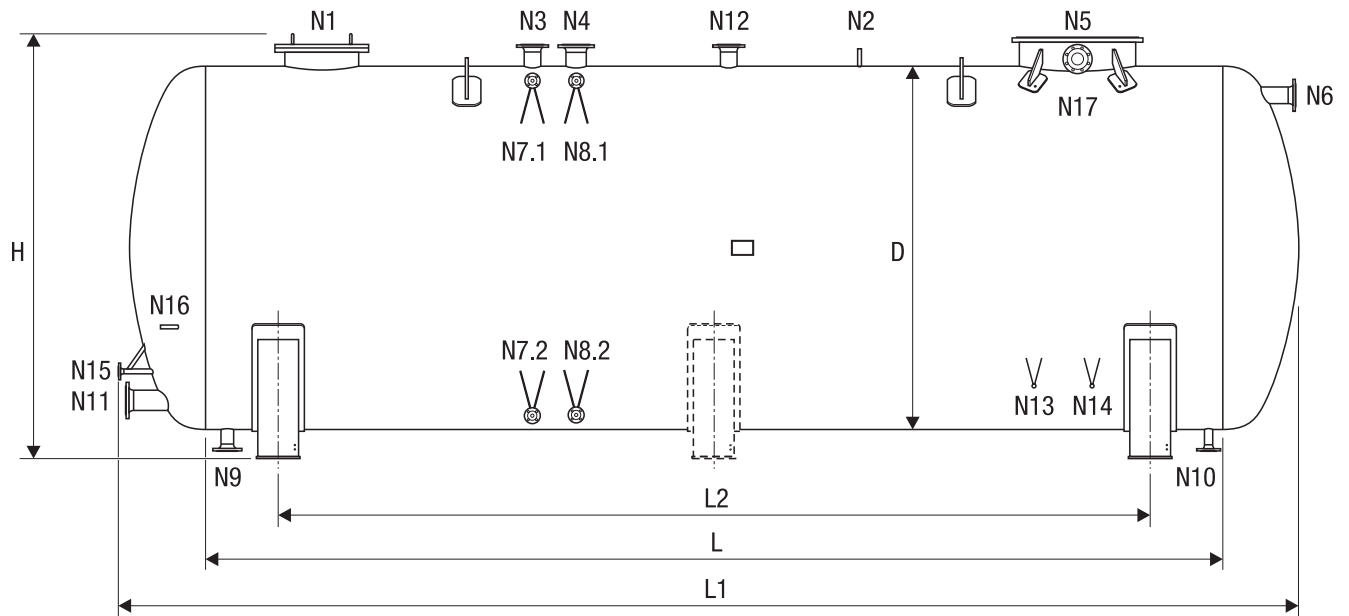
Technical Data
Deaerator Dome NDR



Type NDR		250	350	450	550	650	800
Capacity	[m³/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	[m³/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	[m³]	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.

Feedwater Deaerating Plant
Deaerating Dome NDR
Feedwater Tank SW

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.	

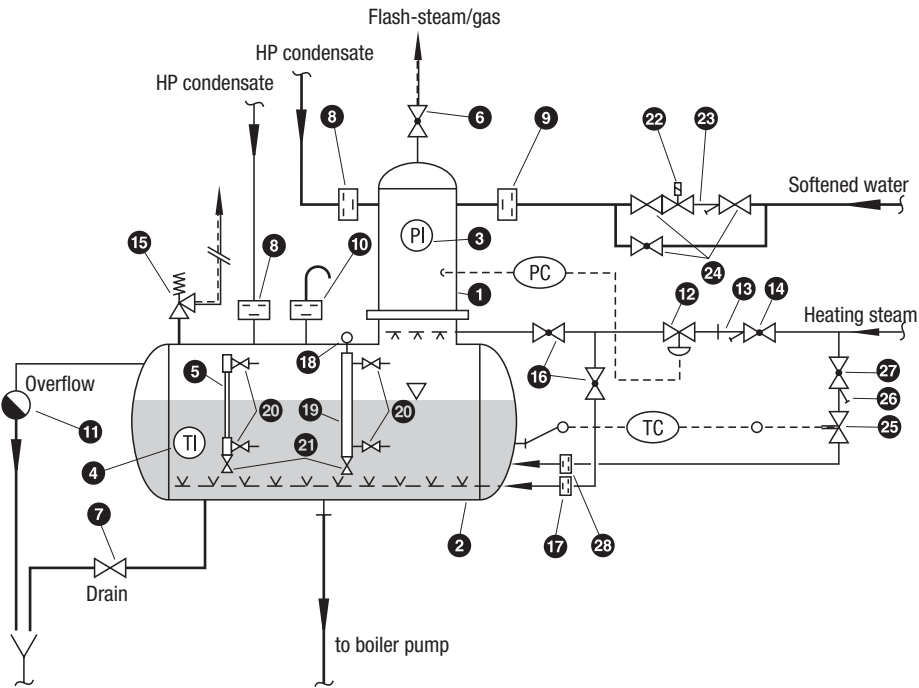
For more information see our folder "GESTRA Specification Texts".

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

P.O. Box 10 54 60, D-28054 Bremen
Münchener Str. 77, D-28215 Bremen
Telephone +49 (0) 421 35 03 - 0, Fax +49 (0) 421 35 03-393
E-Mail gestra.ag@flowserve.com, Internet www.gestra.de



GESTRA