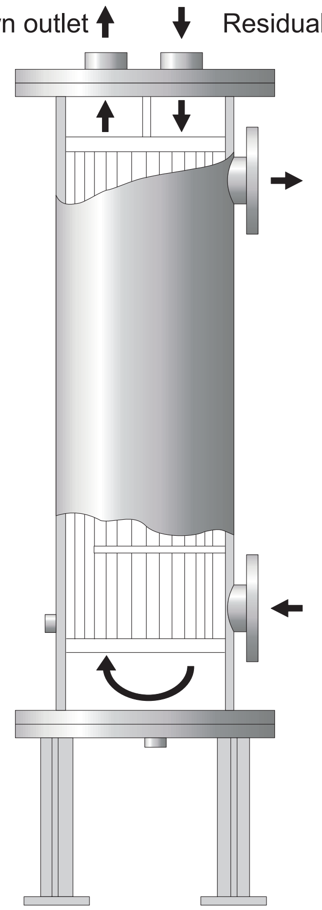
GESTRA Steam Solutions

FCD GSEDS0045-01 Issued 03/06 | Replaces CD.4.1.11 Issued 09/97



Type HE

- **Simple and easy installation**
- **Pays for itself within months**
- **Straight through tubes for easy cleaning**
- **When combined with a flash vessel, the heat recovery from the blowdown exceeds 75%**
- **Ensures maximum heat recovery and minimum blowdown discharge temperature**

General

A range of shell and tube heat exchangers used to recover the sensible heat from residual blowdown of a boiler blowdown flash steam recovery system.

Feed make up water is passed through the unit prior to entering the feed tank.

Design

Straight through, double pass, fixed tube heat exchanger. Flanges to BS4504 PN16. Other connections screwed BSP.

The shell and tube have a working pressure of 8 barg (116 psig) and a test pressure of 12 barg (174 psig).

The heat exchanger type HE... has copper tubes and the type HE...S has stainless steel tubes.

The shell and other parts are in carbon steel. The finish is red oxide paint.

Heat Recovery

Selection based on a residual blowdown inlet temperature of approximately 105°C (220°F) a final discharge temperature of 40°C (104°F) and a cold make-up water at 10°C (50°F).

Although the recovered heat content of the residual blowdown is high, the make-up temperature rise will normally be low. The actual rise is a function of the make-up flowrate relative to the residual blowdown flowrate.

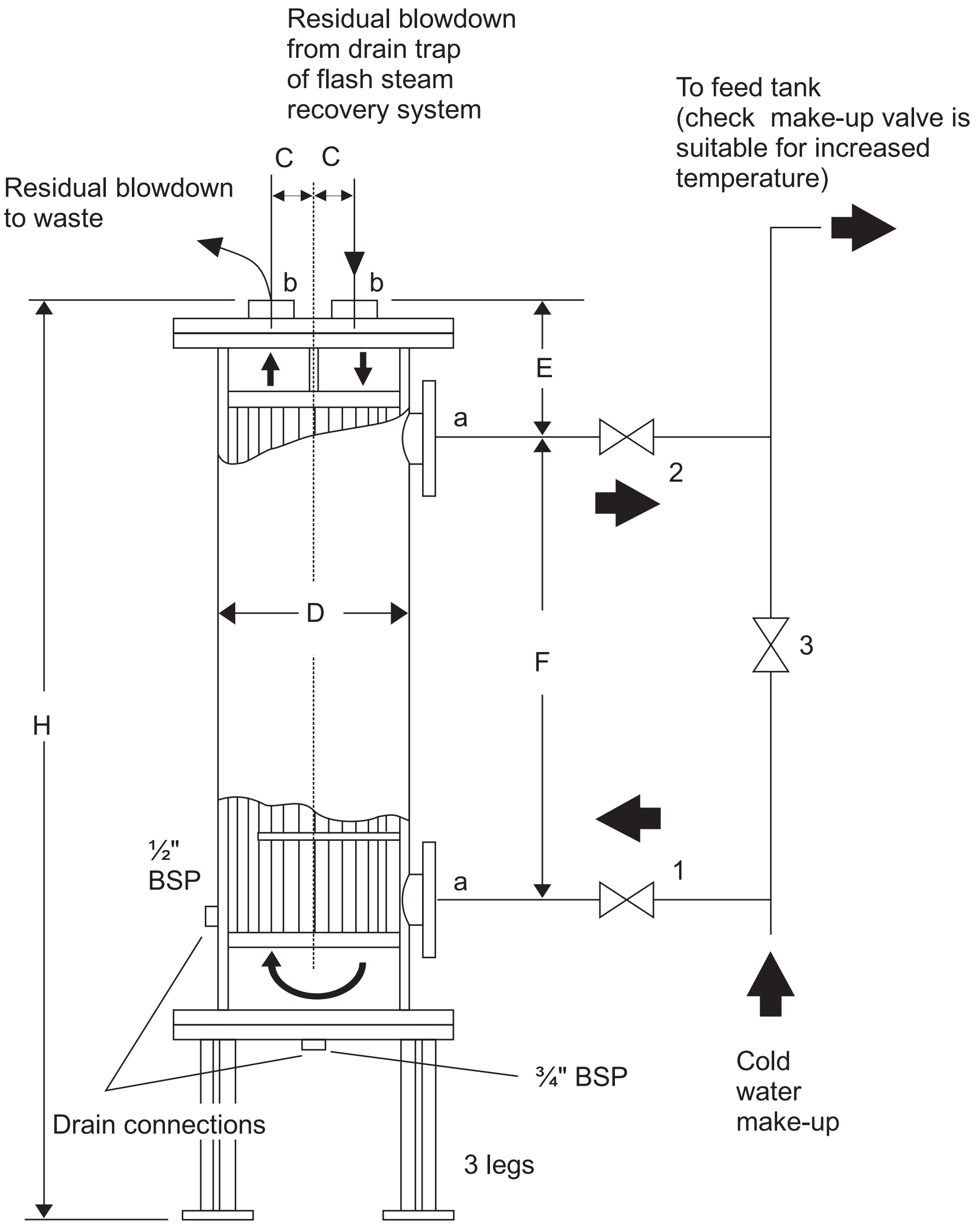
Installation

The heat exchanger should be installed in a by-pass arrangement as shown. For normal operation, valves 1 and 2 are left fully open and valve 3 closed. The heat exchanger can be inspected and maintained without interrupting the make-up water supply by opening valve 3 and closing valves 1 and 2.

Alternative Installations

Ideally, the cold water supply should be taken through the residual blowdown heat exchanger. However, this is often unacceptable to local water authorities and a break tank is required.
Fig. 1 shows how the heat exchanger can be installed between the make-up tank and a main feed tank. The pressure drop through the heat exchanger on the make-up water side is normally less than 0.25 psi (6" w.g.) and, provided suitable sized pipework and full bore valves are used, this should be acceptable. All the flow is normally directed through the heat exchanger and the straight through valve kept closed.

Heat Exchanger Type HE... or HE...S	Max. residual blowdown rate		a mm	b n.b.	C	D n.b.		E	F	H	
	lb/h	kg/h	fl. PN16	BSP	mm	mm	in	mm	mm	mm	in
43	1000	455							765	1225	48
44	1350	615	40	1"	35	100	4	140	1065	1525	60
45	1900	865							1365	1825	72
63	2150	975							725	1240	49
64	2850	1295	50	1½"	50	150	6	170	1025	1540	61
65	3600	1635							1325	1840	72
83	4450	2020							730	1275	60
84	5900	2680	80	1½"	50	200	8	185	1030	1575	62
85	7400	3365							1330	1875	74
86	8850	4020							1630	2175	86
104	9350	4250							1020	1580	62
105	11650	5295	80	2"	60	250	10	190	1320	1880	74
106	14000	6365							1620	2180	86
124	13500	6135		80mm					1030	1620	84
125	16900	7680	80	(fl.	105	300	12	215	1330	1920	76
126	20250	9205		PN16)					1630	2220	87



Alternatively, Fig.2 can be considered. The method of installation is to circulate cold water from a storage tank through the heat exchanger. If pipework is full bore with minimum bends and horizontal sections, a circulating pump is not required. Other arrangements may be considered for each particular application.

In both cases, it is not necessary to fit any form of temperature control as the water content of the heat exchanger is so small and is unlikely to boil due to the pressure head involved. For clarity, a by-pass around the heat exchanger on the blowdown side and other valves that may be necessary have been omitted.
The table below gives the temperature rise which may be expected in the feedwater tank due to the sensible heat recovery in a heat exchanger.

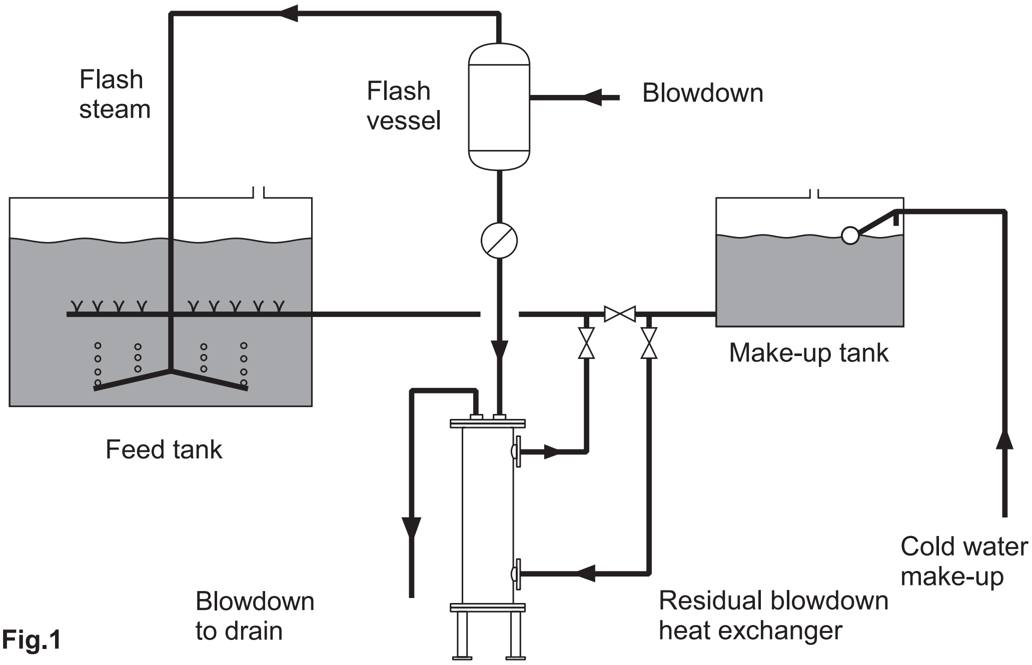


Fig.1

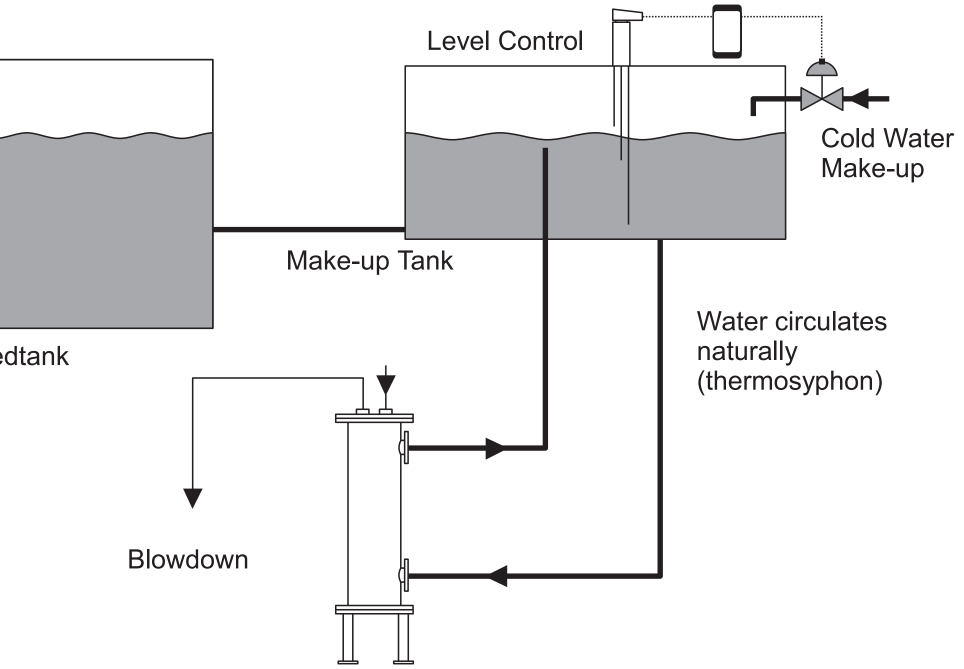


Fig. 2

Temperature rise due to sensible heat recovery

Boiler Pressure		Percentage Blowdown																	
barg	psig	1%		2%		3%		4%		5%		7%		10%		15%		20%	
		°C	°F	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F
3.4	50	0.6	1.1	1.2	2.4	1.8	3.3	2.5	4.4	3.1	5.6	4.3	7.8	6.1	11.1	9.3	16.7	12.3	22.2
5.2	75	0.6	1.1	1.2	2.4	1.8	3.3	2.4	4.3	3	5.4	4.3	7.6	6	10.8	9	16.2	12	21.6
6.9	100	0.6	1.1	1.2	2.3	1.8	3.2	2.4	4.2	3	5.3	4.1	7.4	5.9	10.6	8.8	15.9	11.8	21.2
8.6	125	0.6	1	1.2	2.3	1.7	3.1	2.4	4.2	2.9	5.2	4	7.3	5.8	10.4	8.7	15.6	11.6	20.8
10.3	150	0.6	1	1.1	2.3	1.7	3	2.3	4.1	2.8	5.1	4	7.2	5.7	10.2	8.5	15.3	11.3	20.4
12.1	175	0.6	1	1.1	2.2	1.7	3	2.2	4	2.8	5.1	4	7.1	5.6	10.1	8.4	15.1	11.2	20.1
13.8	200	0.6	1	1.1	2	1.7	3	2.2	4	2.8	5	3.9	7	5.5	9.9	8.3	14.9	11	19.8
17.2	250	0.6	1	1	1.9	1.6	2.9	2.2	3.9	2.7	4.8	3.7	6.7	5.4	9.7	8.1	14.5	10.7	19.3
20.6	300	0.6	1	1	1.9	1.6	2.9	2.1	3.8	2.6	4.7	3.7	6.6	5.3	9.5	7.9	14.2	10.5	18.9
24.1	350	0.5	0.9	1	1.8	1.6	2.8	2	3.7	2.6	4.6	3.6	6.5	5.2	9.3	7.8	13.9	10.3	18.2
27.2	400	0.5	0.9	1	1.8	1.5	2.7	2	3.6	2.6	4.6	3.5	6.4	5.1	9.1	7.6	13.7	10.1	18.2
31	450	0.4	0.8	1	1.8	1.5	2.7	2	3.6	2.5	4.5	3.5	6.3	5	9	7.5	13.5	10	17.9
34.5	500	0.4	0.8	0.9	1.7	1.4	2.6	2	3.5	2.4	4.4	3.4	6.1	4.9	8.8	7.3	13.2	9.7	17.5
41.3	600	0.4	0.8	0.9	1.7	1.4	2.5	1.8	3.1	2.4	4.3	3.3	5	4.8	8.5	7.1	12.8	9.4	17

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