FMBDV

Forbes Marshall Blowdown Vessel

Description

Forbes Marshall Blowdown Vessels, FMBDV, are designed to accept discharges from-

Manual/automatically controlled bottom blowdown

Boiler blowdown control system

Controlled bleed valves for continuous blowdown

Level control chambers and level gauge glass

Heat recovery equipment

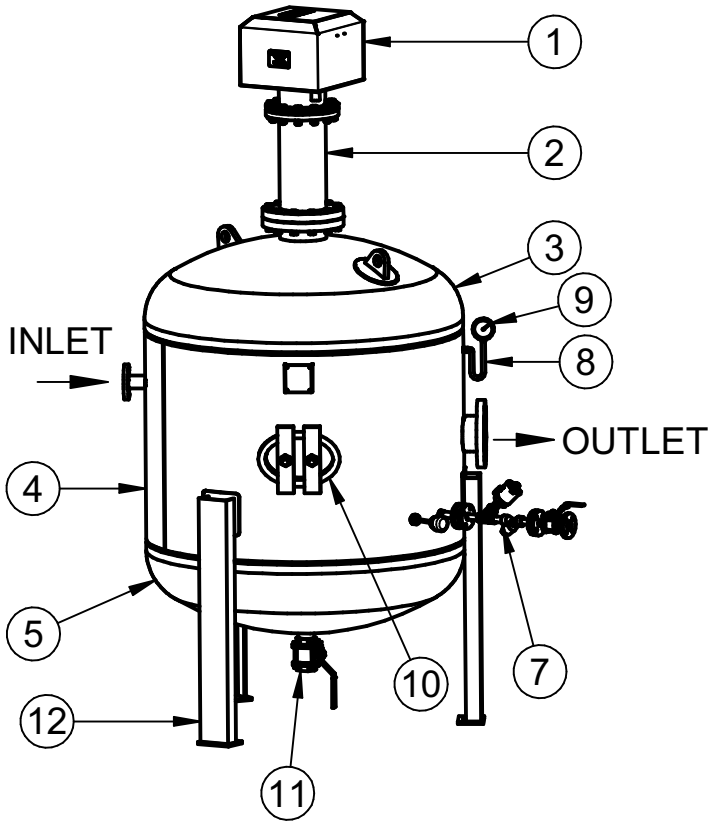
Associated Equipment

FMVH - Forbes Marshall vent head

Pressure gauge and 'U' syphon

Vessel drain valve

Cooling water system



Design and Construction

Design Code	ASME Sec VIII Div 1/IBR
Material	ASTM A 516 Gr.70 / SA 516 or 70
Connection	ASME Class 300 flanges
Paint Finish	Temperature resistant paint

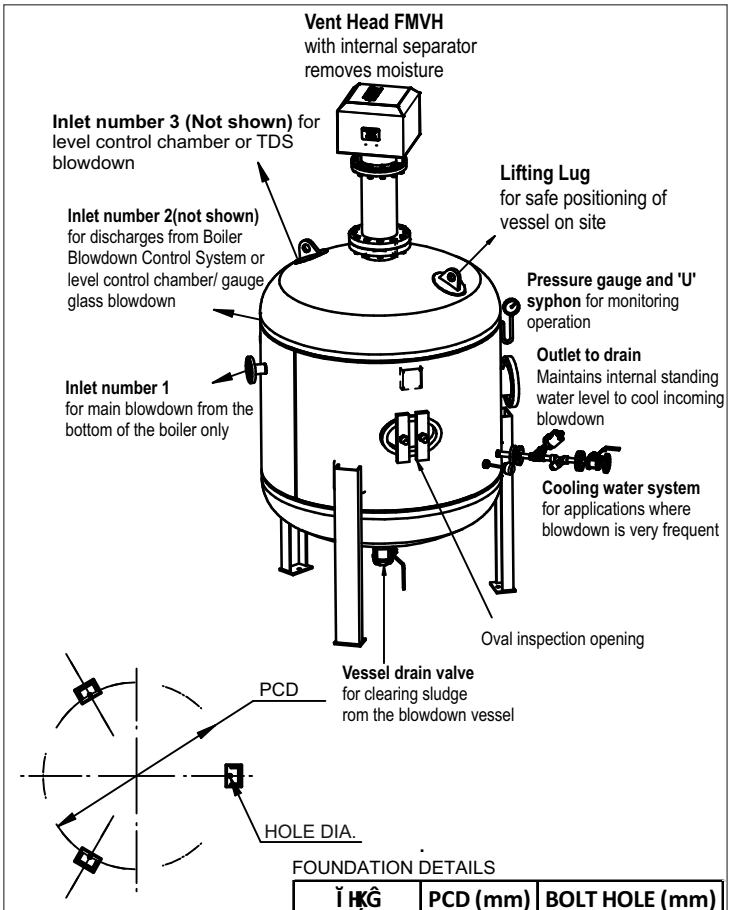
Limiting Conditions

Max. design pressure	10.5 kg/cm^2 @ 183 ^{o}C
Max. design temperature	183 ^{o}C @ 10 kg/cm^2
Min. design temperature	-10 ^{o}C
Max. cold hydraulic test pressure	16 kg/cm^2

ï Bí î	DESCRIPTION	MATERIAL	STANDARD
1	Forbes Marshall Vent Head	Stainless Steel	SS304
2	Spool piece connection	Carbon steel	ASTM A 106 Gr b
3	Top Dish End	Carbon steel	SA 516 Gr 70
4	Main shell pipe	Carbon steel	SA 516 Gr 70
5	Bottom Dish End	Carbon steel	SA 516 Gr 70
6	Outlet residual blow down line	Carbon steel	ASTM A 106 Gr b
7	Cooling Water line	Carbon steel	
8	Syphon	Carbon steel	ASTM A 106 Gr b
9	Pressure Gauge	Stainless Steel	
10	Man hole assembly	Carbon steel	SA 516 Gr 70
11	Drain line Valve	Carbon steel	ASTM A 105
12	Stand assembly	Carbon steel	SA 516 Gr 70

Table A : Sizes, pipe connections, dimensions, weights and capacities (approximate in mm, kg and L)

Blowdown vessel type		FMBDV-3	FMBDV-4	FMBDV-5	FMBDV-6	FMBDV-8	FMBDV-10
Sizes, pipe and dimensions connections	**A** Flanged ANSI #300	100	100	150	150	200	200
	B Flanged ANSI #300	80	80	100	100	150	150
	C Height	120	120	120	320	320	320
	Width	180	180	180	200	200	200
	D	457	610	762	914	1205	1500
	E	400	400	400	400	400	400
	F	500	540	575	635	700	785
	H	1847	1919	1997	2112	2252	2506
	J	1095	1130	1170	1225	1300	1370
	K	327	403	480	555	700	850
	X	327	403	480	555	700	850
Number of Legs		3	3	3	3	3	3
Weights (Approx)	**Empty**	195	250	315	500	801	991
	Full	384	604	893	1384	2458	3748
Capacities – standing water		94	177	289	440	825	1378



FOUNDATION DETAILS

Ï HĶĜ	PCD (mm)	BOLT HOLE (mm)
FMBDV-3	448	20
FMBDV-4	604	20
FMBDV-5	757	20
FMBDV-6	895	20
FMBDV-8	1192	20
FMBDV-10	1487	20

Sizing and Selection

The selection of the Forbes Marshall blowdown vessel depends on the flowrate and the proportion of flash steam released.

The following factors affect the selection.

The boiler pressure

The number of boilers

The duration of blowdown

The blowdown line size

The length of blowdown line between the boiler and the blowdown vessel

The blowdown regime

For example the sizing below assumes the blowdown line has an 'equivalent straight length' of at least 7 m.

When estimating 'equivalent straight length' the lengths shown in **Table 1** should be added to the length of straight pipe to allow for valves and fittings. From **Table 1** it will be seen that in most practical applications it would be unusual for the equivalent straight length to be less than 7 m.

If the length is less than 7 m multiply the actual boiler pressure by 1.15 before using the sizing table, **Table 2.**

The blowdown regime

- Typical normal bottom blowdown of, perhaps, 5 seconds duration.
- Weekly low level alarm steam down from normal level to first low water level and blow down from first to second low water level.

•Blowdown discharges from sequencing valves on external chambers, gauge glasses etc.

•Automatic TDS control discharges.

The selection table (Table 2) only applies if the blowdown duration is no longer than 20 seconds in total, starting with a cold vessel (water at a temperature of 15^{0}C to 20^{0}C).

If this time is exceeded, carryover of water with the flash steam may occur through the vent. The water may also be too hot to discharge safety and legally into a public drainage system.

Always incorporate a cooling water system for multi-boiler applications.

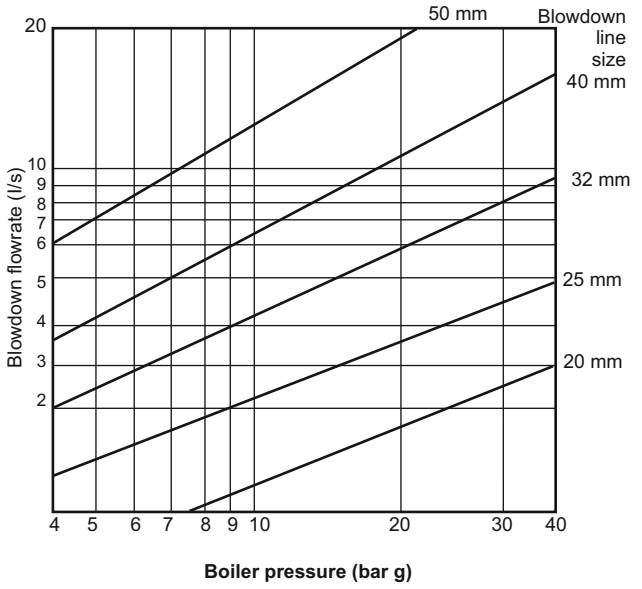
If there is any doubt about correct vessel selection, please contact Forbes Marshall outlining the specific conditions and blowdown regime.

Table 1 Equivalent straight lengths

Blowdown line size	25 mm (1")	32 mm (1$^1/_4$")	40 mm (1$^1/_2$")	50 mm (2")
Pipe fitting or valve	**Equivalent length in metres**			
Long radius bend	0.5	0.7	0.8	0.9
Manifold inlet	1.1	1.5	1.7	2.2
Globe valve	9.6	12.2	13.9	17.8
Check valve	3.6	4.3	5.0	6.3
Blowdown valve	0.3	0.4	0.4	0.5

Graph 1 Blowdown flowrates

This graph will give the flowrate of blowdown in litres per second. When this value has been read, multiply it by the duration of blowdown (seconds) and the answer will be the maximum volume discharged.



How to select the blowdown vessel

Step 1. With the aid of **Table 1,** determine the equivalent straight length of the blowdown line.

Step 2. Use **Table 2** to initially establish the correct size of vessel. If the result of Step 1 is less than 7m, multiply the boiler pressure by 1.15.

Step 3. Using **Table A** which contains the vessel data establish the volume of standing water in the selected vessel. This volume should be at least **twice** that of the maximum volume of blowdown. The maximum volume of blowdown is usually the volume discharged when blowing down from 1st low level to 2nd low level alarm. If this volume is unknown, it can be calculated with the aid of graph 1 where details on its use are given.

If it is determined that the volume of standing water is insufficient, then a larger blowdown vessel must be selected in order to satisfy this requirement.

Step 4. With the aid of **Table 3,** the correct vent head can be selected to suit the vessel.

Selection is now complete.

Selection example

For a 10 bar g boiler with 40 mm blowdown line at least 7 m long select, from **Table 2,** a FMBDV OF 5". From **Table 3** select a **FMVH** vent head of 6".

Table 2 Forbes Marshall blowdown vessel selection

Blowdown line size		25 mm (1")	32 mm (1$^1/_4$")	40 mm (1$^1/_2$")	50 mm (2")
Boiler pressure		**Forbes Marshall Blowdown vessel**			
bar g	**psi g**			**FMBDV**	
5.5	**80**	3	3	3	4
7.6	**110**	3	3	4	5
8.3	**120**	3	4	4	6
10.3	**150**	3	4	5	6
12.1	**175**	4	4	5	8
17.2	**250**	4	5	6	8
20.7	**300**	5	6	8	10

Note : For intermediate pressure go to the next higher pressure.

Table 3 Vent head selection

Note: The vent head required depends on the vessel selected

For a FMBDV-3	select a FMVH vent head of DN100
For a FMBDV-4	select a FMVH vent head of DN100
For a FMBDV-5	select a FMVH vent head of DN150
For a FMBDV-6	select a FMVH vent head of DN150
For a FMBDV-8	select a FMVH vent head of DN200
For a FMBDV-10	select a FMVH vent head of DN250

How to order

Example : 1 No. Forbes Marshall blowdown vessel, FMBDV-5 with a 150FMVH Forbes Marshall vent head to suit a 10 kg/cm^2 g boiler having a 40 mm blowdown line

Safety Information, Installation And Maintenance

For full details see the installation and maintenance instructions supplied with the product.

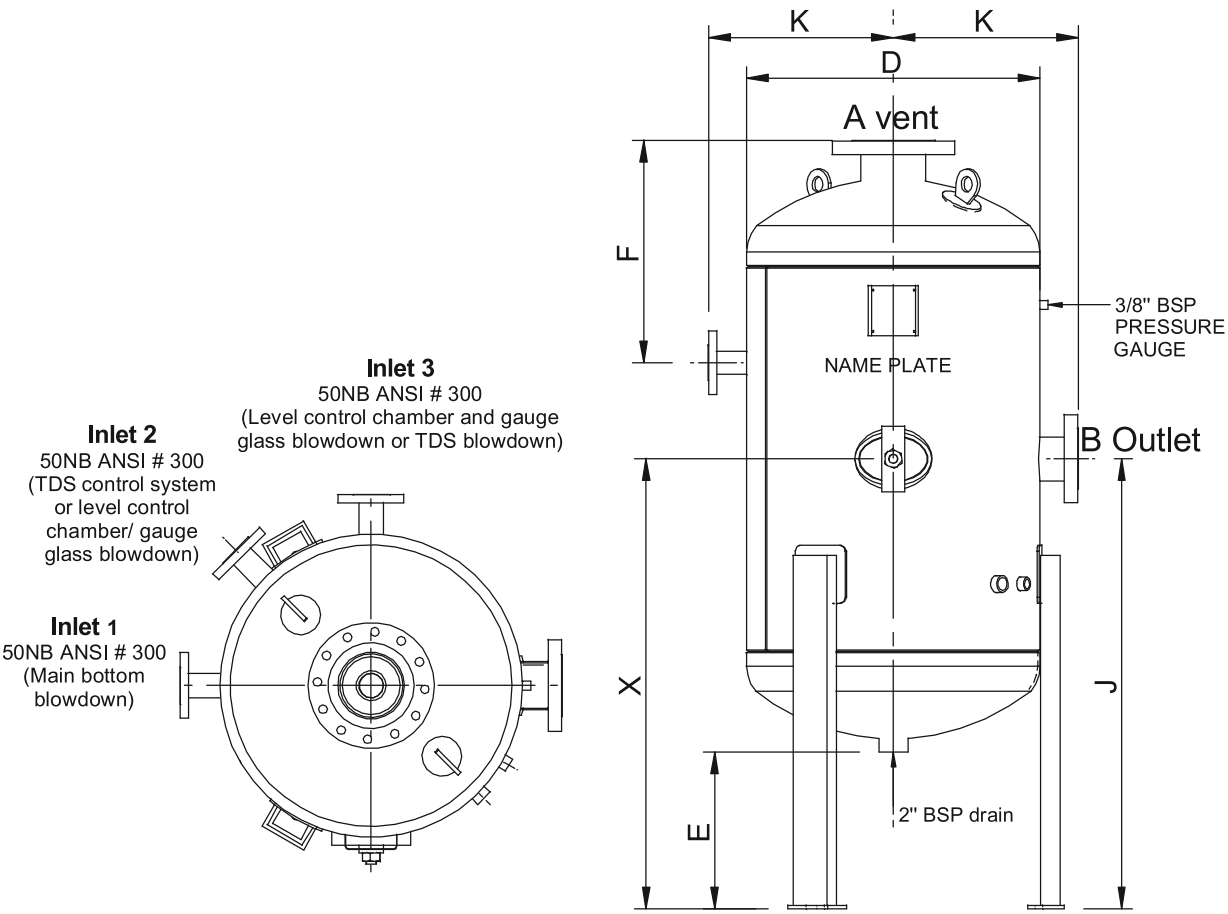
Maintenance Note

The vessel must be drained every six months to remove concentrated blowdown water/sludge. Before reusing, the vessel must be refilled with fresh water.

Forbes Marshall blowdown vessels should be thoroughly examined by a 'competent person' every 14 months or during every major boiler inspection.

Spare Parts

New gaskets for the inspection openings are available as spares from Forbes Marshall.



FORBES MARSHALL

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