spirax sarco

TI-P405-33
AB Issue 6

BDV60
Blowdown Vessels

Description

BDV60 blowdown vessels are designed to accept discharges from:

- Manual/automatically controlled bottom blowdown.
- Automatic TDS blowdown control valves and systems.
- Controlled bleed valves for continuous blowdown.
- Level control chambers and level gauge glasses.
- Heat recovery equipment.

BDV60 blowdown vessels are CE marked and comply with the European Pressure Equipment Directive 97/23/EC.
They also comply with Guidance Note PM60, for the construction of vessels used in boiler blowdown applications, issued by the Health and Safety Executive.

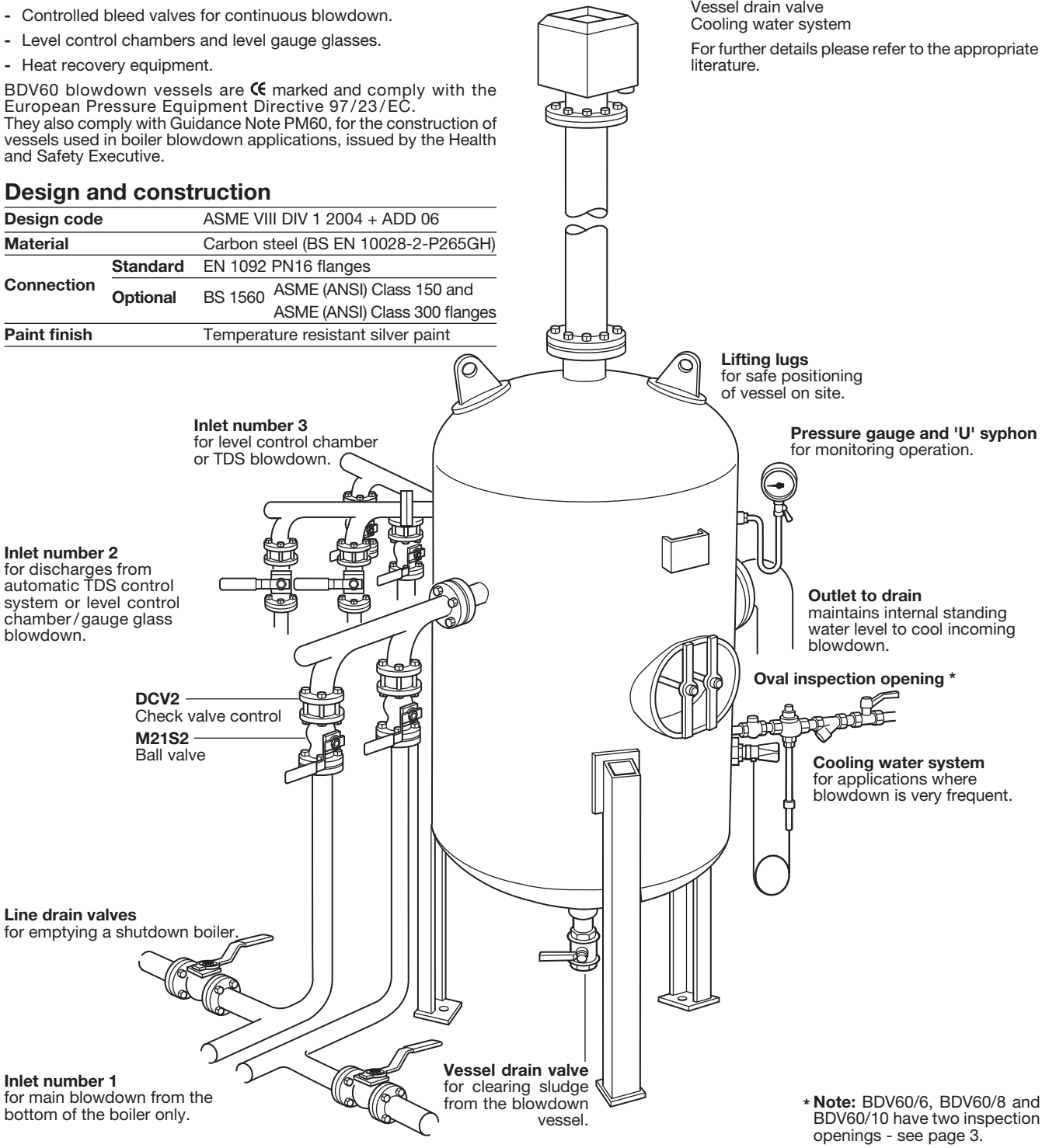
Design and construction

Design code		ASME VIII DIV 1 2004 + ADD 06
Material		Carbon steel (BS EN 10028-2-P265GH)
Connection	**Standard**	EN 1092 PN16 flanges
	Optional	BS 1560 ASME (ANSI) Class 150 and ASME (ANSI) Class 300 flanges
Paint finish		Temperature resistant silver paint

Associated equipment

VH vent head
M21S2 ball valve
DCV2 check valves
Pressure gauge and 'U' syphon
Vessel drain valve
Cooling water system

For further details please refer to the appropriate literature.



* **Note:** BDV60/6, BDV60/8 and BDV60/10 have two inspection openings - see page 3.

Local regulations may restrict the use of this product to below the conditions quoted.
In the interests of development and improvement of the product, we reserve the right to change the specification without notice.

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Sizing and selection

The selection of a 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 testing where practice is in accordance with BG01 and INDG436 - 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°C to 20°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 safely and legally into a public drainage system.

Always incorporate a cooling water system for multi-boiler applications or in instances where the frequency or duration of blowdown is considerably in excess of the requirements stated in PM60, BG01 and INDG436.

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

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. Note that if the result of Step 1 is less than 7 m, multiple the boiler pressure by 1.15.

If the vessel is to be used in the conditions set out above, then continue to Step 4.

Step 3. Using **Table 4** 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.

The 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 **BDV60/5**.
From **Table 3** select a **VH6** vent head.

Table 1 Equivalent straight lengths

Blowdown line size	25 mm (1")	32 mm (1¼")	40 mm (1½")	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

Table 2 Blowdown vessel selection

Blowdown line size		25 mm (1")	32 mm (1¼")	40 mm (1½")	50 mm (2")
Boiler pressure bar g	**psi g**	**Blowdown vessel BDV60/_**			
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
24.1	**350**	5	6	8	10
27.6	**400**	6	8	8	-

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

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.

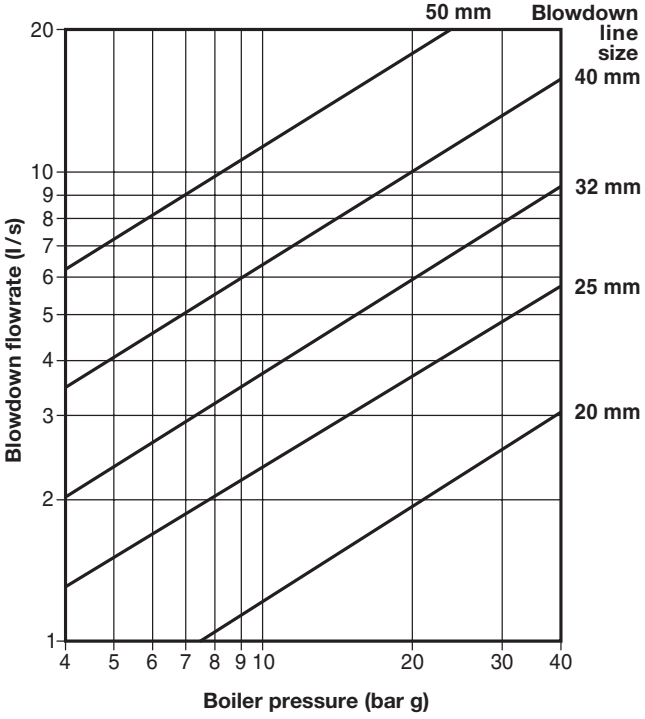


Table 3 Vent head selection

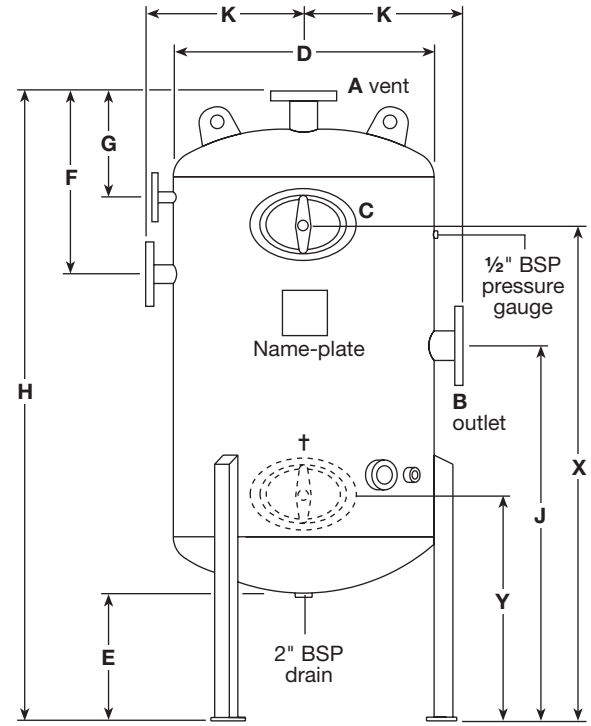
Note: The vent head required depends on the vessel selected

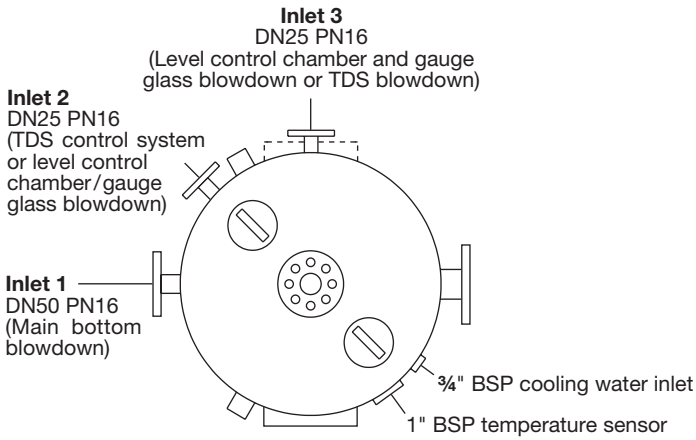
For a **BDV60/3**	select a **VH4**	vent head
For a **BDV60/4**	select a **VH4**	vent head
For a **BDV60/5**	select a **VH6**	vent head
For a **BDV60/6**	select a **VH6**	vent head
For a **BDV60/8**	select a **VH8**	vent head
For a **BDV60/10**	select a **VH8**	vent head

Table 4 Sizes, pipe connections, dimensions, weights and capacities (approximate) in mm, kg and L

Blowdown vessel type			BDV60/3	BDV60/4	BDV60/5	BDV60/6	BDV60/8	BDV60/10
Sizes, pipe connections and dimensions	A	Flanged PN16*	100	100	150	150	200	200
	B	Flanged PN16*	80	80	100	100	150	150
	C	Oval Inspection opening Height (Internal)	100	100	100	100	100	100
		Oval Inspection opening Width (Internal)	150	150	150	150	150	150
	D		460	610	765	915	1 205	1500
	E		400	400	400	400	400	400
	F		500	540	580	630	705	770
	G		310	350	390	440	525	590
	H		1 830	1910	1995	2095	2240	2370
	J		1 080	1125	1165	1215	1290	1355
	K		330	405	485	560	705	850
	X		1080	1120	1163	1568	1612	1676
	Y		-	-	-	864	962	1026
Number of legs			3	3	3	3	3	3
Weights	Empty		185	220	275	392	480	892
	Full (e.g. for hydraulic test)		370	570	825	1 267	2090	3567
Capacities - standing water			92	175	275	437	805	1 337

* **Note:** Flanged BS 1560 ASME (ANSI) Class 150 and 300 connections are available at extra cost. For further details contact Spirax Sarco.





Pressure/temperature limits

Please note:
For the application of boiler blowdown and to comply with the HSE Guidance Note PM60 the vessel internal pressure should not exceed 0.35 bar g.

Body design conditions	PN16
Maximum design pressure	7 bar g @ 171°C
Maximum design temperature	171°C @ 7 bar g
Minimum design temperature	-10°C
Maximum operating pressure re. PM60	0.35 bar g
Maximum operating temperature re. PM60	109°C
Minimum operating temperature	0°C
Designed for a maximum cold hydraulic test pressure of 10 bar g	

Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions supplied with the product.

† **Note:** There is a second inspection opening on the BDV60/6, BDV60/8 and BDV60/10 which is fitted 180° to the top opening. Other sizes have a single central opening, similar to the one shown on page 1.

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.
Blowdown vessels should be thoroughly examined by a 'competent person' every 14 months or at every major boiler inspection.

Spare parts:
New gaskets for the inspection openings are available as spares from Spirax Sarco.

How to order

Example: 1 off Spirax Sarco BDV60/5 blowdown vessel and a VH6 vent head to suit a 10 bar g boiler having a 40 mm blowdown line.