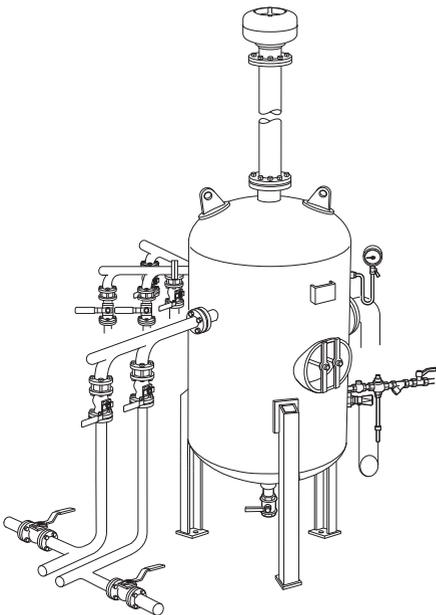


BDV60
Blowdown Vessel
Installation and Maintenance Instructions



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BDV60 BLOWDOWN VESSEL



1. Safety information

Spirax Sarco products are designed, manufactured and tested to exacting standards to meet modern system requirements.

Safe operation of the unit can only be guaranteed if it is properly installed, commissioned and maintained by a qualified person (see Section 1.10 on page 5) in compliance with the operating instructions. General installation and safety instructions for pipeline and plant construction, as well as the proper use of tools and safety equipment must also be complied with.

The product is designed and constructed to withstand the forces encountered during normal use. Use of the product for any other purpose, or failure to install the product in accordance with these Installation and Maintenance Instructions, could cause damage to the product, will invalidate the

 marking, and may cause injury or fatality to personnel.

1.1 Intended use

Referring to these Installation and Maintenance Instructions, name-plate and Technical Information Sheet, check that the product is suitable for the intended use/application.

The products listed below comply with the requirements of the Pressure Equipment Directive and carry the  mark. The products fall within the following Pressure Equipment Directive categories:

Product	Group 2 Gases
BDV60/3	3
BDV60/4	3
BDV60/5	4
BDV60/6	4
BDV60/8	4
BDV60/10	4

- i) The products have been specifically designed for use with steam which is in Group 2 of the above mentioned Pressure Equipment Directive. The product's use on other fluids may be possible but, if this is contemplated, Spirax Sarco should be contacted to confirm the suitability of the product for the application being considered.
- ii) Check material suitability, pressure and temperature and their maximum and minimum values. If the maximum operating limits of the product are lower than those of the system in which it is being fitted, or if malfunction of the product could result in a dangerous overpressure or overtemperature occurrence, ensure a safety device is included in the system to prevent such over-limit situations.
- iii) Determine the correct installation situation and direction of fluid flow.
- iv) Spirax Sarco products are not intended to withstand external stresses that may be induced by any system to which they are fitted. It is the responsibility of the installer to consider these stresses and take adequate precautions to minimise them.
- v) Remove protective covers from all connections and protective film from all nameplates, where appropriate, before installation on steam or other high temperature applications.

1.2 Access

Ensure safe access and if necessary a safe working platform (suitably guarded) before attempting to work on the product. Arrange suitable lifting gear if required.

1.3 Lighting

Ensure adequate lighting, particularly where detailed or intricate work is required.

1.4 Hazardous liquids or gases in the pipeline

Consider what is in the pipeline or what may have been in the pipeline at some previous time. Consider; flammable materials, substances hazardous to health, extremes of temperature.

1.5 Hazardous environment around the product

Consider; explosion risk areas, lack of oxygen (e.g. tanks, pits), dangerous gases, extremes of temperature, hot surfaces, fire hazard (e.g. during welding), excessive noise, moving machinery.

1.6 The system

Consider the effect on the complete system of the work proposed. Will any proposed action (e.g. closing isolation valves, electrical isolation) put any other part of the system or any personnel at risk?

Dangers might include isolation of vents or protective devices or the rendering ineffective of controls or alarms. Ensure isolation valves are turned on and off in a gradual way to avoid system shocks.

Ensure that any pressure is isolated and safely vented to atmospheric pressure. Consider double isolation (double block and bleed) and the locking or labelling of closed valves. Do not assume that the system has depressurised even when the pressure gauge indicates zero.

1.7 Temperature

Allow time for temperature to normalise after isolation to avoid danger of burns.

1.8 Tools and consumables

Before starting work ensure that you have suitable tools and/or consumables available. Use only genuine Spirax Sarco replacement parts.

1.9 Protective clothing

Consider whether any protective clothing is required by yourself and/or others in the vicinity to protect against the hazards of, for example, chemicals, high/low temperature, noise, falling objects, and dangers to eyes and face.

1.10 Permits to work

All work must be carried out or be supervised by a suitably competent person. Installation and operating personnel should be trained in the correct use of the product according to these instructions.

Where a formal 'permit to work' system is in force it must be complied with.

Where there is no such system, it is recommended that a responsible person should know what work is going on and, where necessary, arrange to have an assistant whose primary responsibility is safety.

Post 'warning notices' if necessary.

1.11 Handling

Manual handling of Spirax-Sarco products may present a risk of injury. Lifting, pushing, pulling, carrying or supporting a load by bodily force can cause injury particularly to the back. You are advised to assess the risks taking into account the task, the individual, the load and the working environment and use the appropriate handling method depending on the circumstances of the work being done.

1.12 Residual hazards

In normal use the external surface of the product may be very hot. If used at the maximum permitted operating conditions the surface temperature of blowdown vessels may reach a temperature approaching 171 °C (340°F). Many products are not self-draining. Take due care when dismantling or removing the product from an installation (refer to 'Maintenance Instructions').

1.13 Freezing

Provision must be made to protect products which are not self-draining against frost damage if they are inoperative in environments where they may be exposed to temperatures below freezing point during shutdown. The vessel should be thoroughly defrosted prior to use. Trace heating should be considered under severe environmental conditions, in order to prevent the operating temperature of the vessel dropping below -10 °C (14 °F) during service.

1.14 Disposal

This product is recyclable and no ecological hazard is anticipated with its disposal providing due care is taken.

1.15 Returning products

Customers and stockists are reminded that under UK and EC Health, Safety and Environment Law, when returning products to Spirax Sarco they must provide information on any hazards and the precautions to be taken due to contamination residues or mechanical damage which may present a health, safety or environmental risk. This information must be provided in writing including Health and Safety Data Sheets relating to any substances identified as hazardous.

2. Product safety information

The following information is specific to this product and should be read in conjunction with the General Safety Information - Section 1.

Warning
If this product is not used in the manner specified by this IMI, then the protection provided may be impaired.

2.1 Overpressure protection

The outlet flash steam connection should not be restricted in any way that would cause a rise in the vessel pressure above ambient conditions. Therefore no pressure safety device need be fitted to this vessel.

2.2 Guard rail

The vessel may need a guard rail and/or mesh screen to prevent injury caused by accidental contact with the hot vessel or pipework.

2.3 Associated equipment

Please ensure that you make reference to the technical/installation information for equipment coupled to this vessel to avoid any possible operational difficulties with associated equipment.

3. Product information

3.1 General information

Spirax Sarco products are designed, manufactured and tested to exacting standards to meet modern system requirements. Where applicable, they satisfy current safety and design codes and users can expect long service life when products are selected, installed and maintained in accordance with Spirax Sarco recommendations.

BDV60 blowdown vessels are designed and constructed to comply with the Pressure Equipment Directive. These vessels are particularly suited to accept manual/automatically controlled bottom blowdown, manually controlled bleed valves for continuous blowdown, automatically controlled valves and control systems for TDS, vessels and ancillaries and heat recovery equipment.

This Installation and Maintenance Instruction document provides comprehensive information on operation, installation and maintenance and should be read prior to commencing work on the product.

3.2 Technical data

Materials of construction	Carbon steel
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Paint finish	Temperature resistant silver paint
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3.3 Pressure/temperature limits

Please note:

For the application of boiler blowdown and to comply with the Blowdown Systems, Guidance for Industrial Steam Boilers (Ref: BG03) the vessel internal pressure should not exceed 0.35 bar g (5 psi g).

Body design conditions	PN16	
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Maximum design pressure	7 bar g @ 171 °C	(101 psi g @ 340 °F)
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Maximum design temperature	171 °C @ 7 bar g	(340 °F @ 101 psi g)
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Minimum design temperature	-10 °C	(14 °F)
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Maximum operating pressure re. BG03	0.35 bar g	(5 psi g)
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Maximum operating temperature re. BG03	109 °C	(228 °F)
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Minimum operating temperature	0 °C	(32 °F)
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Designed for a maximum cold hydraulic test pressure of	11 bar g	(160 psi g)
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Note: This test is in accordance with the Pressure Equipment Directive

spirax / sarco
Vessel

Made in the U.K. by	<input type="text"/>
Vessel Designation	<input type="text"/>
Spirax Sarco Part Number	<input type="text"/>
Conforms to Ped 2014/68/EU Category	<input type="text"/>
Design Code	<input type="text"/>
Date of Manufacture	<input type="text"/>
Serial Number	<input type="text"/>
Maximum Design Pressure	<input type="text"/>
Maximum Design Temperature	<input type="text"/>
Minimum Design Temperature	<input type="text"/>
Volume	<input type="text"/>
Hydraulic Test Pressure	<input type="text"/>
Date of Test	<input type="text"/>
Weight (Dry)	<input type="text"/>
Weight (Dry)	<input type="text"/>

Fig. 1 Typical name-plate details

4. Installation

Before actioning any installation observe the 'Safety information' in Sections 1 and 2.

Ensure that any permanent plugs supplied with the vessel are fitted securely, both at ambient and operating temperatures.

The vessel must be mounted with the flash steam outlet uppermost, as shown in Figure 2.

Each vessel incorporates a 3/8" BSP screwed boss for a pressure gauge, U-syphon and cock.

Please refer to Table 1 for the numbers of legs and bolt holes.

The outlet flash steam connection should not be restricted in any way that would cause a rise in the vessel pressure above ambient conditions.

Therefore no pressure safety device need be fitted to this vessel.

Table 1 Fixing bolts

Vessel feet have a pre-drilled hole for fixing bolts (diameters are as stated):-

Blowdown vessel	No. of Legs	PCD of bolt holes
BDV60/3	3	Ø19 mm (¾") on a 436 mm PCD
BDV60/4	3	Ø19 mm (¾") on a 537 mm PCD
BDV60/5	3	Ø19 mm (¾") on a 681 mm PCD
BDV60/6	3	Ø19 mm (¾") on a 833 mm PCD
BDV60/8	4	Ø19 mm (¾") on a 1127 mm PCD
BDV60/10	4	Ø19 mm (¾") on a 1425 mm PCD

4.1 Positioning:

- Use the lifting lugs to position the vessel.
- Ensure there is access to the inspection opening.
- Remove all plastic plugs and blanks from the vessel connections.
- Plug or blank off connections which are not to be used.
WARNING: Do not blank off the vent or the outlet connections.
- Use a spirit level to check that the blowdown vessel is perfectly vertical. This is essential for optimum performance. Use a non-compressible packing under the legs if necessary.

4.2 Mating of vessel pipework on site

We offer as much guidance and technical detail as possible for the vessel to help with connection to system pipework/valves.

When making the final connections between the blowdown vessel and the system pipework please use any technical documents that refer to individual porting dimensions as a guide only and use the final position of the vessel to match up the individual ports to the system pipework for level and mating accuracy.

4.3 Inlet layout

Install the inlet pipework at a lower level than the vessel. This ensures that the blowdown line remains flooded, minimising the effect of waterhammer. Ensure the proper use of stop valves and check valves, or the combination of both to avoid adverse interaction between different supply lines to and from the vessel. (Refer to the Blowdown Systems, Guidance for Industrial Steam Boilers (Ref: BG03) for full details).

Note: Inlet 1 should only be used for the main blowdown from the bottom of the boiler. Inlets 2 and 3 are interchangeable, between level control chamber/gauge glass blowdown and TDS blowdown.

Inlet number 3
for level control chamber or TDS blowdown.

Inlet number 2
for discharges from automatic TDS control system or level control chamber/gauge glass blowdown.

DCV2
Check valve control

M21S2
Ball valve

Line drain valves
for emptying a shutdown boiler.

Inlet number 1
for main blowdown from the bottom of the boiler only.

Lifting lugs
for safe positioning of vessel on site.

Oval inspection opening

Vessel drain valve
for clearing sludge from the blowdown vessel.

Vent head
with internal separator removes moisture from the steam.

This is only a representation of a possible set-up, the product may have 3 or 4 legs and the inspection port may be different on the product.

Pressure gauge and 'U' syphon
for monitoring operation.

Outlet to drain
maintains internal standing water level to cool incoming blowdown.

Cooling water system
for applications where blowdown is very frequent.

Note:
The BDV60/6, BDV60/8 and BDV60/10 have two inspection openings, one towards the top and a lower one at 180°.

Fig. 2 Typical features of a blowdown vessel

BDV60 BLOWDOWN VESSEL



4.4 Vent layout

Install the vent pipe vertically if possible. If it has to run horizontally then it should have a slight slope to drain back to the vessel. It should not join other vent lines.

WARNING: Do not fit a check valve or stop valve in the vent line.

It is useful to fit a spool piece between the vessel and vent pipework, which can be removed to facilitate blanking-off for hydraulic testing.

We strongly recommend the use of a Spirax Sarco vent head to maximise the separation of any entrained water thereby offering protection to nearby personnel and buildings.

Connect the vent head drain to waste, ideally with an air break, which could take the form of a tundish. Do not connect it into the blowdown vessel.

4.5 Outlet

Connect the outlet to drain, which must be at a lower level than the vessel.

WARNING: Do not fit a stop valve or a check valve in the outlet pipework.

It is useful to fit a spool piece between the vessel and the outlet pipework, which can be removed to facilitate blanking-off for hydraulic testing.

4.6 Cooling water system

All vessels are fitted with two connections for a cooling water system, one for a temperature controller and one for cooling water. Install the temperature controller as described in the relevant Installation and Maintenance Instructions supplied with the product.

Set the controller to operate at a temperature below 43 °C (109.4 °F) in the UK, as this is the maximum temperature at which water may be discharged to drain.

4.7 Paint finish

The vessel is protected with one coat of silver paint which would be deemed suitable for protection during transit or for vessels located within the boiler house.

For vessels stored or used in external locations more appropriate protection such as additional paint finish or insulation will need to be considered - See Section 4.8.

4.8 Frost protection

If the vessel is located outdoors there should be some consideration for vessel temperature protection, guarding against the water reservoir freezing.

Provide trace heating in extreme cases.

5. Commissioning

Before putting the unit into service, ensure that:

- Permanent plugs are tight; Tighten these when the vessel has reached normal operating temperature.
Caution!
The maximum operating temperature is 171 °C @ 7 bar g (340 °F @ 101 psi g).
- All connections to adjoining pipework/plant are sound and secured so that no external stresses are introduced into the unit.
- No extraneous objects/material is present within the vessel.
- The vessel is filled with a standing level of water.

6. Operation

Operation of the blowdown vessel is inherently simple and no special operating instructions are required. The vessel allows for the safe expansion of hot water from high to lower pressures with the accompanying production of flash steam.

Before use and after draining/flushing the vessel, it **must** be replenished to its normal working level (level with the outlet on the centreline of the vessel shell) by introducing fresh water until it discharges at the outlet. On a precautionary note, vessels are designed to operate at high temperatures and care should be taken to avoid personal injury as vessels are normally unlagged to dissipate heat.

We recommend that the pressure gauge is checked during bottom blowdown.

If it indicates more than 0.35 bar g (5 psi g) then it may indicate that the vent or outlet is blocked, a situation demanding immediate attention.

WARNING: The stop valve at the vessel/manifold must be in the fully open position before operating/testing any bottom blowdown valve, auto TDS control system, level control system, etc. that may drain into the vessel.

This is particularly important in the case of level control systems, as level controls may appear to be working correctly but in reality will be untested, and may be faulty.

Operating conditions

Spirax Sarco blowdown vessels are designed to operate up to:	7 bar g @ 171 °C	(101 psi g @ 340 °F)
They have a minimum operating temperature of:	0 °C	(32 °F)

7. Maintenance

WARNING:

Isolate the vessel by closing and securing stop valves on blowdown lines at the vessel inlet, closing all boiler blowdown valves and opening any line valves (i.e. double block and bleed principle). Repairs to pressure vessels are not recommended as specialist design procedures and welding operations are required, together with reinspection by a qualified competent person.

6 month intervals

The vessel must be drained every 6 months to remove concentrated blowdown water/sludge. Any accumulation of sludge within the vessel must be cleared by passing a hose through the inspection/access hatch and flushing with the drain valve open.

Before reusing, after draining/flushing the vessel, it must be replenished to its normal working level (level with the outlet on the centreline of the vessel shell) by introducing fresh water until it discharges at the outlet.

14 month intervals

Blowdown vessels should be thoroughly examined by a 'competent person' every 14 months or at every major boiler inspection. An examination would normally include a visual examination of the internal surfaces of the vessel to ensure that there is no excessive corrosion, erosion, or scaling, and a check for scaling or other obstruction in the vessel vent, outlet or outlet anti-syphon hole.

It is the task of the 'competent person' to determine which checks to carry out, and the necessary action to be taken.

Fit a new gasket to the inspection opening every time the cover is removed (see Section 8, Spare parts).

The Table below gives detail of inspection port openings for each model:

Vessel designation	Inspection port opening
BDV60/3, BDV60/4, BDV60/5	Handhole size 150 x 100 mm oval
BDV60/6, BDV60/8, BDV60/10	2 x hole size 150 x 100 mm oval

Note: Vessels should be included in a written scheme of examination compiled by a suitably qualified competent person who is responsible for determining the frequency of examination.

7. Spare parts

Gaskets are the only available spares for blowdown vessels:

Available spares - Inspection opening gaskets

Vessel type

BDV60/3 BDV60/4 BDV60/5	Outside dimensions 180 x 130 mm	1 off Torus gasket Spirax Sarco Part no. 4050181
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BDV60/6 BDV60/8 BDV60/10	Outside dimensions 180 x 130 mm	2 off Torus gasket Spirax Sarco Part no. 4050181
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How to order spares

Example: 1 off Inspection opening gasket for a BDV60/3 - Spirax Sarco Part no. 4050181.

BDV60 BLOWDOWN VESSEL

