

Installation and Maintenance Manual

Forbes Marshall Flash Vessel with Insulation Jacket

FMFV

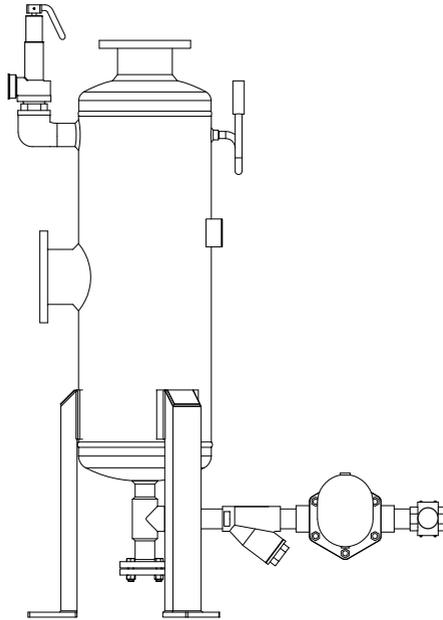


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PLEASE NOTE - Throughout this manual this cautionary symbol is used to describe a potential damage or injury that might occur if the safety considerations are overlooked. This symbol denotes CAUTION, WARNING or DANGER.



1. Preface:

This manual is intended for anyone using, commissioning, servicing, or disposing of the below mentioned products safely and efficiently.

Forbes Marshall Flash Vessel With IJ [FMFV]

SIZE : DN150 (6"), DN200 (8"), DN300 (12"), DN375 (15")

PLEASE NOTE:

Throughout this manual the following cautionary symbol is used to describe a potential damage or injury that might occur if the safety considerations are overlooked.

2. Important Safety Notes:



Read this section carefully before installing/operating/maintaining the product. The precautions listed in this manual are provided for personnel and equipment safety.

Furthermore, Forbes Marshall accepts no responsibility for accidents or damage occurring as a result of failure to observe these precautions. Note that the product is designed to perform for non-contaminated fluids only. A contamination in the form of chemical, foreign particle etc. can lead to problem with product performance and life of the product.

If these products in compliance with the operating instructions are, properly installed, commissioned, maintained and installed by qualified personnel (refer Section 2.7), the safety operations of these products can be guaranteed. General instructions for proper use of tools and safety of equipments, pipeline and plant construction must also be complied with.

2.1 Intended use:

Check if the product is suitable for intended use/ application by referring to the installation and maintenance instructions, name plates and technical information sheets. (TIS)

i) The product is suitable for use as defined in the technical information sheet. In case the need arises to use the product on any other fluid please contact Forbes Marshall for assistance.

ii) Check for the suitability in conformance to the limiting conditions specified in technical information sheet of the product.

iii) The correct installation and direction of fluid flow has to be determined.

iv) Forbes Marshall products are not intended to resist external stresses, hence necessary precautions to be taken to minimize the same.

2.2 Accessibility and Lighting:

Safe accessibility and working conditions are to be ensured prior to working on the product.

2.3 Hazardous environment and media:

The product has to be protected from hazardous environment and check to ensure that no hazardous liquids or gases pass through the product.

2.4 Depressurizing of systems and normalizing of temperature:

Ensure isolation and safety venting of any pressure to the atmospheric pressure. Even if the pressure gauge indicates zero, do not make an assumption that the system has been depressurized.

To avoid danger of burns allow temperature to normalize after isolation.

2.5 Tools and consumables:

Ensure you have appropriate tools and / or consumables available before starting the work. Use of original Forbes Marshall replacement parts is recommended.

2.6 Protective clothing:

Consider for the requirement of any protective clothing for you/ or others in the vicinity for protection against hazards of temperature (high or low), chemicals, radiation, dangers to eyes and face, noise and falling objects

2.7 Permits to work:

All work to be carried out under supervision of a competent person. Training should be imparted to operating personnel on correct usage of product as per Installation and Maintenance instruction. "Permit to work" to be complied with (wherever applicable), in case of absence of this system a responsible person should have complete information and knowledge on what work is going on and where required, arrange to have an assistant with his primary goal and responsibility being safety. "Warning Notices" should be posted wherever necessary.

2.8 Handling:

There is a risk of injury if heavy products are handled manually. Analyze the risk and use appropriate handling method by taking into consideration the task, individual, the working environment and the load.

2.9 Freezing:

Provision should be made to protect systems which are not self-draining, against frost damage (in environment where they may be exposed to temperatures below freezing point) to be made.

2.10 Returning products:

Customers and Stockist are reminded that, when returning products to Forbes Marshall 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 or potentially hazardous.

3. Brief Product Information:

3.1 Description:

Forbes Marshall Flash Vessel, FMFV, is particularly suited to boiler blowdown heat recovery systems where efficient separation of flash steam from blowdown is essential to prevent contamination of the boiler feedtank and /or heat transfer surfaces. It is equally suited to condensate flash steam applications.

3.2 Sizes and Pipe Connections: CLASS 150 / CLASS 300

Sizes (DN)	Condensate Inlet	Condensate Outlet	Flash Steam Outlet
6"	2" Class 150	2" Class 150	2" Class 150
8"	3" Class 150	2" Class 150	3" Class 150
12"	4" Class 150	2" Class 150	4" Class 150
15"	6" Class 150	2" Class 150	6" Class 150

Sizes (DN)	Condensate Inlet	Condensate Outlet	Flash Steam Outlet
6"	2" Class 300	2" Class 300	2" Class 300
8"	3" Class 300	2" Class 300	3" Class 300
12"	4" Class 300	2" Class 300	4" Class 300
15"	6" Class 300	2" Class 300	6" Class 300

3.3 Limiting Conditions:

CLASS 150 CLASS 300

PMO - Maximum working pressure	152 Psig	406 Psig
TMO - Maximum working temperature	356 °F	797 °F
Cold hydraulic test pressure	305 Psig	609 Psig

*For higher pressure applications contact Forbes Marshall

3.4 Available Accessories:

Available Accessories:

Flash Vessel	Safety Valve	Float trap	Strainer	Sight Glass
6"	3/4"	2"	2"	2"
8"	3/4"	2"	2"	2"
12"	1 1/2"	2"	2"	2"
15"	2"	2"	2"	2"

Dimensions (approx. in inches):

Size	A	B	C	D
6	6.6	59.2	4.6	35.8
8	8.6	70.6	3.9	41.6
12	12.8	60.9	4.7	35.0
15	15.7	69.3	4.3	40.9

* Insulation Jacket is optional

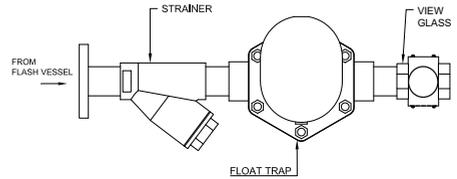
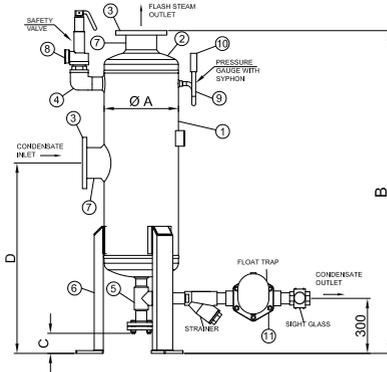


Figure 2 : Available Accessories

Figure 1 : Forbes Marshall Flash Vessel with IJ

Material:

Item No	Description	Material	Standard CLASS 150	Standard CLASS 300
1	Main shell	Carbon steel	IS 3589 (ASTM A 53 Gr. B)	IS 3589 (ASTM A 53 Gr. B)
2	Dish end	Carbon steel	IS 2062, Gr. B (ASTM A 36)	IS 2062, Gr. B (ASTM A 36)
3	Flash steam outlet flange	Carbon steel	ASTM A516 Gr. 70	ASTM A516 Gr. 70
4	Elbow	Forged carbon steel	ASTM A105 Fo	ASTM A105
5	2" Drain assembly	Carbon steel		
6	Support legs	Carbon steel	IS 2062, Gr. B (ASTM A 36)	IS 2062, Gr. B (ASTM A 36)
7	Nozzle pipe	Carbon steel	IS 1239 Class C (ASTM A 135)	IS 1239 Class C (ASTM A 135)
8	Safety valve	SS304	SS304	SS304
9	Syphon	Carbon steel	ASTM A106 Gr. B	ASTM A106 Gr. B
10	Pressure gauge	Stainless steel	SS 304	SS 304
11	Trap set			
11.1	Strainer		IS 210 Gr. FG260 (ASTM A 48 cl.35)	ASTM A 216 Gr WCB
11.2	Float trap		IS 210 Gr. FG260 (ASTM A 48 cl.35)	ASTM A 216 Gr WCB
11.3	Sight glass		IS 210 Gr. FG260 (ASTM A 48 cl.35)	ASTM A 216 Gr WCB

Note: Material specification mentioned in bracket are for reference only.

How to size

Use the chart below to select the appropriate flash vessel. It is necessary to know the pressure on the steam traps or boiler pressure in the case of blowdown heat recovery, the flash steam pressure (desired or existing) and the condensate or blowdown flow rate.

Example 1: (solid lines)

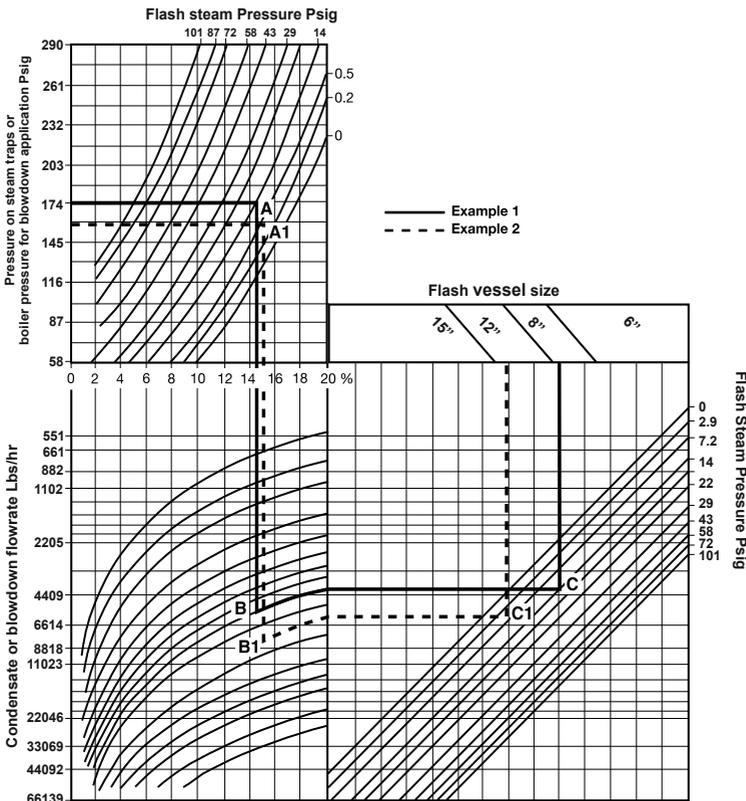
A boiler plant operating at 174 Psig has a TDS control blow down flow rate of 5511 Lbs/hr (3 boilers at 1836 Lbs/hr each). The flash steam from the blow down is to be added to the low pressure steam system operating at 14.5 psig

- From boiler pressure move horizontally to flash steam pressure -**A**
- Drop vertically to blow down flow rate in Lbs/hr -**B**
- Follow curve to right-hand scale and across to same flash pressure -**C**
- Move upwards to flash vessel size. Select flash vessel-in this case a **8" FMFV** is required.

Example 2: (dotted lines)

A plant operating on steam at 160 Psig condenses 8818 Lbs/Hr of steam.
Flash is to be recovered at 7.2 Psig

- From pressure on steam traps move horizontally to flash steam pressure -**A1**
- Drop vertically to condensate flow rate in Lbs/hr -**B1**
- Follow curve to right hand scale and across to same flash pressure -**C1**
- Move upwards to flash vessel size. Select flash vessel in this case a **12" FMFV** is required.



4. Operation:

The Forbes Marshall flash Vessel allows for safe expansion of condensate coming in at high pressure. A sudden drop in pressure in the separator results in the flashing of the condensate. This flash steam is separated from the low pressure condensate, and is used in a low pressure steam system. The condensate is recovered back to the feed water tank or any other process which requires hot water utility.

5. Installation Guidelines: (Refer to Figure 3)



Note: Before implementing any installations observe the "Important Safety notes" in section 2. Referring to the Installation and Maintenance Instructions, name-plate and Technical Information Sheet, check that the product is suitable for the intended installation.

1. The Forbes Marshall flash Vessel is designed for vertical installation and should be mounted with the flash steam outlet at the top, with the condensate inlet from port provided on the main shell.
2. Each Forbes Marshall flash Vessel incorporates a screwed socket for mounting of pressure gauge along with U type syphon.
3. Drainage can be done by opening the 2" blank flange provided at the bottom of Forbes Marshall flash Vessel.
4. Connection is provided on the Forbes Marshall flash Vessel for mounting of safety valve and 2" flange provided at the bottom for mounting of float trap module (Single orifice float trap, strainer and sight glass) which is a part of Forbes Marshall flash Vessel accessories.
5. Non return valve should be installed after the float trap module when connected to the system.
6. The flash steam outlet can be connected to the Deaerator head or can be used in areas where low pressure steam heating application is required and condensate outlet should be connected to condensate recovery system respectively.

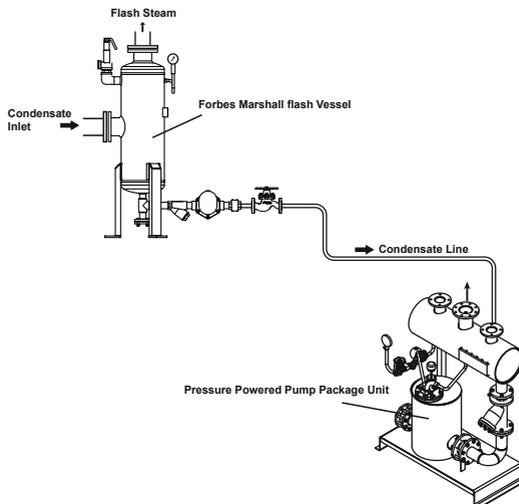


Figure 3: Installation of Forbes Marshall flash Vessel with PPPU

6. Start-up and Commissioning:

6.1. Flushing of lines:

As a part of pre-installation, all fluid handling equipment particularly piping should be thoroughly cleaned of scale and the internal debris which accumulates during construction. This is accomplished by blowing or flushing with air, steam, water and other suitable medium.

Follow this step to carry out flushing of lines.

1. Unscrew the drain 2" blank flange provided at the bottom Forbes Marshall flash Vessel. Ensure correct tools, safety procedures and protective equipment are used all the times.
2. Drain the condensate for 10-15 minutes or until clear condensate starts coming out, whichever is earlier.

Note: Blank Flange should be used to remove muck or dirt and not for welding fluxes and metal burrs. For a detailed procedure on flushing of lines please visit Forbes Marshall website.

6.2. Commissioning:

After installation or maintenance ensure that the system is fully functioning by confirming fluid is passing through it.

1. After flushing of lines is complete, ensure that drain 2" blank flange is closed.
2. All the connections to adjoining pipework or plant are secured safely to ensure that no external stresses are introduced into the Forbes Marshall flash Vessel unit. Please make sure that no external object or material is present inside the vessel.
3. Once the safety valve has been fitted, check that there are no leaks from inlet and outlet connections. Test the safety valve by raising the system pressure. Check that the safety valve at the correct set pressure and the over pressure is limited to 10% of the system operating pressure.
4. Ensure non-return valve is fitted after the float trap module.
5. Checks for leaks and attend, if any.

7. Maintenance Guidelines:



Before undertaking any maintenance on the product it must be isolated from both supply line and return line and any pressure should be allowed to safely normalize to atmosphere. The product should then be allowed to cool.

1. Forbes Marshall flash Vessel requires no regular maintenance; however, routine and preventive maintenance chart should still be strictly followed.
2. Forbes Marshall Flash vessel should be checked by regular internal visual inspection for any signs of excessive corrosion or damage, by a suitably qualified competent person.

7.2. Routine and Preventive Maintenance:

Please refer to the maintenance schedule mentioned in the table below to undertake routine maintenance of the Forbes Marshall flash Vessel.

No.	PARAMETER TO BE CHECKED	FREQUENCY FOR CHECKING VARIOUS PARAMETERS					
		Daily	Weekly	Monthly	Quarterly	Half Yearly	Annually.
1	Checking of flash steam pressure in Forbes Marshall flash Vessel	Y					
2	Cleaning float trap internals of FMFV accessories				Y		
3	Visual inspection for leakages		Y				
4	Arresting leaks		Y				
5	Visual inspection of Forbes Marshall Safety Relief Valve		Y				
6	Overhauling and cleaning of Forbes Marshall Safety Relief Valve						Y

8. Available Spares:

No spares are provided for the Forbes Marshall flash Vessel. Repairs on the Forbes Marshall flash Vessel is not recommended as specialized designing and repairing is required under the supervision of a qualified and competent person.

How to Order:

Example : 12" Forbes Marshall Flash Vessel, FMFV, with accessories.

9. Warranty Period:

As per the ordering information and agreement in the contract.



www.forbesmarshall.com

Forbes Marshall Arca

Codel International

Krohne Marshall

Forbes Vyncke

Forbes Marshall Steam Systems

A: Forbes Marshall Pvt. Ltd.

Opp. 106th Milestone, CTS 2220,
Mumbai-Pune Road, Kasarwadi,
Pune MH 411034 INDIA

P: +91(0)20-68138555

F: +91(0)20-68138402

E: ccmidc@forbesmarshall.com

Forbes Marshall International Pte. Ltd.

16A, Tuas Avenue 1,
#05-21, JTC Space @Tuas
Singapore - 639533

P: +65 6219 3890

CIN No: U28996PN1985PTC037806