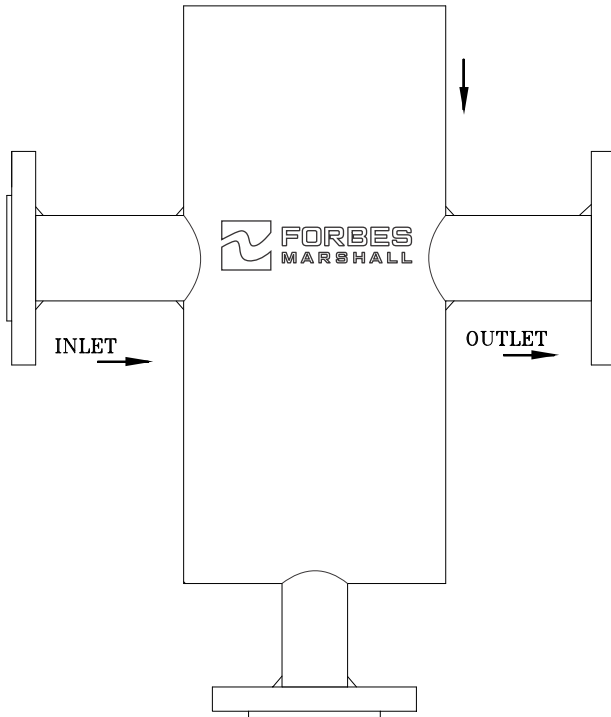


# Installation and Maintenance Manual

## Forbes Marshall Moisture Separator

### Fabricated

FMSEPF8



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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 the below mentioned products safely and efficiently.

### **Forbes Marshall Moisture Separator-Fabricated [FMSEFPFB]**

**Size:** DN15 (1/2 “), DN20 (3/4”), DN25 (1”), DN40 (1 ½ “), DN50 (2”), DN65 (2 ½ “), DN80 (3”), DN100 (4”), DN125 (5”), DN150 (6”), DN200 (8”), DN250 (10”) & DN300 (12”)

### **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.

- 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 Product Disposal:**

It is necessary to dispose this product only in accordance with local regulations at the authorized, qualified collecting point specified for equipment's and its parts—Please refer the part details mentioned in the material table of this manual. Please follow all waste disposal guidelines (Management & Handling) as published by local governing authorities in India & abroad

### **2.11 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:

The Forbes Marshall Moisture Separator - Fabricated, FMSEPFb is a fabricated type separator used for the removal of entrained liquids in steam, so that they can be drained away as condensate.

#### 3.2 Sizes:

DN 15, 20, 25, 40, 50, 65, 80, 100, 125, 150, 200, 250 and 300

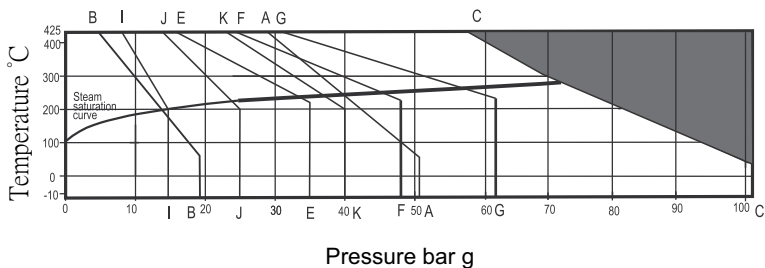
**Note: Available with IBR test certificates, on request.**


#### 3.3 Limiting Conditions:

Flange types	Max. Working pressure	Max. Working temp.
TAB 'H'	34 bar g at 232 °C	425 °C at 17 bar g
TAB 'J'	48 bar g at 232 °C	425 °C at 24 bar g
TAB 'K'	62 bar g at 232 °C	425 °C at 31 bar g
ASA 150	19.6 bar g at 38 °C	425 °C at 5.5 bar g
ASA 300	42 bar g at 250 °C	425 °C at 28.8 bar g
ASA 600	77 bar g at 325 °C	425 °C at 57.5 bar g
PN 16	16 bar g at 200 °C	425 °C at 9.1 bar g
PN 25	25 bar g at 200 °C	425 °C at 14.25 bar g
PN 40	40 bar g at 200 °C	425 °C at 22.8 bar g

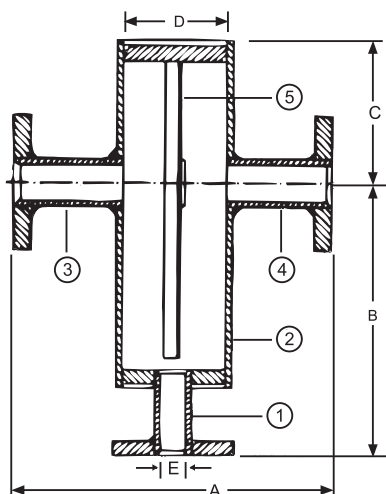
#### 3.4 Operating range:

Pressure / temperature limits



 This product must not be used in this region.

A-A	Flanged ANSI 300	G-G	BS10 Table K
B-B	Flanged ANSI 150	I-I	PN16
C-C	Flanged ANSI 600	J-J	PN25
E-E	BS10 Table H	K-K	PN40
F-F	BS10 Table J		



**Figure 1: Forbes Marshall Moisture Separator - Fabricated**

**Materials :**

Sr. No.	Part	Material
1	Drain	ASTM A106 Gr B
2	Body	ASTM A106 Gr B
3	Inlet	ASTM A106 Gr B
4	Outlet	ASTM A106 Gr B
5	Baffle Plate	IS 2002

**Dimensions (approx.) in mm: (Refer Figure 1)**

Sizes (DN)	A	B	C	D	E Nominal	NET WT kg
15	216	203	100	80	15	5
20	241	203	143	80	15	6
25	368	295	149	100	25	11
40	318	276	149	100	25	12
50	470	355	222	150	25	26
65	470	387	225	150	25	29
80	470	477	238	150	25	35
100	575	515	279	200	25	57
125	673	619	346	250	25	100
150	749	775	394	300	25	166
200	870	841	517	400	25	282
250	900	912	610	400	25	336
300	929	960	660	450	25	451

General tolerance + 2%

#### **4. Product Working Principle:**

Forbes Marshall Moisture Separator-Fabricated are designed to separate water particles from steam. As the steam enters the separator body, because of sudden enlargement of area and hence the drop in velocity, some heavy water particles just drop off to the bottom before even reaching to the baffles. When the steam impinges on the baffles present inside the separator body water particles present in steam are separated from flow path on account of change in momentum. The water is collected at the bottom of the separator and drained through the trap assembly fitted at the bottom of the separator.

## **5. Installation Guidelines:**



**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.

### **5.1. Flushing of lines:**

As 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.

**Note:** For a detailed procedure on flushing of lines please visit Forbes Marshall website.

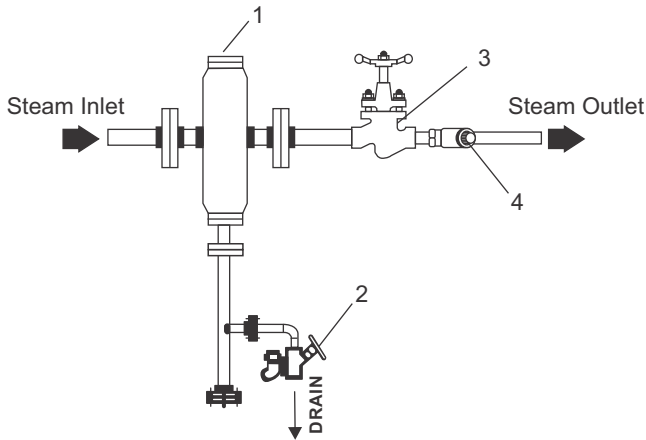
### **5.2. Installation of Forbes Marshall Moisture Separator-Fabricated:**

1. Determine the correct installation situation and the direction of fluid flow.
2. Install Forbes Marshall Moisture Separator-Fabricated vertically with the arrow in the direction of the flow.
3. Check materials, pressure and temperature and their maximum values. If the maximum operating limit of the product is lower than that of the system in which it is being fitted, ensure a safety device is included in the system to prevent over pressurization.
4. Remove protective covers from all connections and the protective film from all name-plates, where appropriate, before installation on steam or other high temperature applications.
5. The Forbes Marshall Separator should be lagged.



**Important Installation note : (Refer to Figure 2)**

To ensure that any separated liquid is drained quickly, a suitable liquid drainer or steam trap must be connected to the drain connection. A FM Pipeline connector (FMPC52) with FM universal thermodynamic trap is recommended. For those steam systems where air can be present, air can collect in the upper portion of the separator. In this situation a suitable air vent should be connected to the air vent connection. Consult Forbes Marshall for further details.



**Figure2: Typical Installation of FMSEPF B**

Part No.	Description
1	Forbes Marshall Moisture Separator FMSEPF B
2	Drain Trap Assembly
3	Piston Valve
4	Strainer

## 6. Troubleshooting:

If the expected performance is unachievable after the installation of Forbes Marshall Moisture Separator-Fabricated, check the following points for appropriate corrective measures.

Failure Mode	Possible Cause	Remedy
Not draining moisture	Drip leg or Drain trap blocked	Remove the separator and flush it. Clean the drain trap assembly
Steam Leaking	Flange Gasket damaged	Remove and replace the gasket

### How to Order:

Example: 1 No. DN100 Forbes Marshall Moisture Separator - Fabricated FMSEPFB Flanged. BS10 table K.

## 7. Warranty Period:

As per the ordering information and agreement in the contract



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