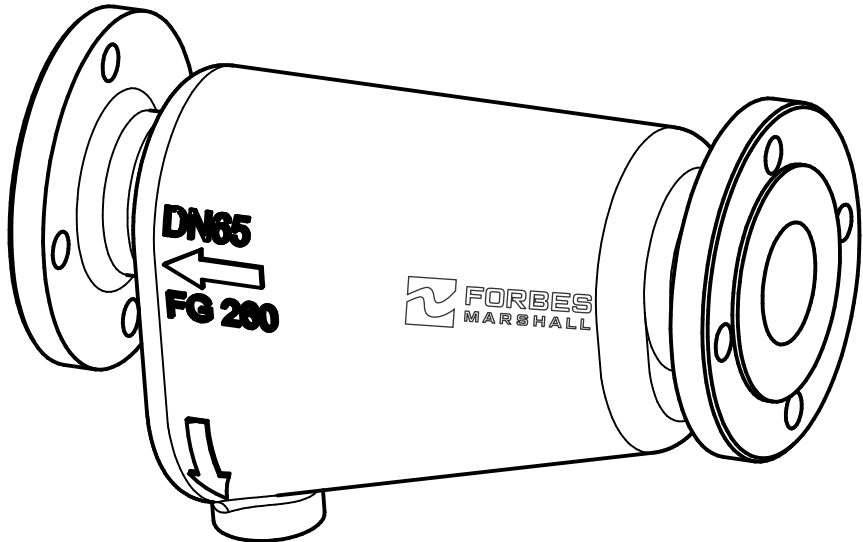


# Installation and Maintenance Manual

## Forbes Marshall Moisture Separator

### Flanged

FMSEP54



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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 - Flanged (FMSEP54):**

Size: DN25 (1"), DN40 (1 ½ "), DN50 (2"), DN65 (2 ½ "), DN80 (3"), DN100 (4"), DN125 (5"), DN150 (6"), DN200 (8")

### **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 pressure gauge indicates zero, do not make an assumption that the system has been the 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<sup>s</sup> 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.

### 3. Brief Product Information:

#### 3.1 Description:

The Forbes Marshall Moisture Separator, FMSEP54, is a carbon steel baffle type separator used for the removal of entrained liquids in steam, so that they can be drained away as condensate.

#### 3.2 Sizes and Connections:

Sizes: DN 25, 40, 50, 65, 80, 100, 125, 150 and 200

Flange Connections

BS 10 Table F, H, J, K, ASME B 16.5

Class 150, 300, PN 10, 16, 25 and 40

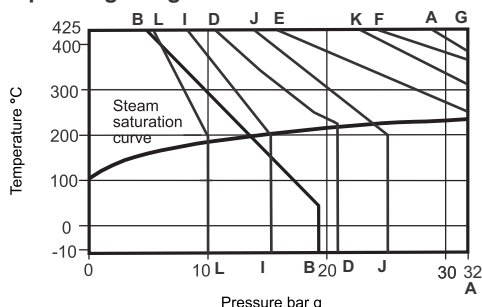
**Notes :** Available with IBR test certificates, on request. Optional insulation packs are available which will increase the performance of the separator.

#### 3.3 Limiting Conditions:

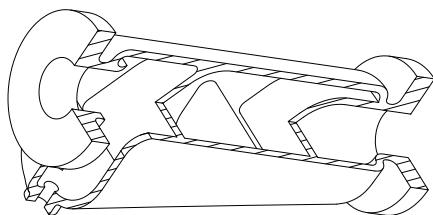
Body design condition	32 bar g at 425 °C
Cold hydraulic test pressure	19.5 bar g

Flange Types	Max. Working Pressure	Max. Working Temp.
TAB 'F'	21 bar g at 232 °C	425 °C at 10.5 bar g
TAB 'H'	32 bar g at 232 °C	425 °C at 17 bar g
TAB 'J'	32 bar g at 232 °C	425 °C at 24 bar g
TAB 'K'	32 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	51.1 bar g at 38 °C	425 °C at 28.8 bar g
PN 10	10 bar g at 200 °C	425 °C at 5.65 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:

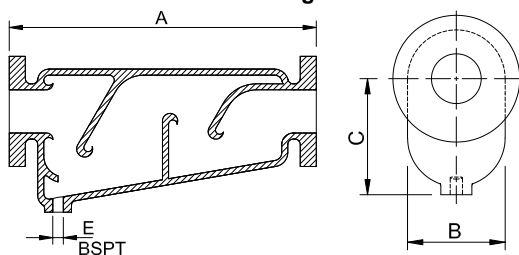


A-A	Flanged ANSI 300
B-B	Flanged ANSI 150
D-D	BS10 Table F
E-A	BS10 Table H
F-A	BS10 Table J
G-A	BS10 Table K
L-L	PN 10
I-I	PN 16
J-J	PN 25
K-A	PN 40



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

### 3.5 Product Dimension and Drawing:



**Figure 2: Dimensional drawing of FMSEP54**

**Dimensions: (approx.) in mm:**

Sizes DN	Dimensions				Weight Kg
	A	B	C	E	
25	280	70	100	20 DN	14
40	390	89	111	20 DN	22
50	472	120.5	146	25 DN	32
65	405	146	171	20 DN	40
80	510	152.4	174	25 DN	69
100	720	200	238	25 DN	114
125	705	354	233	25 DN	184
150	720	375	232	25 DN	200
200	762	416	308	40 DN	300

General Tolerance:  $\pm 3$

## 4. Product Working Principle:

Forbes Marshall Moisture separator 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 is drained through the trap assembly fitted at the bottom of the moisture 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.

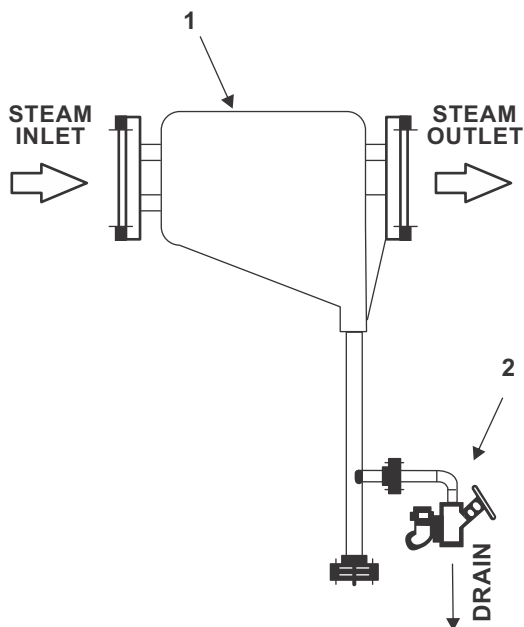
Note: For a detailed procedure on flushing of lines please visit Forbes Marshall website.

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

1. Determine the correct installation situation and the direction of fluid flow.
2. FMSEP54 is installed horizontally 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 Moisture Separators should be lagged.

### Important Installation note: (Refer to Figure 3)

To ensure that any separated liquid is drained quickly, a suitable liquid drainer or steam trap must be connected to the drain connection. 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.



**Figure3: Typical Installation of FMSEP54 on a steam line**

Part No.	Description
1	Forbes Marshall Moisture Separator FMSEP54
2	Drain Trap Assembly



**6. Troubleshooting:**

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

Failure Mode	Possible Cause	Remedy
Not draining moisture	Drip leg or Drain trap assembly 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. DN 40 Forbes Marshall Moisture Separator C.S. FMSEP54 Flanged BS 10 Table "K" IBR

**7. Warranty Period:**

As per the ordering information and agreement in the contract.



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Forbes Marshall Arca

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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](mailto: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