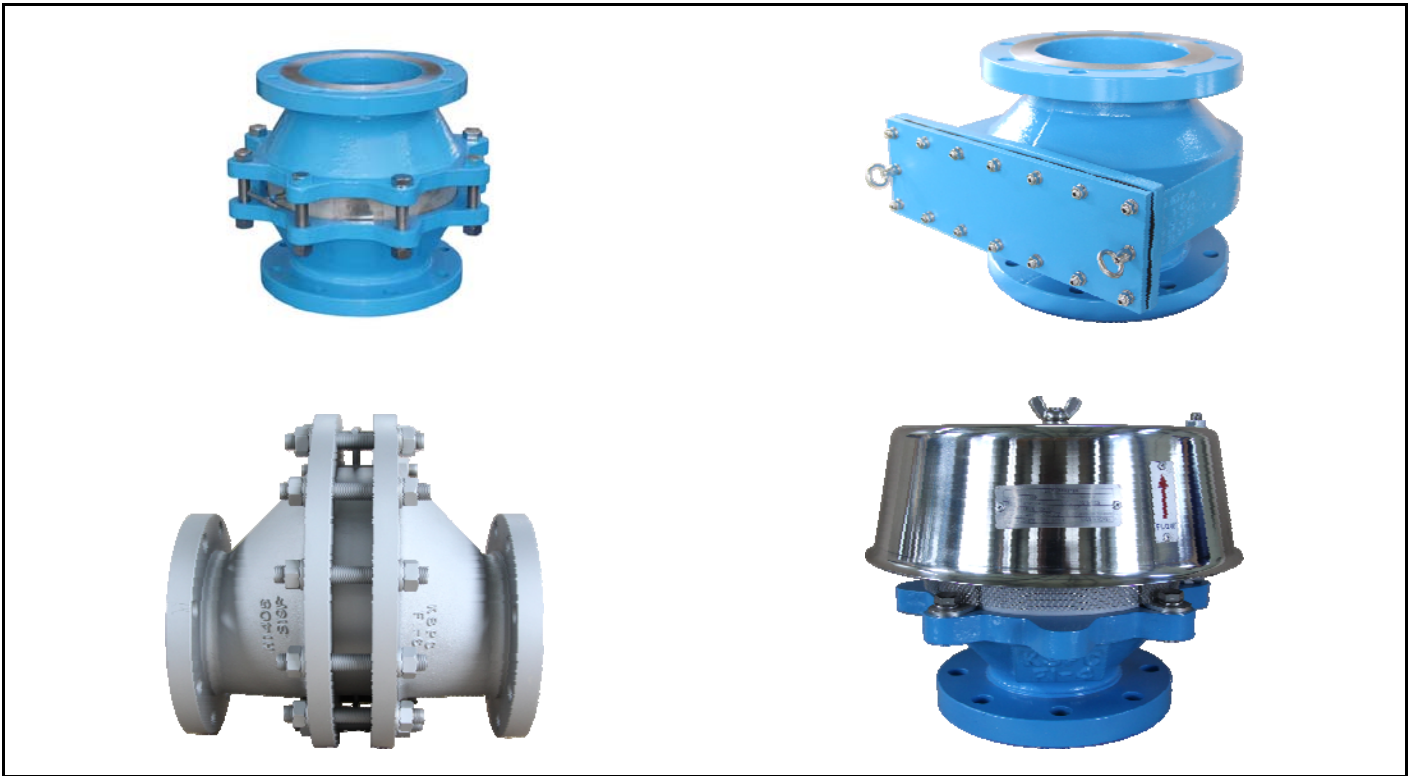


# KSFI / KSFH / KSFL / KSFE TYPE

## Deflagration Flame Arresters

### INSTRUCTION MANUAL



### CONTENTS

- ◆ General Description
- ◆ Operation
- ◆ Shop / Job Site Testing
- ◆ Installation
- ◆ Maintenance

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## **Section 1. General Description**

- 1-1 The flame arrester is designed, manufactured, and tested according to API 2000 / BS 7244 (EN12874) code.
- 1-2 Flame arrester consist of two main components, the arrester bases and the flame element housing.  
The bases serve as the connecting interface to the piping system.  
The flame elements utilize spiral wound, crimped ribbon constructed of corrosion resistant materials (A240-316L), to insure the best flame quenching performances with minimum pressure drop.
- 1-3 Installed in the top nozzle of the several kinds of the inflammable low pressure storage tank(the ignition point below 65 °C), it is the explosion proof and deflagration proof which blocks the influx of flame ignifed externally into the tank.
- 1-4 In general it is combined with pressure and vacuum relief valve , and designed to provide a large quantity of flow under the small pressure differences.
- 1-5 Designed to use for the transport line of the inflammable low pressure gas and installed in a IN-LINE SYSTEM, like the pipe line which transfer the inflammable gas to the incinerator flame shell or the discharging line of combursted gas to the air, it blocks the spread of ignifed fire.

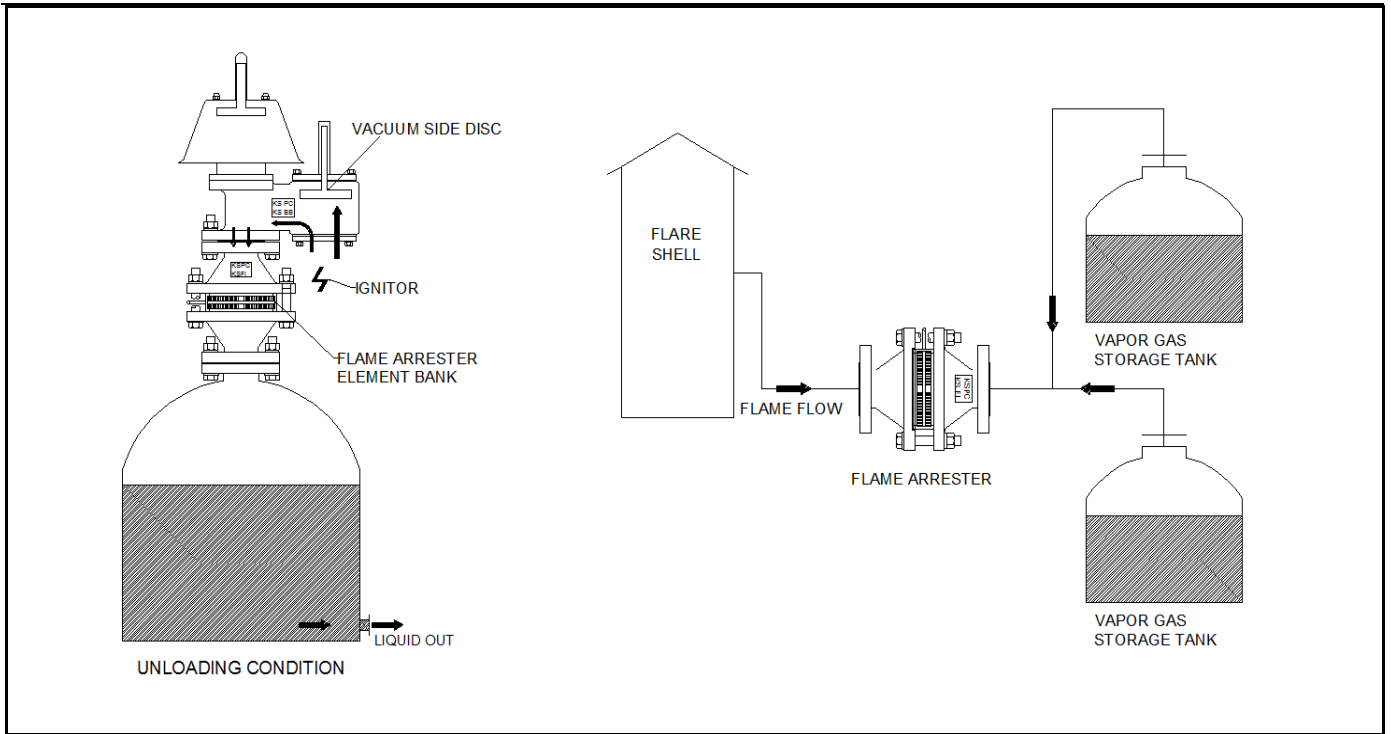


Figure 1.

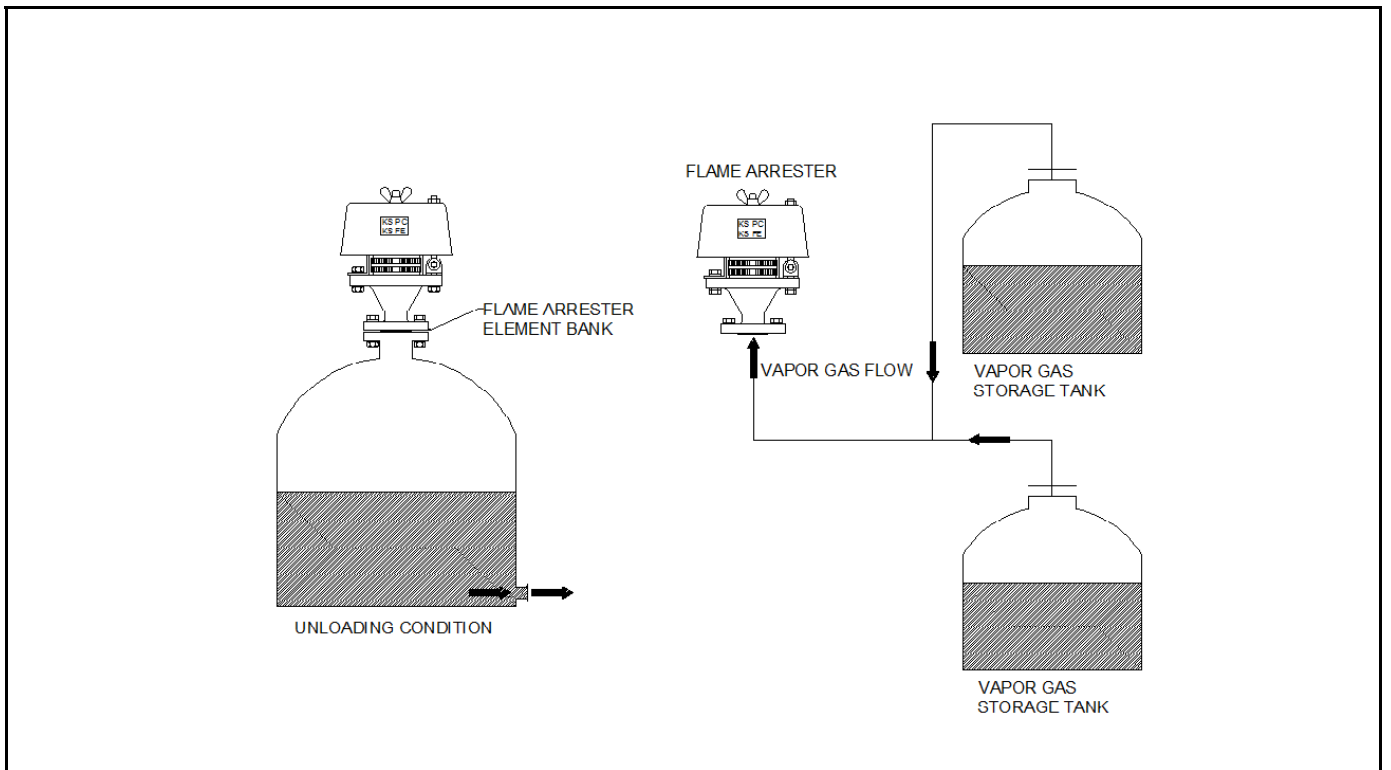


Figure 2

## Section 2-1. Installation of In Line.

2-1-1 Inspect flange faces and flame element for damage or contamination.

2-1-2 Inspect the gasket seating surface of the tank nozzle or pipe. It must be clean, flat, free of scratches, corrosion and tool marks. And the center of gasket within the bolt circle.

2-1-3 Set the arrester between its mating flanges or on the nozzle. It is possible to install the pipe laying vertically and horizontally and install the studs and tighten nuts hand tight.

2-1-4 It is possible to install unrelating to the direction of the gas flow.

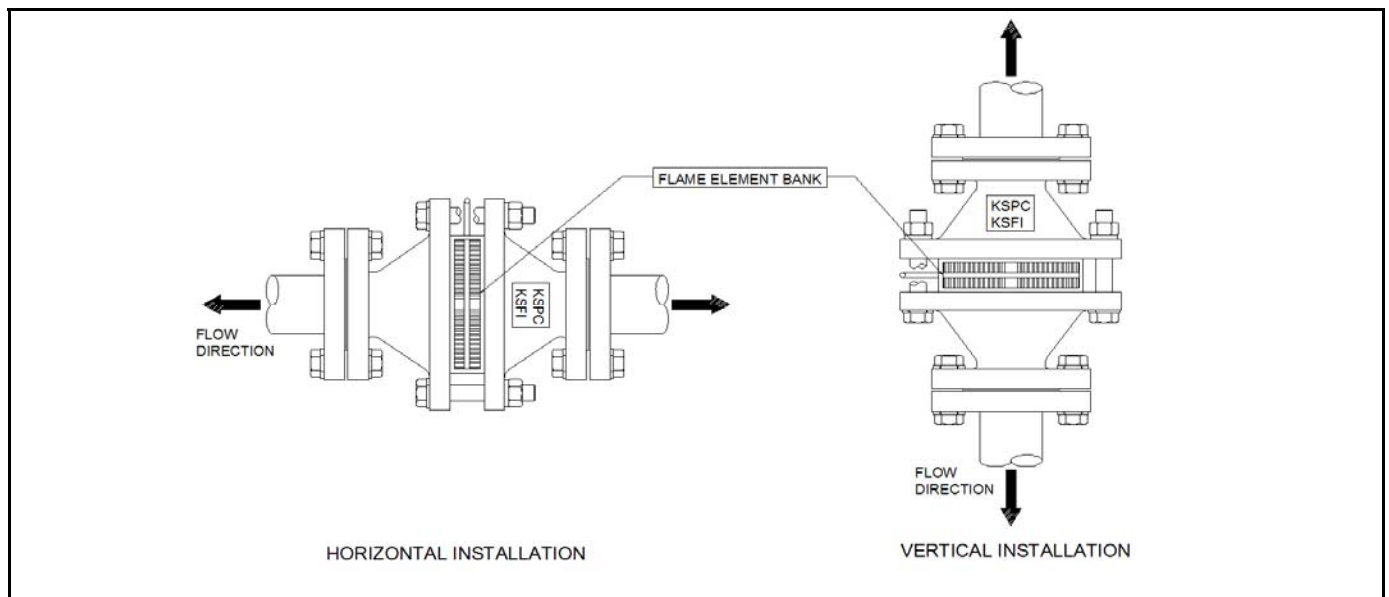


Figure 3 (KSFI TYPE)

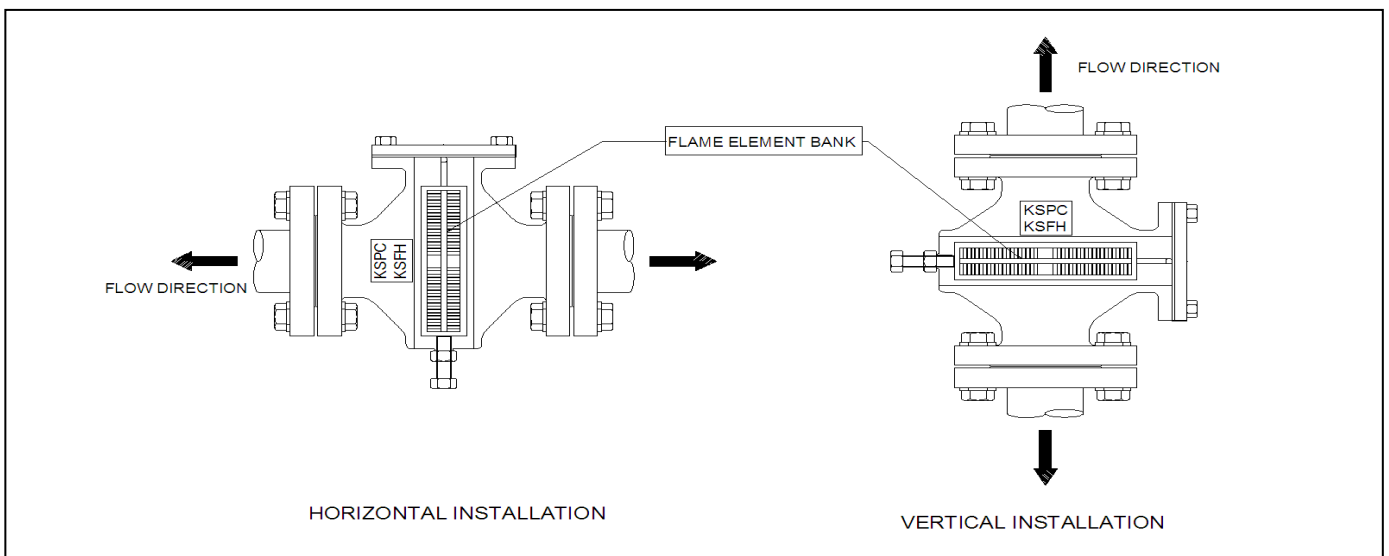


Figure 4 (KSFH TYPE)



## Section 2-2. Installation of End Line.

2-2-1 It should be installed vertically in case of combination with pressure and vacuum relief valve (KSBB / KSBS / KSBG / KSGS model).

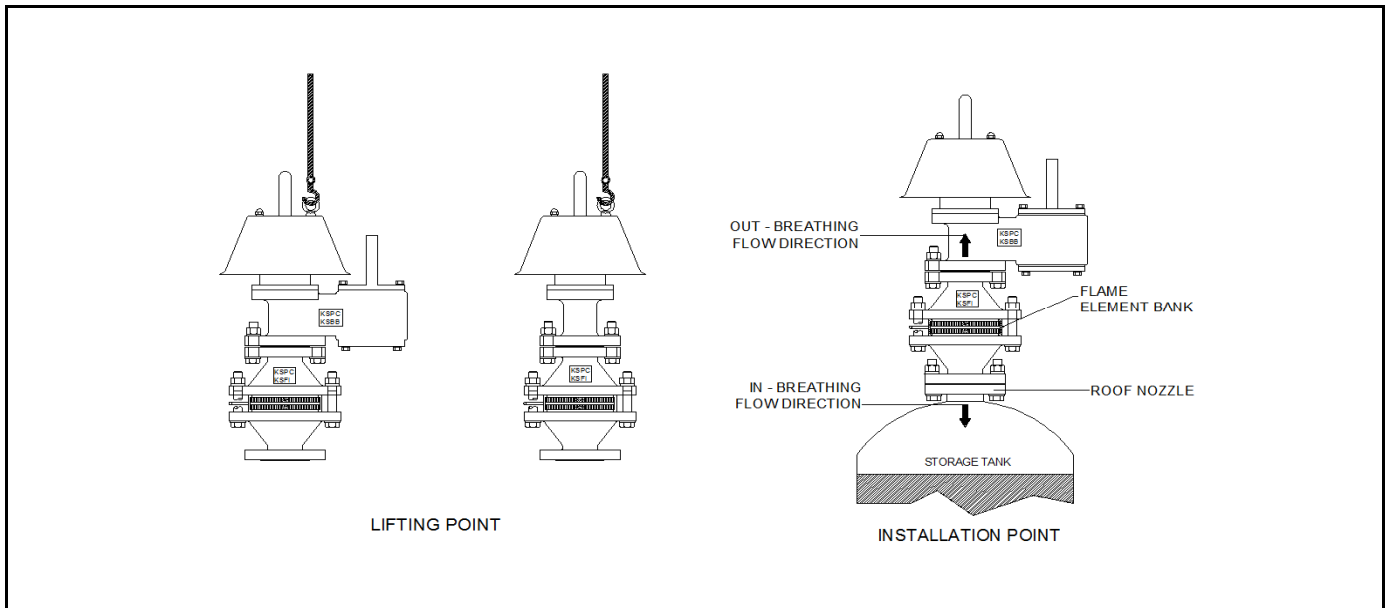


Figure 5 (Combined PVRV)

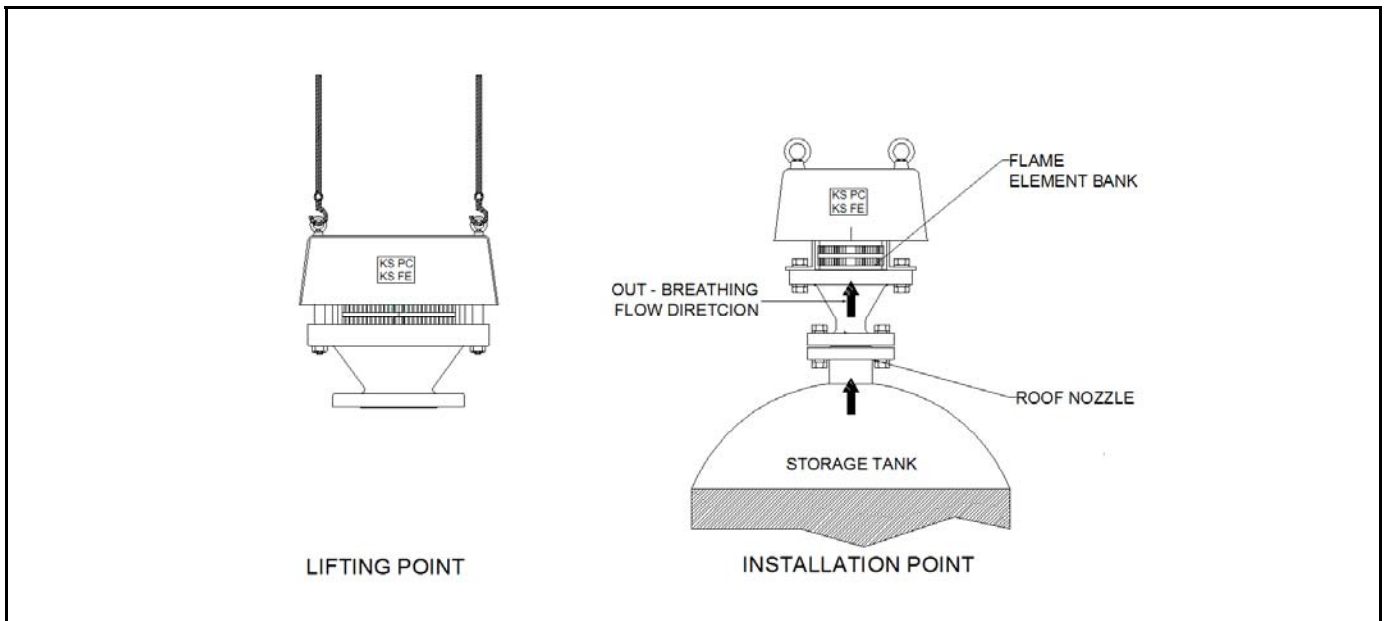


Figure 6. (KSFE TYPE)

**CAUTION**

- \* The handles on the arrester housing are to be used for handling the element only during inspection and maintenance. Do not use the handles to lift the entire flame arrester assembly.
- \* After installation, all connections must be inspected for vapor leakage.



## Section 3. Operation

- 3-1 When the combusted gas pass through the heat exchange lattice net of the element bank of the flame arrester in KSFI type, the combusted gas ignited by the quenching is completely extinguished by lowering the temperature under below the natural ignition point.
- 3-2 Thus, this item is designed to extinguish the fire automatically, and the heat is absorbed by the element bank of flame arrester and the fire cannot be spread.

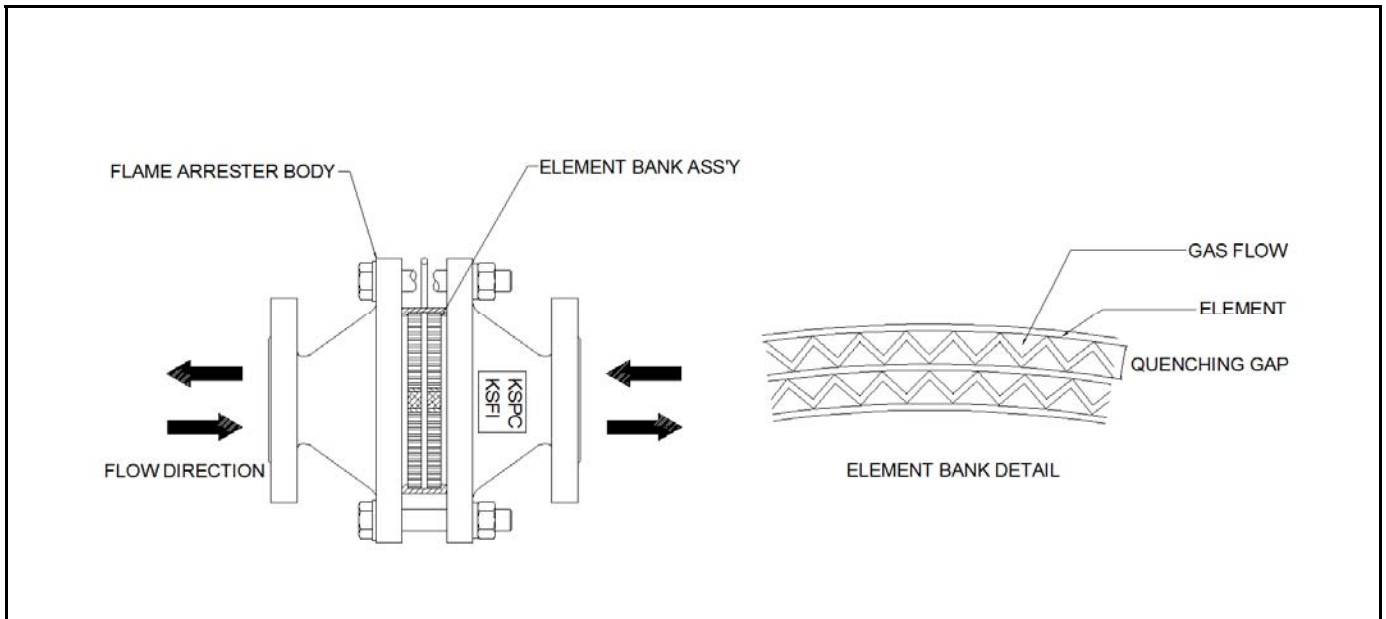


Figure 7 (KSFI TYPE).

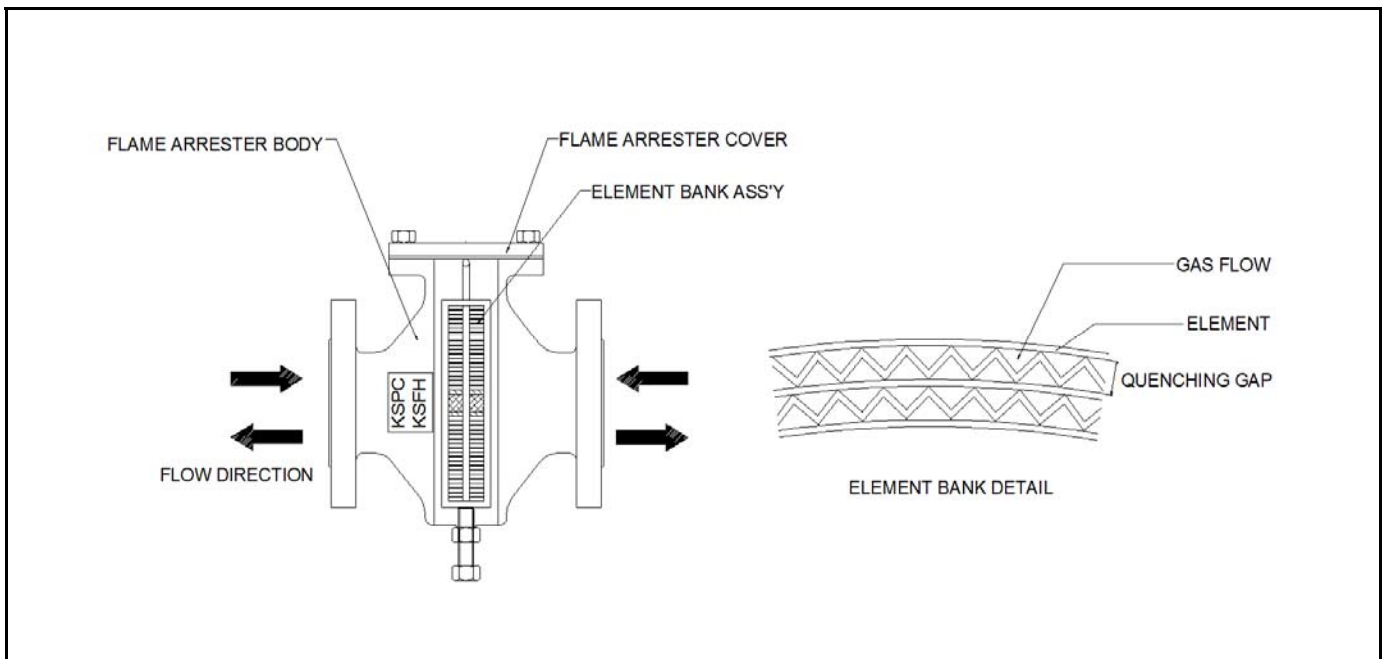


Figure 8 (KSFH TYPE).

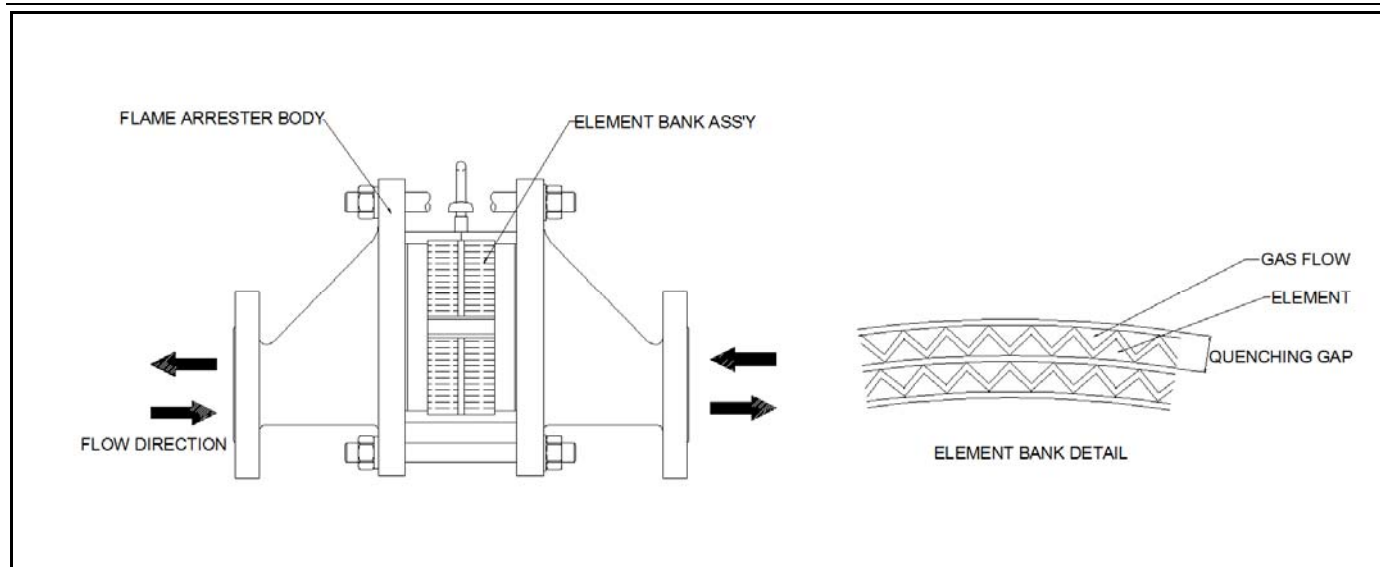


Figure 9 (KSFL TYPE).

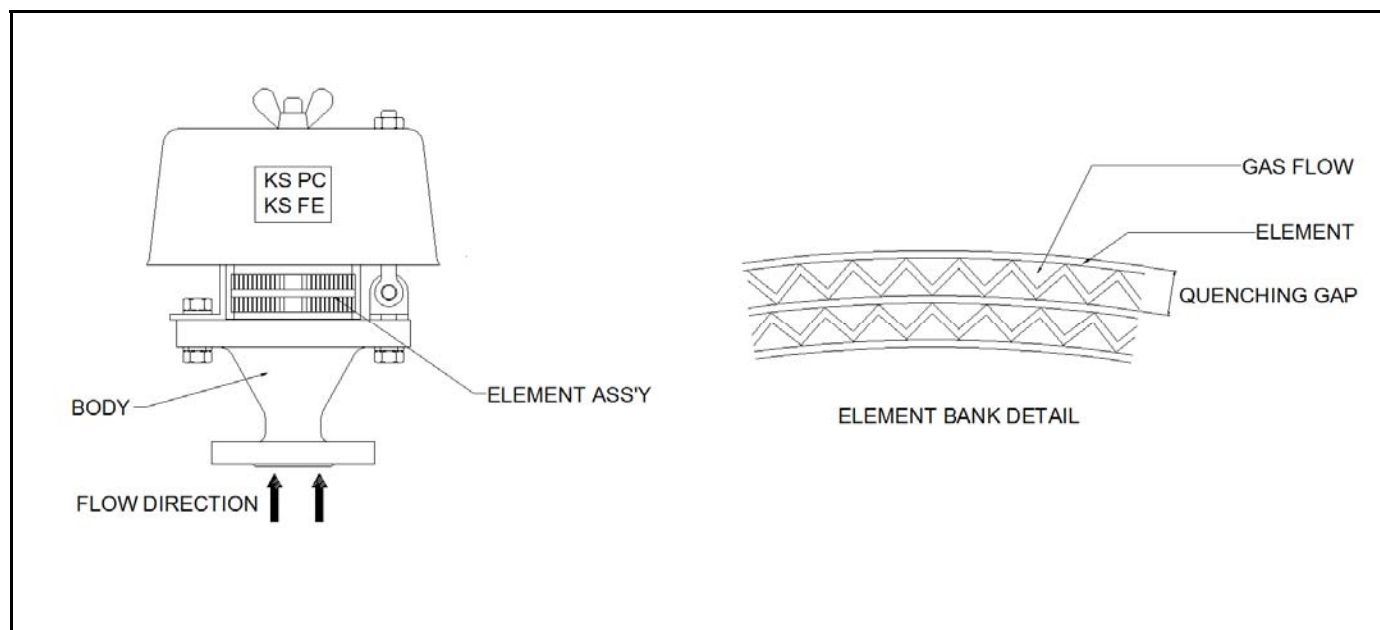


Figure 10 (KSFE TYPE).

## Section 4. Maintenance

### 4-1 General

- 4-1-1 It is recommended to check the flame arrester of element bank ass'y in the first 6 months after operation.
- 4-1-2 Thereafter, it need to be inspected and cleaned regularly in every 6 months at least.
- 4-1-3 To remove the oil dirt in the element of the element bank, soak it in a solvent wash and blow it with compressed air or high pressure steam.
- 4-1-4 The aging and other artificial changes of element quenching gap could be a critical for flashback. In this case, exchange the element bank ass'y into new one.

#### CAUTION

- \* The connection pipeline must be free of all hazardous of flammable vapors before inspection procedures begin.
- \* It is necessary to check the flame arrester regularly installed in the END-LINE of storage tank according to the liquid type and operation condition.
- \* It is necessary to check the element bank ass'y in case of pressure drop in IN-LINE.

### 4-2 THE SAFETY RULES OF MAINTENANCE

- 4-2-1 It is necessary to use the spark free tools for the maintenance work.
- 4-2-2 Before the maintenance work, the inside of storage tank and connection pipe line should be depressurized and all hazardous of flammable gas freed.

#### CAUTION

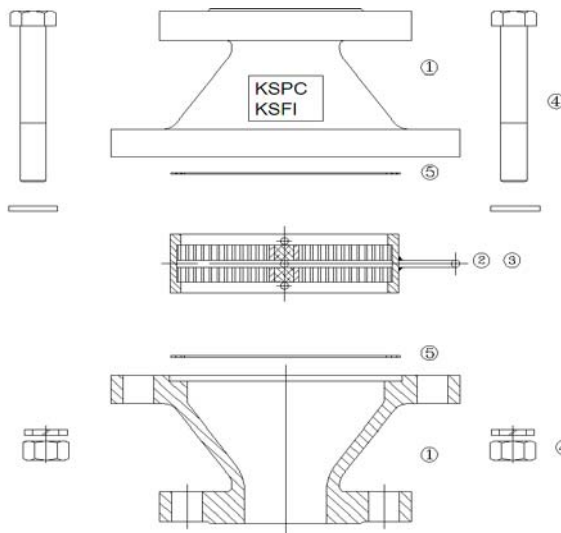
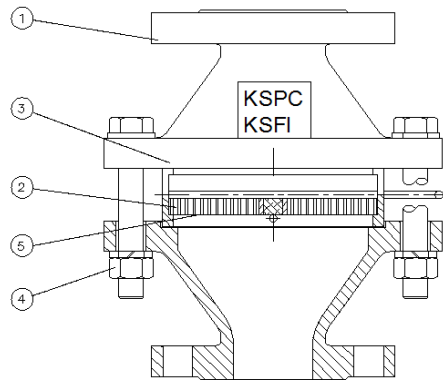
For the maintenance work, it is necessary to take the preventive measures against inflammability and toxicity of liquid or gas in the tank.



4.3 The Procedure Disassembly and Assembly (Figure 4)

● MODEL KSFI TYPE DISASSEMBLY & ASSEMBLY

**-ASSEMBLY-**

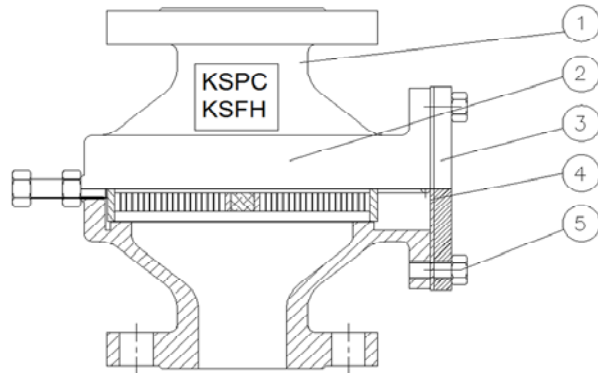


**- DIASSEMBLY-**

- ① BODY
- ② ELEMENT
- ③ ELEMENT RING
- ④ HEX BOLT/NUT
- ⑤ GASKET

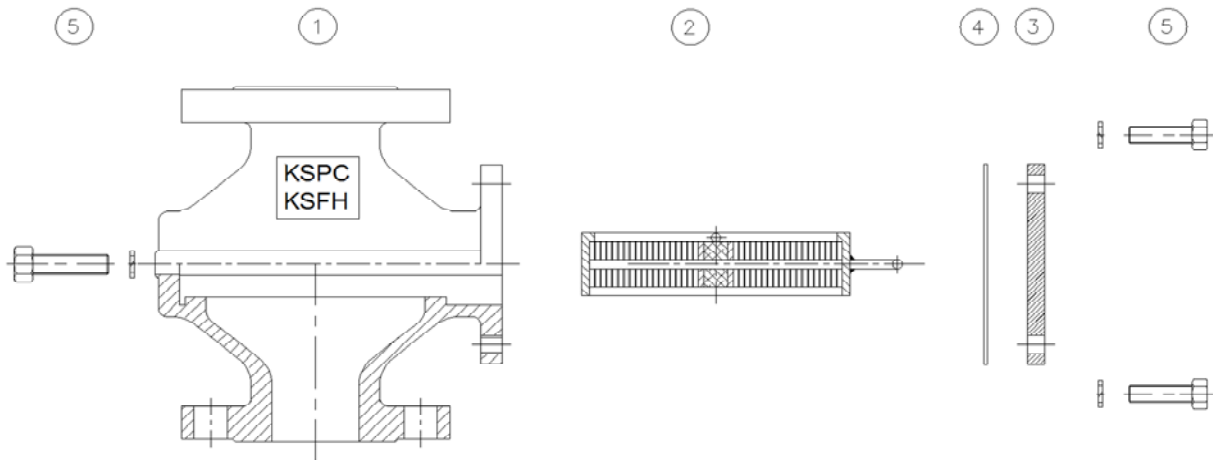
● MODEL KSFH TYPE DISASSEMBLY & ASSEMBLY

-ASSEMBLY-



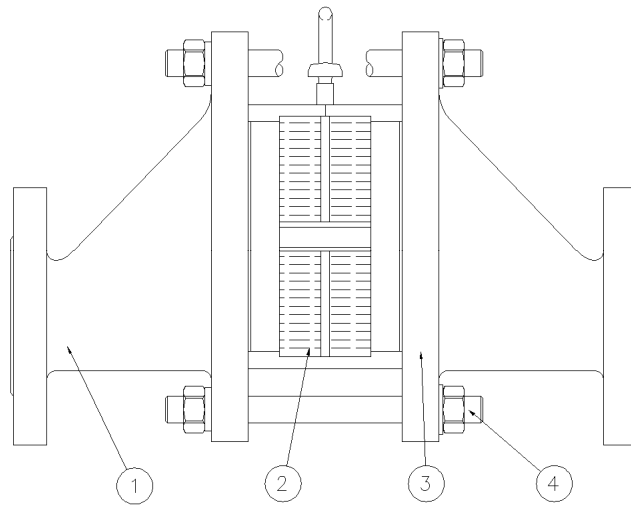
-DIASSEMBLY-

- ① BODY      ② ELEMENT      ③ COVER      ④ GASKET      ⑤ HEX BOLT



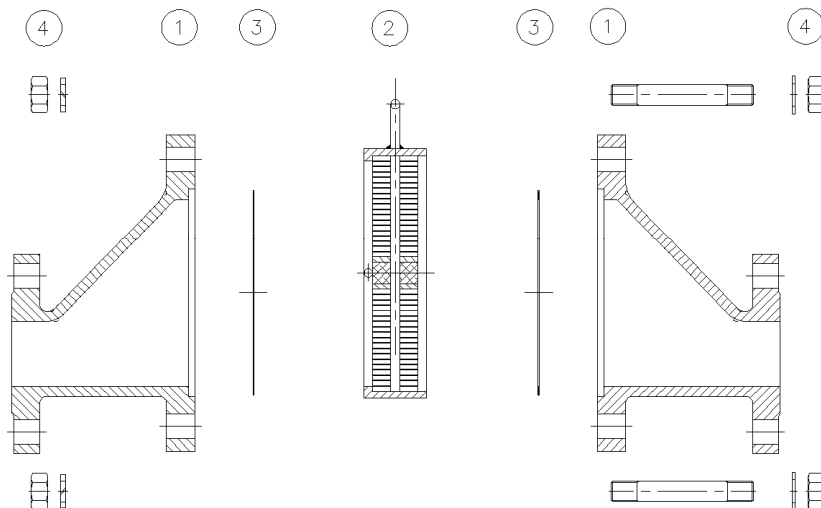
● MODEL KSFL DISASSEMBLY & ASSEMBLY

-ASSEMBLY-



-DIASSEMBLY-

- ① BODY      ② ELEMENT      ③ GASKET      ④ HEX BOLT/NUT

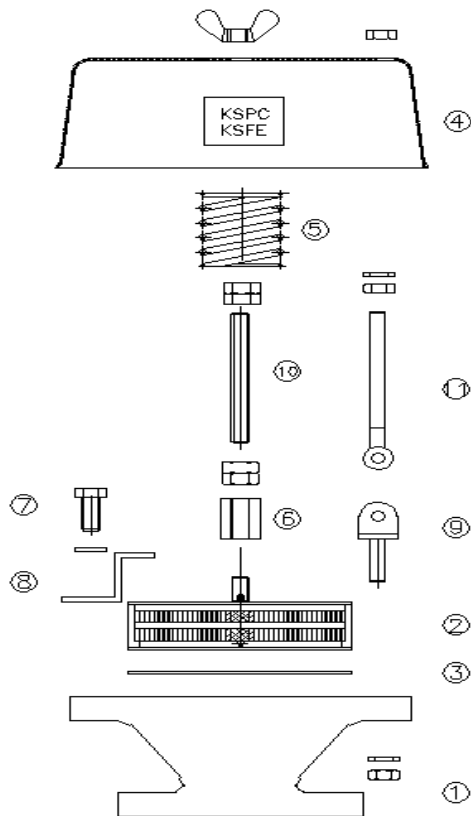
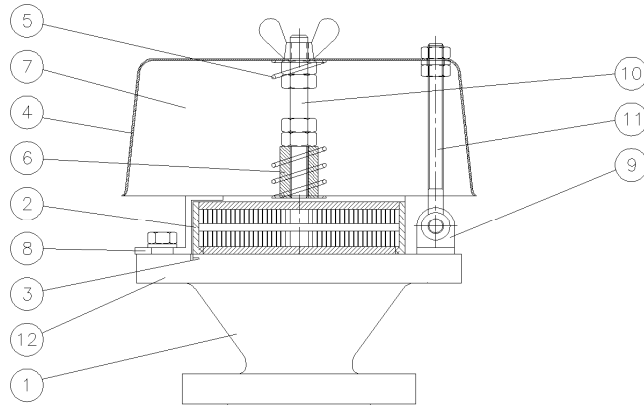


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● MODEL KSFE(2"-4)" TYPE DISASSEMBLY & ASSEMBLY

- ASSEMBLY-

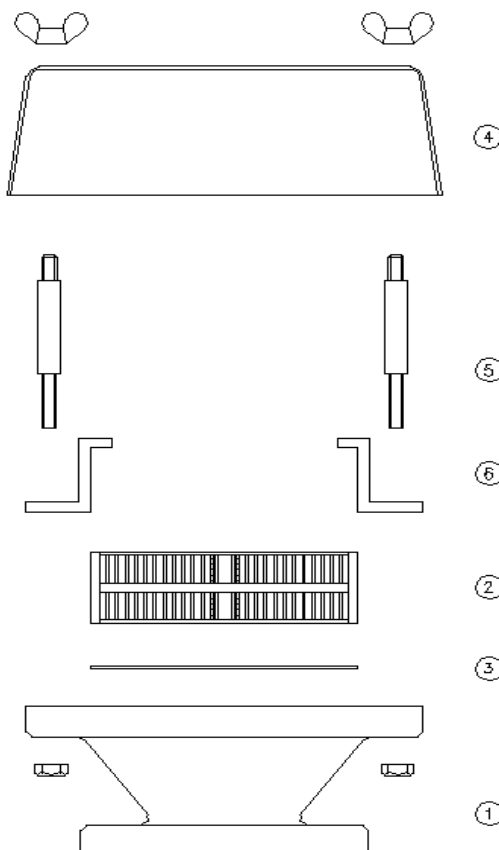
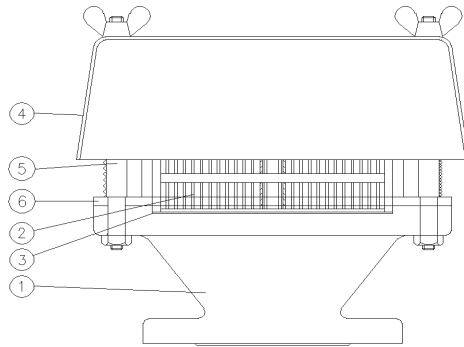


- DISASSEMBLY -

- 1 BODY
- 2 ELEMENT
- 3 GASKET
- 4 HOOD
- 5 SPRING
- 6 PE FREE
- 7 HEX BOLT
- 8 ELEMENT BRACKET
- 9 HANGER BOLT BRACKET

● MODEL KSFE(6~)" TYPE DISASSEMBLY & ASSEMBLY

- ASSEMBLE -



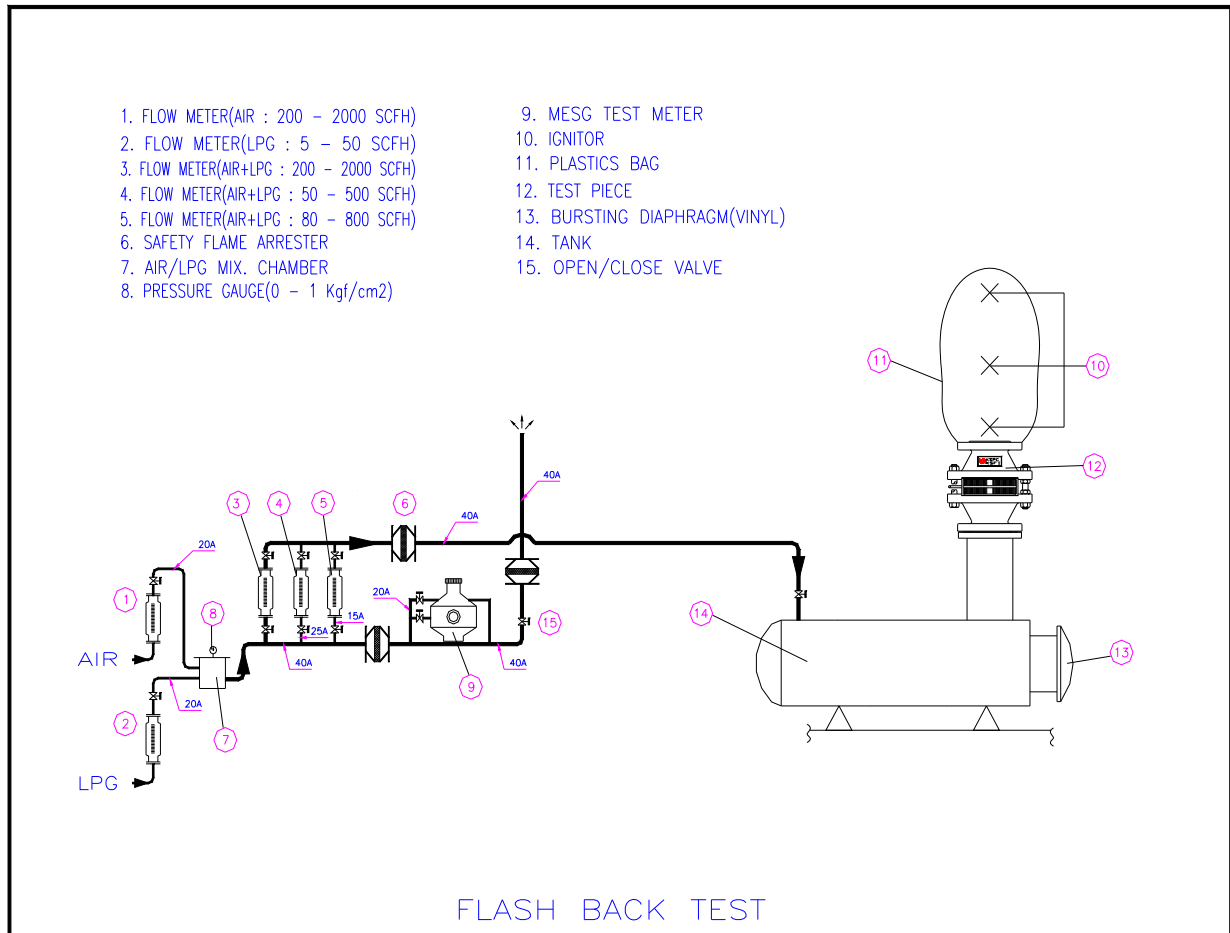
- DISASSEMBLY -

- ① BODY
- ② ELEMENT
- ③ GASKET
- ④ HOOD
- ⑤ STUD BOLT
- ⑥ ELEMENT BRACKET

- 4-3-1 Purge the line or tank with an inert gas before attempting to remove the arrester for maintenance.
- 4-3-2 Loosen the arrester body nuts and remove only those studs or tie rods necessary to withdraw the body.  
Do not remove studs, which have spreader nuts.
- 4-3-3 If the flame arrester is in a horizontal line, attach whatever lifting equipments is required to remove the element.
- 4-3-4 If a vertically mounted flame arrester is used to support a pressure and vacuum relief valve, tightening the housing nuts after separating the bases will provide sufficient support for the PVRV.
- 4-3-5 Remove the housing assembly for inspection.  
Visually inspect the flame element, supporting grids, and steam line for damage or corrosion build-up from both sides.  
If the flame element appears to be damaged, it should be replaced immediately.

## 5. SHOP TESTING

5-1 All products should be examined by the flash back test before the shipping according to arrester group IIA / IIB / IIC of EN ISO 16852.



**Figure 11.**

# KFD / KSFLD / KSFD / KSFM TYPE

## Detonation Flame Arresters



### INSTRUCTION MANUAL

#### CONTENTS

- ◆ General Description
- ◆ Operation
- ◆ Shop / Job Site Testing
- ◆ Installation
- ◆ Maintenance

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## **Section 1. General Description**

- 1-1 The flame arrester is designed, manufactured, and tested according to API 2000 / BS 7244 (EN12874) code.
- 1-2 Flame arrester consist of two main components, the arrester bases and the flame element housing.  
The bases serve as the connecting interface to the piping system.  
The flame elements utilize spiral wound, crimped ribbon constructed of corrosion resistant materials (A240-316L), to insure the best flame quenching performances with minimum pressure drop.
- 1-3 Installed in the top nozzle of the several kinds of the inflammable low pressure storage tank(the ignition point below 65 °C), it is the explosion proof and deflagration proof which blocks the influx of flame ignifed externally into the tank.
- 1-4 In general it is combined with pressure and vacuum relief valve , and designed to provide a large quantity of flow under the small pressure differences.
- 1-5 Designed to use for the transport line of the inflammable low pressure gas and installed in a IN-LINE SYSTEM, like the pipe line which transfer the inflammable gas to the incinerator flame shell or the discharging line of combursted gas to the air, it blocks the spread of ignifed fire.

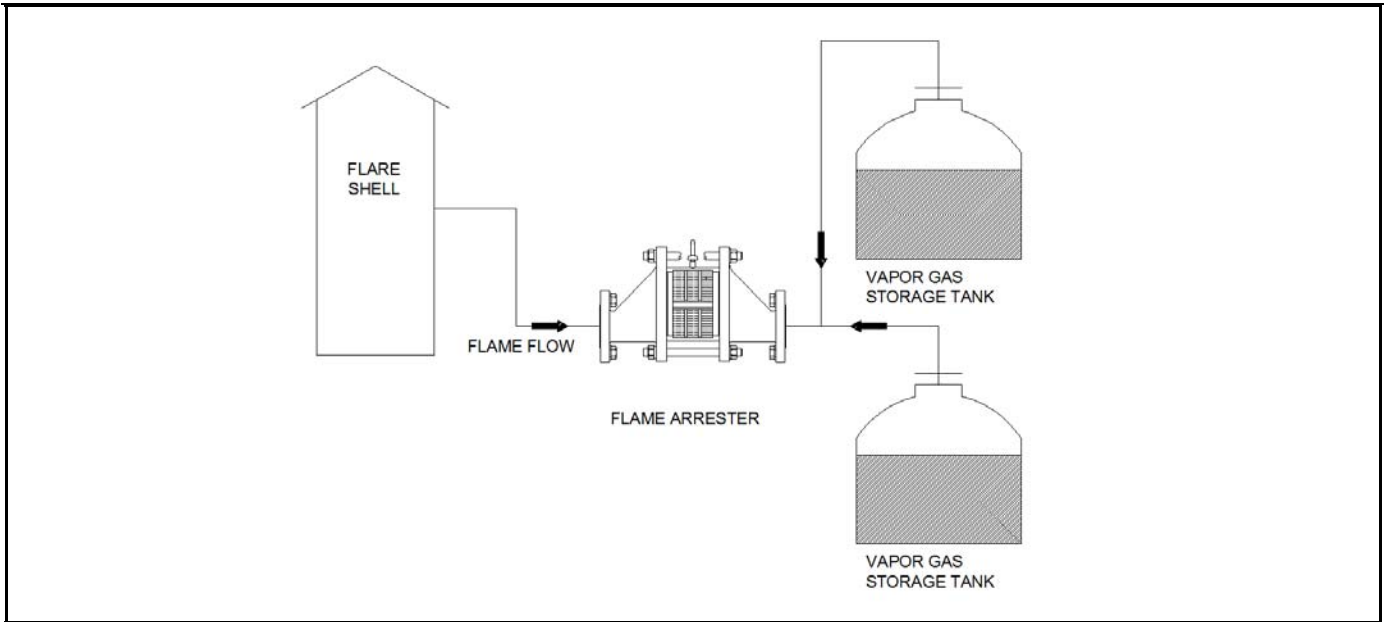


Figure 1.

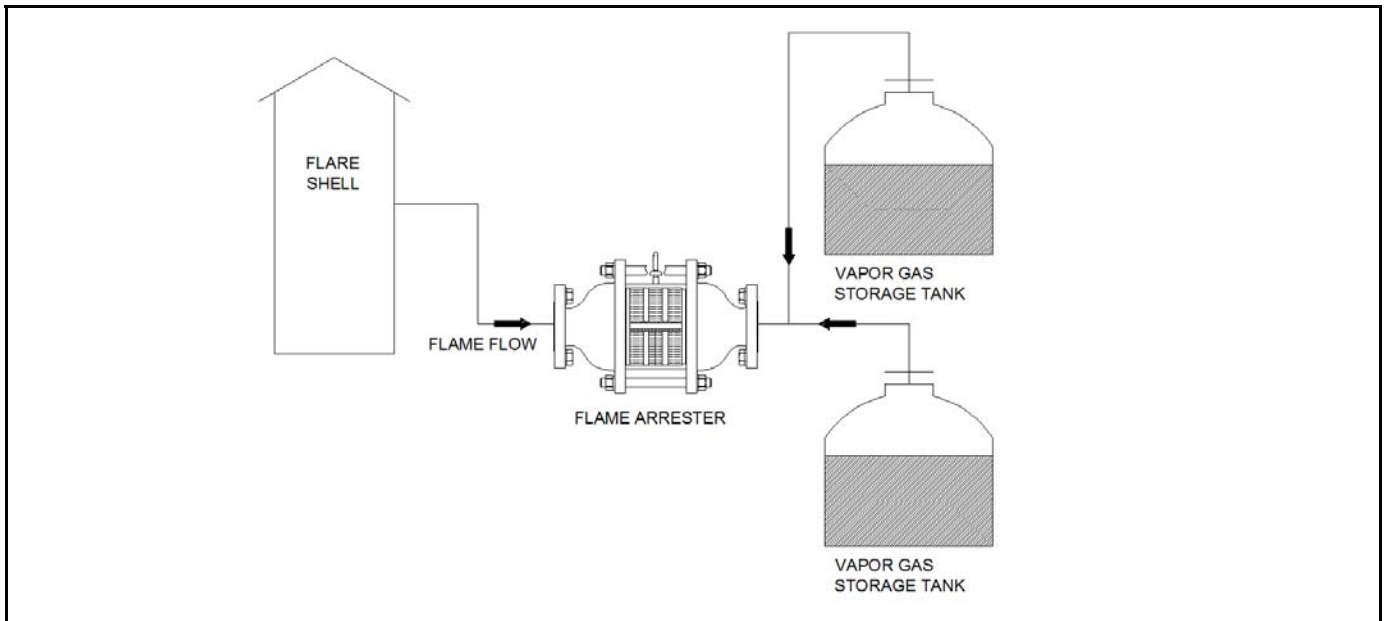


Figure 2

## Section 2-1. Installation of In Line.

- 2-1-1 Inspect flange faces and flame element for damage or contamination.
- 2-1-2 Inspect the gasket seating surface of the tank nozzle or pipe. It must be clean, flat, free of scratches, corrosion and tool marks. And the center of gasket within the bolt circle.
- 2-1-3 Set the arrester between its mating flanges or on the nozzle. It is possible to install the pipe laying vertically and horizontally and install the studs and tighten nuts hand tight.
- 2-1-4 It is possible to install unrelating to the direction of the gas flow.

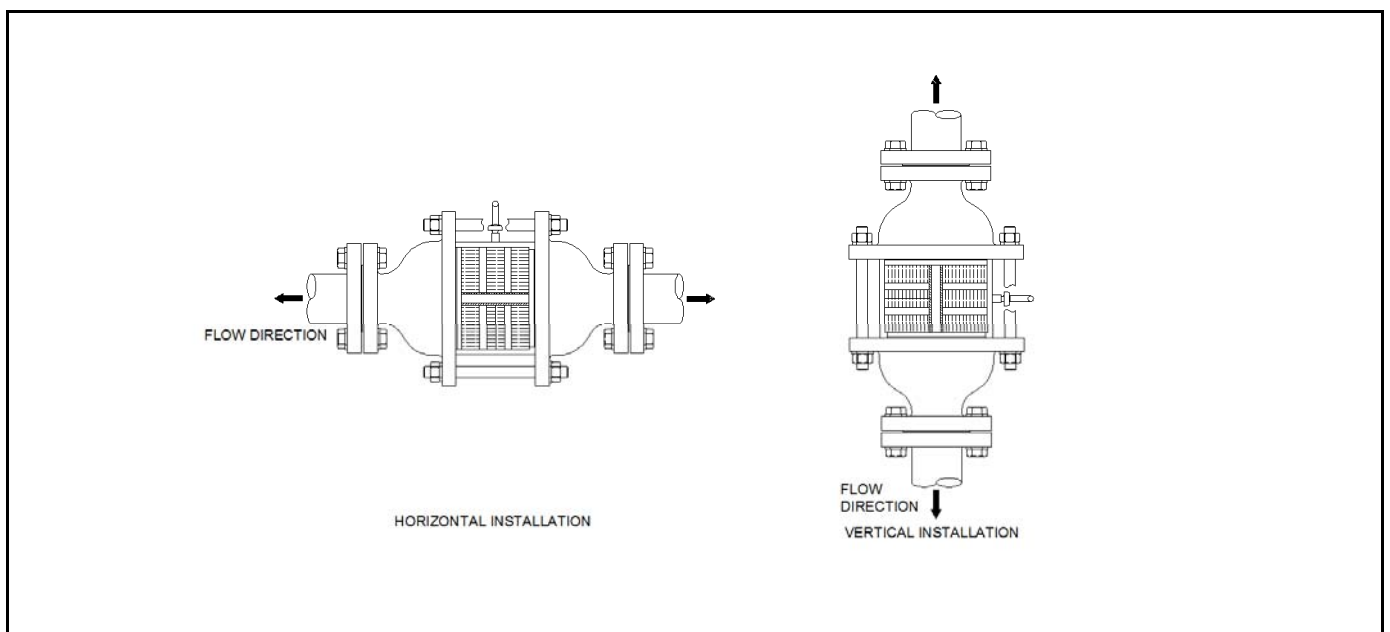


Figure 3 ( KFD TYPE)

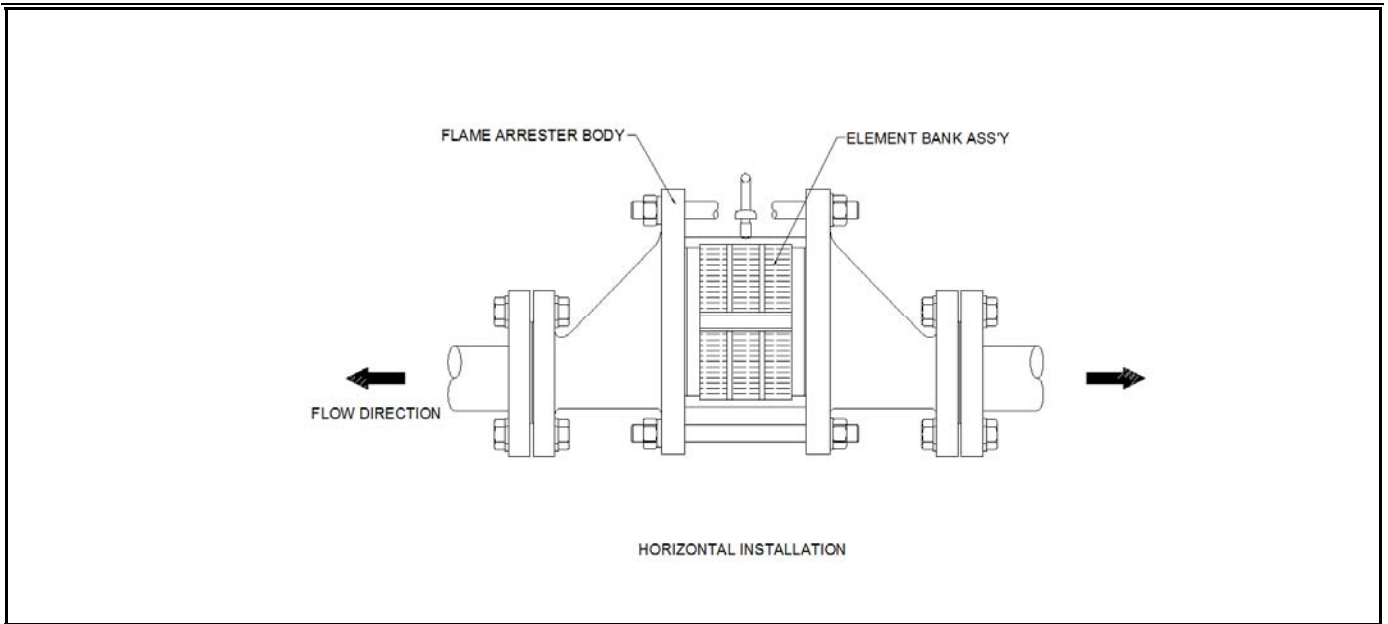


Figure 4 (KSFLD TYPE)

## Section 2-2. Installation of End Line.

2-2-1 It should be installed vertically in case of combination with pressure and vacuum relief valve (KSBG / KSGS model).

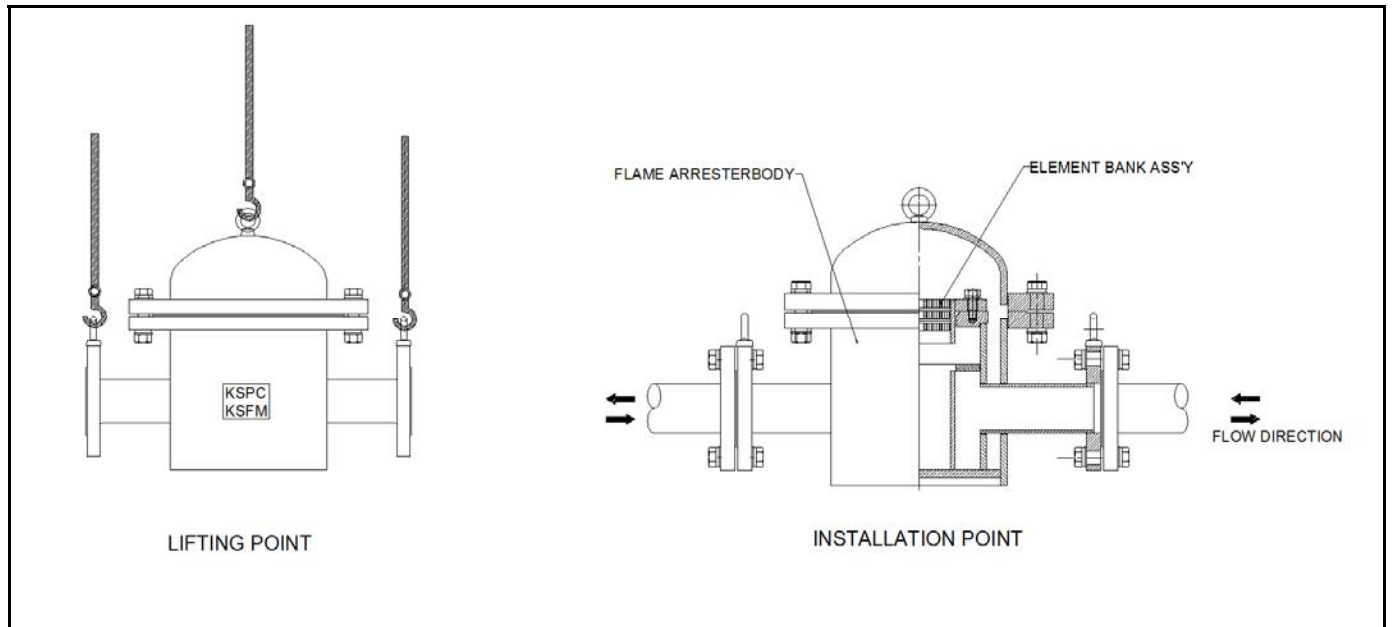


Figure 5.

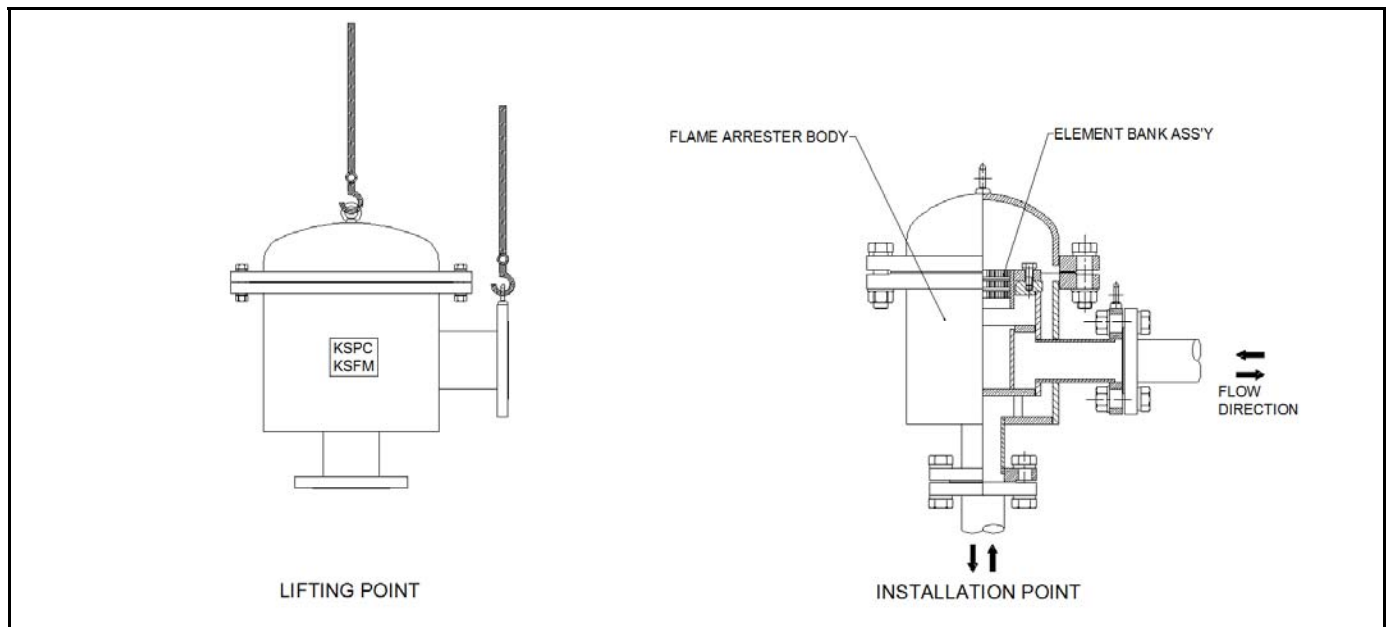


Figure 6.

**CAUTION**

- \* The handles on the arrester housing are to be used for handling the element only during inspection and maintenance. Do not use the handles to lift the entire flame arrester assembly.
- \* After installation, all connections must be inspected for vapor leakage.

## Section 3. Operation

- 3-1 When the combusted gas pass through the heat exchange lattice net of the element bank of the flame arrester in KFD type, the combusted gas ignited by the quenching is completely extinguished by lowering the temperature under below the natural ignition point.
- 3-2 Thus, this item is designed to extinguish the fire automatically, and the heat is absorbed by the element bank of flame arrester and the fire cannot be spread.

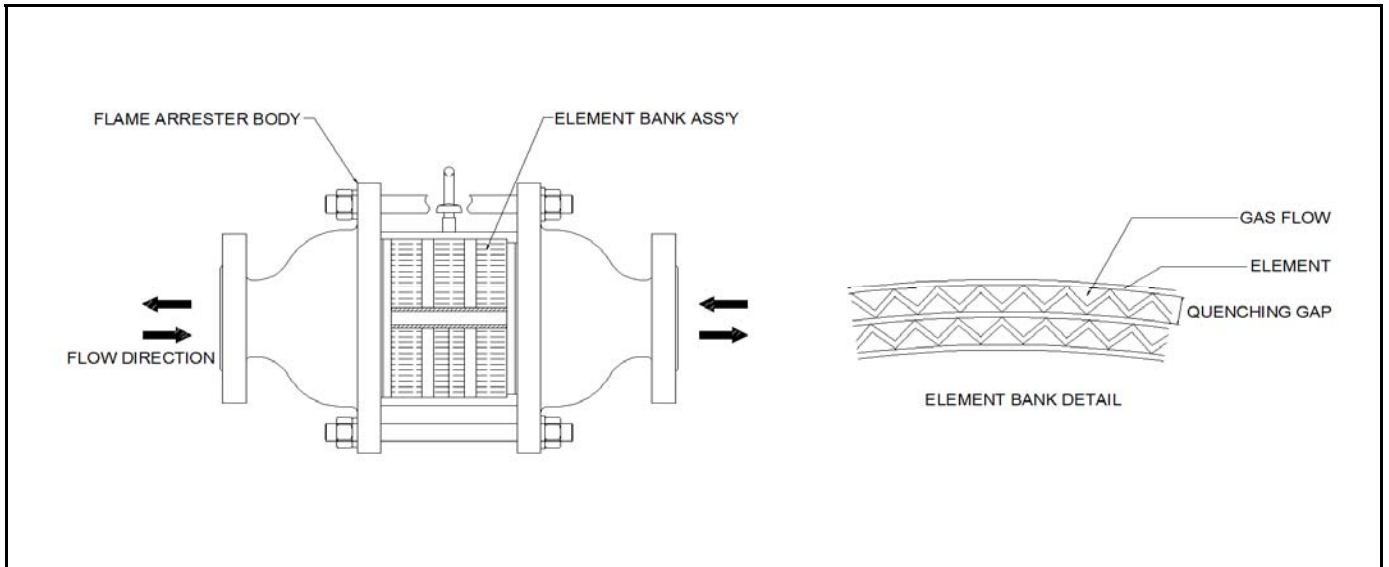


Figure 7 (KSKFD TYPE).

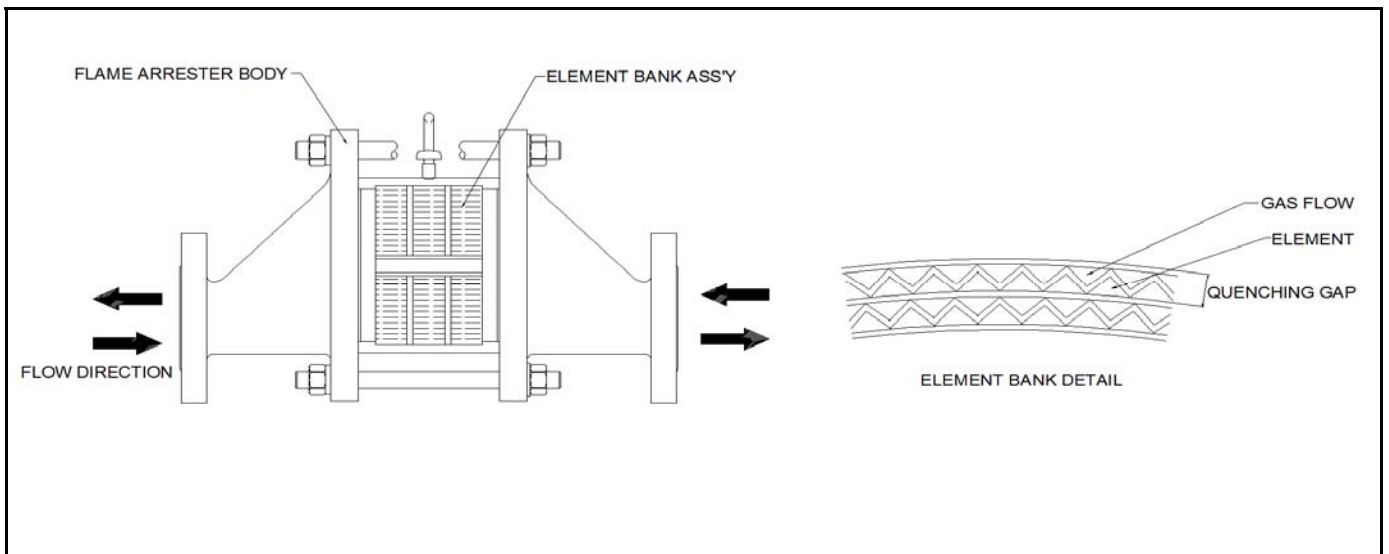


Figure 8 (KSFLD TYPE).

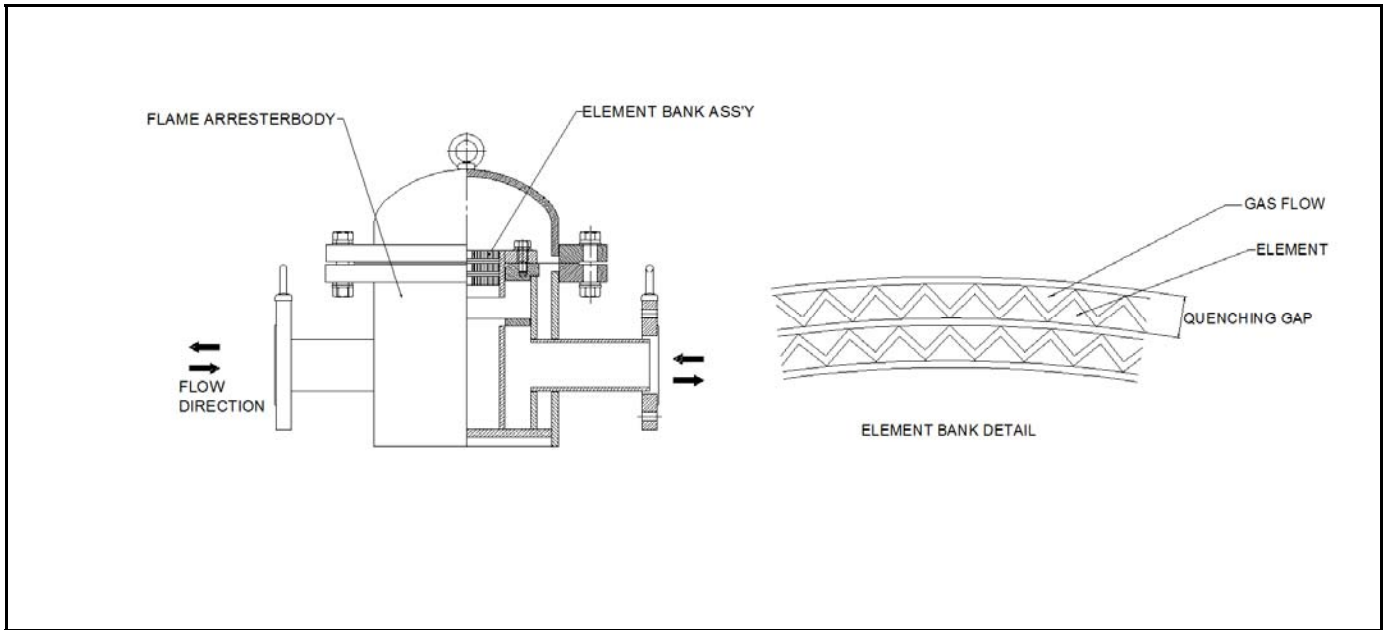


Figure 9 (KSF D TYPE).

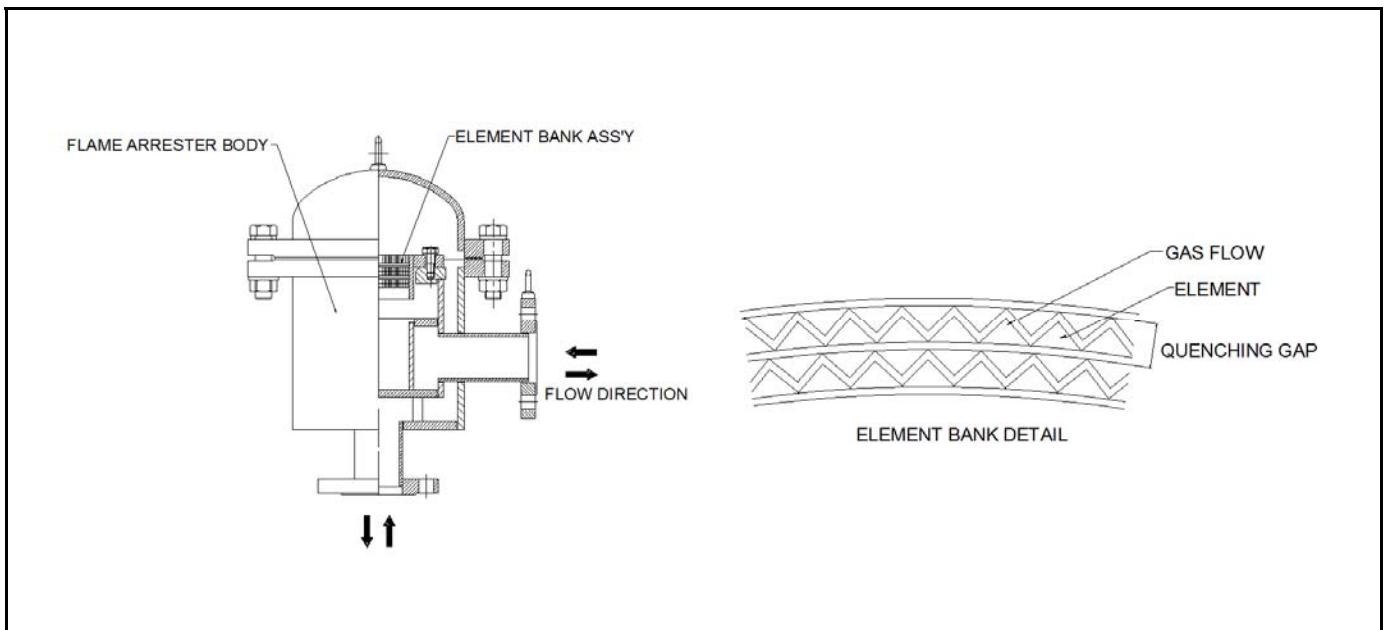


Figure 10 (KSF M TYPE).

## Section 4. Maintenance

### 4-1 General

- 4-1-1 It is recommended to check the flame arrester of element bank ass'y in the first 6 months after operation.
- 4-1-2 Thereafter, it need to be inspected and cleaned regularly in every 6 months at least.
- 4-1-3 To remove the oil dirt in the element of the element bank, soak it in a solvent wash and blow it with compressed air or high pressure steam.
- 4-1-4 The aging and other artificial changes of element quenching gap could be a critical for flashback. In this case, exchange the element bank ass'y into new one.

#### CAUTION

- \* The connection pipeline must be free of all hazardous of flammable vapors before inspection procedures begin.
- \* It is necessary to check the flame arrester regularly installed in the END-LINE of storage tank according to the liquid type and operation condition.
- \* It is necessary to check the element bank ass'y in case of pressure drop in IN-LINE.

### 4-2 THE SAFETY RULES OF MAINTENANCE

- 4-2-1 It is necessary to use the spark free tools for the maintenance work.
- 4-2-2 Before the maintenance work, the inside of storage tank and connection pipe line should be depressurized and all hazardous of flammable gas freed.

#### CAUTION

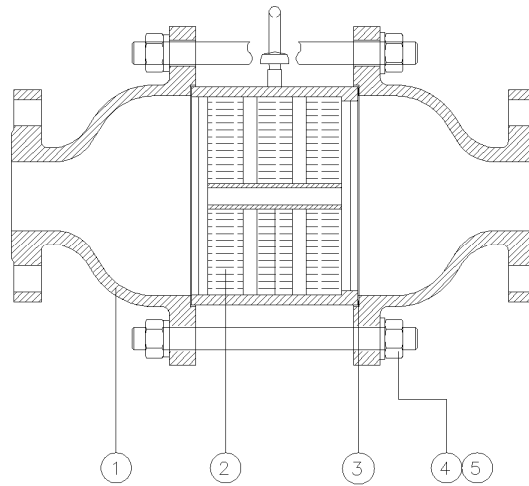
For the maintenance work, it is necessary to take the preventive measures against inflammability and toxicity of liquid or gas in the tank.



4.3 The Procedure Disassembly and Assembly (Figure 4)

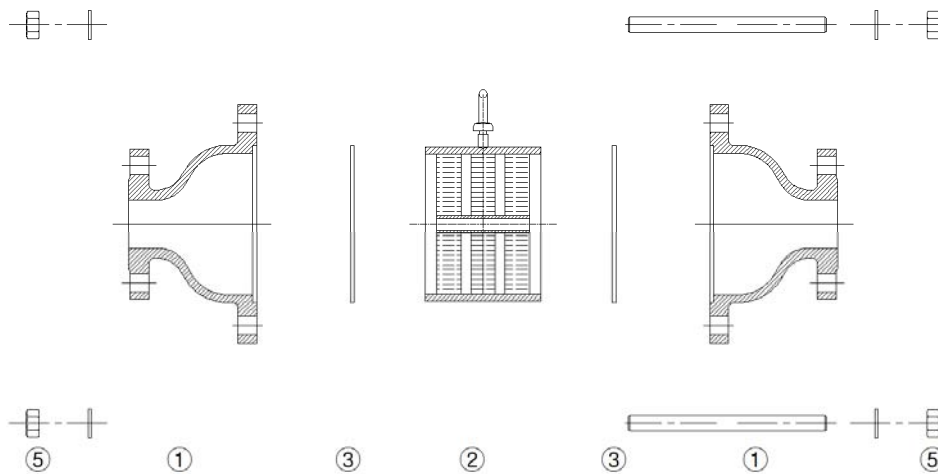
● **MODEL KFD TYPE DISASSEMBLY & ASSEMBLY**

**-ASSEMBLY-**



**-DIASSEMBLY-**

- ① BODY    ② ELEMENT    ③ GASKET    ④ BOLT    ⑤ NUT / WASHER

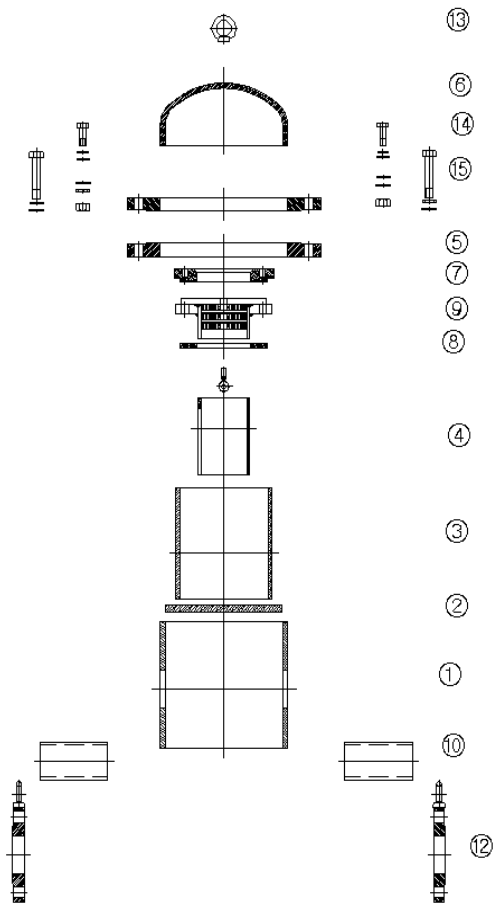
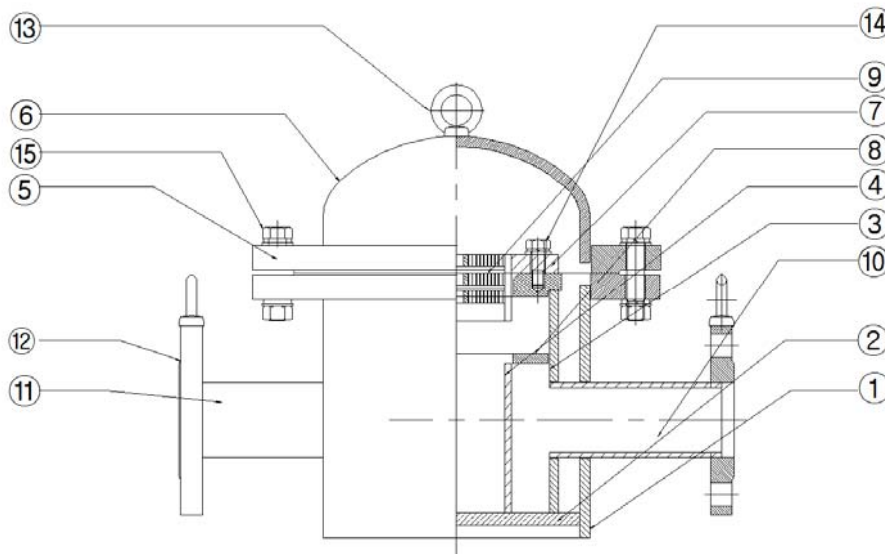


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● **MODEL KSFD TYPE DISASSEMBLY & ASSEMBLY**

**-ASSEMBLY-**

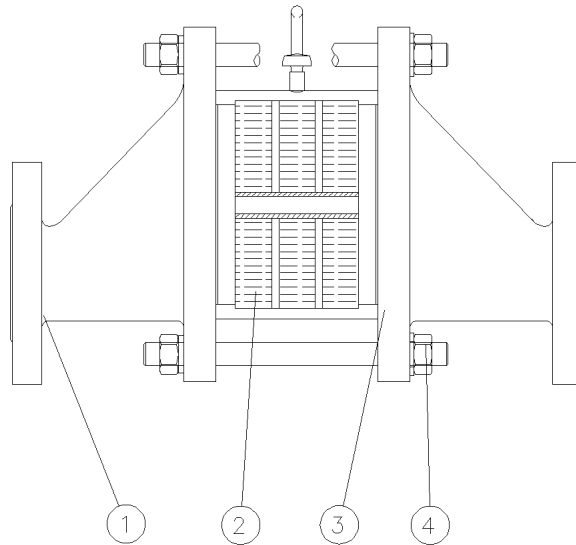


**-DISSEMBLY-**

- ① EXTERNAL WALL
- ② LOWER COVER
- ③ DOUBLE WALL
- ④ TRIPLE WALL
- ⑤ BODY & CAP FLANGE
- ⑥ PIPE END CAP
- ⑦ DOUBLE WALL FLANGE
- ⑧ TRIPLE WALL FLANGE
- ⑨ ELEMENT
- ⑩ INLET LINE
- ⑪ OUTLET LINE
- ⑫ IN & OUTLET FLANGE
- ⑬ EYE NUT
- ⑭ HEX. BOLT
- ⑮ STUD. BOLT & NUT

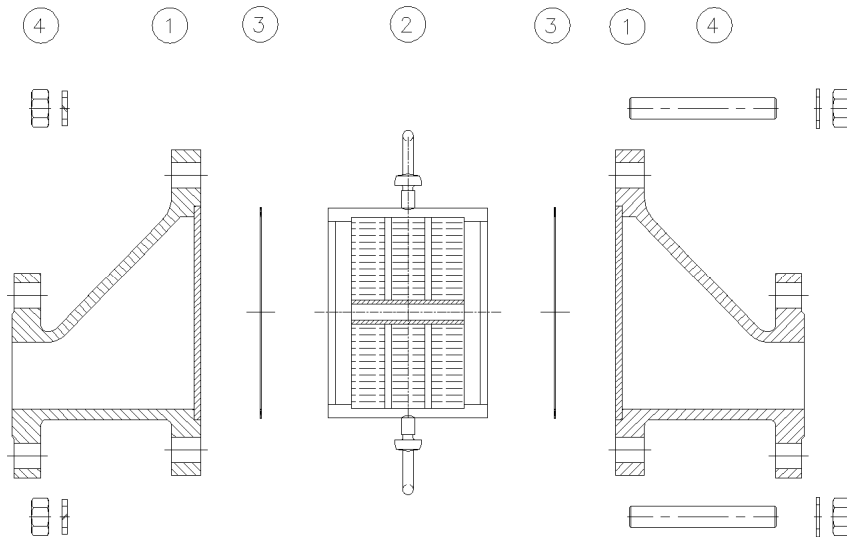
● **MODEL KSFL DISASSEMBLY & ASSEMBLY**

- ASSEMBLY-



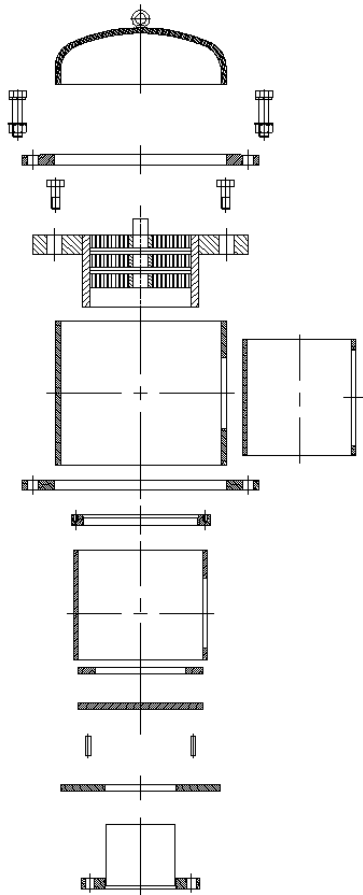
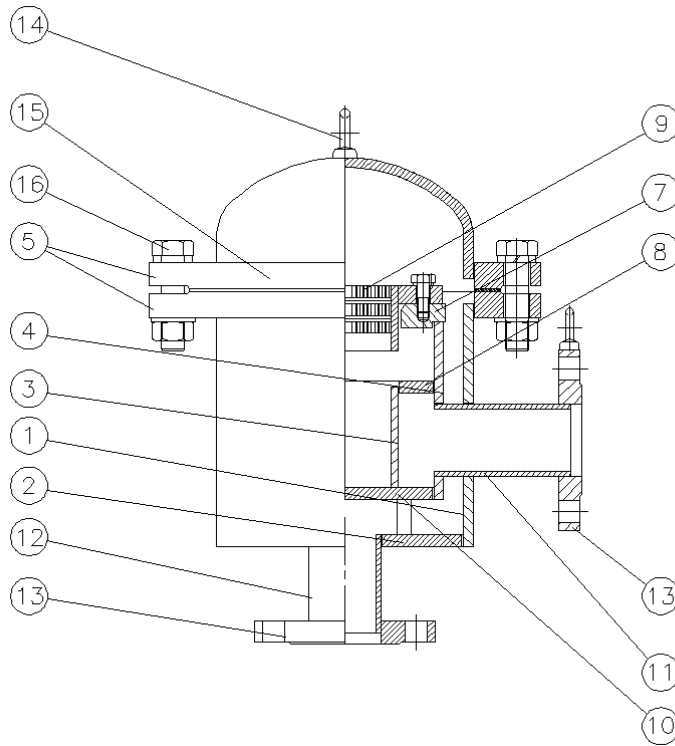
. - DIASSEMBLY-

- ① BODY                      ② ELEMENT                      ③ GASKET                      ④ STUD BOLT/NUT



● **MODEL KSFM TYPE DISASSEMBLY & ASSEMBLY**

**-ASSEMBLY-**



14

**-DISSEMBLY-**

- ①. EXTERNAL WALL
- ②. EXTERNAL WALL COVER
- ③. DOUBLE WALL
- ④. TRIPLE WALL
- ⑤. BODY & CAP FLANGE
- ⑥. PIPE END CAP
- ⑦. DOUBLE WALL FLANGE
- ⑧. TRIPLE WALL FLANGE
- ⑨. ELEMMENT
- ⑩. DOUBLE WALL COVER
- ⑪. INLET LINE
- ⑫. OUTLET LINE
- ⑬. IN & OUTLET FLANGE
- ⑭. EYE NUT
- ⑮. HEX. BOLT
- ⑯. STUD. BOLT & NUT

5

15

9

7

1

3

11

13

8

4

2

12

13



- 4-3-1 Purge the line or tank with an inert gas before attempting to remove the arrester for maintenance.
- 4-3-2 Loosen the arrester body nuts and remove only those studs or tie rods necessary to withdraw the body.  
Do not remove studs, which have spreader nuts.
- 4-3-3 If the flame arrester is in a horizontal line, attach whatever lifting equipments is required to remove the element.
- 4-3-4 If a vertically mounted flame arrester is used to support a pressure and vacuum relief valve, tightening the housing nuts after separating the bases will provide sufficient support for the PVRV.
- 4-3-5 Remove the housing assembly for inspection.  
Visually inspect the flame element, supporting grids, and steam line for damage or corrosion build-up from both sides.  
If the flame element appears to be damaged, it should be replaced immediately.



## 5. SHOP TESTING

5-1 All products should be examined by the flash back test before the shipping according to arrester group IIA / IIB / IIC of EN ISO 16852.

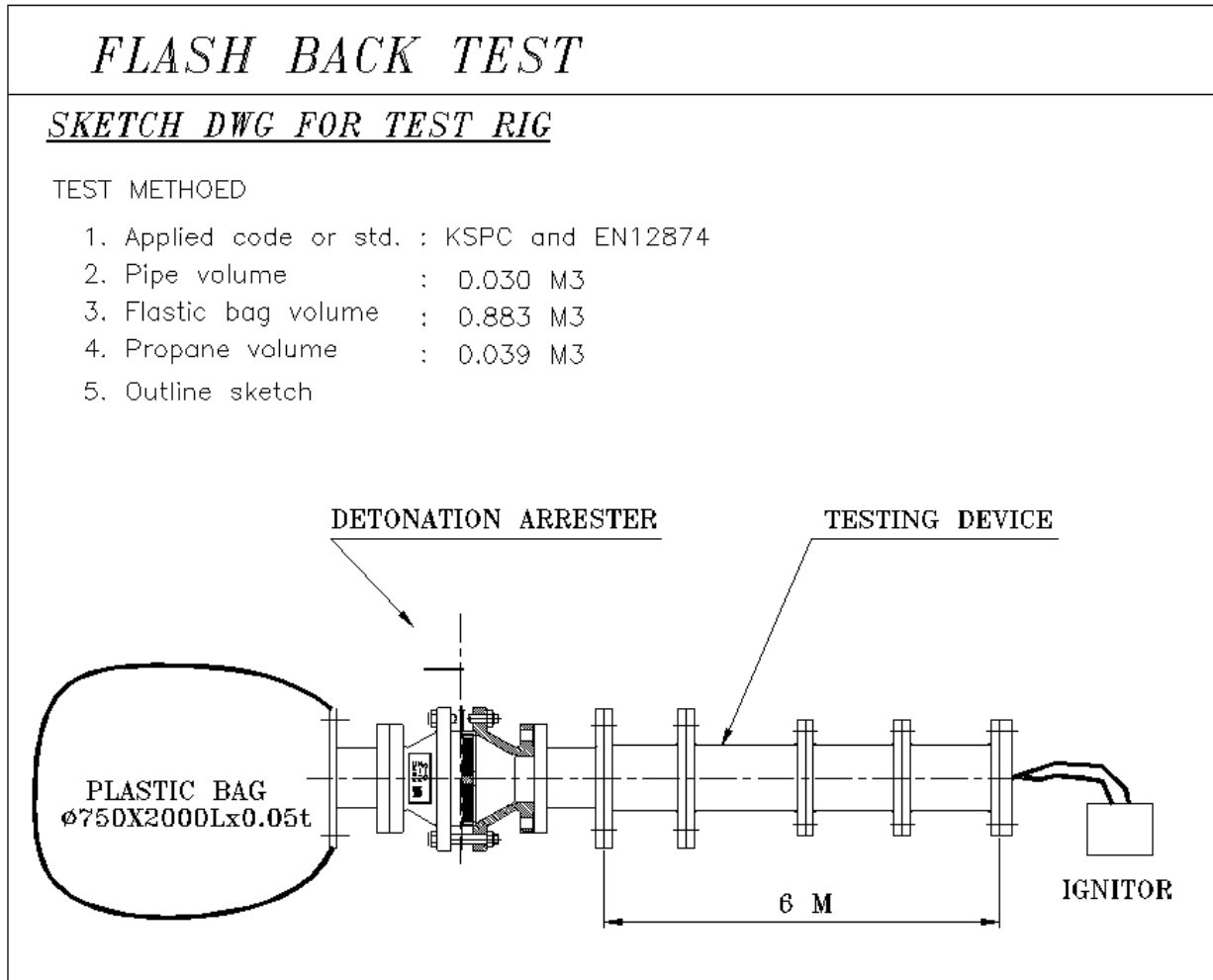


Figure 11.