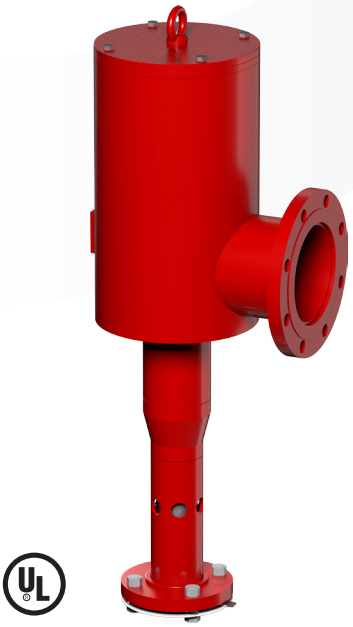
Tyr Foam Chamber

Discharge Devices | Model KCS

1 General description



Foam chambers are suitable for the protection of fixed roof-mounted tanks and are to be used as low expansion Type II discharge devices (as defined by NFPA 11) with approved and/or listed foam concentrates and proportioning devices. Foam chambers are designed to apply an expanded foam blanket over the surface of a flammable liquid fire as gently as possible to achieve extinguishment and/or vapor suppression. A deflector positioned on the inside of the storage tank directs the expanded foam back onto the wall of the tank. The foam runs down the wall of the tank onto the liquid surface, minimizing submergence and fuel pick-up thereby maximizing the positive effect of the foam.

Low expansion foam deluge systems are the preferred protection for large outdoor tanks of flammable liquids. Typical applications include manufacturing plants, large tank farms, oil refineries and chemical plants.

This technical data is intended for trained experts.

For further information, please contact Fomtec or refer to the technical documentation.

The contents of this publication are subject to modifications without notice.

2 Listings and approvals

The foam chamber is UL Listed as part of a fire extinguishing system combining designated foam concentrates, proportioning devices and bladder tanks. Listed system components can be found at *www.database.UL.com*

- UL Listed – GFUT.EX16314

NOTE: Other international approval certificates may be available upon request.

3 Technical data

3.1 Construction features

- Available in 2.5", 3", 4", 6" sizes to cover a wide range of design configurations
- Painted carbon steel or painted stainless steel for increased corrosion protection
- Available with ANSI 150 or PN16 flanges
- Lifting lug/handle to assist with installation and servicing
- Choice of 2 deflectors: Solid and split (For installation from outside of storage tank)
- Specifically UL Listed with Fomtec foam concentrates

3.2 Standard materials

	Carbon steel version	Stainless steel version
Body	Carbon steel ASME SA-106 Gr.B/EN P265GH	Stainless steel ASME SA-182 F316 / EN 1.4401 AISI-316
Flanges (ANSI 150 or PN16)	Carbon steel ASME SA-105 / EN P245GH	Stainless steel ASME SA-182 F316 / EN 1.4401 AISI-316
Vapor seal	Aluminium	Aluminium
Calibrated orifice material	Stainless steel UNS-S30400	Stainless steel UNS-S30400 / ASME SA-182 F316 / EN 1.4401 AISI-316
Paint	Epoxy zinc-rich primer with aliphatic polyurethane finish	Epoxy zinc rich primer with aliphatic polyurethane finish
Standard colour	RAL3000 Red	RAL3000 Red
Inlet flange gasket	Composite	Composite

Table 3.2.1 - Standard materials

3.3 Standard design specifications

Model	Inlet size	Working pressure[1]				Flow range				Orifice range		Approval[2]
		Minimum		Maximum		Minimum		Maximum				
		PSI	bar	PSI	bar	GPM	LPM	GPM	LPM	inches	mm	
KCS	2-1/2"	30	2.07	125	8.61	36	137	226	855	0.600 - 1.050	15 - 27	UL
	3"	30	2.07	125	8.61	82	312	480	1818	0.906 - 1.531	23 - 39	UL
	4"	30	2.07	125	8.61	131	496	740	2800	1.142 - 1.900	29 - 48	UL
	6"	30	2.07	125	8.61	362	1372	1261	4774	1.900 - 2.481	48 - 63	UL

Footnotes:
1 Working pressure at the inlet orifice of the foam chamber.
2 Please refer to www.database.UL.com for specific listing details.

Table 3.3.1 - Standard design specifications

3.3.1 Determining orifice size

After determining the required foam flow rate and available pressure, the orifice must be sized using the following formula:

$$d=\left(\frac{Q}{18.327 \cdot P^{1/2}}\right)^{1/2}$$

d = Orifice Ø (in.)
Q = Solution Flow Rate (GPM)
P = Pressure at orifice inlet (PSI)

3.3.2 Vapor seal

Vapor seal burst pressure is 10-25 psi (0.69 - 1.72 bar) measured just upstream of inlet orifice as required by UL162. Maximum allowable back pressure is 2 psi (0.14 bar).

3.4 Ordering information

Inlet orifice plate(s) are manufactured according to your specific project requirements. The following steps should be followed to ensure the correct order processing information is specified.

1. Use the tables in ***section 7*** (Performance data) to determine what size foam chamber will satisfy the flow and pressure requirements for your specific project. (Required)
2. Check the UL Listing for the specific foam concentrate model to ensure the inlet pressure, orifice size and fuel type is listed. (Recommended)
3. Select the foam chamber size, flange pattern and material from ***table 3.4.1***. (Required)
4. Select a split or solid deflector with the flange pattern that matches the outlet flange pattern of the foam chamber. (Required)
5. If required, select the mounting flange with the flange pattern that matches the outlet flange pattern of the foam chamber. (Optional)
6. The foam chamber is supplied with a vapor seal already installed. If spare vapor seals are required then ***refer to table 13.1.1*** (Recommended)
7. When the official purchase order is made for a foam chamber, the foam chamber size, orifice inlet pressure and desired flow rate must be provided. Please use the foam chamber order form to ensure your order is processed correctly (Required)

   NOTE: The inlet orifice size will be manufactured to match the pressure and flow information that you provide in step 7.

   Refer to your customer service representative for further information and order form.

Description	Material	Finish	Part number		Weight	
			ANSI 150	PN16	lbs	kg
2-1/2" Foam chamber	Carbon steel	Painted	KCS20904	KCS20905	94.4	42.8
Split deflector	Carbon steel	Painted	K20941	K20943	4.2	1.9
Solid deflector	Carbon steel	Painted	K20937	K20939	4.2	1.9
4" Mounting flange with studs	Carbon steel	Painted	K20919	K20920	11.9	5.4
2-1/2" Foam chamber	Stainless steel	Painted	KCS20906	KCS20907	99.0	44.9
Split deflector	Stainless steel	Painted	K20942	K20944	4.4	2.0
Solid deflector	Stainless steel	Painted	K20938	K20940	4.4	2.0
4" Mounting flange with studs	Stainless steel	Painted	K20921	K20922	12.5	5.7
3" Foam chamber	Carbon steel	Painted	KCS21203	KCS21204	145.9	66.2
Split deflector	Carbon steel	Painted	K21169	K21171	8.6	3.9
Solid deflector	Carbon steel	Painted	K21157	K21159	8.6	3.9
6" Mounting flange with studs	Carbon steel	Painted	K21181	K21182	16.8	7.6
3" Foam chamber	Stainless steel	Painted	KCS21205	KCS21206	153.2	69.5
Split deflector	Stainless steel	Painted	K21170	K21172	9.0	4.1
Solid deflector	Stainless steel	Painted	K21158	K21160	9.0	4.1
6" Mounting flange with studs	Stainless steel	Painted	K21183	K21184	17.6	8.0
4" Foam chamber	Carbon steel	Painted	KCS21207	KCS21208	201.9	91.6
Split deflector	Carbon steel	Painted	K21173	K21175	13.7	6.2
Solid deflector	Carbon steel	Painted	K21161	K21163	13.7	6.2
8" Mounting flange with studs	Carbon steel	Painted	K21185	K21186	21.4	9.7
4" Foam chamber	Stainless steel	Painted	KCS21209	KCS21210	212.1	96.2
Split deflector	Stainless steel	Painted	K21174	K21176	14.4	6.5
Solid deflector	Stainless steel	Painted	K21162	K21164	14.4	6.5
8" Mounting flange with studs	Stainless steel	Painted	K21187	K21188	22.5	10.2
6" Foam chamber	Carbon steel	Painted	KCS21211	KCS21212	396.3	178.4
Split deflector	Carbon steel	Painted	K21177	K21179	17.9	8.1
Solid deflector	Carbon steel	Painted	K21165	K21167	17.9	8.1
10" Mounting flange with studs	Carbon steel	Painted	K21189	K21190	35.9	16.3
6" Foam chamber	Stainless steel	Painted	KCS21213	KCS21214	412.9	187.3
Split deflector	Stainless steel	Painted	K21178	K21180	18.8	8.5
Solid deflector	Stainless steel	Painted	K21166	K21168	18.8	8.5
10" Mounting flange with studs	Stainless steel	Painted	K21191	K21192	37.7	17.1

Table 3.4.1 - Ordering information

4 Scope of supply

Ensure that all components are complete and in good condition.

Included

- Foam chamber
- Sized orifice (Quantity 1)
- Installed vapor seal (Quantity 1)
- Inlet flange gaskets (Quantity 2)
- Lifting lug to allow safe maneuverability on site

Not Included

- Tank mounting flange (sold separately – ***see table 3.4.1***)
- Split/solid deflector (sold separately – ***see table 3.4.1***)

5 Availability

Please contact Fomtec for further information.
The product is available directly from Fomtec and official distributors only.

6 Product variants

6.1 Options

- Also available with galvanized or paint over galvanized finish (Not UL Listed)
- Various colours
- Internal paint

6.2 Dimensions: Foam Chamber

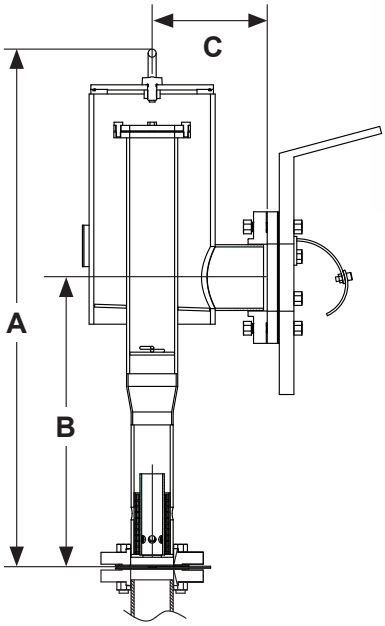


Figure 6.2.1 - Foam chamber dimensions

Part number	Foam chamber/ Inlet flange size	Outlet flange size	Material	Mounting flange style	A		B		C	
					inches	mm	inches	mm	inches	mm
KCS20904	2-1/2″	4″	Steel	ANSI	35.30	897	19.67	500	7.87	200
KCS20905			Steel	PN16						
KCS20906			Stainless steel	ANSI						
KCS20907			Stainless steel	PN16						
KCS21203	3″	6″	Steel	ANSI	40.35	1025	23.62	600	9.84	250
KCS21204			Steel	PN16						
KCS21205			Stainless steel	ANSI						
KCS21206			Stainless steel	PN16						
KCS21207	4″	8″	Steel	ANSI	41.18	1046	25.59	650	11.81	300
KCS21208			Steel	PN16						
KCS21209			Stainless steel	ANSI						
KCS21210			Stainless steel	PN16						
KCS21211	6″	10″	Steel	ANSI	54.57	1386	29.92	760	13.97	355
KCS21212			Steel	PN16						
KCS21213			Stainless steel	ANSI						
KCS21214			Stainless steel	PN16						

Table 6.2.2 - Foam chamber dimensions

6.3 Dimensions: Deflectors

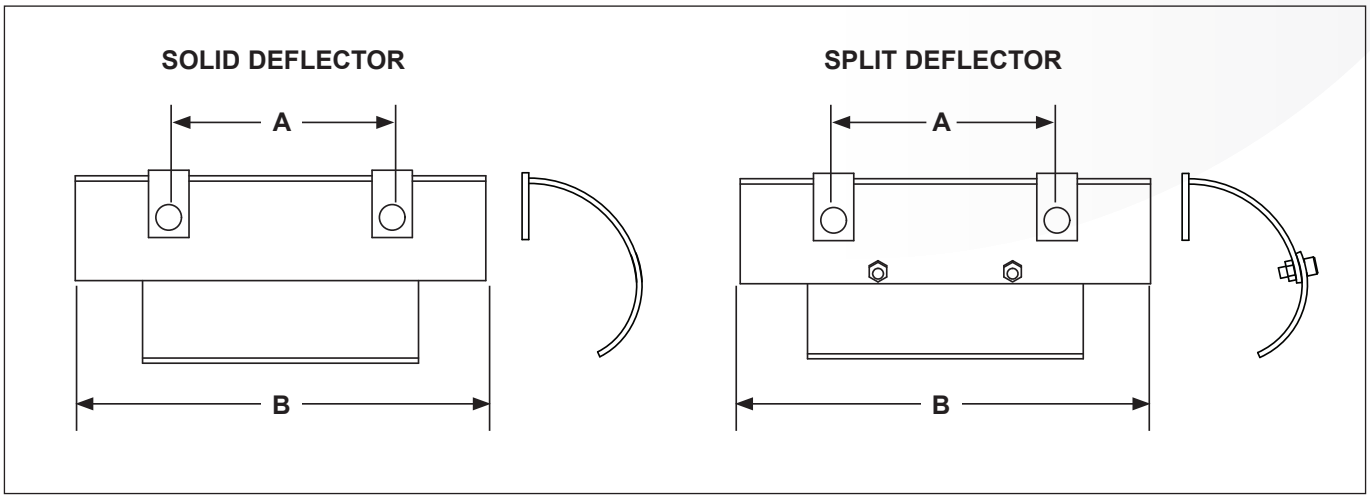
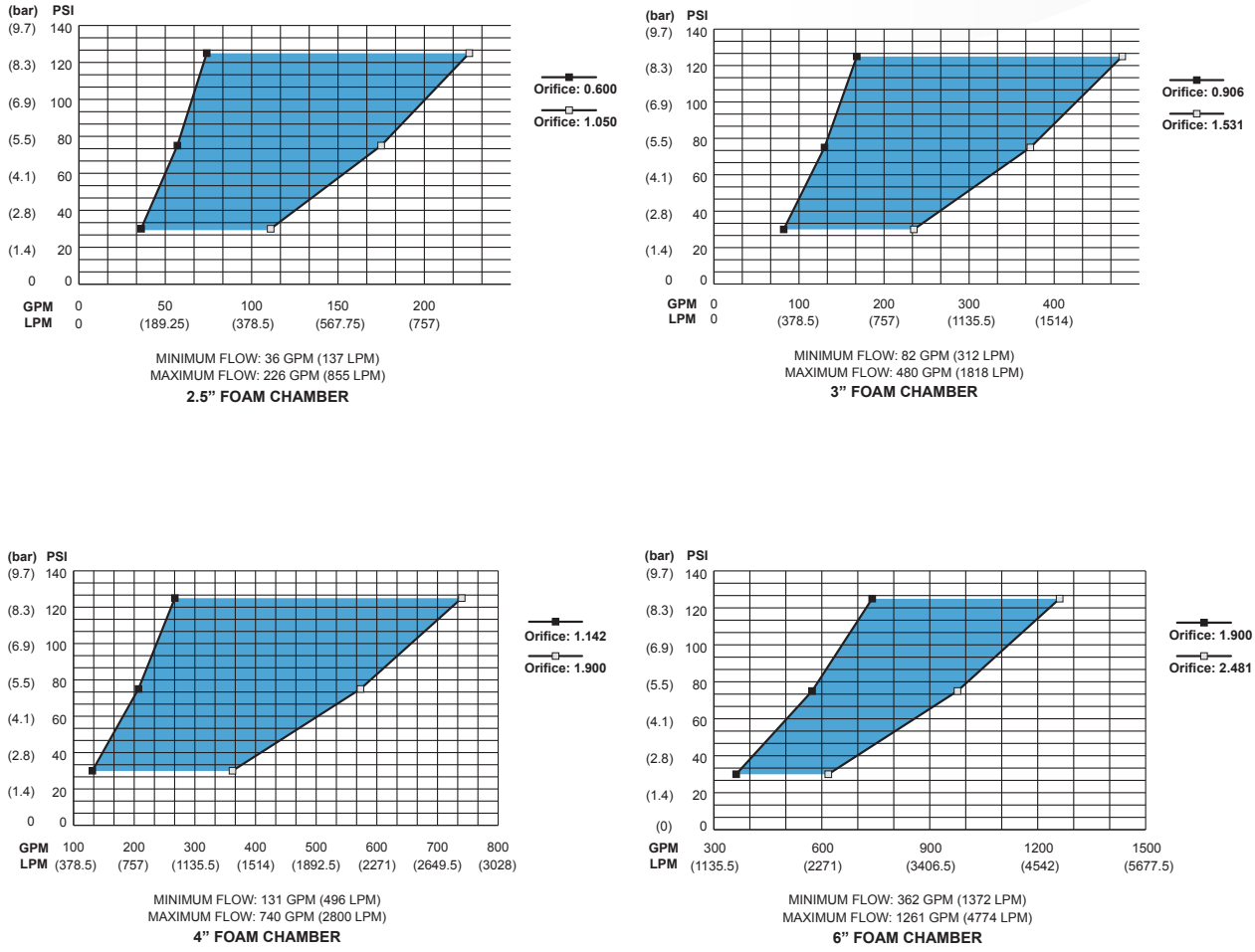


Figure 6.3.1 - Deflector dimensions

Part number	Foam chamber size	Style	A		B		Weight	
			inches	mm	inches	mm	lbs	kg
K20937	2-1/2″	SOLID	6.93	176	12.01	305	4.19	1.90
K20939			6.53	166			4.19	1.90
K20938			6.93	176			4.40	2.00
K20940			6.53	166			4.40	2.00
K21157	3″		8.78	223	18.11	460	8.60	3.90
K21158			8.74	222			9.03	4.10
K21159			8.78	223			8.60	3.90
K21160			8.74	222			9.03	4.10
K21161	4″		10.87	276	24.02	610	13.67	6.20
K21162			7.80	198			14.35	6.51
K21163			10.87	276			13.67	6.20
K21164			7.80	198			14.35	6.51
K21165	6″		10.08	256	25.59	650	17.86	8.10
K21166			9.80	251			18.75	8.51
K21167			10.08	256			17.86	8.10
K21168			9.80	251			18.75	8.51
K20941	2-1/2″	SPLIT	6.93	176	12.01	305	4.19	1.90
K20943			6.53	166			4.19	1.90
K20942			6.93	176			4.40	2.00
K20944			6.53	166			4.40	2.00
K21169	3″		8.78	223	18.11	460	8.60	3.90
K21170			8.74	222			9.03	4.10
K21171			8.78	223			8.60	3.90
K21172			8.74	222			9.03	4.10
K21173	4″		10.87	276	24.02	610	13.67	6.20
K21174			7.80	198			14.35	6.51
K21175			10.87	276			13.67	6.20
K21176			7.80	198			14.35	6.51
K21177	6″		10.08	256	25.59	650	17.86	8.10
K21178			9.80	251			18.75	8.51
K21179			10.08	256			17.86	8.10
K21180			9.80	251			18.75	8.51

Table 6.3.2 - Deflector dimensions

7 Performance data



Graph 7.1.1 - Performance data

8 Installation

Refer to appropriate installation standards (i.e. NFPA 11,EN13565-2).

Do not alter the piping without consulting a system design representative.

Foam chambers are compatible with many types of foam concentrate but are only UL listed when used with the specific foam concentrates detailed on *www.database.UL.com*

Foam chambers are generally installed on the side wall of vertical storage tanks above the maximum product storage level. Piping coupled to the unit can be linked to a fixed foam proportioning system, or terminated a safe distance from the tank, where foam solution can be delivered via mobile fire apparatus or portable foam proportioning equipment.

Care should be taken during the filling of the storage tanks with flammable liquids to ensure that the internal pressure is relieved to avoid rupturing the foam chamber vapor seals due to excessive back pressure.

It is recommended to install the deflector before the foam chamber is positioned onto the tank wall studs or mounting flange bolts. If the storage tank is new and access is possible to the inside of the tank then a solid deflector can be used. Use the split deflector when installation has to be made from the outside of the tank. The split deflector can be disassembled into 2 pieces. The section with flange holes can be passed through the flange opening in the tank wall and installed onto the existing studs or mounting flange bolts. After the first part is securely in place, the second half of the deflector can be passed through the flange opening and secured to the first part using the bolts provided.

Always verify that the vapor seal is in place and undamaged due to transportation and installation movement.

9 Operation

Foam solution can be delivered to the foam chamber in a variety of ways as previously noted.

The foam chamber produces foam by introducing air into the foam solution stream.

Air is drawn into the foam maker section through a series of annular holes located around the integral foam maker. To prevent obstruction, the air inlet holes are protected by a stainless steel screen (mesh) selected with a perforation size designed to exclude most known nesting birds and insects. The open area of the screen is designed to be not less than the total area of the foam maker air inlet holes.

The aluminium foil burst disc is perforated due to the system supply pressure and the expanded foam enters the main mixing chamber where further agitation takes place before been discharged through the oversized outlet and deflecting onto and down the tank wall before rapidly spread across the liquid surface.

10 Guarantee

For details of warranty, contact Fomtec directly.

11 Inspections, tests and maintenance

NOTICE

The owner is responsible for maintaining the fire protection system and devices in proper operating condition. The pilot operated pressure control valve must be kept from freezing conditions and physical damage that could impair its operation.

WARNING

Any system maintenance or testing that involves placing a control valve or detection system out of service may eliminate the fire protection capabilities of that system. Prior to proceeding, notify all Authorities Having Jurisdiction. Consideration should be given to employment of a fire patrol in the affected areas.

11.1 Vapor seal inspection

Inspection of the vapor seal is recommended to as part of the fire protection system maintenance schedule. As foam chambers are installed at height, care should be taken to ensure a safe working platform or other suitable access is in place before commencing this work.

The vapor seal is accessed by removing all but one of the inspection cover bolts. The cover can then be rotated to one side taking care not to damage or dislodge the cover seal. A visual inspection can then be performed to check if the foil vapor seal is still intact.

11.2 Vapor seal replacement

If the vapor seal needs replacing the retaining bolts on the vapor seal retaining assembly should be carefully removed and kept secure. The assembly cover can then be removed and the vapor seal replaced. Care should be taken to ensure the correct vapor seal is selected in accordance with the instruction in ***Table 13.1.2.***

The vapor seal assembly cover can then be remounted and the retaining bolts secured to a torque of 90lbs (10 Nm). The inspection cover then be moved back into position taking care that the inspection cover seal is undamaged during the process. The inspection cover bolts can the be inserted and tightened to a torque of 40ft lbs (54 Nm).

12 Disposal

At end of use the product described here should be disposed of via the national recycling system. Upon request, the manufacturer can take back and properly dispose of the electrical equipment and electronic devices.

13 Accessories and spare parts

Due to the wide operating range of the foam chambers it is necessary to have different vapor seals depending on the inlet orifice size selected. When ordering spare or replacement vapor seals, care should be taken to check the foam chamber orifice size and match with the correct vapor as shown in ***table 13.1.1.*** The 6" foam chamber has 1 vapor seal option for the full orifice range.

1. When the official purchase order is made for the orifice plate kit, the foam chamber size, the orifice inlet pressure and desired flow rate must be provided (required).
   NOTE: The inlet orifice size will be manufactured to match the pressure and flow information provided in step 2 and assembled with the correct vapor seal. Any modifications made after the release of the foam chamber are the responsibility and at the risk of the authorized purchaser. Changes could include but are not limimted to an entire system redesign, revamping of system components, restocking fees, etc.
2. The final (ordering) part number will contain the required orifice size.
   Example: An orifice plate for a 2-1/2" foam chamber with a 0.750 inch orifice will be given the part number F21499/0750.

Vapor seals				
Part number	Orifice size range	Foam chamber size	Vapor seal thickness	
			Inches	Millimeters
F20908	0.600" - 0.875"	2-1/2"	0.0005	0.0127
F20909	0.875" - 1.050"		0.0007	0.0178
F20933	0.906" - 1.100"	3"	0.0007	0.0178
F20934	1.100" - 1.531"		0.0015	0.0381
F20928	1.142" - 1.450"	4"	0.001	0.0254
F20929	1.450" - 1.900"		0.002	0.0508
F20930	1.900" - 2.481"	6"	0.002	0.0508

Table 13.1.1 - Accessories

Part number	Orifice size range	Foam chamber size
F21499	0.600" - 1.050"	2-1/2"
F21500	0.906" - 1.531"	3"
F21501	1.142" - 1.900"	4"
F21502	1.900" - 2.481"	6"

Table 13.1.2 - Orifice plate kits (Includes orifice plate and vapor seal)

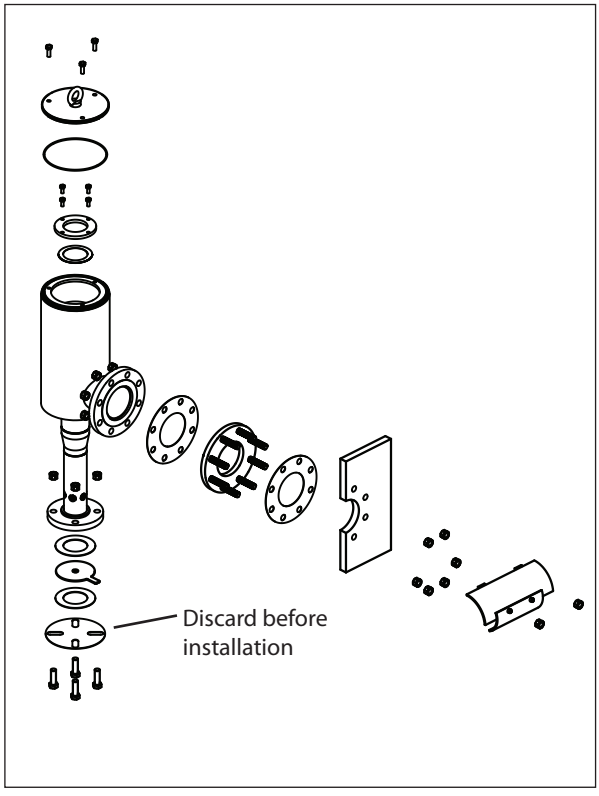


Figure 13.1.1 - Foam chamber

14 Declaration of conformity

If required, contact the appropriate sales office in ***Section 5 Availability*** for further assistance.