FIRETECH
Transforming Challenges with Expertise

Document No.: FPC-640-MKT-FM
Revision: 0
Product Number: 640

UL LISTED

FIRETECH FOAM CHAMBER – UL LISTED

SPECIAL FEATURES

- Wide Flow Range Capacity: 66 to 2838 LPM
- Effective for operation at low inlet pressure ranging 2.1 Bar to 7 Bar
- Compact sizes: 50 NB, 65 NB, 80 NB & 100 NB
- UL listed for MOCs : Carbon Steel, Stainless Steel 304/L & 316/L
- Ease of replacement of Vaporseal Glass and testing at site
- Listed with AFFF 3% & AR-AFFF 3 x 3% Foam Concentrates

DESCRIPTION

FIRETECH Foam Chamber is an air aspirating foam discharge device designed to produce low expansion foam employed for fire suppression and/or vapor suppression in fixed (Cone) roof flammable liquid storage tanks with or without internal floating roof. It is a fixed discharge device classified as Type II in accordance with NFPA-11 used in the surface application system for application of low expansion foam over the fuel surface.

The general arrangement of FIRETECH Foam Chamber – UL listed shall be as per fig. 640-1. Orifice plate supplied with Foam Chamber is field replaceable so as to meet design changes if any. Orifice plate is factory calibrated to the required flow rate and pressure at the Foam Chamber inlet. Refer Table 640-2 for appropriate selection of Foam Chamber as per design calculation to meet required flow rate, pressure and K-Factor for mentioned model of Foam Chamber. Please refer fig. 640-3 for typical arrangement of FIRETECH UL listed Foam Chamber with Foam Deflector installation on fixed roof flammable liquid storage tank.

Foam is directed on to the fuel surface by the Foam Deflector fitted on the foam nozzle (Refer fig. 640-3). Foam solution is delivered through a foam riser. Foam proportioning units such as Bladder type, Pump type, Foam tender, Foam trailer or Inline inductor is used for supplying foam solution to the Foam Chambers.

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OPERATION

When foam solution is supplied to the Foam Chamber at required flow rate within working pressure range (i.e. 2.1 Bar to 7 Bar) of Foam Chamber, a ventury-effect is created at the outlet of orifice plate, which results in entrapment of air into the foam solution stream via the air strainer. The entrapment of air causes the aspiration and expansion of foam. Foam Chamber is designed to produce low expansion foam and should be used only with low expansion foam concentrates. The vaporseal glass prevents the entry of vapors generated inside the storage tanks into the fixed/semi-fixed foam system line. The vaporseal glass is carefully designed to sustain required back and front rupture pressure as shown in table 640-2. The inspection hatch is provided to check the status of vaporseal glass and carry out necessary replacement work post operation. The test connection is designed so that without removal of vaporseal glass or without affecting normal operation of the storage tank, testing can be carried out. For testing purposes, the test connection needs to be removed and foam aspiration can be tested without breaking the vaporseal glass during Foam Chamber operation.

FIRETECH Foam Deflector – UL listed, fitted to the foam nozzle welded to the tank shell, directs the foam along the tank shell (Refer fig.640-3). This allows for application of foam with less submergence of foam and agitation of fuel surface.

SELECTION OF FIRETECH FOAM MAKER

The basis for estimating the number of Foam Chambers and size of Foam Chamber required to protect a risk depends primarily on code used for designing the fixed foam system. Generally the codes used are NFPA-11 or OISD 117.

The number of Foam Chambers and size of Foam Chamber depends upon,

- Risk to be protected (Classification of product stored in storage tank)
- Diameter of tank
- Foam solution application density
- Pressure at the Foam Chamber inlet
- K-Factor as per flow rate & pressure combination (Refer Table 640-2)

EXAMPLE CALCULATION

Below is an example calculation as per NFPA-11 for protection of fixed roof flammable liquid storage tanks by surface application system. It does not cover all types of risks and necessary supplementary protection. Refer to respective code for more details.

Product Classification: IB (Hydrocarbon liquid)
Diameter of Tank (D): 32 M
Min. Foam Solution Application Density: 4.1 LPM/Sq.M
Pressure at Foam Chamber Inlet: 3 Bar

1. **Area to be Protected:**
   In a fixed roof flammable liquid storage tank, the area to be protected (A) is the surface area of the liquid stored in the tank:
   $A = 0.785 \times D^2$
   $A = 0.785 \times (32)^2$
   = 803.84 Sq.M
2. **Foam Solution Application Rate:**
   Foam Solution Application Rate = Area to be Protected x Min. Foam Solution Application Density
   = 804.84 x 4.1
   = 3295.744 LPM
3. **Number of Foam Chambers:**
   The number of FIRETECH Foam Chambers required to protect the risk depends upon the diameter of the tank. As per NFPA-11, minimum 2 numbers of foam discharge outlets required for protecting a 32 M diameter storage tank.
   Note: Foam Chambers shall be spaced equally along the tank periphery
4. **Capacity of Foam Chambers:**
   = Foam Solution Application Rate / Number of Foam Chambers
   = 3295.744/2
   = 1647.872 LPM
   Note: All the Foam Chambers shall be sized to deliver foam at approximately the same rate.
5. **Foam Chamber Size & Model:**
   Selection of Foam Chamber depends upon the K-Factor (Discharge Coefficient) of Foam Chamber. K-Factor can be calculated by using formula;
   $Q = K \times \sqrt{P}$
   $K = Q / \sqrt{P}$
   Where, Q Foam solution flow rate in LPM
   K = Discharge Coefficient (Constant)
   $K = 1647.872 / \sqrt{3}$
   K = 951.399

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Please refer to table 640-2 for selection of FIRETECH Foam Chamber. The calculated K-Factor lies within the K-Factor range 496 -1072 that refers to the Foam Chamber model FCD. Hence 2 Nos of FIRETECH Foam Chamber of model FCD are required for protecting the above risk.

Note: When calculated K-Factor of Foam Chamber is nearly equal to its maximum value of K-Factor range, it is recommended to choose the next higher size and model of FIRETECH Foam Chamber. To achieve satisfactory performance, minimum operating pressure at FIRETECH Foam Chamber inlet shall be 2.1 (30) Bar or more.

ORDERING INFORMATION

While ordering a FIRETECH Foam Chamber, please specify following;

1. Item Code
2. Pressure at Foam Chamber Inlet
3. Foam Solution Flow Rate
4. K-Factor
5. Quantity
6. Type of Flange
7. Flange drilling

Refer to table 640-2 for dimensional details for accurate fitment of device as per site conditions.

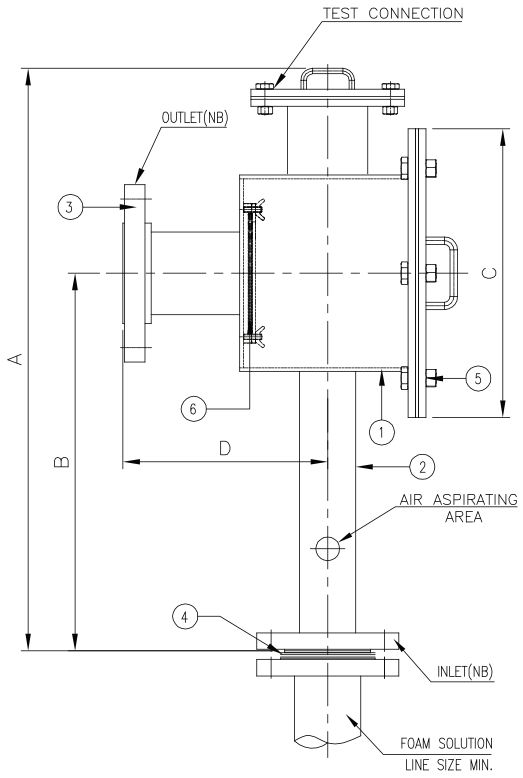

Fig No. 640-1

LISTED

TECHNICAL DETAILS	
1	WORKING PRESSURE:–2.1 BAR(30 PSI) TO 7 BAR(100 PSI)
2	FLANGES DRILLING– ANSI.B.16.5,150#,FF/RF
3	VAPOUR SEAL RUPTURE PRESSURE:–0.7 TO 1.75 BAR
4	MAX.VAPOUR SEAL BACK PRESSURE:–0.07 BAR
5	FINISH:–PAINTED FIRE–RED TO SHADE RAL 3000
6	UL FILE NO: EX27295

PERFORMANCE & DIMENSIONAL DETAILS

MODEL	INLET (NB)	OUTLET (NB)	INLET PRESSURE RANGE BAR(PSI)	FLOW RANGE		K–FACTOR RANGE(LPM/√BAR)	A	B	C	D
				GPM	LPM					
FCA	50	80	2.1(30)–7(100)	17.5–96	66–363	45.5–137	640	405±10	295±5	175±10
FCB	65	100	2.1(30)–7(100)	51–190	193–719	133–271	740	505±10	295±5	200±10
FCC	80	150	2.1(30)–7(100)	100–390	378–1476	261–558	930	650±10	390±5	260±10
FCD	100	200	2.1(30)–7(100)	190–750	719–2838	496–1072	1030	750±10	390±5	290±10

NOTES:– 1] WORKING PRESSURE SPECIFIED IS AT INLET OF FOAM CHAMBER.
2] ALL DIMENSIONS ARE IN MM,UNLESS OTHERWISE SPECIFIED.
3] FOAM CHAMBER IS OPEN TO ATMOSPHERE HENCE HYDRO TEST IS NOT APPLICABLE AS PER UL–162
4] HIGHER SIZE FLANGE MAY BE USED AT INLET & OUTLET,IF REQUIRED BY CUSTOMER.
5] K–FACTOR MENTIONED IN THE TABLE IS METRIC UNITS (LPM/√BAR)

Fig No. 640-2

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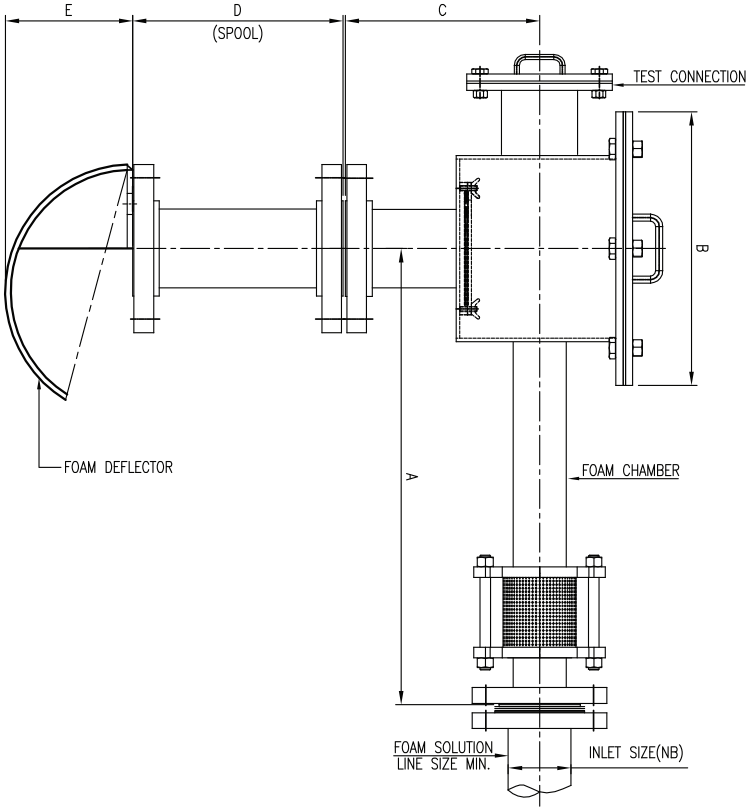

TECHNICAL DATA–

1. WORKING PRESSURE – 2.1 BAR (30 PSI) TO 7 BAR (100 PSI).
2. FLANGE DRILLING – ANSI.B.16.5,150#, RF/FF.
3. FINISH – CORROSION RESISTANT COATING.

NOTE–

1. WORKING PRESSURE SPECIFIED IS AT INLET OF FOAM CHAMBER.
2. ALL DIMENSIONS ARE IN mm,UNLESS OTHERWISE SPECIFIED.
3. FOAM CHAMBER IS OPEN TO ATMOSPHERE HENCE HYDRO TEST IS NOT APPLICABLE AS PER UL–162.
4. HIGHER SIZE FLANGE MAY BE USED AT INLET & OUTLET, IF REQUIRED BY CUSTOMER.
5. PIPES USED SHALL BE OF ERW CONSTRUCTION HOWEVER SEAMLESS PIPE MAY ALSO BE USED.

DIMENSIONS OF FOAM CHAMBER WITH FOAM DEFLECTOR TEST SET UP

MODEL (FOAM CHAMBER)	MODEL (FOAM DEFLECTOR)	INLET SIZE(NB)	A	B	C	D	E
FCA/FCA–S	FDA/FDA–S	50	405±10	295±5	175±10	300	102
FCB/FCB–S	FDB/FDB–S	65	505±10	295±5	200±10	300	114
FCC/FCC–S	FDC/FDC–S	80	650±10	390±5	260±10	300	125
FCD/FCD–S	FDD/FDD–S	100	750±10	390±5	290±10	300	176

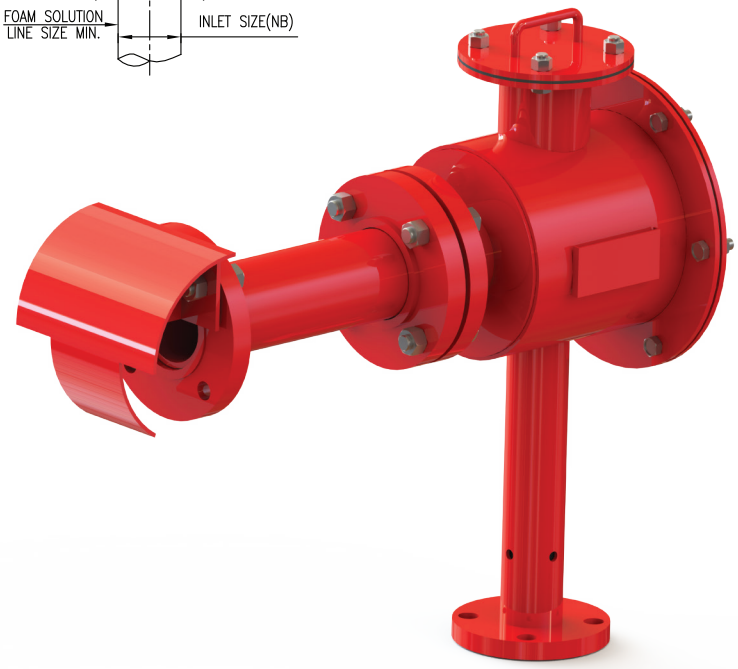

Fig No. 640-3

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FIRETECH FOAM DEFLECTOR – UL LISTED

DESCRIPTION

FIRETECH Foam Deflector is a part of foam discharge device arrangement used typically in fixed (cone) roof flammable liquid storage tanks. The primary purpose of Foam Deflector is to direct the foam on the inside circumferential surface of the storage tank so that foam will poured and slides down along the tank shell to gradually reach the fuel surface area. Please refer to fig. 638-1 for typical general arrangement of FIRETECH Foam Deflector and table 638-2 for its dimensional details.

FIRETECH Foam Deflectors shall be manufactured in various materials that includes Carbon steel, Stainless steel 304/L, and Stainless steel 316/L. The selection of Foam Deflector model shall be done with its respective model of Foam Chamber and outlet size to match inlet size of deflector.

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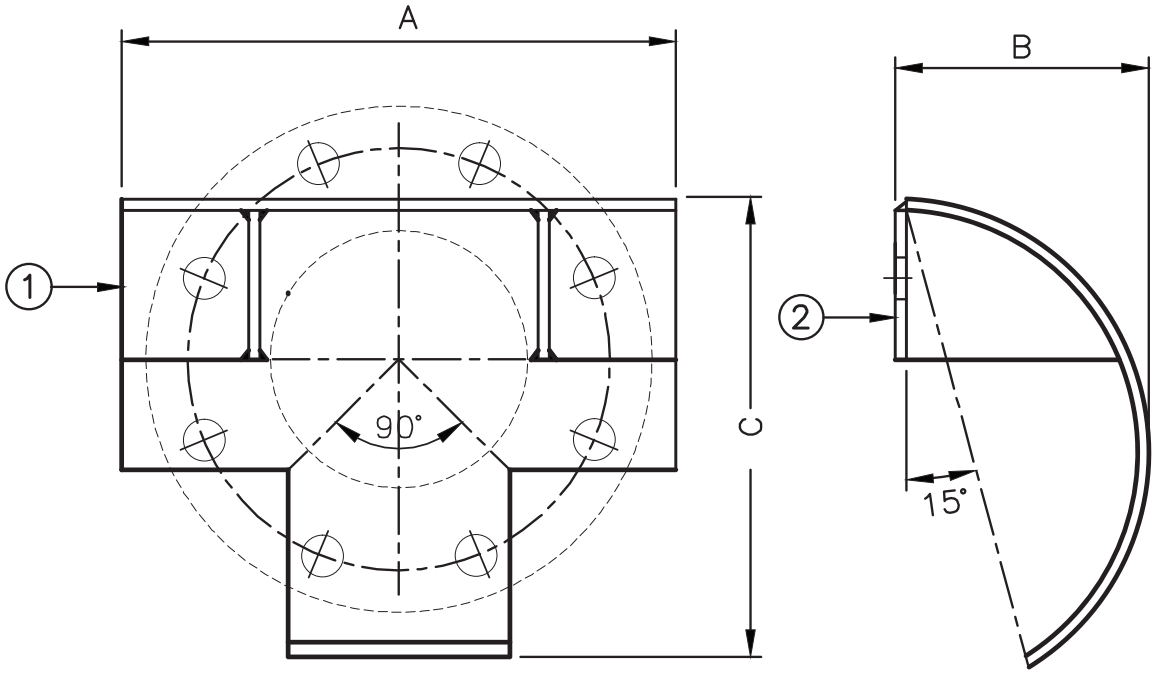

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Fig No. 638-1

TECHNICAL DETAILS

1	FLANGES DRILLING– ANSI.B.16.5,150#,RF/FF
2	FINISH:–PAINTED FIRE–RED TO SHADE RAL 3000

DIMENSIONAL DETAILS

MODEL	SIZE(NB)	A	B	C
FDA–CS	80	200	102	187
FDB–CS	100	250	114	212
FDC–CS	150	300	125	251
FDD–CS	200	350	176	329

NOTES:– 1] ALL DIMENSIONS ARE IN MM,UNLESS OTHERWISE SPECIFIED.

Fig No. 638-2

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