

Table 9.11: Foam Sprinkler/ Deluge/ Pourer System Requirements

ITEMS	REQUIREMENTS
15. DESIGN CRITERIA FOR LOW – EXPANSION FOAM SYSTEM	<ul style="list-style-type: none"> xi. Design Criteria of Subsurface application of Foam protection for Fixed-Roof Storage tanks containing Hydrocarbons shall comply with Table 9.11.F. xii. Subsurface injection systems shall not be used for protection of Class IA hydrocarbon liquids or for the protection of alcohols, esters, ketones, aldehydes, anhydrides, or other products requiring the use of alcohol-resistant foams. xiii. Foam concentrates and equipment for subsurface injection shall be listed. xiv. Fluoroprotein foam, AFFF, and FFFP for subsurface injection shall have expansion ratios between 2:1 and 4:1. xv. The foam velocity at the point of discharge into the tank contents shall not exceed 3 m/sec (10 ft./sec) for Class IB liquids or 6 m/sec (20 ft./sec) for other classes of liquids unless actual tests prove that higher velocities are satisfactory. xvi. Where two or more outlets are required, they shall be located so that the foam travel on the surface cannot exceed 30 m (100 ft.). xvii. The number of subsurface foam discharge outlets for fixed-roof storage tanks containing Hydrocarbons shall comply with Table 9.11.F. xviii. A highly viscous liquid heated above 93°C lower initial application rated may be required to prevent frothover. Good judgment should be used in applying foam in tank containing hot oil, burning asphalt or burning liquid heated over 100°C. xix. If due to type and quantity of discharge outlet the discharge rate is highly proportionate, the reduction in the discharge period is permitted but shall be not less than 70%. xx. The foam discharge outlet shall be elevated at least 0.3m above the highest water level at the bottom. xxi. The size and length of the pipe upstream of the foam maker shall be designed to limit the back pressure within the design condition of the equipment.

Table 9.11.F.: Subsurface Foam Discharge Density, Number of Outlets for Fixed Roof Hydrocarbon Tanks

TANK DIAMTER m	CLASS II LIQUID	CLASS I AND LIQUID HEATED ABOVE THEIR FLASH POINTS	CRUDE OIL AND LIQUID WITH BOILOVER
1. Up to 24 m	4.1 lpm (0.10 gpm) 1 Outlet 30 minutes	4.1 lpm (0.10 gpm) 1 Outlet 55 minutes	4.1 lpm (0.10 gpm) 1 Outlet 55 minutes
2. Over 24 m—36 m	4.1 lpm (0.10 gpm) 1 Outlet 30 minutes	4.1 lpm (0.10 gpm) 2 Outlet 55 minutes	4.1 lpm (0.10 gpm) 2 Outlet 55 minutes
3. Over 36 m—42 m	4.1 lpm (0.10 gpm) 2 Outlet 30 minutes	4.1 lpm (0.10 gpm) 3 Outlet 55 minutes	4.1 lpm (0.10 gpm) 3 Outlet 55 minutes
4. Over 42 m—48 m	4.1 lpm (0.10 gpm) 2 Outlet 30 minutes	4.1 lpm (0.10 gpm) 4 Outlet 55 minutes	4.1 lpm (0.10 gpm) 4 Outlet 55 minutes
4. Over 48 m—54 m	4.1 lpm (0.10 gpm) 2 Outlet 30 minutes	4.1 lpm (0.10 gpm) 5 Outlet 55 minutes	4.1 lpm (0.10 gpm) 5 Outlet 55 minutes
4. Over 54 m—60 m	4.1 lpm (0.10 gpm) 3 Outlet 30 minutes	4.1 lpm (0.10 gpm) 6 Outlet 55 minutes	4.1 lpm (0.10 gpm) 6 Outlet 55 minutes
4. Over 60 m	4.1 lpm (0.10 gpm) 3 Outlet, and additional 1 outlet for every 465 m ² 30 minutes	4.1 lpm (0.10 gpm) 6 Outlet, and additional 1 outlet for every 700 m ² 55 minutes	4.1 lpm (0.10 gpm) 6 Outlet, and additional 1 outlet for every 465 m ² 55 minutes