

GP 03-02-02	Foam Systems for Storage Tanks	December 2004
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Foam Systems for Storage Tanks

GP 03-02-02

Scope

- 1) [I] This Global Practice (GP) covers the design and installation of firefighting foam systems using high or low back pressure foam makers, for use with fixed roof tanks operating at approximately atmospheric pressure (not exceeding 2½ psig [17 kPag]) or with annular pontoon or double deck open-top floating roof tanks. The systems also are applicable to tanks furnished with internal floating roofs or covers.
 - 2) [I] An asterisk (*) indicates that additional information is required. If a job is contracted, this additional information is furnished in the Job Specification.
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1. Required References

This Section lists Practices and Standards that are generically referenced and assumed to be a part of this document. Unless otherwise specified herein, use the latest edition.

1.1. Global Practices–ExxonMobil Engineering Practices

GP 09-07-01	Accessories for Atmospheric Storage Tanks
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1.2. NFPA–National Fire Protection Association

NFPA 11	Standard for Low-, Medium-, and High Expansion Foam
NFPA 30	Flammable and Combustible Liquids Code (National Fire Codes, vol. 1)

2. Materials

- 1) * [S] Piping for risers, laterals, and distribution systems shall be carbon steel, Sch. 40 minimum wall thickness, galvanized or lined with a heat-cured epoxy or phenolic-epoxy system with a minimum dry film thickness of 8 mils (200 µm). The Owner's Engineer shall approve use of unlined pipe.
- 2) [S] Foam chambers, outlet assemblies, and deflectors shall be carbon steel, galvanized or epoxy lined. Foam dams shall be fabricated from carbon steel. Pipe carrying foam concentrate shall not be galvanized.
- 3) [S] Foam backboards shall be the same material specification and grade as the shell plate to which they are attached.
- 4) [S] Frangible diaphragms, incorporated in the seal chamber of foam chambers, shall be 14 oz (0.061 in. [1.5 mm]) thick common soda lime glass, scored to facilitate breakage under foam pressure.
- 5) [S] Screening, installed at the foam deflector or air entry ports of foam makers, shall be 2 x 2 mesh with 0.459-in. (12-mm) nominal opening.

3. Design

- 1) [S] Lateral terminal connection:
 - a) Laterals shall terminate on the roadside of all pipelines and drainage ditches.
 - b) The terminal connections shall be located in relation to fire hydrants so that the total length of hose from the hydrant to fire truck does not exceed 25 ft (7.5 m) and from fire truck to foam lateral terminals does not exceed 50 ft (15 m). Connections should be located at least a distance of one tank diameter from the tank but in no case less than 50 ft (15 m).

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- c) Terminal connections shall be from 2 ft to 4 ft (600 mm to 1200 mm) above grade and shall be suitably protected against collision.
- d) A sign shall be installed at each lateral termination point identifying the tank served.
- 2) * [S] Fire hose coupling type to be used at terminal connections and at foam outlet stations will be specified. In some locations, the plant fire departments will provide the actual fire hose couplings.
* [S] Coupling thread type shall be suitable for use with Owner's firefighting equipment. Couplings shall be provided with dust caps or plugs.
- 3) [S] For tanks requiring multiple laterals, up to two laterals can be brought to a single location 4 ft (1200 mm) apart. However, not more than two laterals from any one tank shall be brought to the same location.
- 4) * [S] Locate the lateral terminals on the side of the tank lot that most directly faces the prevailing wind, if any, consistent with good access.
- 5) [S] The terminal connections on foam makers shall be as follows:
 - a) Laterals to single foam outlets up to 250 gpm (0.93 m³/min) capacity shall terminate in one NPS 2 1/2 (65 mm) size mating hose coupling.
 - b) Laterals to single foam outlets greater than 250 gpm (0.93 m³/min) capacity or to multiple foam outlets shall terminate in one NPS 2 1/2 inch (65 mm) size mating hose coupling for every 250 gpm (0.93 m³/min) of lateral capacity or part thereof.
- 6) [S] The riser pipe size from the foam maker to the foam chamber shall be determined by hydraulic calculation, but shall not be smaller than the foam chamber inlet flange size.
- 7) [S] Riser supports shall be 1/2 in. (12 mm) thick plate, 12 in. (300 mm) length, with the width depending on riser dimension, but selected to maintain the riser a minimum of 4 in. (100 mm) clear from the tank shell. Installation shall be as follows:
 - a) Each support shall be located on about 8-ft (2.4 m) centers and placed perpendicular to the tank shell and centered on the riser pipe.
 - b) The edges of the plate shall be continuously welded on all sides to both tank shell and pipe with 1/4 in. (6 mm) fillet welds to support the shell in event of a fire.
- 8) [S] Foam lateral size shall be determined by hydraulic calculation, but shall not be less than NPS 2 1/2 (65 mm) size. Laterals shall be installed as follows
 - a) Slope continuously toward the termination point outside the dike. If this is impractical, a (normally closed) NPS 3/4 (20 mm) drain valve shall be provided at the low point.
 - b) Not run through the dike area of any other tank, group of tanks, or paired tanks. However, piping within a group of tanks may cross intermediate toe walls within that group.
 - c) Extend outside the dike to a safe location (taking into consideration the plant prevailing wind) at least one tank diameter or 50 ft (15 m), whichever is greater, from the tank.
 - d) Maintain a minimum elevation of 1 ft (300 mm) above finished grade.
- 9) [S] The ratio of the strainer's open basket area to its pipe area shall be at least 10:1. The net open area of the strainer shall be at least four times the area of the suction piping.
- 10) [S] Underground carbon steel piping and portions of above ground carbon steel piping that pass through a dike or pipe sleeve shall be protected against external corrosion using a Single Coat-Single Wrap or Double Coat-Double Wrap protective coating system.

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