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Revision Memo

03/04 This section relating to refinery storage facilities has been updated without major changes. Some definitions have been enhanced and further clarified.

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SCOPE

This section deals with the basic concepts that affect the selection of storage modes for refineries and chemical plants. There are three basic modes of storage: atmospheric, pressure, and refrigerated. Detailed mechanical requirements are covered in the API Standards and ExxonMobil General Practices, and are not repeated here. Design and selection criteria for atmospheric, pressure and refrigerated storage are given in [Sections XXII-B](#), [XXII-C](#) and [XXII-D](#), respectively.

REFERENCES

DESIGN PRACTICES (BESIDES OTHER SUBSECTIONS OF THIS SECTION)

[Section XV](#) Safety in Plant Design

OTHER LITERATURE

NFPA 30, Flammable and Combustible Liquids Code

BACKGROUND

The choice of storage mode is governed by safety requirements associated with the physical properties (e.g., vapor pressure) of the material to be stored. Economics and environmental requirements are secondary considerations. The selection of types of storage within the same mode is dealt with in [Sections XXII-B](#), [XXII-C](#) and [XXII-D](#).

DEFINITIONS

Atmospheric Tank

A storage tank which is designed to operate at approximately atmospheric pressure.

Autoignition Temperature

The temperature to which a flammable mixture of vapor and air in the explosive range must be heated for ignition to occur spontaneously without external source of ignition.

Ballast Water

- ◆ Oil contaminated water contained in the cargo compartments of marine vessels. Ballast water is taken aboard empty or near empty vessels to provide a safe level of stability for the vessel. Tankers arriving at a refinery dock to take on product discharge ballast water into shoreside storage tanks for subsequent wastewater treatment. This operation is known as deballasting.

Barrels per Calendar Day @ 60°F (B/CD @ 60°F)

This is the production rate of a unit normally used in planning studies. It is based on an assumed constant daily output over a one-year period in order to satisfy sales demands.

Barrels per Stream Day @ 60°F (B/SD @ 60°F)

This is the throughput during a 24-hour period when a unit is operating at its design capacity.

Blocked Operation

The use of a single process unit alternately in more than one operation to manufacture various grades of product. Lube oils and certain chemicals such as linear paraffins are often made in blocked operation.

Breathing Loss

Loss associated with thermal expansion and contraction of the vapor space, resulting from the daily temperature cycle or any such temperature cycle that can be induced by weather conditions such as rainstorms.

BS&W (Bottom sediment and water)

The sludge and water which settles to the bottom of storage tanks, as measured by standard test method and expressed in volume percent.

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Cone Bottom Up

A tank bottom configuration that slopes up from the periphery to the center. This configuration is usually limited to locations with poor soil conditions, small diameter tanks such as in marketing terminals, and molten sulfur tanks.

Cone Bottom Down

A tank bottom configuration that slopes down from the periphery to the center. The apex for either cone bottom up or down is generally but not necessarily located at the center of the tank.

Cubic Meters per Calendar Day @ 15°C

This is the production rate of a unit normally used in planning studies. It is based on an assumed constant daily output over a one-year period in order to satisfy sales demands.

Cubic Meters per Stream Day @ 15°C

This is the throughput during a 24-hour period when a unit is operating at its design capacity.

Dike

A dike is an earthen or concrete wall providing a specified liquid retention for the enclosed vessel(s).

Dome Roof

A fixed truss roof design that is in the shape of a dome. The dome roof can be designed to carry small internal pressures of 1 to 1.5 psig (7 to 10 kPa gage). In special cases, roofs can be designed for higher pressure, but such designs are usually not economical.

Explosive Limits

These are the limits of the explosive (flammable) range, i.e., the range between the minimum and maximum concentrations of a flammable vapor in air, which form explosive mixtures. These conditions may exist in the vapor space of ordinary fixed roof tanks.

Feed Stock

Crude oil or a fraction therefrom to be charged to any process equipment.

Flash Point

The lowest temperature of a petroleum liquid at which sufficient vapors are produced to form a mixture with air that will ignite in the presence of an ignition source, as measured under specified conditions in standardized test apparatus.

Floating Roof

A roof which floats on the surface of the liquid in a tank. The floating roof is used to eliminate a vapor space in atmospheric storage tanks, thereby reducing evaporation losses and providing increased safety. A floating roof may be installed in either an open roof (external floater) or a cone roof tank (internal floater).

Flush Nozzle

A rectangular tank nozzle which enters the side of the tank and has the underside flush with the tank bottom.

