Venting Atmospheric and Low-Pressure Storage Tanks

Nonrefrigerated and Refrigerated

API STANDARD 2000
FIFTH EDITION, APRIL 1998

STEP
Strategies for Today's Environmental Partnership

American Petroleum Institute

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- To work with others to resolve problems created by handling and disposal of hazardous substances from our operations.
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- To promote these principles and practices by sharing experiences and offering assistance to others who produce, handle, use, transport or dispose of similar raw materials, petroleum products and wastes.

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FOREWORD

This standard covers the normal and emergency vapor venting requirements for aboveground liquid petroleum storage tanks and aboveground and underground refrigerated storage tanks designed for operation at pressures from vacuum through 15 pounds per square inch gauge (1.034 bar gauge). Discussed in this standard are the causes of overpressure or vacuum; determination of venting requirements; means of venting; selection, installation, and maintenance of venting devices; and testing and marking of relief devices.

This standard has been developed from the accumulated knowledge and experience of qualified engineers in the petroleum-processing industry and its related industries. The vapor venting requirements in this standard are based on studies using hexane. Intended for petroleum products, this standard may be applied to other materials; however, sound engineering analysis and judgment should be used whenever this standard is applied to other materials.

Engineering studies of a particular tank may indicate that the appropriate venting capacity for the tank is not the venting capacity estimated in accordance with this standard. The many variables associated with tank venting requirements make it impractical to set forth definite, simple rules that are applicable to all locations and conditions. Larger venting capacities may be required on tanks in which liquid is heated, on tanks that receive liquid from wells or traps, and on tanks that are subjected to pipeline surges. Larger venting capacities may also be required on tanks that use flame arresters or have other restrictions that may build up pressure under certain conditions.

This standard does not apply to external floating roof tanks or free vented internal floating roof tanks.

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Asbestos is specified or referenced for certain components of the equipment described in some API standards. It has been of extreme usefulness in minimizing fire hazards associated with petroleum processing. It has also been a universal sealing material, compatible with most refining fluid services.

Certain serious adverse health effects are associated with asbestos, among them the serious and often fatal diseases of lung cancer, asbestosis, and mesothelioma (a cancer of the chest and abdominal linings). The degree of exposure to asbestos varies with the product and the work practices involved.

Consult the most recent edition of the Occupational Safety and Health Administration (OSHA), U.S. Department of Labor, Occupational Safety and Health Standard for Asbestos, Tremolite, Anthophyllite, and Actinolite, 29 *Code of Federal Regulations* Section 1910.1001; the U.S. Environmental Protection Agency, National Emission Standard for Asbestos, 40 *Code of Federal Regulations* Sections 61.140 through 61.156; and the U.S. Environmental Protection Agency (EPA) rule on labeling requirements and phased banning of asbestos products (Sections 763.160-179).

There are currently in use and under development a number of substitute materials to replace asbestos in certain applications. Manufacturers and users are encouraged to develop and use effective substitute materials that can meet the specifications for, and operating requirements of, the equipment to which they would apply.

SAFETY AND HEALTH INFORMATION WITH RESPECT TO PARTICULAR PRODUCTS OR MATERIALS CAN BE OBTAINED FROM THE EMPLOYER, THE MANUFACTURER OR SUPPLIER OF THAT PRODUCT OR MATERIAL, OR THE MATERIAL SAFETY DATA SHEET.

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The venting requirements provided in this standard are based on studies of hexane stored in steel tanks. Sound engineering judgment should be applied when extrapolating these results to other liquids and nonmetallic tanks.

Detailed engineering studies of a particular tank and its operating conditions may indicate that the appropriate venting capacity for the tank is not the venting capacity estimated in accordance with this standard. If a tank's operating conditions could deviate from those used in developing this standard, detailed engineering studies should be performed.

1 Scope

This standard covers the normal and emergency vapor venting requirements for aboveground liquid petroleum or petroleum products storage tanks and aboveground and underground refrigerated storage tanks designed for operation at pressures from vacuum through 15 pounds per square inch gauge (1.034 bar gauge). Discussed in this standard are the causes of overpressure or vacuum; determination of venting requirements; means of venting; selection, installation, and maintenance of venting devices; and testing and marking of relief devices.

2 References

Unless otherwise specified, the referenced sections of the most recent editions or revisions of the following standards, codes, and specifications shall, to the extent specified herein, form a part of this standard.

2.1 STANDARDS

API

Std 620	*Design and Construction of Large, Welded, Low-Pressure Storage Tanks*
Std 650	*Welded Steel Tanks for Oil Storage*
Std 2510	*Design and Construction of Liquefied Petroleum Gas (LPG) Installations*

ASME[1]

PTC 19.5	*Fluid Meters: Interim Supplement on Instruments and Apparatus, Part II—"Application"*
PTC 25	*Pressure Relief Devices*
	Boiler & Pressure Vessel Code, Section VIII, Division 1, Rules for Construction of Pressure Vessels

[1]American Society of Mechanical Engineers, 345 East 47th Street, New York, New York 10017

2.2 OTHER REFERENCES

API

RP 520	*Sizing, Selection, and Installation of Pressure-Relieving Devices in Refineries, Part I—"Sizing and Selection"*
RP 521	*Guide for Pressure-Relieving and Depressuring Systems*
RP 576	*Inspection of Pressure-Relieving Devices*
Publ 2210	*Flame Arresters for Vents of Tanks Storing Petroleum Products*
RP 2350	*Overfill Protection for Petroleum Storage Tanks*
Bull 2521	*Use of Pressure-Vacuum Vent Valves for Atmospheric Pressure Tanks to Reduce Evaporation Loss*

3 Definition of Terms

For the purposes of this standard, the following definitions apply:

3.1 accumulation: The pressure increase in a tank over its maximum allowable working pressure when the vent valve is relieving (expressed in pressure units or percentage of the maximum allowable working pressure). Maximum allowable accumulations are typically established by applicable codes for operating and fire contingencies.

3.2 barrel: A liquid unit of measure equal to 42 US gallons (0.159 cubic meters).

3.3 BTU: British Thermal Unit, a unit of heat that will increase the temperature of one pound of water one degree Fahrenheit.

3.4 emergency venting: The venting required when an abnormal condition, such as ruptured internal heating coils or an external fire, exists either inside or outside of a tank.

3.5 nonrefrigerated tank: A container that stores material in a liquid state without the aid of refrigeration either by evaporation of the tank contents or by a circulating refrigeration system. Generally, the storage temperature will be close to or higher than ambient temperature.

3.6 normal venting: The venting required because of operational requirements or atmospheric changes.

3.7 overpressure: The pressure increase at the valve inlet above the set pressure, when the valve is relieving, expressed in pressure units or as a percentage of the set pressure. It is the same as accumulation when the valve is set at the maximum allowable working pressure and the inlet piping losses are zero.