

Manual of Petroleum Measurement Standards Chapter 19.1

Evaporative Loss from Fixed-roof Tanks

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Contents

	Page
1 Scope	1
2 Normative References	1
3 Symbols	2
4 Procedure for Estimating Loss	3
4.1 General	3
4.2 Standing Loss, L_S	3
4.3 Working Loss, L_W	10
5 Example	12
5.1 Parameters	12
5.2 Solution	13
6 Equipment Descriptions	15
6.1 General	15
6.2 Fixed-roof Tanks	16
6.3 Roof Fittings	16
6.4 Insulation	17
6.5 Outside Surfaces of the Tank	18
7 Loss Mechanisms	18
7.1 General	18
7.2 Standing Loss	18
7.3 Working Loss	19
8 Development of Estimation Methods	20
8.1 General	20
8.2 Standing Loss	21
8.3 Working Loss	25
Annex A SI Units	28
Bibliography	29
Figures	
1 Fixed-roof Tank Geomet.	5
2 Typical Fixed-roof Tank	16
Tables	
1 Annual Stock Turnover Rate (N) for 123 Test Tanks	25

Summary of Changes to API *MPMS* Chapter 19.1, Fourth Edition

- 1) Added guidance for estimating emissions from insulated and partially insulated tanks.
- 2) Added guidance for estimating standing (breathing) loss from underground tanks or fully insulated aboveground tanks due to cyclic heating of the stored liquid.
- 3) Added an explanation of what is meant by the term “true vapor pressure” as used in this document.
- 4) Edited the coefficients in the expressions for T_{LA} , T_V , and ΔT_V to use a uniform assumption of 0.5 for the tank height-to-diameter ratio and expressed the coefficients to one significant figure.
- 5) Added language to clarify, in the instances of alternative equations, which equations are referred to as being more accurate.
- 6) Added an upper limit of 1 to the vapor space expansion factor, KE .
- 7) Replaced the former equation for calculating T_B from ambient conditions with the equation developed in APIMPMS Ch. 19.4, Annex I.

Evaporative Loss from Fixed-roof Tanks

1 Scope

This standard contains methodologies for estimating the total evaporative losses of hydrocarbons from fixed-roof tanks. The methodologies provide loss estimates for general equipment types based on laboratory, test-tank, and field-tank data.

Types of fixed-roof tanks and roof fittings described are for information only.

The equations estimate average annual losses from fixed-roof tanks for various liquid stocks, stock vapor pressures, tank sizes, meteorological conditions, and operating conditions.

The following special cases are addressed:

- a) horizontal tanks,
- b) higher volatility stocks (true vapor pressure greater than 0.1 psia),
- c) vent settings higher than 0.03 psia (0.5 oz/in.²),
- d) tanks that have either roof or shell insulation.

The estimation may be improved by using detailed field information, including climatic data and operational data for the appropriate time period.

The equations are not intended to be used in the following applications:

- a) to estimate losses from unstable or boiling stocks or from petroleum liquids or petrochemicals for which the vapor pressure is not known or cannot readily be predicted [to calculate emissions from tanks that contain material at or above its boiling point or the point at which material starts to flash, the API model E&P Tank (API 4697) can be used];
- b) to estimate losses from fixed-roof tanks that have an internal floating roof (API MPMS Ch. 19.2^[4] and API 2569^[13] address these);
- c) to estimate losses from cleaning fixed-roof tanks (API 2568^[12] addresses this);
- d) to estimate losses from tanks with air sparging operations.

The estimation procedures were developed to provide estimates of typical losses from fixed-roof tanks that are properly maintained and are in normal working condition. Losses from poorly maintained tanks may be greater. Because the loss equations are based on equipment conditions that represent a large population of tanks, a loss estimate for a group of fixed-roof tanks may be more representative than a loss estimate for an individual tank.

Evaporative loss considerations are not the only criteria for equipment selection. Many other factors not addressed in this standard, such as tank operation, maintenance, and safety, are important in designing and selecting tank equipment for a given application.

2 Informative References

The following documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

API *Manual of Petroleum Measurement Standards (MPMS) Chapter 19.4, Evaporative Loss Reference Information and Speciation Methodology*, Third Edition, 2012, including Addendum 2