Manual of Petroleum Measurement Standards Chapter 3.2

Standard Practice for Gauging Petroleum and Petroleum Products in Tank Cars

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Contents

Page

1 Scope ... 1

2 Normative References ... 1

3 Terms, Definitions, and Acronyms ... 1
3.1 Terms and Definitions ... 1
3.2 Acronyms ... 2

4 Measurement Equipment ... 2
4.1 Liquid-level Measurement Equipment ... 3
4.2 Temperature Measurement Equipment ... 3

5 Liquid-level Measurement Procedures ... 3
5.1 Gauge Tape and Bob ... 4
5.2 Portable Measurement Unit (PMU) ... 4
5.3 Slip-tube Gauging Procedure ... 4
5.4 Magnetic Gauging Procedure (Rod Type) ... 4
5.5 Magnetic Gauging Procedure (Tape Type) ... 6
5.6 Outage Bars ... 7

6 Temperature Measurement Procedure ... 7

7 Sampling ... 8

8 Reading Tank Car Capacity Tables ... 8

9 Reporting ... 8

Annex A (informative) Rail Tank Car Capacity Table Example ... 9

Bibliography ... 14

Figures

1 Non-pressure Tank Car ... 3
2 Rod-type Magnetic Gauging Device ... 5
3 Tape-type Magnetic Gauging Device ... 6
4 Outage Bar Type Gauging Device ... 7

Tables

A.1 Rail Tank Car Capacity Table Example ... 9

Introduction

This standard provides a uniform method for measuring liquids and liquefied gases in tank cars by liquid level measurement. Measurement of both vapor space and liquid level are described.

Significance and Use

Volumes based on liquid level measurements in tank cars are used for commercial purposes and to indicate compliance with regulations regarding weight and volume. The procedures in this standard are intended to reduce variability in the results of measurement and sampling operations when comparing loading terminal data to unloading terminal data.

Safety and Health Considerations

Caution—All applicable safety and health procedures should be consulted. Considerations should include, but are not limited to, potential electrostatic and other fire and explosion hazards, potential personnel exposure (for example, exposure limits, hazard communication, training, associated protective clothing and equipment requirements, and work practices), and potential explosive and toxic hazards associated with a tank car's atmosphere. The physical characteristics of the commodity and existing operational conditions should be evaluated, and applicable international, federal, state, and local regulations should be observed. Safety procedures designated by the employer and other parties concerned should also be observed. The Association of American Railroads *Manual of Standard Recommended Practices* and API publications provide additional safety information and should be consulted.

Caution—Petroleum vapors and associated substances may also involve potential toxicity, including hydrogen sulfide vapors from "sour" crude. Petroleum vapors with high concentrations of hydrogen sulfide may cause unconsciousness or death. During and after the opening of the manway, one should stand so that vapor inhalation is minimized. Harmful vapors or oxygen deficiency cannot be detected safely by smell, visual inspection, or judgment. Appropriate precautions should be used for protection against toxic vapors or oxygen deficiency. Procedures should be developed to provide for appropriate exposure monitoring, personal protective equipment, and emergency rescue precautions. When necessary, suitable respirator protection should be worn prior to entering the gauge site and during the gauging procedure.

Physical Characteristics and Fire Considerations

Caution—Personnel involved with the handling of petroleum-related substances (and other chemical materials) should be familiar with their physical and chemical characteristics—including the potential for fire, explosion, and reactivity—and appropriate emergency procedures, as well as potential toxicity and health hazards. They should comply with individual company safe operating practices and local, state, and federal regulations. Personnel should be alert to avoid potential sources of ignition; they should keep containers of materials closed when not in use.

Standard Practice for Gauging Petroleum and Petroleum Products in Tank Cars

1 Scope

This standard provides a uniform method for measuring liquids and liquefied gases in tank cars by liquid level measurement. Measurement of both vapor space and liquid level are described.

Tank car contents may be measured by three methods: railroad scale weighing, metering, and liquid level measurement. This standard describes only the equipment for and the procedures of the liquid level method of measurement.

When tank cars can be opened for manual measurements, gauge tapes and bobs may be used to measure the level of liquid contents. When tank cars cannot be opened for gauging contents, closed-system measurement equipment has to be used for gauging. This standard describes gauging and temperature measurement equipment used in both open and closed measurement systems.

2 Normative References

There are no normative references for this document.

3 Terms, Definitions, and Acronyms

3.1 Terms and Definitions

For the purposes of this document, the following terms and definitions apply. Terms of more general use can be found in the API *MPMS* Chapter 1—*Online Terms and Definitions Database*.

3.1.1
tank capacity table
Table showing the liquid volume capacities, on an innage or ullage (outage) basis, and the corresponding vapor space capacities, in a tank, tank car or vessel compartment, at various liquid levels, which are measured at the reference gauge point: from the datum up to the liquid surface level for innage gauges; or, from the reference gauge point down to the liquid surface level for ullage (outage) gauges.

3.1.2
dome tank cars
Non-pressure tank cars with an expansion trunk (dome) at the top center of the tank car to provide space for expansion of the liquid in the car.

3.1.3
domeless tank car
Tank cars with the manway opening attached directly to the top of the tank car shell.

NOTE See Figure 1.

3.1.4
interior lining
The surface coating applied to the interior of a tank car shell to prevent contents from contacting the metal shell.

3.1.5
magnetic float gauging device
An assembly consisting of a float with an interior magnet that moves up and down a hollow tube (sealed to the outside) as the liquid level changes. Another magnet is attached to the bottom of a graduated gauge rod located