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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 19779-2005

**Petroleum and liquid petroleum products -- Calculation of oil
quantities -- Static measurement**

(English Translation)

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1 Scope

This standard specifies the calculation method for the static liquid quantity of crude oil, petroleum products, petrochemical products (hereinafter referred to as oil products) in oil storage containers. It defines the terminology used in static oil quantity calculations;

provides formulas for calculating certain correction factors. The principle is that regardless of whether the underlying data is collected manually or automatically, different users can calculate consistent results using the same underlying data (tank capacity tables, liquid levels, density, temperature, etc.).

This standard applies to the calculation of oil quantity in vertical cylindrical tanks, tankers, railroad tank cars, horizontal cylindrical tanks, truck tankers, other oil storage containers under atmospheric pressure.

This standard does not cover the calculation of oil quantity for wall oil, non-liquid substances, trace residual oil, or oil and gas spaces.

The reference conditions for calculating static oil quantity in this standard. standard temperature of 20 °C and atmospheric pressure of 101.325 kPa.

2 Normative references

The provisions in following documents become the provisions of this Standard through reference in this Standard. For the dated references, the subsequent amendments (excluding corrections) or revisions do not apply to this Standard; however, parties who reach an agreement based on this Standard are encouraged to study if the latest versions of these documents are applicable. For undated references, the latest edition of the referenced document applies.

GB/T 260 Test method for water in petroleum products - Distillation method

GB/T 1884 Crude petroleum and liquid petroleum products - Laboratory determination of density - Hydrometer method (GB/T 1884-2000, eqv ISO

3675.1998)

GB/T 1885 Petroleum measurement tables (GB/T 1885-1998, eqv ISO 91-2)

GB/T 4756 Method for manual sampling of petroleum liquids (GB/T 4756-1998,

JJG 266 Verification regulation of the volume of horizontal metallic tank

JJG 702 Ship liquid cargo tank capacity

SH/T 0604 Crude petroleum and petroleum products - Determination of density -

Oscillating U-tube method (SH/T 0604-2000, eqv. ISO 12185.1996)

ISO/TR 8338 Crude petroleum oil - Transfer accountability - Method for estimation on ships of total quantity remaining on board (ROB)

ISO 3171 Petroleum liquids - Automatic pipeline sampling

API MPMS Chapter 2 Tank calibration

API MPMS Chapter 17 Tanker measurement

3 Terms and definitions

The following terms and definitions apply to this standard. For a table of international and domestic terminology symbols, see Appendix B.

3.1

Free water (FW)

Water that forms an independent layer in an oil product and is primarily present below the oil product. VFW represents the deduction of free water, which includes bottom sediment.

3.2

Sediment and water (SW)

Suspended sediment, dissolved water, suspended water in oil products are collectively referred to as sediment and water. Their mass fraction or volume fraction, volume, mass are expressed as SW%, Vsw, msw, respectively.

3.3

Correction for SW (CSW)

This is the correction factor used to correct the gross standard volume to the net standard volume, or the gross mass to the net mass, by deducting sediment and water (SW) from the oil product.

3.4

Volume correction factor (VCF)

4 Rounding off of values

The rounding off method for values shall comply with GB/T 8170. In most cases, the number of decimal places used will be influenced by the data source. For example, if a tank capacity table is calibrated to the nearest liter, the derived volume value shall be recorded accordingly. However, in the absence of other limiting factors, the user shall round to the number of decimal places specified in Table 1. The data in Table 1 shall not be considered as the accuracy requirements of the measuring instrument. When verifying the compliance of calculation methods with this standard, the display and printing hardware shall have a binary word length of at least 32 bits or be capable of displaying 10 digits.

5 Preparation of basic data

To obtain accurate results for oil inventory and transfer within tankers or tankers, it is necessary to ensure that the basic data for calculating oil quantity (such as liquid level, oil temperature, density, moisture content) is obtained simultaneously according to prescribed standard methods and recorded on the same measurement ticket or measurement report.

5.1 Volume table

Oil storage containers must be calibrated according to the relevant standards and have a volume table that meets the standard requirements. The calibration standards for vertical oil tanks, horizontal oil tanks, railway tank cars, truck tankers, oil tankers shall be GB/T 13235.1 ~ GB/T 13235.3 (or JJG 168), GB/T 17605 (or JJG 266), JJG 140, JJG 133, MPMS Chapter 2 (Section 8A) (or JJG 702), in that order.

5.2 Oil level

Accurately measure and record the actual or empty height of the oil product according to GB/T 13894 or other automated measurement methods that meet accuracy requirements. Also, measure and record the total height of the gauge opening in use and the total height of the gauge opening indicated on the volume table, as needed. If free water and sediment are present at the bottom of the container, the height of the free water and sediment shall be measured and recorded.

5.3 Measuring temperature

The measuring temperature of the oil product shall be measured and recorded in accordance with GB/T 8927 or other automated measurement methods, that meet the accuracy requirements, ultimately obtaining the average measuring temperature of the oil product in the tank or tanker.

5.4 Sampling

To determine the density of the oil product in the tank, tanker, or in transit, as well as the mass or volume fraction of sediment and water, sampling shall be conducted according to the requirements of GB/T 4756 or ISO 3171 based on actual measurement needs for experimental analysis.

5.5 Standard density

The standard density of the sample collected in Section 5.4 shall be determined in accordance with GB/T 1884, GB/T 13377, or SH/T 0604, to obtain a standard density representative of the oil product in the tank.

5.6 Mass or volume fraction of sediment and water (SW%)

Depending on the oil product type and trade agreement, determine the water mass or volume fraction according to GB/T 260 or GB/T 8929; determine the sediment mass or volume fraction according to GB/T 6531. The sum of these two values is used to determine the sediment and water mass and volume fractions. Alternatively, the water and sediment mass or volume fractions in crude oil can be determined simultaneously according to GB/T 6533.

5.7 Ambient air temperature

For non-insulated tanks, the tank wall temperature is significantly affected by the external environment. When calculating the correction factor for the temperature effect on the tank wall, the ambient air temperature must be considered in addition to the liquid temperature. The ambient air temperature surrounding the oil tank is a random and widely varying