Crude petroleum and petroleum products — Bulk cargo transfer — Guidelines for achieving the fullness of pipelines

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BSi
British Standards

National foreword

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The UK participation in its preparation was entrusted by Technical Committee PTI/12, Petroleum measurement and sampling, to Subcommittee PTI/12/3, Bulk cargo transfer, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

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Crude petroleum and petroleum products — Bulk cargo transfer — Guidelines for achieving the fullness of pipelines

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Foreword

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ISO 11563 was prepared by Technical Committee ISO/TC 28, *Petroleum products and lubricants*, Subcommittee SC 6, *Bulk cargo transfer, accountability, inspection and reconciliation*.

Introduction

When petroleum liquids are transferred, the accuracy of measurement of the transferred quantity is affected by the contents and integrity of the pipelines. Pipelines which contain air or vapour with the liquid, or material of different characteristics, require procedures to ensure that, as far as is practical, pipelines are full of liquid compatible with the material to be transferred.

Crude petroleum and petroleum products — Bulk cargo transfer — Guidelines for achieving the fullness of pipelines

1 Scope

This International Standard establishes procedures to achieve the fullness of a pipeline system.

This International Standard is applicable to crude oils and petroleum products which are liquid at atmospheric pressure and at the observed temperature. It can be applied to loading, discharges and movements between local storage tanks. It is not the intention of this International Standard to recommend practices for transcontinental movements.

2 Safety recommendations

All safety precautions should comply with the *International Safety Guide for Oil Tankers and Terminals (ISGOTT)* and regulations specified by the vessel or terminal operator, and any statutory authorities who may be concerned.

3 Responsibilities

3.1 Terminal

3.1.1 The terminal should designate a pipeline system including meters (if used), and tank(s) (if used), and advise on the nominal capacity of the pipeline system.

NOTE The preferred temperature for stating capacity is 15 °C.

3.1.2 If the high-point bleed-valve/sight-glass procedure (see 4.5) is selected to determine if a designated pipeline system is full, the valve or sight-glass locations for this purpose should be identified by the terminal.

3.2 Vessel

3.2.1 The capacity of the vessel's lines designated for the line-displacement operation should be available for reference. The vessel should also report whether the designated lines are full or empty.

3.2.2 The condition of the vessel's lines will have a direct effect on the accuracy of the line-displacement procedure between the vessel and the shore. The vessel should provide every assistance to accurately determine the fullness condition of the vessel's lines.

4 Procedures

4.1 General

The following procedures are described in this International Standard:

a) line displacement between the vessel and the shore, see 4.3;

b) internal circulation of shore lines, see 4.4;

c) high-point bleed-valve/sight-glass procedure, see 4.5;

d) pigging of shore lines, see 4.6;

e) line press (line pack), see 4.7.

Procedures b), c), d) and e) do not require the presence of a vessel.

4.2 Agreed tolerance

Parties should agree on the differences in volumes or tank levels, determined at the commencement and completion of a line-fullness procedure, that will be acceptable. Such differences are referred to as the "agreed tolerance".

NOTE 1 Agreed tolerances can be derived from consideration of the nominal precision of the measurement techniques employed. In addition, records of previous line-fullness operations at a particular terminal can provide details to assist arriving at the agreed tolerance.

NOTE 2 For the line-press procedure, a typical agreed tolerance would be a 3 mm difference in tank level.

4.3 Line displacement between vessel and shore

4.3.1 This procedure consists of measuring the amount of liquid pumped from a shore tank to a vessel (or from a vessel to a shore tank) through the pipeline system designated for cargo transfer, and comparing the total observed volume (TOV) delivered to the TOV received. In some cases, for instance where temperatures of liquid in lines and tanks differ considerably, comparison of volumes corrected from the observed, TOV, condition may be necessary. If free water (FW) can be ignored, comparison using the gross standard volume (GSV) is satisfactory. If free water is present, comparison by the total calculated volume (TCV), namely GSV + FW, should be used. The parties involved should agree prior to the displacement on the comparison procedure adopted.

4.3.2 The vessel should either be on even keel with no list, or a trim correction or wedge calculation should be applied.

4.3.3 All cargo quantities on board and the shore tank quantity should be determined prior to line displacement.

4.3.4 The number of vessel tanks used for the line displacement should be kept to a minimum and be selected to minimize changes in trim or list (preferably one centre tank).

4.3.5 Obtain the fullness condition of the vessel lines before and after the displacement operation.

4.3.6 Obtain the nominal capacity of the shore pipeline system.

4.3.7 Agree on the quantity to be displaced. The displacement should be stopped when the TOV of product is at least 120 % of the combined capacity of all designated vessel and shore transfer pipelines. Calculate a stop gauge for the designated vessel or shore tank(s) to meet the agreed volume.

4.3.8 Agree on the flow rate.

4.3.9 Ensure proper coordination between the vessel and the shore to enable, for example, correct valve settings.

4.3.10 Record metered volumes or measure liquid levels in the tank and, as necessary, temperature and free water in delivery and receiving tanks, to derive TOVs or GSVs or TCVs as required.

4.3.11 Transfer the volume required for displacement between the vessel and the shore.

4.3.12 Record metered volumes or redetermine liquid levels in the tank and, as necessary, temperature and free water in the delivery and receiving tanks to provide TOVs or GSVs or TCVs as required.

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4.3.13 Compare transferred TOVs based on both shore and vessel tank measurements.

4.3.14 The designated pipeline system is deemed to be full if the difference between the volume delivered and the volume received is within the agreed tolerance (see 4.2).

4.3.15 If the vessel and shore volumes differ by more than the agreed tolerance, any or all of the following options may be exercised:

a) recheck all calculations;

b) regauge shore tank(s) (or verify meter reading) and designated vessel tank(s);

c) regauge all vessel tanks and reconfirm the fullness condition of the vessel's lines;

d) verify valve settings.

4.3.16 If the difference still exceeds the agreed tolerance, a second line displacement should be considered.

4.4 Internal circulation of shore lines

4.4.1 This procedure consists of transferring a measured volume of liquid from one shore tank into the same or another shore tank through the pipeline system designated for cargo transfer, and comparing the TOV delivered to the TOV received.

4.4.2 The terminal should circulate liquid through the designated pipeline system after the system has been isolated.

4.4.3 The liquid volume in the delivering and receiving tanks should be measured before line circulation.

4.4.4 Circulate sufficient liquid to displace at least 120 % of the capacity of the designated pipeline system.

4.4.5 Remeasure the liquid volume in the tank(s).

4.4.6 Quantify and compare the TOVs of the delivering and receiving shore tanks.

4.4.7 The designated pipeline systems are deemed to be full if the difference between the TOV delivered and the TOV received is within the agreed tolerance (see 4.2).

4.4.8 Compare TOVs of delivering and receiving shore tanks. If the difference exceeds the agreed tolerance, any or all of the following options may be exercised:

a) recheck all calculations;

b) regauge shore tank(s) (or verify meter reading);

c) verify valve settings.

4.4.9 If the difference still exceeds the agreed tolerance, a second line circulation should be considered.

4.5 High-point bleed-valve/sight-glass procedure

4.5.1 This procedure consists of checking for the presence of liquid at high points in the designated pipeline system. It may not be applicable to pipeline systems with extensive horizontal sections since vapour may remain in these sections.

4.5.2 High-point bleed valves and sight glasses should be located at those points along the pipeline where the line's elevation is at its highest, such as road crossings or other elevated sections. For this procedure, the following criteria should be met, otherwise an alternative pipeline-fullness procedure should be selected.

High-point valves are tapped into the pipe at the uppermost point on the pipeline circumference.

Sight-glass connections are made at the top and bottom of the pipeline circumference and permit convenient visual observation.

Sight-glass systems permit bleeding to evacuate gases seen in the sight glass.

4.5.3 All appropriate valves between the designated shore tank and the vessel berth should be open and under positive pressure to permit the pipeline to be filled with liquid.

4.5.4 Appropriate measures should be taken to ensure that any venting of vapours or release of liquids during bleeding operations is controlled and contained in accordance with applicable regulations.

4.5.5 The line should be at a positive pressure at bleed positions prior to opening and bleeding through each valve. Lines will be deemed to be full when liquid issues from all the valves.

4.6 Pigging of shore lines

4.6.1 This procedure consists of displacing the contents of a pipeline system by a tight-fitting wiping device propelled through the line by gas or liquid, leaving the line full of propellant.

4.6.2 The pigging procedure is acceptable only when the terminal is equipped with the launching and receiving systems designed for this purpose.

4.6.3 The pigging procedure may be used before, after, or both before and after a cargo transfer.

4.7 Line press (line pack)

4.7.1 This procedure consists of pressurizing the liquid contents of the designated pipeline system with liquid to determine if gases are present.

4.7.2 This procedure requires that the designated pipeline system is able to maintain pressures applied during the press operations. Alternative procedures should be used if these requirements cannot be met.

4.7.3 Determine the liquid level in the tank to be used to pressurize the designated pipeline system.

4.7.4 Set the valves and pressurize the shorelines until the pressure stabilizes and reaches a predetermined value. This should be as close as possible, but not greater than, the normal operating pressure.

4.7.5 Isolate the designated pipeline.

4.7.6 Regauge and record the liquid level in the tank.

4.7.7 If the liquid levels in the tank before and after the line press are within the agreed tolerance, the pipeline system is deemed to be full.

4.7.8 If the liquid level in the tank has changed by more than the agreed tolerance after the line press, regauge the tank. If the level change is still more than the agreed tolerance, relieve the pressure and repeat the procedure given in 4.7.3 to 4.7.7.

4.7.9 If the liquid level in the tank changes by more than the agreed tolerance after the second line press, the line is deemed not to be full.

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