

Methods for calibration of vertical cylindrical tanks for petroleum and liquid petroleum products —

Part 4: Internal electro-optical distance-ranging method

ICS 75.200

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee PTI/12, Petroleum measurement and sampling, upon which the following bodies were represented:

- Department of Trade and Industry (National Engineering Laboratory)
- Department of Trade and Industry (Oil and Gas Office)
- Institute of Petroleum
- Salvage Association

The following body was also represented in the drafting of the standard through subcommittees and panels:

- GAMBICA (BEAMA Ltd.)

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Contents

	Page
Committees responsible	Inside front cover
National foreword	ii
1 Scope	1
2 Normative references	1
3 Definitions	1
4 Precautions	1
5 Equipment	1
6 General considerations	2
7 EODR instrument setup within the tank	2
8 Selection of target points	3
9 Calibration procedure	3
10 Tolerances	4
11 Other measurements	5
12 Calculation and development of capacity tables	5
Annex A (normative) Field equipment verification	6
Annex B (normative) Calculation of internal radii from measured parameters	6
Annex C (informative) Bibliography	7
Figure 1 — Illustration of target positioning on tank shell wall	3
Figure 2 — Illustration of calibration procedure	4
Figure A.1 — Illustration of the distance measurement set-up	6
Table 1 — Minimum number of target points per set	3
List of references	Inside back cover

National foreword

This Part of BS 7723 has been prepared by Technical Committee PTI/12. It is identical with ISO 7507-4:1995, *Petroleum and liquid petroleum products — Calibration of vertical cylindrical tanks — Part 4: Internal electro-optical distance-ranging method*, published by the International Organization for Standardization (ISO). ISO 7507-4 was prepared by Technical Committee ISO/TC 28, Petroleum products and lubricants, Subcommittee SC 3, Static petroleum measurement, in which the UK participated.

Cross-references

International Standard	Corresponding British Standard
	BS 7723 <i>Methods for calibration of vertical cylindrical tanks for petroleum and liquid petroleum products</i>
ISO 7507-2:1993	Part 2:1994 <i>Optical-reference-line method</i> (Identical)
ISO 7078:1985	BS 6953:1988 <i>Glossary of terms for procedures for setting out, measurement and surveying in building construction (including guidance notes)</i> (Identical)
ISO 8322-8:1992	BS 7334 <i>Measuring instruments for building construction</i> Part 8:1992 <i>Methods for determining accuracy in use of electronic distance-measuring instruments up to 150 m</i> (Identical)

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 8, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

1.1 This part of ISO 7507 specifies a method for the calibration of vertical cylindrical tanks having diameters greater than 5 m by means of internal measurements using an electro-optical distance-ranging instrument, and for the subsequent compilation of tank capacity tables. This method is known as the internal electro-optical distance-ranging (EODR) method.

1.2 This part of ISO 7507 is not applicable to the calibration of abnormally deformed (e.g. dented) tanks or of noncircular tanks.

1.3 This part of ISO 7507 is applicable to tanks tilted by ≤ 3 % from the vertical, provided a correction is applied for the measured tilt as described in ISO 7507-1.

1.4 This part of ISO 7507 is applicable to tanks with cone-up or cone-down bottoms, as well as to tanks with flat bottoms.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 7507. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 7507 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 7507-1:1993, *Petroleum and liquid petroleum products — Calibration of vertical cylindrical tanks — Part 1: Strapping method*.

ISO 7507-3:1993, *Petroleum and liquid petroleum products — Calibration of vertical cylindrical tanks — Part 3: Optical-triangulation method*.

IEC 825-1:1993, *Safety of laser products — Part 1: Equipment classification, requirements and user's guide*.

3 Definitions

For the purposes of this part of ISO 7507, the definitions given in ISO 7507-1 and the following definitions apply.

3.1

reference target point

fixed point clearly marked on the inside surface of the tank shell wall

3.2

slope distance

distance measured from the electro-optical distance-ranging instrument to a target point on any given course of the tank shell wall

3.3

target point

one of a series of points on the inside surface of the tank shell wall to which slope distance, vertical and horizontal angles are measured by use of the electro-optical ranging instrument

4 Precautions

The general and safety precautions contained in ISO 7507-1 shall apply to this standard.

In addition, the laser beam emitted by the distance-ranging unit shall conform to IEC 825 for a class 1 laser.

5 Equipment

5.1 Electro-optical distance-ranging instrument

5.1.1 The angular measuring part of the instrument shall have an angular graduation and resolution equal to or better than $\pm 0,000\ 2$ gon¹⁾, a repeatability equal to or better than $\pm 0,000\ 5$ gon, and an uncertainty equal to or better than $\pm 0,001$ gon.

5.1.2 The distance-measuring part of the instrument, used for direct determination of distances, shall have a graduation and resolution equal to or better than ± 1 mm, a repeatability equal to or better than ± 2 mm, and an uncertainty equal to or better than ± 2 mm.

5.2 Instrument mounting, consisting of a tripod which is firm and stable. The legs of the tripod shall be held firm, and steadied, by suitable devices such as magnetic bearers.

5.3 Laser beam emitter, having a low-power laser beam complying with IEC 825, which is either an integral part of the EODR instrument or a separate device. If the laser beam emitter is a separate device, it may be fitted with a fibre optic light transmitter system and a theodolite telescope eyepiece connection, by which the laser beam may be transmitted through a theodolite, or such that it may be fitted to a theodolite with its axis parallel to the axis of the theodolite. The laser beam may be coincident with the optical axis of the telescope.

NOTE 1 The laser beam emitter is used to position target points on the tank shell.

¹⁾ 2π radians = 400 gons = 400 grades.