

USA STANDARD

**METHOD FOR
MEASUREMENT AND CALIBRATION OF
SPHERES AND SPHEROIDS**



API Standard 2552
ASTM Designation: D 1408—65
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NOTE: *API Standard 2552-ASTM D 1408* was approved as a USA Standard Dec. 30, 1966.

FOREWORD

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Suggested revisions are invited and should be submitted to the director of the Division of Science and Technology, American Petroleum Institute, 1271 Avenue of the Americas, New York, N. Y. 10020.

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Standard Method for
MEASUREMENT AND CALIBRATION OF SPHERES AND SPHEROIDS¹



API Standard: 2552

ASTM Designation: D 1408 – 65

ADOPTED, 1965.^{2,3}

This standard of the American Petroleum Institute issued under the fixed designation API 2552 is also a standard of the American Society for Testing and Materials issued under the fixed designation D 1408; the final number indicates the year of original adoption as standard, or, in the case of revision, the year of last revision.

This method was adopted as a joint API-ASTM standard in 1965.

Scope

1. This standard describes the procedures for calibrating spheres and spheroids which are used as liquid containers. It is presented in two parts: Part I (Sections 2 to 10) outlines the procedures for the measurement and calibration of spherical tanks; Part II (Sections 11 to 20) out-

lines the procedures for the measurement and calibration of spheroidal tanks.

NOTE 1.—Calibration procedures for other types of tanks are contained in the following standards:

API Standard 2550—ASTM D 1220: *Measurement and Calibration of Upright Cylindrical Tanks*

API Standard 2551—ASTM D 1410: *Measurement and Calibration of Horizontal Tanks*

API Standard 2553—ASTM D 1407: *Measurement and Calibration of Barges*

API Standard 2554—ASTM D 1409: *Measurement and Calibration of Tank Cars*

API Standard 2555—ASTM D 1406: *Liquid Calibration of Tanks*

Definition

2. A *Sphere* is a stationary liquid storage tank, supported on columns so that the entire tank shell is abovegrade. There

are, usually, no internal structural members. A typical sphere is shown in Figs. 1 and 2.

Outline of Procedure

3. (a) Practical difficulties limit tape paths for measuring great circles on the sphere where the tape will lie flat and not tend to slip sidewise. Three representative great circles are chosen—one at the horizontal equator and two passing vertically through the poles at right angles to each other. The total volume is calculated based on these three measurements. Partial volumes are then distributed over the measured inside height by a formula or table based on the partial volume *versus* depth in a true sphere.

(b) In a sphere the bottom capacity line is the lowest point of the spherical shell inside the sphere. No water bottom

or dead capacity exists. This same point is zero gage.

Liquid Calibration

4. (a) Liquid calibration is preferred for any tank or portion of a tank not susceptible to adequate or accurate measurement (see API Standard 2555—ASTM D 1406).

(b) *Capacity Table*.—The capacity table should be prepared in any desired increments (usually 1/8 in.) using graphs or mathematical methods to establish a smooth curve.

Calibration by Meter

5. The sphere may initially be either empty or full. Calibration should proceed by introducing or withdrawing liquid. Meter readings should be taken for each inch of the upper 25 per cent

¹Under the standardization procedures of the API and the ASTM, this standard is under the jurisdiction of the API Central Committee on Petroleum Measurement and the ASTM Committee D-2 on Petroleum Products and Lubricants.

²The API method was adopted as API Standard 2552 in October, 1965.

Prior to its present publication, the API Recommended Practice 50B was originally adopted as tentative in November, 1937, and as final in November, 1941; the second edition was issued in May, 1942; the third edition was issued in June, 1949, and reissued in January, 1952; the fourth edition was issued in June, 1957.

³Revised and adopted as standard June, 1965, by action of the ASTM at the Annual Meeting and confirming letter ballot.

Prior to adoption as ASTM standard, this method was published as tentative from 1956 and revised in 1958.