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Standard Practice for Calibration of Upright Cylindrical Tanks Using the Optical Reference Line Method¹

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This practice has been approved by the sponsoring committees and accepted by the cooperating societies in accordance with established procedures.

¹ NOTE—Editorial corrections were made in Table 1, Fig. 3, and Fig. 4 on Jan. 5, 1990.

INTRODUCTION

The optical reference line method (ORLM) is an alternative method to tank strapping for determining tank diameter. The primary difference between ORLM and the strapping method is the procedure for determining tank diameter at shell courses other than the bottom course. The optical reference line method provides for measuring a reference diameter on the bottom course by manual strapping and measuring deviations in tank diameter at other predetermined horizontal and vertical stations by using an optical device. Other required special measurements, procedures, methods, and analytical tools for the development of a tank capacity table are identical to those stated in API Standard 2550, *Measurement and Calibration of Upright Cylindrical Tanks*.

1. Scope

1.1 This practice describes measurement and calculation procedures for determining the diameters of upright welded (lap/butt) cylindrical tanks or vertical cylindrical tanks with smooth outside surface with either floating or fixed roofs. This practice should be used in conjunction with API Standard 2550. There are a few occasions when there may be limitations to the application of the ORLM techniques described in this standard. Specifically, the use of the ORLM is not suitable for:

1.1.1 Abnormally deformed (for example, severely dented or having visible signs of damage) tanks. These tanks are excluded from this practice and should be repaired prior to calibration.

1.1.2 Outside measurement of insulated tanks. For application of ORLM, the insulation must be stripped, if possible. ORLM may be used on the interior of the tank; however, the reference circumference on the bottom course must be measured externally if possible, requiring the removal of insulation at the bottom course. This measurement shall conform to the procedures described in API Standard 2550.

1.3 *This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety problems associated with its use. It is*

the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

1.4 The values in inch-pound units are the preferred units. The values in parentheses are for information only.

2. Referenced Document

2.1 *American Petroleum Institute Standards:*
API 2550 Method for Measurement and Calibration of Upright Cylindrical Tanks²

3. Terminology

3.1 Definitions:

3.1.1 Definitions listed in API MPMS Chapter 1, "Vocabulary" and Standard 2550 are applicable to this standard. In addition, the following definitions are relevant to ORLM:

3.1.1.1 *horizontal station*—a pre-established location in the horizontal plane at ground level along the tank circumference.

3.1.1.2 *offset*—the measurement observed through the optical device on the horizontal scale of the traversing magnetic slide at each vertical station.

3.1.1.3 *optical device*—an optical plummet or a theodolite equipped with a precision level.

3.1.1.4 *reference circumference*—the circumference of a

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² Available from American Petroleum Institute, 1220 L Street, NW, Washington, DC 20005.