



Standard Test Method for Evaluating the Performance of Optical Tracking Systems that Measure Six Degrees of Freedom (6DOF) Pose¹

This standard is issued under the fixed designation E3064; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 *Purpose*—This test method presents metrics and procedures for measuring, analyzing, and reporting the relative pose error of optical tracking systems that compute the pose (that is, position and orientation) of a rigid object while the object is moving.

1.2 *Usage*—System vendors may use this test method to determine the performance of their Six Degrees of Freedom (6 DOF) optical tracking system which measures pose. This test method also provides a uniform way to report the measurement errors and measurement capability of the system. System users may use this test method to verify that the system's performance is within the user's specific requirements and within the system's rated performance.

1.3 *Test Location*—The procedures defined in this standard shall be performed in a facility in which the environmental conditions are within the optical tracking system's rated conditions.

1.4 *Test Volume*—This standard shall be used for testing an optical tracking system working volumes of 3000 mm long by 2000 mm wide by 2000 mm high, 6000 mm long by 4000 mm wide by 2000 mm high, or 12 000 mm long by 8000 mm wide by 2000 mm high.

1.5 *Units*—The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.6 *This standard does not purport to address all of the safety concerns, if any, 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 This test method is under the jurisdiction of ASTM Committee E57 on 3D Imaging Systems and is the direct responsibility of Subcommittee E57.02 on Test Methods.

Current edition approved June 1, 2016. Published June 2016. DOI: 10.1520/E3064-16

2. Referenced Documents

2.1 ASTM Standards:²

E2919 Test Method for Evaluating the Performance of Systems that Measure Static, Six Degrees of Freedom (6DOF), Pose

E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods

2.2 ASME Standard:³

B89.4.19 Performance Evaluation of Laser-Based Spherical Coordinate Measurement Systems

2.3 ISO/IEC Standards:⁴

ISO/IEC Guide 99:2007 International Vocabulary of Metrology—Basic and General Concepts and Associated Terms (VIM: 2007)

ISO/IEC Guide 98-3:2008 Uncertainty of measurement—Part 3: Guide to the expression of uncertainty in measurement (GUM: 1995)

IEC 60050-300:2001 International Electro technical Vocabulary—Electrical and electronic measurements and measuring instruments

JCGM 200:2012 International Vocabulary of Metrology Basic and General Concepts and Associated Terms (VIM), 3rd edition

3. Terminology

3.1 Definitions:

3.1.1 *degrees of freedom, DOF, n*—any of the minimum number of translation or rotation components required to specify completely the pose of a rigid object. **E2919**

3.1.1.1 Discussion—

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from American Society of Mechanical Engineers (ASME), ASME International Headquarters, Two Park Ave., New York, NY 10016-5990, <http://www.asme.org>.

⁴ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.