



Designation: E2566 – 17

Standard Test Method for Determining Visual Acuity and Field of View of On-Board Video Systems for Teleoperation of Robots for Urban Search and Rescue Applications¹

This standard is issued under the fixed designation E2566; 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.

INTRODUCTION

The robotics community needs ways to measure whether a particular robot is capable of performing specific missions in unstructured and often hazardous environments. These missions decompose into elemental robot tasks that can be represented individually as standard test methods and practices. The associated test apparatuses and performance metrics provide a tangible language to communicate various mission requirements. They also enable repeatable testing to establish the reliability of essential robot capabilities.

The ASTM International Standards Committee on Homeland Security Applications (E54) specifies standard test methods and practices for evaluating individual robot capabilities. These standards facilitate comparisons across robot models, or across various configurations of a particular robot model. They support robot researchers, manufacturers, and user organizations in different ways. Researchers use them to understand mission requirements, encourage innovation, and demonstrate break-through capabilities. Manufacturers use them to evaluate design decisions, integrate emerging technologies, and harden systems. User organizations leverage the resulting robot capabilities data to guide purchasing, align deployment objectives, and focus training with standard measures of operator proficiency. An associated usage guide describes how such standards can be implemented to support these various objectives.

The overall suite of standards addresses critical subsystems of remotely operated response robots, including maneuvering, mobility, dexterity, sensing, energy, communications, durability, proficiency, autonomy, logistics, safety, and terminology. This test method is part of the sensing test suite and addresses the acuity of onboard cameras.

1. Scope

1.1 This test method covers the measurement of several key parameters of video systems for remote operations. It is initially intended for applications of robots for Urban Search and Rescue but is sufficiently general to be used for marine or other remote platforms. Those parameters are (1) field of view of the camera system, (2) visual acuity at far distances with both ambient lighting and lighting on-board the robot, (3) visual acuity at near distances, again in both light and dark environments, and (4), if available, visual acuity in both light and dark environments with zoom lens capability.

¹ This test method is under the jurisdiction of ASTM Committee E54 on Homeland Security Applications and is the direct responsibility of Subcommittee E54.08 on Operational Equipment.

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1.2 These tests measure only end-to-end capability, that is, they determine the resolution of the images on the display screen at the operator control unit since that is the important issue for the user.

1.3 This test method is intended to be used for writing procurement specifications and for acceptance testing for robots for urban search and rescue applications.

1.4 This test method will use the Snellen fraction to report visual acuity; readers may wish to convert to decimal notation to improve intuitive understanding if they are more familiar with that notation. Distances will be given in metres with English units in parentheses following.

1.5 *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.*