



Standard Guide for Conducting a Stability Test (Lightweight Survey and Inclining Experiment) to Determine the Light Ship Displacement and Centers of Gravity of a Vessel¹

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This standard has been approved for use by agencies of the U.S. Department of Defense.

INTRODUCTION

This guide provides the marine industry with a basic understanding of the various aspects of a stability test. It contains procedures for conducting a stability test to ensure that valid results are obtained with maximum precision at a minimal cost to owners, shipyards, and the government. This guide is not intended to instruct a person in the actual calculation of the light ship displacement and centers of gravity, but rather to be a guide to the necessary procedures to be followed to gather accurate data for use in the calculation of the light ship characteristics. A complete understanding of the correct procedures used to perform a stability test is imperative to ensure that the test is conducted properly and so that results can be examined for accuracy as the inclining experiment is conducted. It is recommended that these procedures be used on all vessels and marine craft.

1. Scope

1.1 This guide covers the determination of a vessel's light ship characteristics. In this standard, a vessel is a traditional hull-formed vessel. The stability test can be considered to be two separate tasks; the lightweight survey and the inclining experiment. The stability test is required for most vessels upon their completion and after major conversions. It is normally conducted inshore in calm weather conditions and usually requires the vessel be taken out of service to prepare for and conduct the stability test. The three light ship characteristics determined from the stability test for conventional (symmetrical) ships are displacement (“*displ*”), longitudinal center of gravity (“*LCG*”), and the vertical center of gravity (“*KG*”). The transverse center of gravity (“*TCG*”) may also be determined for mobile offshore drilling units (MODUs) and other vessels which are asymmetrical about the centerline or whose internal arrangement or outfitting is such that an inherent list may develop from off-center weight. Because of their nature, other special considerations not specifically addressed in this guide may be necessary for some MODUs. This standard is not applicable to vessels such as a tension-leg platforms, semi-submersibles, rigid hull inflatable boats, and so on.

1.2 The limitations of 1 % trim or 4 % heel and so on apply if one is using the traditional pre-defined hydrostatic characteristics. This is due to the drastic change of waterplane area. If one is calculating hydrostatic characteristics at each move, such as utilizing a computer program, then the limitations are not applicable.

1.3 The values stated in inch-pound units are to be regarded as standard. No other units of measurement are included in this standard.

1.4 *This standard does not purport to address 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.*

2. Referenced Documents

- 2.1 *ASTM Standards:*
[E100 Specification for ASTM Hydrometers](#)

3. Terminology

3.1 Definitions:

3.1.1 *inclining experiment*—involves moving a series of weights, in the transverse direction, and then measuring the resulting change in the equilibrium heel angle of the vessel. By using this information and applying basic naval architecture principles, the vessel's vertical center of gravity *KG* is determined.

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