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Standard Guide for Determining the Buoyancy to Weight Ratio of Oil Spill Containment Boom[1]

This standard is issued under the fixed designation F2682; 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 This guide describes a practical method for determining the buoyancy to weight (B/W) ratio of oil spill containment booms.

1.2 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.3 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

F818 Terminology Relating to Spill Response Booms and Barriers

F1523 Guide for Selection of Booms in Accordance With Water Body Classifications

3. Terminology

3.1 *boom section*—length of boom between two end connectors. **F818**

3.2 *boom segment*—repetitive identical portion of the boom section. **F818**

3.3 *buoyancy to weight ratio*—gross buoyancy divided by boom weight. **F818**

3.4 *gross buoyancy*—weight of fresh water displaced by a boom totally submerged.

3.5 *reserve buoyancy*—gross buoyancy minus boom weight. **F818**

4. Significance and Use

4.1 This guide describes a method of determining the buoyancy to weight ratio of spill response booms. The principle is based on Archimedes Law, which states that a body either wholly or partially immersed in a fluid will experience an upward force equal and opposite to the weight of the fluid displaced by it.

4.2 Unless otherwise specified, when used in this guide, the term *buoyancy to weight ratio (B/W ratio)* refers to the gross buoyancy to weight ratio. Buoyancy is an indicator of a spill response boom's ability to follow the water surface when exposed to current forces, fouling due to microbial growth (which adds weight), and wave conditions. Surface conditions other than quiescent will have an adverse effect on collection or containment performance. When waves are present, conformance to the surface is essential to prevent losses. Minimum buoyancy to weight ratios for oil spill containment booms are specified in Guide F1523 for various environmental conditions.

4.3 This guide provides the methodology necessary to determine the buoyancy to weight ratio using a fluid displacement method. This method is typically applied to booms having relatively low B/W ratios (in the range of 2:1 to 10:1). Booms with greater buoyancies may also be tested in this manner. It is acceptable to use calculation methods to estimate boom displacement for booms with buoyancies greater than 10:1, where the potential error in doing so would have a less significant effect on performance.

4.4 When evaluating the B/W ratio of a spill response boom, consideration must be given to the inherent properties of the boom that may affect the net B/W ratio while in use. These considerations include, but are not limited to, absorption of fluids into flotation materials, membranes that are abraded during normal use, and entry of water into components of the boom.

The entry of water into boom components is of particular concern with booms that contain their flotation element within an additional membrane. (This is the case for many booms that use rolled-foam flotation and relatively lightweight material for the boom membrane.) It is also important for booms that have

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[1] This guide is under the jurisdiction of ASTM Committee F20 on Hazardous Substances and Oil Spill Response and is the direct responsibility of Subcommittee F20.11 on Control.

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[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.