Designation: F1599 – 95 (Reapproved 2014)

Standard Guide for Collecting Performance Data on Temporary Storage Devices[1]

This standard is issued under the fixed designation F1599; 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 covers a guideline for measuring the performance parameters of full-scale temporary storage devices that would be used to store oil and oil-water mixtures.

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.3 *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.* Specific precautionary statements are given in 6.2.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

F625 Practice for Classifying Water Bodies for Spill Control Systems

F631 Guide for Collecting Skimmer Performance Data in Controlled Environments

F715 Test Methods for Coated Fabrics Used for Oil Spill Control and Storage

3. Terminology

3.1 *Definitions:*

3.1.1 *Design Terminology—Terms Associated With Temporary Storage Device Design:*

3.1.2 *accessories—optional* mechanical devices used on or in conjunction with a temporary storage device system but not included with the basic storage device and hose connectors, that is, lights, paravanes, buoys, anchor systems, storage bags, repair kits, etc.

3.1.3 *ancillary equipment*—mechanical devices necessary to the operation of a given temporary storage device system, for example, air pumps, hydraulic power supplies, control manifolds, etc.

3.1.4 *ballast*—the weight applied to the device to improve performance.

3.1.5 *container body*—the continuous portion of the device that serves to provide structural strength and shape to the device to contain the stored material.

3.1.6 *device weight*—the dry weight of a fully assembled temporary storage device.

3.1.7 *draft*—the maximum vertical dimension of the device below the water line.

3.1.8 *flotation*—that portion of the device that provides buoyancy.

3.1.9 *freeboard*—the minimum vertical height of the device above the water line; for open devices, this is the minimum height at which water can enter it.

3.1.10 *handhold*—any strap, handle, depression, or other provision for grasping the device by hand.

3.1.11 *lifting point*—the structural point(s) on the device designed for the attachment of a lifting device, such as a crane.

3.1.12 *liner*—accessory or ancillary equipment that provides containment within the container body.

3.1.13 *mooring point*—the structural point(s) along the length of the device designed for the attachment of anchor or mooring lines.

3.1.14 *overall height*—the maximum vertical dimension of the device.

3.1.15 *sail*—the maximum vertical height of the device above the water-line.

3.1.16 *shipping weight*—the weight of the device when packaged for transportation.

3.1.17 *shipping volume*—the volume of the device when packaged for transportation.

3.1.18 *stiffener*—a component that provides support to the device.

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

Current edition approved Sept. 1, 2014. Published November 2014. Originally approved in 1995. Last previous edition approved in 2009 as F1599 – 95(2009). DOI: 10.1520/F1599-95R14.

[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.

3.1.19 *temporary storage device*—a collapsible device used to store fluids temporarily.

3.1.20 *tension member*—any component that carries tension loads imposed on the device.

3.1.21 *tow point*—structural point(s) on the device designed for the attachment of towing lines.

3.1.22 *Engineering Terminology— Terms Associated With Temporary Storage Device Engineering:*

3.1.23 *drag force*—the resisting force on a device that results from it being towed.

3.1.24 *gross buoyancy*—the weight of fresh water displaced by the device at the point of submergence.

3.1.25 *gross buoyancy to weight ratio*—the gross buoyancy divided by device weight.

3.1.26 *heave response*—the ability of the device to react to the vertical motion of the water surface.

3.1.27 *maximum capacity*—the maximum volumetric capacity of the device as calculated from physical dimensions.

3.1.28 *maximum dynamic load*—the sum of all instantaneous dynamic loads, including those due to acceleration, wave forces, etc.

3.1.29 *operational capacity*—the maximum volumetric capacity of the device per application.

3.1.30 *pitch response*—the tendency of the device to oscillate about its lateral axis.

3.1.31 *rated pressure*—the maximum continuous operating pressure of the device, as specified by the manufacturer.

3.1.32 *reserve buoyancy*—the gross buoyancy minus device weight.

3.1.33 *reserve buoyancy to weight ratio*—the reserve buoyancy divided by device weight.

3.1.34 *roll response*—the tendency of the device to rotate about its longitudinal axis due to wave, wind, or current forces.

3.1.35 *yaw response*—the tendency of the device to oscillate about its vertical axis.

3.1.36 *Classification Terminology:*

3.1.37 *pillow tank*—a closed, generally rectangular or round coated fabric tank.

3.1.38 *open pool*—an open, generally rectangular or round coated fabric tank, similar in structure to a "wading pool."

3.1.39 *towable pillow tank*—similar to a pillow tank used on land or on deck, but generally made of heavier material and having special rigging for towing.

3.1.40 *towable flexible tank*—a storage device that is generally long and cylindrical in shape and, when full, is largely submerged, characterized by flexibility along the length of the device.

3.1.41 *towable open tank*—an open, inflatable, barge-type vessel that resembles a large inflatable boat, characterized by a portion of the top surface being open to atmosphere.

4. Significance and Use

4.1 This guide covers the collection of quantitative data in the form of storage capacity, strength of materials, filling and offloading rates, and towability under controlled test conditions. The data can be used for evaluating the design characteristics of a particular temporary storage device or as a means of comparing two or more devices. Caution must be exercised whenever the test data are used to predict performance in actual spill situations since the uncontrolled environmental conditions that affect performance in the field are rarely identical to conditions in the test facility. Other variables such as mechanical reliability, the presence of debris, ease of repair, required operator training, operator fatigue, and transportability also affect performance in an actual spill but are not included in this guide. These variables should be considered along with the test data when making comparisons or evaluations of temporary storage devices.

4.2 Although this guide provides data on the performance of temporary storage devices, all of the combinations of actual conditions of use are not simulated in this series of tests. In particular, the resistance of the device to grounding, abrasion resistance of the container body, venting of the device during loading, and other operational issues not covered by this guide should be considered along with the test data when making comparisons or evaluations of temporary storage devices.

5. Overall Observations

5.1 For each of the tests that follow, the total manpower required to conduct the procedure and the required ancillary equipment will be noted in the test record. In addition, the total elapsed time for each portion of the tests will be noted.

5.2 Observations of the buoyancy and stability of the deployed device will be made for the marine testing of towable devices.

5.3 Any observations relative to safety will be entered as part of the test record. These should include any hazardous conditions noted and limitations due to weather conditions, as well as any safety precautions that were observed or should be observed. If the manufacturer's specified operating procedures are found to be deficient relative to safety observations, this should be noted.

5.4 The test series should be videotaped to document the tests and procedures.

6. Initial (Static) Loading Tests

6.1 The storage device, and any enclosed ancillary equipment (for example, flotation collars), should be subjected to the following tests using air or dyed water, as appropriate, in order to confirm the structural integrity and evaluate (qualitatively) any leakage. The following is presented as a guideline in the absence of manufacturer-supplied guidelines for performing initial loading tests.

6.2 Overpressure tests can be extremely dangerous, and precautions should be taken against the possibility of sudden and complete failure of the device. The following tests use