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Standard Terminology Relating to Spill Response Booms and Barriers[1]

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1. Scope

1.1 This document defines the terminology used in the field of spill response barriers. Only those terms commonly used or peculiar to this field have been included; no attempt has been made to list all terms used. Where a second term is in common use, "aka" is used to mean "also known as."

1.2 Design, engineering, and performance terms are listed separately: design terminology (3.1), engineering terminology (3.2), and performance terminology (3.3).

1.3 Guidance on minimum dimensions and performance specifications for booms is provided in Guide F1523.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

F625 Practice for Classifying Water Bodies for Spill Control Systems

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

3. Terminology

3.1 *Design Terminology*—Terms associated with Spill Response Design:

General

boom—floating mechanical barrier used to control the movement of substances that float.

boom section—length of boom between two end connectors.

boom segment—repetitive identical portion of the boom section.

Types

bottom-tension boom—boom with tension member located along the bottom of the skirt.

calm water boom—boom intended for use in calm waters (see Practice F625 for environmental descripters).

"curtain type" boom—boom consisting of a flexible skirt supported by flotation.

"fence type" boom—boom consisting of a self-supporting or stiffened membrane supported by flotation.

fire resistant boom (aka fire containment boom) —boom intended for containment of burning oil slicks.

ice boom—boom intended for use in ice-infested waters, designed to withstand effects of ice contact.

inflatable boom—boom that uses inflated gas-filled chambers as the flotation.

open water boom— boom intended for use in open waters (see Practice F625 for environmental descripters).

permanent boom—boom intended for long-term or permanent deployment.

protected water boom—boom intended for use in protected waters with moderate environmental conditions (see Practice F625 for environmental descripters).

river boom (aka fast water boom)—boom intended for use in currents greater than 1 knot.

sorbent boom—sorbent material contained or arranged in the form of a long cylinder.

weir boom (aka skimming boom/barrier)—boom that has a weir skimming device(s) built into its face.

Special Purpose Barriers

air bubble barrier—special-purpose barrier created by rising stream of air bubbles and entrained water, produced by injecting air at some depth below water surface.

berms—a barrier for spills on land constructed of available materials such as earth, gravel, or snow.

ice slotting—in order to contain oil spilled under river ice, a slot is cut through the ice transverse to the direction of flow, capturing oil and preventing it from moving downstream.

[1] This terminology 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.

net boom—special purpose boom in which all or part of the membrane material is netting.

plunging water jet barrier—special purpose barrier created by a series of coherent streams of water directed vertically downward into a body of water.

shore seal boom—boom that, when grounded, seals against the shoreline.

silt barrier—boom with very deep skirt used to control the movement of suspended sediments.

special purpose boom—boom that departs from the general characteristics of "fence type" and "curtain type" booms, either in design or intended use.

submersible boom—boom that normally resides on the seabed and is positioned by inflating with air, causing it to rise to the water surface.

water jet barrier—barrier created by stream of pressurized water spray directed across the water surface.

underflow dams—a barrier for spills in creeks, in which a dam is created and includes a pipe below the water level to allow the passage of water while still preventing the flow of oil on the surface. The upstream end of the pipe is submerged and the downstream end of the pipe is elevated.

Components

accessories—*optional* mechanical devices used on or in conjunction with a boom system but not included with the basic boom and end connector; for example, lights, paravanes, drogues, buoys, anchor systems, storage bags, boxes or reels, bulkhead connectors or repair kits, and so forth.

anchor point—structural point on the end connector or along the length of a boom section designed for the attachment of anchor or mooring lines.

ancillary equipment—mechanical devices *essential* to the operation of a given boom system; for example, air pumps, hydraulic power supplies, control manifolds, and so forth.

ballast—weight applied to the skirt to improve boom performance.

bridle—device attached to a boom to distribute the load exerted by towing or anchoring the boom.

buoyancy chamber (aka flotation chamber)—enclosed compartment of air or other buoyant material providing flotation for the boom.

end connector—device permanently attached to the boom used for joining boom sections to one aother or to other accessory devices.

external flotation (aka outboard flotation)—flotation element located external to the boom membrane.

external tension—external tension member separated from the boom membrane by bridles.

fin—portion of the boom membrane above the float.

float—separable component of a boom that provides buoyancy.

flotation—portion of a boom that provides buoyancy.

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

hinge—location between boom segments at which the boom can be folded back 180° upon itself.

internal flotation—flotation element located within the boom membrane.

lifting point—structural point on the end connector or along the length of a boom section designed for the attachment of a lifting device, such as a crane.

membrane—continuous portion of a boom that serves as a barrier to the movement of a substance.

pressure inflated—inflatable boom that requires pressurized gas for its flotation.

self-inflating—boom that automatically inflates as it is deployed.

skirt—continuous portion of the boom below the floats.

solid flotation—boom that uses solid buoyant material for the flotation element.

stiffener—component that provides support to the membrane.

tension member—any component that carries horizontal (axial) tension loads imposed upon the boom.

Characteristics

boom weight—dry weight of a fully assembled boom section including end connectors.

compactibility—measure of a boom's storage volume per unit length (m^3/m).

draft—minimum vertical depth of the membrane below the water line.

freeboard—minimum vertical height of the boom above the waterline.

height—sum of draft and freeboard.

maximum draft—maximum vertical dimension of the boom below the water line.

overall height—maximum vertical dimension of boom.

3.2 *Engineering Terminology*—Terms associated with Spill Barrier Engineering:

catenary drag force—load imposed on a boom, deployed in a catenary configuration, resulting from towing, current, and/or wind forces.

current response—change in freeboard or draft due to current forces acting to displace the boom from rest.

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

gross buoyancy to weight ratio—gross buoyancy divided by boom weight.

heave response—ability of the boom to react to the vertical motion of the water surface.

maximum dynamic load—sum of all instantaneous dynamic loads including those due to acceleration, wave forces, and so forth.

reserve buoyancy—gross buoyancy minus boom weight.

reserve buoyancy to weight ratio—reserve buoyancy divided by boom weight.

roll response—rotation of the boom from rest due to wave, wind, or current forces.

straight line drag forces—load on a boom that results from towing it from one end.

wind response—change in freeboard or draft due to wind force acting to displace the boom from rest.

3.3 *Performance Terminology*—Terms associated with Spill Response Barrier Performance:

apex (aka pocket)—pocket formed at the downstream end of a U, V, J, or W shaped configuration.

boom planing—heeling over of a boom and loss of draft.

boom submergence (aka submarining)—containment failure due to loss of freeboard.

bridging failure—portions of a boom emerging from the water due to poor wave conformance, with resulting containment failure.

catenary configuration (aka "U," "J" configuration)—booming configuration formed by towing or anchoring each end of a length of boom, resulting in a characteristic" U" or "J" shape.

cascading booms—booming configuration formed by positioning two or more booms in a deflection mode such that successive booms progressively move oil to the desired area.

chevron configuration—booming configuration used in narrow watercourses, formed by positioning two lengths of boom in a deflection mode, the leading end of each length is positioned in the middle of the watercourse and the trailing ends lead to opposite shores.

conformance—ability of a boom to maintain freeboard and draft when subjected to a given set of environmental conditions.

containment mode—placement of a boom to prevent free movement of a floating substance.

deployment—placing a boom in the water and making it operational.

diversion mode—placement of a boom to redirect the movement of a floating substance.

drainage loss— oil accumulating and pooling against the boom skirt and escaping with the flow of water down and along the skirt.

entrainment loss—oil droplets escaping with the flow of water diverted under the skirt.

exclusion booming—placement of a boom to protect an area from the entry of a floating substance.

first-loss tow/current velocity—minimum tow/current velocity normal to the membrane at which oil escapes past a boom.

gap ratio—sweep width divided by boom length.

loss rate—rate at which oil is lost past a boom (m^3/h).

performance—ability of a boom to contain or deflect oil under a given set of environmental conditions.

retrieval—removing a deployed boom from the water.

splashover—oil splashing over a boom's freeboard.

stability—resistance to overturning moment.

sweep width (aka swath)—width intercepted by a boom in collection mode, the projected distance between the ends of a boom deployed in a "U," "V," or "J" configuration.

sweeping mode—movement of a boom relative to the water for the purpose of controlling or collecting a floating substance.

towing—transporting a boom from one place to another by pulling from one end.

vortex loss—oil escaping past a boom due to drainage vortices produced at the boom.

"J" configuration—boom positioned in a "J" shape.

"U" configuration (aka catenary configuration) —boom positioned in a "U" shape.

"V" configuration—boom positioned in a "V" shape.

"W" configuration (aka "3" configuration)—boom positioned in a "W" shape.