



Designation: D6082 – 23

Standard Test Method for High Temperature Foaming Characteristics of Lubricating Oils¹

This standard is issued under the fixed designation D6082; 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 test method covers the procedure for determining the foaming characteristics of lubricating oils (specifically transmission fluid and motor oil) at 150 °C.

1.2 Foaming characteristics of lubricating oils at temperatures up to 93.5 °C are determined by Test Method D892 or IP 146.

1.3 The values stated in SI units are to be regarded as standard.

1.3.1 *Exception*—The values given in parentheses are provided for information only.

1.4 **WARNING**—Mercury has been designated by many regulatory agencies as a hazardous substance that can cause serious medical issues. Mercury, or its vapor, has been demonstrated to be hazardous to health and corrosive to materials. Use caution when handling mercury and mercury-containing products. See the applicable product Safety Data Sheet (SDS) for additional information. The potential exists that selling mercury or mercury-containing products, or both, is prohibited by local or national law. Users must determine legality of sales in their location.

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

1.6 *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.*

¹ This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products, Liquid Fuels, and Lubricants and is the direct responsibility of Subcommittee D02.06 on Analysis of Liquid Fuels and Lubricants.

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2. Referenced Documents

2.1 ASTM Standards:²

D892 Test Method for Foaming Characteristics of Lubricating Oils

D4175 Terminology Relating to Petroleum Products, Liquid Fuels, and Lubricants

E128 Test Method for Maximum Pore Diameter and Permeability of Rigid Porous Filters for Laboratory Use

E1272 Specification for Laboratory Glass Graduated Cylinders

2.2 Energy Institute Standards:³

IP 146 Standard Method of Test for Foaming Characteristics of Lubricating Oils

3. Terminology

3.1 Definitions:

3.1.1 For definitions of terms used in this test method, refer to Terminology D4175.

3.1.2 *diffuser, n—for gas*, a device for dispersing gas into a liquid (Test Method D892).

3.1.2.1 *Discussion*—Although diffusers can be made of either metallic or non-metallic materials, in this test method the diffuser is sintered stainless steel.

3.1.3 *entrained air (or gas), n—in liquids*, a two-phase mixture of air (or gas) dispersed in a liquid in which the liquid is the major component on a volumetric basis.

3.1.3.1 *Discussion*—The air (or gas) is in the form of discrete bubbles of about 10 μm to 1000 μm in diameter. The bubbles are not uniformly dispersed. In time, they rise to the surface to coalesce to form larger bubbles which break or form foam. Subsurface coalescence can also occur, in which case, the bubbles will rise more rapidly.

3.1.4 *foam, n—in liquids*, a collection of bubbles formed in or on the surface of a liquid in which the air or gas is the major component on a volumetric basis.

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 Available from Energy Institute, 61 New Cavendish St., London, WIG 7AR, U.K., <http://www.energyinst.org.uk>.

*A Summary of Changes section appears at the end of this standard

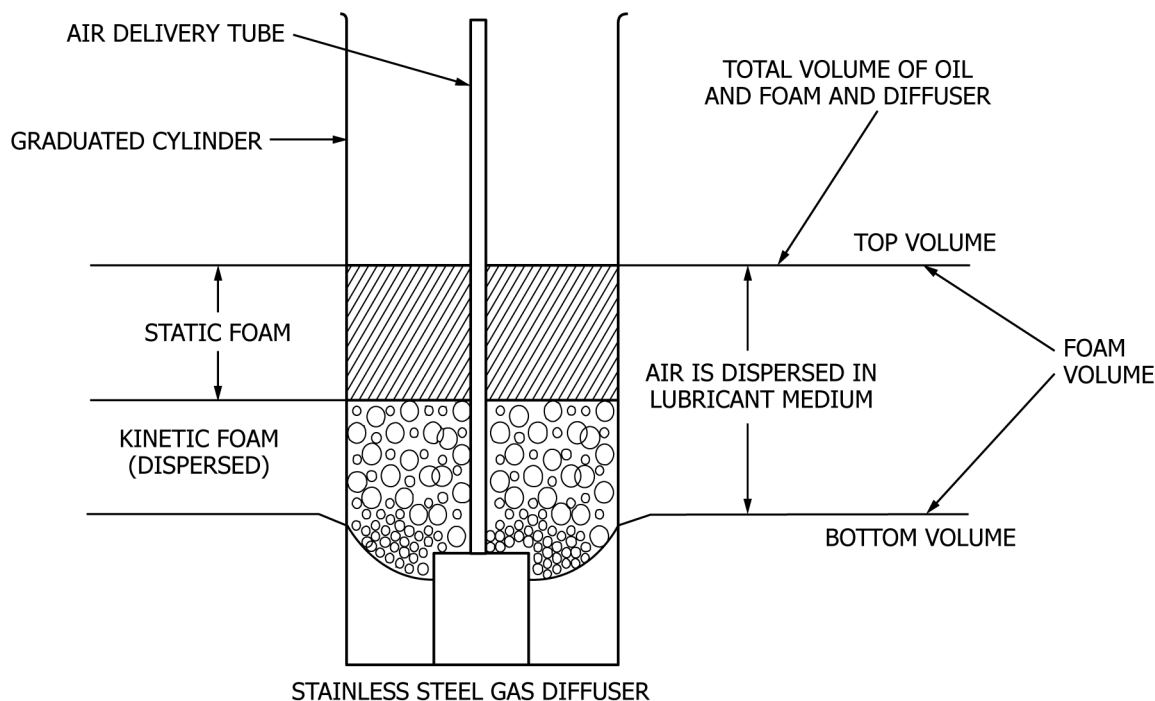


FIG. 1 Terminology Diagram

3.1.5 *gas, n*—a fluid (such as air) that has neither independent shape nor volume but tends to expand indefinitely.

3.1.6 *lubricant, n*—any material interposed between two surfaces that reduces friction or wear between them.

3.1.6.1 *Discussion*—In this test method, the lubricant is an oil which may or may not contain additives such as foam inhibitors.

3.1.7 *maximum pore diameter, n—in gas diffusion*, the diameter of a capillary of circular cross-section which is equivalent (with respect to surface tension effects) to the largest pore of the diffuser under consideration. The pore dimension is expressed in micrometers (μm).

3.1.8 *permeability, n—in gas diffusion*, the rate of a substance that passes through a material (diffuser) under given conditions.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *bottom volume, n*—the volume of liquid sample, that is, sample substantially free of air, at any given time during the test.

3.2.2 *collapse time, n—in foam testing*, the time in seconds, for zero foam to appear after the air is disconnected at the end of the five minute air blowing time.

3.2.3 *dynamic bubble, n*—the first bubble to pass through and escape from the diffuser followed by a continuous succession of bubbles when testing for the pore diameter in [Annex A1](#).

3.2.3.1 *Discussion*—When a diffuser is immersed in a liquid such as propan-2-ol, air can be trapped in the pores. It can escape eventually or as soon as a pressure is applied to the diffuser. When testing for pore diameter ([Annex A1](#)), the escape of such bubbles is to be ignored.

3.2.4 *foam stability, n—in foam testing*, the amount of static foam remaining at specified times following the disconnecting of the air supply.

3.2.4.1 *five-second foam stability, n*—the amount of static foam present 5 s after disconnecting the air supply.

3.2.4.2 *fifteen-second foam stability, n*—the amount of static foam present 15 s after disconnecting the air supply.

3.2.4.3 *one-minute foam stability, n*—the amount of static foam present 1 min after disconnecting the air supply.

3.2.4.4 *five-minute foam stability, n*—the amount of static foam present 5 min after disconnecting the air supply.

3.2.4.5 *ten-minute foam stability, n*—the amount of static foam present 10 min after disconnecting the air supply.

3.2.5 *foaming tendency, n—in foam testing*, the amount of static foam immediately before the cessation of air flow.

3.2.6 *kinetic foam, n*—entrained air that has been created by the passage of air through the diffuser during the test (see [Fig. 1](#)).

3.2.6.1 *Discussion*—Because the process of passing air through the diffuser and the oil sample during the test has resulted in an increase in volume and because such entrained air can be considered as foam on its way to being made, the term kinetic foam has been introduced.

3.2.7 *percent volume increase, n—in foam testing*, the increase in total volume expressed as a percentage of the initial total volume with diffuser in place at test temperature.

3.2.8 *static foam, n*—foam that has been created by the passage of air through the diffuser during the test (see [Fig. 1](#)).