Designation: F 1115 – 95 (Reapproved 2001)

Standard Test Method for Determining the Carbon Dioxide Loss of Beverage Containers[1]

This standard is issued under the fixed designation F 1115; 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 The objective of this test method is to determine the carbon dioxide (CO_2) loss from plastic beverage containers after a specified period of storage time.

1.2 Factors contributing to this pressure loss are volume expansion and the gas transport characteristics of the package including permeation and leakage.

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.*

2. Referenced Documents

2.1 *ASTM Standards:*

D 1129 Terminology Relating to Water[2]

D 1193 Specification for Reagent Water[2]

E 177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods[3]

E 380 Practice for Use of the International System of Units (SI) (the Modernized Metric System)[3]

E 691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method[3]

3. Terminology

3.1 Units, symbols, and abbreviations used in this test method are those recommended by Practice E 380.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *carbonation volume*—the volume of CO_2 (at 0°C, 1 atm pressure) that is dissolved in the carbonated water, divided by the volume of the liquid (based on water volume at 3.98°C equals 1.000 g/cm^3). The conversion of pressure to carbonation volumes should be made using a carbonation volumes table. A table for carbonated water would not necessarily apply to liquids containing additional substances, such as carbonated beverages containing sugar.

3.2.2 *initial pressure*—the equilibrium pressure in the test bottles as measured at 24 h after filling with carbonated water. (The filled bottles are allowed to stand for 24 h to obtain temperature equilibrium with the test environment and to allow time for pressure adjustment and equilibration of the CO_2 in the headspace and liquid.)

3.2.3 *sample*—a set of bottles produced on the same equipment in a single run and using the same material and process conditions. Bottles should represent normal thickness distribution.

3.2.4 *shelf life*—the number of weeks a sample set of bottles retain a specified carbonation level, or a percent of the initial level.

3.2.5 *pressure monitoring device*—a pressure gage or transducer assembly with support electronics for indicating internal pressure level of the bottle. This device is used with brass closure fitting-equipped bottles.

3.2.5.1 *temperature monitoring device*—a thermocouple with support electronics (same equipment as described in 7.2.2). A precision glass thermometer may be used provided a bottle filled with noncarbonated water is used as a control in each sample set (Procedure A).

3.2.6 *Terriss CO_2* Analyzer—an electronic unit that will pierce the roll-on closure and automatically read pressure, temperature, and volume of gas (Procedure B).

3.2.7 *Zahm-Nagle Pressure Tester*—a unit that manually pierces the closure and measures container pressure; an attached thermometer is then used to measure temperature (Procedure B).

3.2.8 *support ring*—a protrusion below the bottle finish which is used to support or stabilize the bottle during filling and capping.

3.2.9 *finish*—the threaded part of the bottle which receives the cap.

3.3 For other terms used in this test method, refer to Terminology D 1129.

4. Summary of Test Method

4.1 Test bottles are filled with carbonated water or beverage and, after closure application, are exposed to test environments for specified time periods. By periodically measuring the initial and final carbonation levels in the container, the loss and rate can be calculated.

[1] This test method is under the jurisdiction of ASTM Committee F2 on Flexible Barrier Materials and is the direct responsibility of Subcommittee F02.30 on Test Methods.

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[2] *Annual Book of ASTM Standards*, Vol 11.01.

[3] *Annual Book of ASTM Standards*, Vol 14.02.

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