



Designation: D7991 – 22

Standard Test Method for Determining Aerobic Biodegradation of Plastics Buried in Sandy Marine Sediment under Controlled Laboratory Conditions¹

This standard is issued under the fixed designation D7991; 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 determines the biodegradation level of plastic materials exposed to laboratory conditions that simulate the environment found in the sandy tidal zone.

1.2 The tidal zone, that is, the part of the coast affected by the tides and movement of the waves, is the borderline between sea and land, frequently a sandy area that is kept constantly damp by the lapping of the waves. Stony and rocky shorelines also exist.

1.3 Plastic marine debris is frequently washed up in this habitat where it must be removed in order to restore the original landscape.

1.4 It is of interest to know the biodegradation behavior of plastics when exposed to conditions simulating this habitat, because this information can help in predicting the time needed for the biodegradation of the litter.

1.5 Biodegradation is determined by measuring the CO₂ evolved by the plastic material when exposed to a sediment kept wet with salt-water in a reactor, to simulate the tidal zone.

1.6 Marine fresh-water habitats (for example, those found in brackish waters and estuaries) are not considered by this standard.

1.7 Reports shall clearly state the percentage of net CO₂ generation for both the test and reference samples at the completion of the test. Furthermore, in the laboratory reports, the results shall not be extrapolated beyond the actual duration of the test.

NOTE 1—There is no known ISO equivalent to this standard.

1.8 *Units*—The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

¹ This test method is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.96 on Environmentally Degradable Plastics and Biobased Products.

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1.9 *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.*

1.10 *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

D5988 Test Method for Determining Aerobic Biodegradation of Plastic Materials in Soil

2.2 *ISO Standards*:³

ISO 8245 Water quality Guidelines for the determination of total organic carbon (TOC) and dissolved organic carbon (DOC)

3. Terminology

3.1 *Definitions*:

3.1.1 *tidal zone, n*—the part of the marine environment that extends from the high tide line, which is rarely inundated with water, to the low tide line, which is typically always covered with water.

3.1.1.1 *Discussion*—Synonyms are: eulittoral zone, midlittoral zone, mediolittoral zone, intertidal zone, foreshore.

4. Summary of Test Method

4.1 This test method consists of the following:

4.1.1 Selection of plastic material for the determination of aerobic biodegradation in a controlled laboratory system.

4.1.2 Obtaining sediment and seawater from the shoreline.

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 American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.