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.

Designation: E1690 – 08 (Reapproved 2021)

Standard Test Method for Determination of Ethanol Extractives in Biomass[1]

This standard is issued under the fixed designation E1690; 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 determination of ethanol soluble extractives, expressed as a percentage of the oven-dried biomass, of hard and soft woods, herbaceous materials (such as switchgrass and sericea), agricultural residues (such as corn stover, wheat straw, and bagasse), and wastepaper (such as office waste, boxboard, and newsprint). All results are reported relative to the oven-dried weight of the sample.

NOTE 1—This test method may not be suitable for hard and soft wood samples that include bark or those with more than 10% extractable materials.

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

1.4 *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]

D1107 Test Method for Ethanol-Toluene Solubility of Wood

E1756 Test Method for Determination of Total Solids in Biomass

E1757 Practice for Preparation of Biomass for Compositional Analysis

3. Terminology

3.1 *Definitions:*

3.1.1 *ethanol extractives*—the residue remaining after evaporation of the ethanol solvent. These are materials that are removed from the biomass by extraction with 190 proof ethanol.

3.1.2 *oven-dried weight*—the moisture-free corrected weight of the prepared biomass sample. The correction factor is determined in accordance with Test Method E1756.

3.1.3 *prepared biomass*—the biomass that has been prepared in accordance with Practice E1757.

4. Significance and Use

4.1 Ethanol extractives are any materials found in biomass that are soluble in ethanol. They are not considered to be part of the structural components of biomass and should be removed prior to any chemical analysis of the sample. The prolonged extraction removes nonstructural materials that can include waxes, fats, resins, tannins, gums, sugars, starches, and pigments. Removing hydrophobic materials from the biomass makes it easier to wet the material for the analysis of structural components in the biomass.

4.2 This test method yields results comparable to Test Method D1107.

5. Apparatus

5.1 *Soxhlet Extraction Apparatus,* glass, of a size (100 mL) suitable for containing the sample and a 250-mL collection flask.

5.2 *Alundum Extraction Thimbles,* medium porosity (10 to 15-μm pore), sized to fit the Soxhlet extractor.

5.3 *Analytical Balance,* sensitive to 0.1 mg.

5.4 *Rotary Evaporator with Vacuum and Water Bath,* configured with a "bump" or safety trap, condenser, and receiving vessel. A water aspirator will generally provide sufficient vacuum (<150 torr).

5.5 *Vacuum Oven,* controllable to 40 ± 1 °C and with vacuum between 75 and 100 torr.

6. Reagents and Materials

6.1 *Ethyl Alcohol,* 190 proof, USP grade.

[1] This test method is under the jurisdiction of ASTM Committee E48 on Bioenergy and Industrial Chemicals from Biomass and is the direct responsibility of Subcommittee E48.05 on Biomass Conversion.

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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.

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