

## **A REVIEW OF CURRENT ASTM E-37 ACTIVITIES**

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The objectives of the presentation are to introduce ASTM (American Society for Testing and Materials) and ASTM Technical Committee E-37 on Thermal Measurements to those who may not be familiar with their activities.

**Keyword:** ASTM

### **Introduction**

The scope of ASTM Technical Committee E-37 on Thermal Measurements includes the coordination and development of standard test methods, recommended practices, nomenclature, and definitions for thermal measurements in cooperation with other technical committees of the Society and other national and international organizations; cooperation with organizations concerned with the preparation and distribution of standard reference materials; the providing of a forum for the exchange of information; and the stimulation of research and education in the field of thermal measurements.

### **ASTM – General**

ASTM is a non-profit organization devoted to the development of voluntary full consensus standards for materials, products, systems, and services and for the promotion of related knowledge.

### **ASTM – Genesis of a Standard Method**

The 'life' of a standard begins within a task group chartered to draft a specific standard method. The draft proceeds through several levels of balloting – task group, then subcommittee, and main committee. Having completed balloting

within the technical committee, the document is presented for ASTM Society ballot. Successful completion of this phase results in the published standard. A round-robin with a specific protocol is conducted concurrent with the task group/subcommittee ballot procedures. The round-robin and the statistical evaluation of the results are required for all documents classified by ASTM as Standard Methods. This information is included in the final method as the 'Precision and Bias' statement.

### **ASTM – Balloting Procedure**

The balloting mechanism mandated by ASTM includes the following voting options:

- (i) abstain, if the voter has insufficient technical knowledge to comment on the document,
- (ii) affirmative, acceptance of the total document as presented,
- (iii) affirmative with comment, acceptance of the document with editorial comment, and
- (iv) negative, a rejection of the document in whole or part for technical reasons. A negative vote requires that the voter explain in detail the reason for the voting choice and how the 'offending' portion should be rewritten. It is the job of the group offering the document for ballot – task group or subcommittee or committee – to discuss the negative vote. The document can only proceed on its way to an accepted standard when every negative vote is addressed at every voting level – a true consensus document. Each accepted standard is reviewed at least every five years for continued acceptance as a standard method.

### **ASTM E-37**

E-37's Executive Committee is composed of the elected officers, and the chairmen of each Subcommittee as shown in Tables 1 and 2.

**Table 1** E-37 Officers

Chairman:	Rosalie G. Ferrillo
First Vice Chairman:	Peter Kamarchik
Second Vice Chairman:	David S. McMorran
Recording Secretary:	R. Bruce Cassel
Membership Secretary:	William F. Hammetter
ASTM Staff Manager:	Margaret P. Lawlor

**Table 2** Subcommittees and Chairmen: E-37

E-37.01:	Test Methods and Recommended Practices	– D. S. McMorran
E-37.02:	Standard Reference Materials	– J. E. Callanan
E-37.03:	Nomenclature and Definitions	– S. M. Dyszel
E-37.04:	Technical Programs	– A. T. Riga
E-37.06:	Editorial	– R. P. Tye
E-37.07:	Liaison	– R. L. Blaine

### ASTM Subcommittee E-37.01

E-37.01 is the largest subcommittee as shown in Table 3. Their goal is to generate documents that define the methodology for various thermal measurements as applied to a broad spectrum of materials. Presently, there are 17 task groups within the subcommittee. Task groups stand down on completion of the assigned task. New task groups are added when a new project is initiated.

**Table 3** Subcommittee E-37.01 – Test Methods and Recommended Practices

E-37.01.02:	Enthalpy and Temperature Calibrations of DSC's	– R. L. Blaine
E-37.01.03:	Mass Loss	– P. Kamarchik
E-37.01.05:	Vapor Pressure Measurement by DSC/DTA	– R. J. Seyler
E-37.01.09:	Compositional Analysis by TG	– J. J. Penn and L. Judovits
E-37.01.10:	Oxidative Stability	– A. T. Riga
E-37.01.13:	Decomposition Kinetics	–
E-37.01.14:	Glass Transition Measurements By Dynamic Mechanical Analysis	– M. Neag and R. L. Blaine
E-37.01.15:	Thermal Conductivity	– R. P. Tye
E-37.01.16:	Thermal Diffusivity	– R. E. Taylor
E-37.01.17:	Thermal Expansion	– R. Tye
E-37.01.18:	Dielectric Analysis	– D. R. Day
E-37.01.19:	Volatility	– R. J. Seyler
E-37.01.20:	Glass Transition Measurements By Thermomechanical Analysis	–
E-37.01.21:	Isothermal Calorimetry	– N. G. Chacos
E-37.01.22:	Calibration of Dynamic Mechanical Analysis Instrumentation	– P. L. Kolek
E-37.01.23:	Vapor Pressure by Ebulliometry	– J. D. Olsen
E-37.01.24:	Interlaboratory Studies	– R. L. Blaine

### ASTM Subcommittee E-37.02

E-37.02 is responsible for standard reference materials. The major activity is interaction with other standards organizations with similar interests. Interaction with ICTAC (International Confederation for Thermal Analysis and Calorimetry) through E. Charsley and J. Rouquerol is proceeding.

### ASTM Subcommittee E-37.03

E-37.03 consists of two task groups to generate documents defining terms used in thermoanalytical (W. Hammett) and thermophysical measurements (C. Foltz). These terms are used not only in documents written within E-37, but are referenced in documents generated by other ASTM groups. The importance that these terms be clearly defined and correctly used by the scientific community cannot be stressed strongly enough. Terms related to both thermochemical and thermophysical measurements are continually added to the documents.

### ASTM Subcommittee E-37.04

E-37.04 is the subcommittee responsible for the presentation of tutorials to the E-37 group and for implementing symposia sponsored by E-37. A symposium on Glass Transition Measurements, chaired by R. J. Seyler, is under the auspices of this subcommittee and was held in March 1993 in Atlanta, GA. Proceedings from the glass transition measurements symposium and three other symposia sponsored by E-37 are available from ASTM (Table 4). We encourage every thermal analyst to add these STP's to their thermal analysis library.

**Table 4** STP's: E-37

STP 838	PURITY DETERMINATIONS BY THERMAL METHODS R. L. Blaine and C. Schoff, editors
STP 997	COMPOSITIONAL ANALYSIS BY THERMOGRAMMETRY C. M. Earnest, editor
STP 1136	MATERIALS CHARACTERIZATION BY THERMOMECHANICAL ANALYSIS A. T. Riga and M. Neag, editors

### ASTM Subcommittee E-37.07

E-37.07 serves as a conduit between E-37 and other groups involved in thermal measurements. These groups include ASTM technical committees using specific thermal methods for specific materials, e.g. D-2 on Petroleum Products,

D-9 on Electrical and Electronic Insulating Materials, D-20 on Plastics, E-27 on Hazard Potential of Chemical, and other groups not affiliated with ASTM, e.g. ICTAC, IUPAC, Institute for Petroleum Research.

### **E-37: Established Methods**

Table 5 describe some of the documents written by E-37 which are accepted ASTM standards. The list, which is by no means complete, includes (i) calibration procedures for several thermal instruments and (ii) measurement of specific properties using appropriately calibrated instruments. We hope to add other documents in 1992.

**Table 5** Established Methods

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E228:	Standard Test Method for Linear Thermal Expansion of Solid Materials with a Vitreous Silica Dilatometer
E289:	Standard Test Method for Linear Thermal Expansion of Rigid Solids with Interferometry
E472:	Standard Practice for Reporting Thermoanalytical Data
E473:	Standard Definitions of Terms Relating to Thermal Analysis
E793:	Standard Test Method for Heats of Fusion and Crystallization by Differential Scanning Calorimetry
E794:	Standard Test Method for Melting and Crystallization Temperatures by Thermal Analysis
E831:	Standard Test Method for Linear Thermal Expansion of Solid Materials by Thermo-mechanical Analysis
E914:	Standard Practice for Evaluating Temperature Scale for Thermogravimetry
E928:	Standard Test Method for Mol Percent Impurity by Differential Scanning Calorimetry
E967:	Standard Practice for Temperature Calibration of Differential Scanning Calorimeters and Differential Thermal Analyzers
E968:	Standard Practice for Heat Flow Calibration of Differential Scanning Calorimeters
E1131:	Standard Test Method for Compositional Analysis by Thermogravimetry
E1142:	Standard Terminology Relating to Thermophysical Properties
E1225:	Standard Test Method for Thermal Conductivity of Solids by Means of the Guarded-Comparative-Standard Longitudinal Heat Flow Technique
E1269:	Standard Test Method for Determining Specific Heat Capacity by Differential Scanning Calorimetry
E1356:	Standard Test Method for Determining Glass Transition Temperatures by Differential Scanning Calorimetry or Differential Thermal Analysis
E1363:	Standard Test Method for Temperature Calibration of Thermomechanical Analyzers
E1461:	Standard Test Method of Thermal Diffusivity of Solids by the Flash Method

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**E-37: Draft Methods**

A few of the methods are presently in committee. For example (1) glass transition determination by thermomechanical analysis, (2) glass transition determination by dynamic mechanical analysis, and (3) calibration of dynamic mechanical analysis instrumentation. Several task groups within E-37.01 have just started on their activities; their proposed methods are not included in this list.

**E-37: Future Plans**

E-37 can remain a viable group only if we can continue to provide standard methods and materials to satisfy the needs of the thermal analysis community. But we have to be aware of just what these needs are. That means that we must hear from you, the thermal analysis community. We welcome you to join with us in our activities.

Inquiries on the activities of E-37 may be addressed to the author. Inquiries on the purchase of STPs and methods should be addressed directly to ASTM in Philadelphia, PA.

**Zusammenfassung** — Vorliegende Arbeit dient der Darlegung der Aktivitäten der ASTM (American Society for Testing and Materials) und des ASTM-Ausschusses E-37 für thermische Messungen.