

SEMI MF1569-0307 (Reapproved 1023) GUIDE FOR GENERATION OF CONSENSUS REFERENCE MATERIALS FOR SEMICONDUCTOR TECHNOLOGY

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NOTICE: Paragraphs entitled ‘NOTE:’ are not an official part of this Standard or Safety Guideline and are not intended to modify or supersede the official Standard or Safety Guideline. These have been supplied by the global technical committee to enhance the usage of the Standard or Safety Guideline.

1 Purpose

1.1 This Guide covers the procedures for producing a single set of consensus reference materials (ConRefs) in the absence of suitable certified reference materials from an established source.

1.2 Such reference materials are frequently required for calibration of measurement systems to reduce bias differences between different organizations.

NOTE 1: Refer to Figure 1 for a schematic presentation of the hierarchy of reference materials.

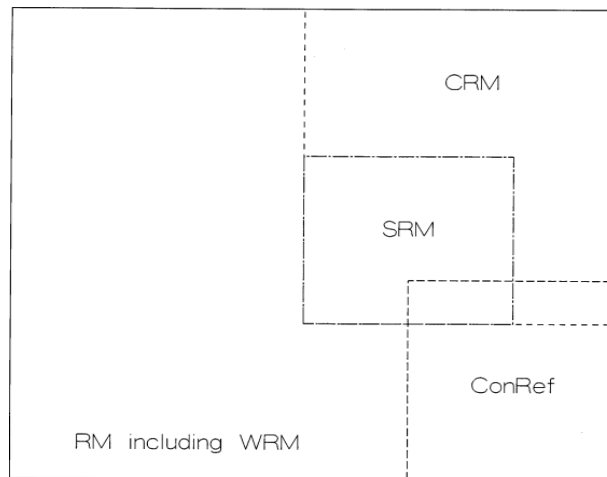


Figure 1
Reference Material Hierarchy

1.3 The generated ConRefs can be used by a single laboratory for internal use or for interlaboratory comparison of related equipment and materials.

1.4 Most often, however, they are used for replicating multiple sets of reference materials. In such a case, the property values of these reference materials are traceable to the values of the property value of the ConRefs. Depending on the nature of the preparing organization, these multiple sets may be certified reference materials or working reference materials. For this purpose, a guide for generation of reference materials specific to the materials and property may be required; Appendix 1 outlines the requirements for preparing a guide for generation of multiple sets of reference materials.

2 Scope

2.1 This Guide covers the steps to be taken to generate a set of ConRefs for a specific property or family of related properties required in semiconductor technology.

2.2 The procedure for generating the set of ConRefs is based on interlaboratory testing in accordance with ASTM E691. It is assumed for the purposes of this Guide that the test method evaluated by the interlaboratory study (ILS) is appropriate for determining the property values of the ConRef.

2.3 This Guide does not cover the selection of one of several possible test methods nor does it cover the case for which other reference materials must be used in the measurement of the properties of the ConRef.

2.4 This Guide also describes procedures that may be used to generate consensus property values that may form the basis for the generation of multiple sets of CRMs or reference materials (RMs).

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3 Referenced Standards and Documents

3.1 SEMI Standards and Safety Guidelines

SEMI M59 — Terminology for Silicon Technology

3.2 ASTM[®] Standards¹

ASTM E456 — Standard Terminology Relating to Quality and Statistics

ASTM E691 — Standard Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

NOTICE: Unless otherwise indicated, all documents cited shall be the latest published versions.

4 Terminology

4.1 Terms relating to silicon and other semiconductor technology are defined in SEMI M59.

4.2 Terminology related to the conduct and analysis of the ILS may be found in ASTM E456 and ASTM E691.

5 Summary of Guide

NOTE 2: Refer to Figure 2 for a flow chart of the steps covered.

5.1 The test method to be used is selected or developed, and acceptable levels of repeatability and reproducibility are defined.

5.2 An ILS test protocol for use with the selected consensus test method is developed in accordance with ASTM E691 and the proper materials and instrumentation are assembled.

5.3 The ILS is executed and analyzed.

5.4 The results are evaluated against the criteria selected in ¶ 5.1. If the results are acceptable, a precision statement is developed and balloted for inclusion in the test method. If the results are not acceptable, the test method validity and the usefulness of the materials tested are assessed.

5.5 The results are incorporated into a research report.

5.6 If the results are acceptable, the materials used in the test are now qualified as ConRefs. They have values of the desired property (or properties) that represent the consensus of the industry; the uncertainty in these values can be estimated from the repeatability and reproducibility obtained in the test, as documented in the research report. These materials are stored in a location accessible for future use in preparing replicate sets of reference materials.

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