



**International SEMATECH Semiconductor Industry Standards
Conformance Guidelines: Test Service Provider Processes and
Criteria**

**International SEMATECH
Technology Transfer #02114344A-ENG**

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International SEMATECH
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Abstract: This document from the MFGM017 project provides guidance in applying consistent processes for assuring competent, independent assessment of conformance of a product to an industry standard. Intended audiences are IC makers who prefer suppliers to provide third-party assessment of conformance or certification, suppliers who are requested to provide third-party assessment or certification, and test service providers who perform assessments. The guideline includes recommended criteria and processes for third-party test service providers (TSPs) who assess the conformance of an implementation with respect to standards relevant to the semiconductor industry. This document covers general guidance on processes and criteria for third-party test service providers. Guidance specific to integration and automation software standards TSPs is in the appendix. This document complements Technology Transfers #02114342A-ENG, 02114343A-ENG, and 02114345B-ENG.

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1 INTRODUCTION

1.1 Purpose

This document recommends assessor competency criteria and test service provider (TSP) project and configuration management processes. Guidance is provided for entities providing third-party assessment services (TSPs) for assessing conformance to standards. Accreditation bodies may derive processes and criteria from the guideline when evaluating third-party TSP qualifications for accreditation. Specifically, this document provides

- Generic third-party test service provider criteria for competency, configuration management, and project management
- Criteria specific to software TSPs (Version 1.0)

1.2 Benefit

This guideline provides a consistent set of criteria for evaluation and accreditation of test service providers and assessors. These criteria are intended to help assure that TSPs are qualified and able to perform assessments, follow pre-defined and repeatable test processes (planning and conduct), and use an accepted “known good test.” In doing so, there is higher confidence that assessment results are valid and reliable.

1.3 Scope

This guideline defines TSP competency criteria and processes to ensure consistent quality, document control, and reporting systems (data generation, collection, reporting and archival guidelines). In addition, the guideline provides application-specific criteria for software test service providers. Table 9 in the appendix lists all the essential elements and requirements. Recommended practices are included for additional guidance.

1.4 Guideline Limitations

This document is not intended to prescribe, supercede, or otherwise interfere with any contractual agreements or legal relationships between parties in the assessment process. Revision 1.0 is intended as a reference for parties to improve communication. The determination of requirements based on this guideline is solely the users’ responsibility. Infrastructure in the semiconductor industry for formal accreditation of third-party TSPs might not be in place at the time of publication of Rev 1.0. This guideline will not recommend or endorse product brands (test tools, management tools, etc.) but could identify known or acceptable tools, formats, and best practices.

2 TEST SERVICE PROVIDERS

2.1 Essential Element: TSP Company Synopsis

REQUIREMENT

1. The TSP must maintain a company synopsis that gives an overview of its qualification, capabilities, and operating procedures in assessment and testing for conformance to standards.

RECOMMENDED PRACTICES

TSPs should have the team and operating procedures in place to support the test service. In addition to traditionally accepted procedures for conducting project management, test processes, configuration management, and quality system activities, other support procedures should be available to the team. At specified intervals, adherence to procedures should be reviewed internally and evaluated for compliance. For procedures that repeatedly fail to service the project, the TSP should undertake actions to improve the process. The responsible TSP team member should define team operating procedures for overall project execution. As a minimum, communication procedures, recordkeeping procedures, project review procedures, and issue escalation procedures are recommended. Table 3 provides a checklist of the key TSP criteria.

2.2 Essential Element: Company Structure

REQUIREMENT

1. The TSP should have an overall organization structure that supports the key project management and support positions.

RECOMMENDED PRACTICE

The structure should be documented in a traditionally acceptable format such as a hierarchy chart illustrating reporting relationships. Personnel with direct responsibility should be noted along with their specific functional area. The structure should not only present those departments or functions directly related to the test project but also include the top-level organizations within the company to which the test project reports. The organization structure in place to support the test effort is expected to promote a focus on process and facilitate project objectives.

2.3 Essential Element: TSP Responsibilities

REQUIREMENT

1. The TSP is responsible for planning, conducting, and reporting the results of the conformance assessment of products.

RECOMMENDED PRACTICE

For each position identified within the organization, major roles and responsibilities should be clearly defined. Interdepartment dependencies, communication channels, and accountability should be in place. Individuals with key responsibilities should possess an appropriate level of authority to carry out assigned tasks.

2.4 Essential Element: TSP Staffing

REQUIREMENTS

1. The TSP must have a staffing plan for the test project to ensure adequately skilled people are available to generate quality work products and to complete the project in a timely fashion.

RECOMMENDED PRACTICE

The core team members from within the company identified to support the test effort from project initiation through project closure (i.e., “total” project lifecycle) should be established early in the project planning. Their specific project responsibilities, reporting structure, and accountability should be agreed upon before project assignment.

The TSP should have a staff augmentation plan to ensure continued test progress or support peak periods in the project performance. Team members who provide temporary or intermittent “expert” knowledge in a specific area should be identified to the overall team as needed. While on assignment to the test project, their availability and anticipated extent of support must be clearly specified. The use of contractors, temporary services, students, etc., should be identified and agreed upon with the client before project assignment.

2.5 Essential Element: Contact Information

REQUIREMENT

1. The TSP must identify the high-level company and individual team contact information applicable to the project.

RECOMMENDED PRACTICE

The official company address, along with a project list containing current team contact information (i.e., name, title, office location, telephone, e-mail, etc.), should be provided at the beginning of the project.

3 TSP OPERATING PROCEDURES

3.1 Essential Element: TSP Project Management

REQUIREMENT

1. TSPs must perform project management activities that are consistent with generally accepted industry best practices.

RECOMMENDED PRACTICES

The approach to project management and relevant project execution details should be documented in a Project Management Plan (PMP). Tools selected to support project management (PM) should be identified during project planning and implemented in the early stages of project execution. PM tools should be placed under configuration control and be accessible to the designated team members.

A list of project management activities is in Table 4.

The TSP should establish methods for exchanging and distributing information among project members. Project distribution lists should be defined early in the project planning stages along with documentation available to disseminate key project data.

The TSP should define team procedures for maintaining project and assessment records. The procedures should include standard formats, minimum descriptive information, and documentation guidelines.

The TSP should conduct regular project and status reviews. Information such as schedule, cost, and resource allocation should be addressed during the reviews. Procedures should be documented and cover the administrative actions necessary to schedule the session, disseminate materials in advance, record meeting events and action items, and provide for followup.

The TSP should have a defined process for escalating assessment project issues to the appropriate contact(s) for timely resolution. The procedures should include a contact point, a scheme for issue prioritization, and feedback expectations. The steps for identifying the issue,

describing the issues, and submitting the issue for action and tracking should be documented and disseminated to the team. The procedures should consider the operating procedures of the overall issue tracking system implemented as part of the configuration management process and the corrective action process implemented as part of the quality system.

3.2 Essential Element: Assessment Process

REQUIREMENT

1. Test service providers must follow known and accepted industry best practices in test development and documentation.
2. Any deviations should be noted and explained in the test plan.

RECOMMENDED PRACTICE

Associated assessment documents are listed in Table 1. An overview of the assessment process and components of documentation and reporting procedures that should be covered are in Technology Transfer #02114342A-ENG, *International SEMATECH Assessment Processes Guideline*.

Table 1 Assessment Documentation

Assessment Plan
Test Design Specification
Test Case Specification
Test Procedure Specification
Test Log
Test Incident Report
Assessment Report

3.3 Essential Element: TSP Configuration Management

REQUIREMENT

1. TSPs must perform configuration management (CM) activities that are consistent with generally accepted best practices.

RECOMMENDED PRACTICE

The extent to which configuration management techniques are needed may depend on the scope and duration of the test project. The following practices may need to be weighed against the needs and scope of the project. Table 7 lists configuration management activities.

The approach to CM and relevant execution details should be recorded in a Configuration Management Plan (CMP) and be made available to the client upon request. Tools selected to support the CM process should be placed under configuration control and accessible to the designated team members.

Project Repository: The CM procedures should address the steps to establish the project repository, use the repository to archive and retrieve project and assessment process configuration items (CI's), request and manage changes, and track issues. At project initiation, the TSP should identify suitable storage locations and support tools to efficiently store and maintain all project materials. The TSP should provide the team with procedures to archive and

retrieve project CIs. As a minimum, the steps to identify the current version of a CI, archive changes to the CI, retrieve a current CI, etc., should be covered. All items should be assigned a unique version identifier (ID) when introduced to the project. With each change to the item, the version ID should be updated according to project identification conventions. Selected items such as correspondence or test logs may be generated once and not be subject to change. In this case, the item is assigned an ID and stored in the project repository. For items subject to revision and update, such as a project document or test case design, revision control is essential to successful project execution.

Version Control: Materials received from external sources may contain label information according to the source organization policies and procedures. The assessment project scheme may include this label in the CI ID or may simply record the information for traceability and reference. For example, all documents should be given a version number that is incremented with each revision of the document. The initial release of a document is typically numbered as version 1.0 or something similar (major number) with subsequent minor releases numbered as 1.1, 1.2, 1.3, and so on. Draft versions for review before initial release should be distinguishable from the final releases in the numbering scheme. Ideally, each controlled document should have its version number indicated on every page of the document as well as a revision history that shows all revisions of the document. The TSP should identify all individual items that compose the assessment project configuration. Typical items, distinguished by those associated with the overall project rather than those specific to the assessment, are shown in Table 8.

Change Management: The TSP should develop and distribute procedures for the change management process. As a minimum, the steps to request the change, record initial identification information, record updates to progress, view “progress” status, etc., should be covered.

- The TSP should institute a control process to ensure adequate traceability for project and test CIs from project start to finish. The process should ensure that changes are managed with sufficient review, analysis, and approval. The process should provide for a project repository for easy storage and access of project materials. Tools and processes should be established to facilitate the overall change management process.
- A change management body, typically referred to as a Configuration Control Board (CCB), comprised of members from key functional areas may be formed to review and assess proposed changes to the project or assessment process.
- The TSP should develop a suitable backup process to ensure that project materials are retained for an appropriate duration as adopted by the TSP organization and guided by the quality objectives.

Configuration Status Accounting: The TSP should establish an appropriate level of reporting status on the project and assessment process CIs. Standard reports should be defined and issued according to a regular reporting schedule (i.e., weekly, monthly, as appropriate). The reporting methodology should allow for ad hoc reporting on an “as needed” basis. Typical status reports include project repository contents (i.e., project documentation, assessment materials, etc.), issue reports, and change requests. Common change request documents are the Engineering Change Proposal (ECP), Engineering Change Notice (ECN), and the deviation/waiver.

3.4 Essential Element: TSP Quality System

REQUIREMENT

1. TSPs must perform quality assurance (QA) activities that are consistent with generally accepted best practices.

RECOMMENDED PRACTICE

The extent to which configuration management techniques are needed may depend on the scope and duration of the test project. The following practices may need to be weighed against the needs of the project. Some of the processes described below may be considered “value added” services provided by a TSP.

For TSP organizations that adhere to an existing quality system (QS), the relevant information (i.e., policy, commitment statement, etc.) should be made available to the client. A quality statement should include a commitment to comply with quality goals and objectives as well as continually improve upon the effectiveness of the QS. The TSP should ensure that the statement is communicated to the team and continually reviewed for suitability.

The approach to QA along with the tools, output products, and relevant execution details should be documented in a Quality Assurance Plan (QAP). This may include auditing actions (i.e., planning, conducting, and documenting results), control of nonconforming product, and corrective/preventative actions. Team procedures for audits, inspections, and reviews should be sufficiently detailed to ensure consistent results.

The TSP should ensure that the quality goals and objectives are measurable and consistent with the quality statement. The TSP should outline and document the procedures for collecting data, as well as calculating, analyzing, distributing, and archiving project metrics.

Audit categories should address the overall project (i.e., adherence to procedures, progress tracking, etc.), test process, and product conformance (i.e., test results, deficiency tracking, corrective action closure, etc.). The TSP should establish the audit criteria, scope, frequency, and methods.

Root cause analysis and corrective action are not the TSP’s responsibility in performing a conformance assessment. However, the TSP may offer additional services to support root cause analysis and corrective action. The TSP may provide a process for tracking issues identified during the project execution and assessment process. The identification data should include a unique problem ID along with the date identified, initiator, environmental definition (i.e., equipment ID, software version, hardware configuration, etc.), and a sufficiently detailed description of the symptoms to allow for timely root cause analysis and resolution. The problem should be classified and assigned a severity level. Ideally, the tracking system should allow for data collection associated with identification, analysis, and “fix” actions, specifically, labor hours to diagnose, correct, and confirm the corrective actions. The data from this process should feed the corrective action process for final impact analysis and closure. The TSP may implement procedures to support the corrective action process and ensure actions associated with resolving previously identified issues are defined and recorded, action is taken, and resolution is achieved. The procedures should clarify the steps to obtain status as well as report back to the issue initiator and affected team members. Corrective actions should be analyzed for trends, confirmed as resolved, and evaluated to identify future preventative actions.

4 TSP COMPETENCY CRITERIA

4.1 Essential Element: Assessor Competency Criteria

REQUIREMENT

1. Individual personnel associated with the TSP must be competent for the functions they perform, including making required technical judgments.

RECOMMENDED PRACTICE

To ensure effective and uniform evaluations, minimum relevant criteria should be defined to establish the competence of assessors. The following provides suggested criteria to assist the TSP or accreditation body in determining the appropriate criteria. Competency criteria specific to software assessment is included in the appendix, section A.1.1.

Levels of Assessors

LEVEL 1	Have the necessary qualifications and experience to perform assessments without supervision, train assessors, function as a lead assessor, and meet the criteria for Level 1 as described below.
LEVEL 2	Perform assessments under the supervision and direction of a Level 1 assessor. The work product of a Level 2 assessor should be subject to technical review by a Level 1 assessor. A Level 2 assessor should meet the criteria described below.

Education

LEVEL 1	A bachelor's degree from an accredited college-level institution or equivalent training and experience (e.g., an associate degree and 4 years of experience in relevant technical area).
LEVEL 2	Individual(s) certified in related technical discipline(s) (e.g., engineering or science) may perform assessments when trained by experienced personnel and when their work product is subject to technical review by a Level 1 assessor.

Experience

LEVEL 1	Adequate proven experience in the semiconductor field as determined by a competent TSP or accreditation body. The assessor should have at least 2 years' recent experience with semiconductor equipment manufacturing, equipment design, test, and semiconductor fabrication and 1 year of experience with the equipment or system related to the discipline in which the assessment is to be performed. Professional activity of at least 4 years with no less than 2 years practice in testing, inspection, and/or assessment tasks in a calibration, testing, inspection, or certification body.
LEVEL 2	Experience in the semiconductor field. At least 1 year recent experience with semiconductor equipment manufacturing, equipment design, test, and semiconductor fabrication, including familiarity with the equipment or system related to the discipline in which the assessment is to be performed. Experience in field under supervision of qualified TSP and letter of recommendation.

Knowledge

LEVEL 1	Knowledge of procedures in testing, inspection, quality assurance, or certification on the basis of practical experience and/or successful participation in relevant training courses. Be active participants in the standards development process and possess a current, detailed working knowledge of the intent and extent of those standards as they relate to the discipline for which an assessment is to be performed.
LEVEL 2	Knowledge of procedures in testing, inspection, quality assurance, or certification on the basis of practical experience and/or successful participation in relevant training courses or training under the supervision of a Level 1. Working knowledge of the intent and extent of the standards as they relate to the discipline for which an assessment is to be performed.

Formal Training

LEVEL 1	Formal training in test design, test execution, and defect analysis; training using relevant testing tools for the system or product under test.
LEVEL 2	Formal training or experience in the field under the supervision of qualified Level 1 assessor and letter of recommendation. Training using relevant testing tools for the system or product under test.

Professional

LEVEL 1	Be recognized as a registered or certified professional in the discipline(s) in which the evaluations were performed or comply with one (or more if applicable) certification standards. Examples include ANSI Z34.1, ASSE/ANSI Z590, ISO/IEC Guide 23, ISO/IEC Guide 25, ISO/IEC Guide 28, ISO/IEC Guide 39, and ISO/IEC Guide 65. The determination of relevant professional certifications depends on the scope and discipline of the assessment to be performed. Have credentials that are accepted by professional entities as business experience and knowledge equivalent to the degrees, training, and work experience noted in this guideline.
LEVEL 2	Have credentials that are accepted by professional entities as business experience and knowledge equivalent to the degrees, training, and work experience noted in this guideline.

Personnel Code of Conduct

TSPs and assessors associated with TSPs should adhere to principles such as those provided in the IEEE Code of Conduct for Professional Engineers and sign a professional agreement with their employers or contracted customers, by which they commit themselves to

- Meet the criteria as specified in this guideline, including those relating to confidentiality and independence from commercial and other interest.
- Disclose any previous or present association on their own part, or on the part of any previous employer, with a supplier or designer of goods and services associated with any assessment to be performed.

4.2 Essential Element: Maintaining Accreditation**REQUIREMENT**

1. To maintain accreditation, TSP's must do the following:
 - a) Conduct at least one assessment every 6 months
 - b) Retain qualified personnel to perform assessments
 - c) File an annual report with the accreditation body covering the assessments activities of the TSP
 - d) Respond to any requests from the accreditation body
 - e) Maintain current working knowledge of the standards to which conformance assessments are performed.

APPENDIX A – SOFTWARE TSP CRITERIA

A.1 Software Assessor Competency Criteria

Table 2 includes suggested competency criteria specific to software assessor qualifications. The general competency criteria in section 4.1 should also be considered.

Table 2 Suggested Software TSP Competency Criteria

Data Acquisition Experience	
Level 1 Criteria	<ul style="list-style-type: none"> – In-depth understanding of current SEMI standards as they pertain to factory automation – Ability to characterize a tool to derive test setup parameters and resolve discrepancies between a supplier’s documentation and implementation with a supplier – Ability to gather specific customer requirements to develop original acceptance test procedure documentation – With support, ability to deviate from a standard written test procedure for tools for unique tool type implementations without impacting testing integrity – Ability to define customer-specific acceptance test procedures and provide guidance and input based on experience with actual supplier community maturity and trends
Level 2 Criteria	<ul style="list-style-type: none"> – In-depth understanding of current SEMI standards as they pertain to factory automation – Ability to characterize a tool to derive test setup parameters – Ability to gather specific customer requirements to support the development of original acceptance test procedure documentation – Ability to execute a standard written acceptance test procedure
Data Analysis Experience	
Level 1 Criteria	<ul style="list-style-type: none"> – Ability to characterize a tool to derive test setup parameters and resolve discrepancies between a supplier’s documentation and implementation with a supplier – Ability to ascertain whether a test failure is a result of a test software discrepancy, a tool setup failure, or an actual problem with the supplier’s implementation – Ability to define and deploy meaningful failure analysis report templates for a project
Level 2 Criteria	<ul style="list-style-type: none"> – With support, ability to ascertain whether a test failure is a result of a test software discrepancy, a tool setup failure, or an actual problem with the supplier’s implementation – With occasional support, analyze test report data to ascertain the root cause of specific testing failures – Generates failure analysis reports that follow a specific or predefined format

A.2 Software TSP Process, Documentation and Reporting

Software TSPs should follow industry-accepted best practices in their test process and test documentation. IEEE Std 829-1998 is recommended. Further information about assessment documentation and reporting results is provided in Technology Transfer # 02114343A-ENG, *International SEMATECH Assessment Criteria and Processes Guideline*.

APPENDIX B – TOOLS AND TEMPLATES

B.1 TSP Checklist

Table 3 Checklist of TSP Criteria

Section	Criteria	Yes	No	N/A	Comments
3.1	Company Synopsis				
	Company Capabilities and experience with successful test services				
3.1.1	Project management and support organizational structures in place				
3.1.2	Roles and responsibilities clearly defined				
3.1.3	Approach to staffing described				
3.1.4	Contact Information provided				
3.2	Project Management				
	Project Management Plans utilized				
	Adequate resources for the project ensured				
	Detail task descriptions developed				
	Test project schedule developed				
	Required commitments from all project team members				
	Performance tracking process in place				
	Change management process in place				
	Team operating procedures in place				
3.3	Test Process				
3.4	Configuration Management				
	Existing CM Process in place				
	Formal CM Plans utilized				
3.5	Quality System				
	Existing Quality System in place				
	Formal Quality Assurance Plans utilized				
	Test Project Metrics defined				
3.6	Project Staff Competency				
	Education				
	Experience				
	Knowledge				
	Professional				
	Code of Conduct				

B.2 Project Management Tools

Table 4 provides examples of project management activities. The template in Table 5 may be used to record the findings of an evaluation of project management processes based on Project Management Maturity (PMM) criteria. A TSP could use this template as an internal working model and prepare for application to the accreditation body. PMM levels are described in Table 6.

Table 4 Project Management Activities

Estimate size, effort, and cost of the assessment activities.
Ensure adequate resources are available for execution. In addition to the appropriately skilled people, typical resources include facilities and tools.
Detail assessment tasks to include a meaningful task name and description. A traditionally accepted format is the work breakdown structure (WBS).
Develop an assessment schedule that includes tasks (WBS elements), duration, resources, and constraints.
Gain approval of project tasks, assessment activities, and commitments from affected groups and individuals comprising the assessment team.
Document, archive, and report project actions and commitments to the assessment team.
Identify project artifacts and work products to be placed under configuration management.
Identify suitable metrics to evaluate project performance, test results, and product conformance to standards.
Track performances of assessment activities and actual results against the plans and schedules.
Analyze project and assessment process metrics.
Take corrective actions and manage to closure when actual results and performance of the assessment activities deviate significantly from the plans.
Agree on changes to assessment project commitments with the affected groups and individuals.

Table 5 TSP Project Management Maturity Template

Management Process	Goals	Commitment to Perform	Ability to Perform	Activities Performed	Measurement and Analysis	Verifying Implementation
		PMM Level	PMM Level	PMM Level	PMM Level	PMM Level
Requirements Management	Identify process to gather requirements, possible team charter on gathering requirements					
Project Planning	Identify process for planning assessments, identify tools (Gantt, MPP)					
Project Tracking	Identify process for assessment project tracking, identify testing tools					
Quality Assurance	Identify process for conformance, identify policy (e.g., SEMI standards)					
Configuration Management	Identify process for tracking various versions/levels of implementation of software, documentation & standards					

Table 6 Project Management Maturity (PMM) Levels*

PMM Levels
Level 1 – characterized by chaos, periodic panics, and heroic efforts required by individuals to successfully complete projects. Few if any processes in place; successes may not be repeatable.
Level 2 – project tracking, requirements management, realistic planning, and configuration management processes are in place; successful practices can be repeated.
Level 3 – standard development and maintenance processes are integrated throughout an organization; an Assessment Process Group is in place to oversee testing processes, and training programs are used to ensure understanding and compliance to criteria.
Level 4 – metrics are used to track productivity, processes, and products. Project performance is predictable, and quality is consistently high.
Level 5 – the focus is on continuous process improvement. The impact of new processes and technologies can be predicted and effectively implemented when required.

* Note: These project management principles and levels are derived from the SEI CMMI Software Maturity Model Integration.¹ For this guideline, CMMI rating is not required, but criteria have been derived as examples of good management practices. See References and Related Documents.

B.3 Configuration Management Tools

Table 7 Configuration Management Activities

Identify the project baselines and each Configuration Item (CI) that makes up the baselines. Project artifacts frequently maintained under the CM process include project correspondence, e-mails, documents, meeting minutes, etc.
Identify the test baselines and each CI that makes up the baselines. For the assessment project, each individual equipment assessment may represent an “assessment baseline.” Representative artifacts associated with an assessment include test plans, assessment procedures, assessment reports, etc.
Establish an agreed upon identification (ID) system for project and assessment CIs. Traditionally acceptable identifiers include a text designator, numerical designator, or combination text/numerical designator for each CI. The ID conventions should allow for multiple versions of a CI.
Establish a repository for project and test CIs. Traditionally acceptable repositories include documentation libraries, online file management systems, source code control systems, etc.
Define a process for controlling baseline change. Identify a change management body such as the Configuration Control Board (CCB) to approve, monitor, and control changes to the individual CIs.
Implement a process supported by documents, records, and/or commercial-off-the-shelf (COTS) applications for reporting status of CM processes and CIs that make up project and assessment baselines.
Develop or acquire tools to support the CM process. The may include forms (COTS) software applications, manual processes, etc.
Define and document procedures for all aspects of the CM process, including but not limited to identification, control, and status accounting.

¹ Carnegie Mellon Software Engineering Institute, Pittsburgh, PA 15213-3890, <http://www.sei.cmu.edu/cmmi/cmmi.html>

Table 8 Configuration Identification Categories and Examples

CI Category	Typical Project CIs	Typical Assessment CIs
Documents	Project Management Plan Configuration Management Plan Quality Assurance Plan	Assessment Plan Test Design Specification Test Case Specification Test Procedure Specification Test Log Test Incident Report Assessment Report
Records	Correspondence, E-mail,	Test Logs, Test Results, etc.
Files (Project / Assessment)		Hardware Configuration Test Tool Software Under Test (SUT)
Artifacts (Project / Assessment)	Project Schedule, Resource Allocation Matrix, etc.	Test Designs, Test Case Specifications, Assessment Procedures, etc.
Artifacts (Client)	Product Roadmaps Equipment Manuals Release Notes	Test Procedures Test Results
Archives/Backups	All Materials	All Materials
Issues Reporting and Response Service (or similar)	Issues List	Deficiency List

APPENDIX C – ESSENTIAL ELEMENTS AND REQUIREMENTS

Table 9 TSP Essential Elements and Requirements

Section #	Essential Element	Requirements
2.1	TSP Company Synopsis	1. The TSP must maintain a company synopsis that gives an overview of its qualification, capabilities, and operating procedures in the area of assessment and testing for compliance to standards.
2.2	Company Structure	1. The TSP should have an overall organization structure that supports the key project management and support positions.
2.3	TSP Responsibilities	1. The TSP is responsible for planning, conducting, and reporting the results of the conformance assessment of products
2.4	TSP Staffing	1. The TSP must have a staffing plan for the test project to ensure adequately skilled people resources are available to generate quality work products and to complete the project in a timely fashion.
2.5	Contact Information	1. The TSP must identify the high-level company and individual team contact information applicable to the project.
3.1	TSP Project Management	1. TSPs must perform project management activities that are consistent with generally accepted best practices.
3.2	Assessment Process	1. Test service providers must follow known and accepted industry best practices in test development and documentation. 2. Deviations should be noted and explained in the test plan.
3.3	TSP Configuration Management	1. TSPs must perform configuration management (CM) activities that are consistent with generally accepted practices.
3.4	TSP Quality System	1. TSPs must perform quality assurance (QA) activities that are consistent with generally accepted best practices.
4.1	Assessor Competency Criteria	1. Individual personnel associated with the test service provider must be competent for the functions they perform, including making required technical judgments.
4.2	Maintaining Accreditation	1. To maintain accreditation, TSP's must do the following: <ul style="list-style-type: none"> a. Conduct at least one assessment every 6 months b. Retain qualified personnel to perform assessments c. File an annual report with the accreditation body covering the assessments activities of the TSP d. Respond to any requests from the accreditation body e. Maintain current working knowledge of the standards to which conformance assessments are performed

APPENDIX D – REFERENCE DOCUMENTS

D.1 Industry Standard

ANSI Documents²

ANSI Z34.1 — Third-party Certification Program

IEEE Documents³

Std 829-1998 IEEE Standard for Software Test Documentation

IEEE Computer Society Certified Software Development Professionals

ISO/IEC Documents⁴

ISO/IEC Guide 2 — Standardization and Related Activities - General Vocabulary, Sections 12–17

ISO/IEC Guide 22:1996 — General Criteria for Supplier's Declaration of Conformity

ISO/IEC Guide 23:1982 — Methods of Indicating Conformity with Standards for Third-Party Certification Systems.

ISO/IEC Guide 25:1990 — General Requirements for the Competence of Calibration and Testing Laboratories.

ISO/IEC Guide 28:1982 — General Rules for a Model Third-Party Certification System for Products.

ISO/IEC Guide 39:1988 — General Requirements for the Acceptance of Inspection Bodies.

ISO/IEC Guide 53:1988 — An Approach to the Utilization of a Supplier's Quality System in Third-Party Product Certification.

ISO/IEC Guide 58:1993 — Calibration and testing laboratory accreditation systems - General requirements for operation and recognition

ISO/IEC Guide 65 — General Requirements for Bodies Operating Product Certification Systems

ISO 8402:1994 — Quality Management and Quality Assurance – Vocabulary.

² American National Standards Institute, New York Office: 11 West 42nd Street, New York, NY 10036, USA. Telephone: 212.642.4900; Fax: 212.398.0023 Website: www.ansi.org

³ Institute of Electrical and Electronics Engineers, Inc., 445 Hoes Lane Piscataway, NJ 08854. Website: www.ieee.org

⁴ International Organization for Standardization, ISO Central Secretariat, 1, rue de Varembé, Case postale 56, CH-1211 Geneva 20, Switzerland. Telephone: 41.22.749.01.11; Fax: 41.22.733.34.30 Website: www.iso.ch

D.2 ISMT Related Documents

International SEMATECH Semiconductor Standards Certification Guidelines: Overview, Technology Transfer # 02114342A-ENG

International SEMATECH Semiconductor Standards Certification Guidelines: Assessment Criteria and Processes, Technology Transfer # 02114343A-ENG

International SEMATECH Semiconductor Standards Certification Guidelines: Accreditation Criteria and Processes, Technology Transfer # 02114345A-ENG

D.3 Additional References

SEI CMMI Software Maturity Model Integration, Carnegie Mellon Software Engineering Institute⁵

⁵ Carnegie Mellon Software Engineering Institute, Pittsburgh, PA 15213-3890, <http://www.sei.cmu.edu/cmmi/cmmi.html>

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