**IEEE Std 1012a-1998**
(Supplement to
IEEE Std 1012-1998)

# Supplement to IEEE Standard for Software Verification and Validation:

# Content Map to IEEE/EIA 12207.1-1997

Sponsor
**Software Engineering Standards Committee**
**of the**
**IEEE Computer Society**

Approved 16 September 1998

**IEEE-SA Standards Board**

**Abstract:** The relationship between the two sets of requirements on plans for verification and validation of software, found in IEEE Std 1012-1998 and IEEE/EIA 12207.1-1997, is explained so that users may produce documents that comply with both standards.
**Keywords:** life cycle data plans, qualification test, verification and validation

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# Introduction

(This introduction is not part of IEEE Std 1012a-1998, Supplement to IEEE Standard for Software Verification and Validation: Content Map to IEEE/EIA 12207.1-1997.)

This standard is designed to act as a supplement to IEEE Std 1012-1998, IEEE Standard for Software Verification and Validation. The readers of this docment should use IEEE Std 1012a-1998 in conjunction with IEEE Std 1012-1998.

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# Supplement to IEEE Standard for Software Verification and Validation:

# Content Map to IEEE/EIA 12207.1-1997

## Annex J

(informative)

## Guidelines for compliance with IEEE/EIA 12207.1-1997

### J.1 Overview

The Software Engineering Standards Committee (SESC) of the IEEE Computer Society has endorsed the policy of adopting international standards. In 1995, the international standard, ISO/IEC 12207, Information technology—Software life cycle processes, was completed. The standard establishes a common framework for software life cycle processes, with well-defined terminology, that can be referenced by the software industry.

In 1995 the SESC evaluated ISO/IEC 12207 and decided that the standard should be adopted and serve as the basis for life cycle processes within the IEEE Software Engineering Collection. The IEEE adaptation of ISO/IEC 12207 is IEEE/EIA 12207.0-1996. It contains ISO/IEC 12207 and the following additions: improved compliance approach, life cycle process objectives, life cycle data objectives, and errata.

The implementation of ISO/IEC 12207 within the IEEE also includes the following:

- IEEE/EIA 12207.1-1997, IEEE/EIA Guide for Information Technology—Software life cycle processes—Life cycle data;
- IEEE/EIA 12207.2-1997, IEEE/EIA Guide for Information Technology—Software life cycle processes—Implementation considerations; and
- Additions to 11 SESC standards (i.e., IEEE Stds 730, 828, 829, 830, 1012, 1016, 1058, 1062, 1219, 1233, 1362) to define the correlation between the data produced by existing SESC standards and the data produced by the application of IEEE/EIA 12207.1-1997.

NOTE—Although IEEE/EIA 12207.1-1997 is a guide, it also contains provisions for application as a standard with specific compliance requirements. This supplement treats IEEE/EIA 12207.1-1997 as a standard.

In order to achieve compliance with both IEEE Std 1012-1998[1] and IEEE/EIA 12207.1-1997, it is essential that the user review and satisfy the data requirements for both standards.

When IEEE Std 1012-1998 is directly referenced, the precedence for conformance is based upon this standard alone. When IEEE Std 1012-1998 is referenced with the IEEE/EIA 12207 standard series, the precedence for conformance is based upon the directly referenced IEEE/EIA 12207 standard, unless there is a statement that this standard has precedence.

### J.1.1 Scope and purpose

Both IEEE Std 1012-1998 and IEEE/EIA 12207.1-1997 place requirements on plans for verification of software and validation of software. The purpose of this annex is to explain the relationship between the two sets of requirements so that users producing documents intended to comply with both standards may do so.

## J.2 Correlation

This clause explains the relationship between IEEE Std 1012-1998 and IEEE/EIA 12207.0-1996 in the following areas: terminology, process, and life cycle data.

### J.2.1 Terminology correlation

The two standards use similar terms in similar ways. Both use the terms test, qualification test, verification, and validation in a similar manner.

### J.2.2 Process correlation

Both IEEE Std 1012-1998 and IEEE/EIA 12207.0-1996 use a process-oriented approach for describing the verification process and the validation process. Both documents have the same major processes: acquisition, supply, development, operation, and maintenance. The two, however, differ in the names of the activities of the development process. IEEE Std 1012-1998 uses the following activities:

— Concept;
— Requirements;
— Design;
— Implementation;
— Test;
— Installation and checkout.

IEEE/EIA 12207.0-1996 subdivides the development process into the following activities:

— Process implementation;
— System requirements analysis;
— System architectural design;
— Software requirements analysis;
— Software architectural design;
— Software detailed design;
— Software coding and testing;
— Software integration;

[1]For the purpose of this document, it should be assumed that references to IEEE Std 1012-1998 include this supplement, IEEE Std 1012a-1998.

 

— Software qualification testing;
— System integration;
— System qualification testing;
— Software installation;
— Software acceptance support.

IEEE Std 1012-1998 provides a greater level of detail about what is involved in the verification and validation of software.

### J.2.3 Life cycle data correlation for Software Verification and Validation Plans

The information required in a Software Verification and Validation Plan (or V&V plan) by IEEE Std 1012-1998 and the information required in a verification process plan and validation process plan by IEEE/EIA 12207.1-1997 are similar. It is reasonable to expect that a single document could comply with both standards. Details are provided in J.3.

### J.2.4 Life cycle data correlation between other data in IEEE/EIA 12207.1-1997 and IEEE Std 1012-1998

Table J.1 correlates the life cycle data other than Software Verification and Validation Plans between IEEE/EIA 12207.1-1997 and IEEE Std 1012-1998. It provides information to users of both standards.

**Table J.1—Life cycle data correlation between other data in IEEE/EIA 12207.1-1997 and IEEE Std 1012-1998**

| Information item | IEEE/EIA 12207.0-1996 subclause(s) | Kind | IEEE/EIA 12207.1-1997 subclause | IEEE Std 1012-1998 subclause(s) |
|---|---|---|---|---|
| Project management plan | 5.2.4.3, 5.2.4.4, and 5.2.4.5 | Plan | 6.11 | 5.1 and 7 |
| Software verification report | 6.4 | Report | 6.23 | 7.6 |

## J.3 Document compliance

This clause provides details bearing on a claim that a Software Verification and Validation Plan complying with IEEE Std 1012-1998 would also achieve "document compliance" with the verification plan and the validation plan specified in IEEE/EIA 12207.1-1997. The requirements for document compliance are summarized in two rows of Table 1 of IEEE/EIA 12207.1-1997. Those rows are reproduced in Table J.2. of this supplement.

**Table J.2—Summary of requirements for a Software Verification and Validation Plan excerpted from Table 1 of IEEE/EIA 12207.1-1997**

| Information item | IEEE/EIA 12207.0-1996 subclause | Kind | IEEE/EIA 12207.1-1997 subclause | References |
|---|---|---|---|---|
| Verification plan | 6.4.1.5 | Plan (5.2) | — | IEEE Std 1012-1998<br>IEEE Std 1059-1993 |
| Validation plan | 6.5.1.4 | Plan (5.2) | — | IEEE Std 1012-1998<br>IEEE Std 1059-1993<br>ISO/IEC 9126: 1991<br>ISO/IEC 12119: 1994 |

The requirements for document compliance are discussed in the following subclauses:

— J.3.1. discusses compliance with the generic content guideline (the "kind" of document) noted in column 3 of Table J.2 as a "plan." The generic content guidelines for a "plan" appear in 5.2 of IEEE/EIA 12207.1-1997.
— J.3.2 discusses compliance with the specific content for a verification plan as specified in IEEE/EIA 12207.1-1997.
— J.3.3 discusses compliance with the specific content for a validation plan as specified in IEEE/EIA 12207.1-1997.
— J.3.4 discusses compliance with the life cycle data objectives of Annex H of IEEE/EIA 12207.0-1996 as described in 4.2 of IEEE/EIA 12207.1-1997.

### J.3.1 Compliance with generic content guidelines of IEEE/EIA 12207.1-1997

The generic content guidelines for a "plan" in IEEE/EIA 12207.1-1997 are prescribed by 5.2 of IEEE/EIA 12207.1-1997. A complying plan shall achieve the purpose stated in 5.2.1 and include the information listed in 5.2.2 of IEEE/EIA 12207.1-1997.

The purpose of a plan is:

> IEEE/EIA 12207.1-1997, subclause 5.2.1: Purpose: Define when, how, and by whom specific activities are to be performed, including options and alternatives, as required.

A software verification and validation plan complying with IEEE Std 1012-1998 would achieve the stated purpose.

Any plan complying with IEEE/EIA 12207.1-1997 shall satisfy the generic content requirements provided in 5.2.2 of that standard. Table J.3 of this supplement lists the generic content items and, where appropriate, references the clause of IEEE Std 1012-1998 that requires the same information. The third column of Table J.3 lists information that shall be added in order to comply with the generic content requirements.

 

**Table J.3—Coverage of generic plan requirements by IEEE Std 1012-1998**

| IEEE/EIA 12207.1-1997 generic content | Corresponding subclauses of IEEE Std 1012-1998 | Additions to requirements of IEEE Std 1012-1998 |
|---|---|---|
| a) Date of issue and status | 7.1 Purpose | Date of issue and status shall be provided. |
| b) Scope | 7.1 Purpose | — |
| c) Issuing organization | 7.1 Purpose | Identification of issuing organization shall be provided. |
| d) References | 7.2 Referenced documents | — |
| e) Approval authority | 7.1 Purpose | Identification of approval authority shall be provided. |
| f) Planned activities and tasks | 7.5 V&V processes | — |
| g) Macro references (policies or laws that give rise to the need for this plan) | 7.2 Referenced documents | — |
| h) Micro references (other plans or task descriptions that elaborate details of this plan) | 7.2 Referenced documents | — |
| i) Schedules | 7.4.2 Master schedule | — |
| j) Estimates | 7.4.4 Resource summary | — |
| k) Resources and their allocation | 7.4.4 Resource summary | — |
| l) Responsibilities and authority | 7.4.5 Responsibilities | — |
| m) Risks | 7.6 V&V reporting requirements | — |
| n) Quality control measures[a] | 7.7.4 Control procedures | — |
| o) Cost | 7.5 Verification and validation processes | The costs of verification and validation activities and resources shall be provided or referenced. |
| p) Interfaces among parties involved | 7.4.1 Organization | — |
| q) Environment / infrastructure (including safety needs) | 7.4.6 Tools, techniques, and methods | — |
| r) Training | 7.4.6 Tools, techniques, and methods | — |
| s) Glossary | 7.3 Definitions | — |
| t) Change procedures and history | 7.7.4 Control procedures | — |

[a]This includes quality control of the software verification and validation plan itself.

### J.3.2 Compliance with specific verification plan content requirements of IEEE/EIA 12207.1-1997

IEEE/EIA 12207.1-1997 uses the convention that it builds on the content requirements of IEEE/EIA 12207.0-1996 when they exist. Subclause 6.4.1.5 of IEEE/EIA 12207.0-1996 specifies the considerations for software verification plan contents.

Any verification plan complying with IEEE/EIA 12207.1-1997 shall satisfy the specific content requirements provided in 6.4.1.5 of IEEE/EIA 12207.0-1996. Table J.4 of this supplement lists the specific content items and, where appropriate, references the clause of IEEE Std 1012-1998 that requires the same information. The third column of Table J.4 lists information that shall be added in order to comply with the generic content requirements.

**Table J.4—Coverage of specific verification plan requirements by IEEE Std 1012-1998**

| IEEE/EIA 12207.0-1996 information requirement | Corresponding subclauses of IEEE Std 1012-1998 | Additions to requirements of IEEE Std 1012-1998[a] |
|---|---|---|
| Verification tasks and activities for each life cycle activity | 7.5 Verification and validation processes | — |
| Verification tasks and activities for each software product | 7.5 Verification and validation processes | — |
| Resources for verification | 7.4.4 Resource summary | — |
| Responsibilities for verification | 7.4.5 Responsibilities | — |
| Schedule for verification | 7.4.2 Master schedule | — |
| Procedure for forwarding validation reports to acquirer and other parties | 7.6 V&V reporting requirements | — |

[a]No additional requirements were identified.

### J.3.3 Compliance with specific validation plan content requirements of IEEE/EIA 12207.1-1997

IEEE/EIA 12207.1-1997 uses the convention that it builds on the content requirements of IEEE/EIA 12207.0-1996 when they exist. Subclause 6.5.1.4 of IEEE/EIA 12207.0-1996 specifies the consideration for software validation plan contents.

Any validation plan complying with IEEE/EIA 12207.1-1997 shall satisfy the specific content requirements provided in 6.5.1.4 of IEEE/EIA 12207.0-1996. Table J.5 of this supplement lists the specific content items and, where appropriate, references the clause of IEEE Std 1012-1998 that requires the same information. The third column lists information that shall be added in order to comply with the generic content requirements.

**Table J.5—Coverage of specific validation plan requirements by IEEE Std 1012-1998**

| IEEE/EIA 12207.0-1996 information requirements | Corresponding subclauses of IEEE Std 1012-1998 | Additions to requirements of IEEE Std 1012-1998[a] |
|---|---|---|
| Items subject to validation | 7.1 Purpose | — |
| Validation tasks to be performed | 7.5 Verification and validation processes | — |
| Resources for validation | 7.4.4 Resource summary | — |
| Responsibilities for validation | 7.4.5 Responsibilities | — |
| Schedule for validation | 7.4.2 Master schedule | — |
| Procedure for forwarding validation reports to acquirer and other parties | 7.6 V&V reporting requirements | — |

[a]No additional requirements were identified.

### J.3.4 Compliance with life cycle data objectives

In addition to the content requirements, life cycle data shall be managed in accordance with the objectives provided in Annex H of IEEE/EIA 12207.0-1996.

NOTE—The information items covered by IEEE Std 1012-1998 include plans and provisions for creating software life cycle data related to the basic types ‘test data’ and ‘management data’ in H.4 of IEEE/EIA 12207.0-1996. It provides for the following: (1) test data, such as test strategy and criteria, cases (what to test), procedures (how to carry out tests), test results, and key decision rationale, and (2) management data such as management plans, status reports, management indicators, criteria and key decision rationale, and contract and other procurement information.

## J.4 Conclusion

The analysis documented in this annex suggests that any verification and validation plan complying with IEEE Std 1012-1998 and the additions specified in Table J.3, Table J.4, and Table J.5, also complies with the requirements of a verification and validation plan in IEEE/EIA 12207.1-1997. In addition, to comply with IEEE/EIA 12207.1-1997, any verification and validation plan shall support the life cycle data objectives of Annex H of IEEE/EIA 12207.0-1996.