



TECHNICAL REPORT

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REV. A

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Superseding EIA-649-2

(R) Configuration Management Acquisition Requirements for Aeronautics and Space

RATIONALE

This companion standard to SAE/EIA-649 has been revised to apply to and accommodate the broader aerospace industry requirements and to bring this standard into compliance with SAE/EIA-649C. Revision A is considered an entire rewrite of the standard; therefore, change bar indicators in the margins are not utilized.

FOREWORD

SAE International publishes this standard to provide uniform configuration management (CM) requirements for Aeronautics and Space contracts and agreements, where the Acquirer intends to be consistent with the SAE/EIA-649 principles. It may be used in all phases of the program/project/activity life cycle.

We also acknowledge the SAE CM Standards 649-2 Sub-Committee Project Team and the SAE 3M Committee for their support in developing this companion standard.

INTRODUCTION

This standard provides a consistent and systematic set of requirements that are used for the management of configuration items (CIs) delivered to, or produced by, an "Aeronautics, Astronautics, Spaceflight, and/or Ground Support" contract or agreement that achieves the following:

- Identifies how CM will be implemented to provide consistency among the product requirements, product configuration information, and the product throughout the applicable phases of the project life cycle;
- Identifies the configuration of a product at various phases throughout its life cycle;
- Systematically controls changes to the configuration of the product;
- Maintains the integrity and traceability of the configuration of the item throughout its life cycle; and
- Preserves the information about the product and its configuration.

The requirements in this standard support the closed-loop planning and implementation of a systematic approach to CM as described by the functions and principles of the SAE/EIA-649 standard. The requirements are grouped using five functions:

- CM Planning and Management;
- Configuration Identification;

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<https://www.sae.org/standards/content/EIA649-2A>

Documents

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- c. Change Management (Configuration Control);
- d. Configuration Status Accounting (CSA) (including configuration traceability); and
- e. Configuration Verification and Audits.

Requirements are indicated by the word “shall” and are numbered in each section.

“Shall” is used to indicate a requirement that is binding, which must be implemented, and its implementation verified through performance monitoring processes of the Acquirer.

“Should” is used to indicate the best practice or a goal that is desirable but not mandatory.

“May” is used to indicate permission.

“Will” is used to indicate a statement of fact or declaration of purpose on the part of the Acquirer that is reflective of decisions or realities that exist and are to be taken as a given and not open to debate or discussion.

“Is” or “are” are used to indicate descriptive content.

NOTE: For simplicity, when this document uses the term CI, the requirement or guidance presumes the inclusion of all computer software configuration items (CSCIs) unless otherwise specified. All CSCIs that are selected by the Acquirer are subject to the same criteria, as are hardware elements designated as CIs.

The parent standard to this standard, SAE/EIA-649, contains CM principles listed in this document that are copyright-protected by SAE. The principles contained in this standard are intended to be for reference only. Except as permitted under the applicable laws of the user's country, neither the SAE/ANSI/EIA-principles nor any extract may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, whether electronic, photocopying, recording, or otherwise, without prior written permission being secured; they are intended to be for reference only.

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1. SCOPE

This standard applies to all products and services produced for Aeronautics and Space enterprises and regulatory environments, including those produced by component facilities and technical and service support centers. If applied, this standard must be cited in the CM requirements of Enterprise Planning, Facilities Programs, Projects, and Supplier agreements.

NOTE: The use of the term “agreement(s)” refers to arrangements between the Enterprise (or Acquirer) and its Suppliers and includes contracts and less formal items, such as task agreements.

This standard applies throughout all phases of the program and project life cycle.

CM is about the truth, trust, and traceability of products, data used to produce products, and processes throughout their life cycle and should be applied across the Enterprise at the process and product level. The significant data to which CM is applied includes scientific and engineering data; data that drives mission success; data that ensures IT security; and data used to make technical, programmatic, and business decisions. Proper application of CM is essential for product integrity and overall effectiveness. Acquirers complying with the principles in SAE/EIA-649 can tailor the specific “shall” statements in this standard and incorporate the tailored requirements into agreements to ensure the rigor required for Aeronautics, Space, and Ground Systems as discussed in the sections below.

1.1 Responsibility of Acquirer and Suppliers

1.1.1 Responsibility of Acquirer

The Acquirer establishes and controls the functional and performance requirements of the product, controls the Acquirer/Supplier agreement, and has oversight and agreement compliance monitoring responsibility during product design, development, deployment, operation, upgrade/modification, maintenance, and disposal. The Acquirer defines the CM terminology and how CM is to be applied for agreement(s) through the tailored application of this standard. The Acquirer is responsible for defining the CM requirements and associated data deliverables in contracts (or other agreements) with its Suppliers.

NOTE: The Acquirer is expected to create a set of tailored requirements from this standard that are included as part of internal agreements for enterprises, programs, and projects.

1.1.2 Responsibility of Supplier

The Supplier is responsible for complying with, or requesting that the Acquirer grant relief from, the requirements contained in this standard as tailored by the Acquirer and documented in the agreement. In addition, the Supplier is responsible for ensuring that their Sub-Suppliers also comply with the tailored requirements when needed to assure that the requirements levied by the Acquirer are being met efficiently.

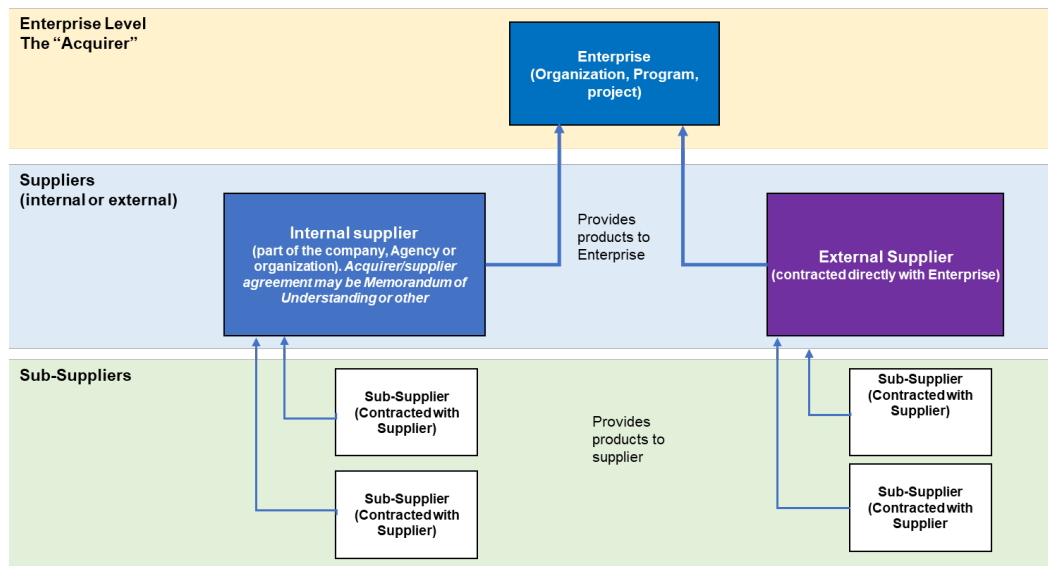


Figure 1 - Acquirer/Supplier levels

1.2 Requirements Approach

1.2.1 Tailoring

Tailoring includes the up-front adaptation of CM practices to accomplish the requirements as appropriate to the type, size, complexity, and risk tolerance of the Acquirer. The requirements of this standard may be applied without tailoring; however, appropriate tailoring is important to the cost-effective, efficient execution of CM activities.

The Acquirer is responsible for tailoring the requirements from this standard to develop and invoke a unique set of CM requirements for each agreement or internal development activity. Factors that influence tailoring include the program's or project's life cycle phase, agreement type and structure, complexity, scope, intended use, risk-tolerance, and criticality for the identified CIs. A specific Compliance Matrix is provided in Appendix D. The Compliance Matrix should be used to indicate which requirements from this standard, whether as written or tailored (if any), are applicable, not applicable, or how compliance will be customized for the Acquirer agreement. The Acquirer should also document the rationale for tailoring. The Compliance Matrix is used in formulating the Acquirer/Supplier agreement.

Acquirer/Supplier agreements often take the form of a contract, which specifies the requirements in a performance work statement (PWS), statement of work (SOW), or an equivalent. These "shall" statements are often paired with data deliverables, which can be known as contract data requirement Lists (CDRLs), supplier data requirements lists (SDRLs), data item descriptions (DIDs), data requirement descriptions (DRDs), or other terms. Each data deliverable should fully describe the required data (design models, analyses, documents, reports, and/or drawings) by defining the product type, purpose (description/use), content, format, delivery schedule, and other specific submission and approval requirements.

Examples of data deliverables are provided in this document. These data deliverables are referred to by a number "DRD-STD-d," where "xxxx" may be two to four characters. Data deliverables should be customized for the Acquirer/Supplier agreement as part of the tailoring process. Data deliverables referenced in this document may be found in Appendix C.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AS9100	Quality Management Systems - Requirements for Aviation, Space, and Defense Organizations
EIA-649C	Configuration Management Standard (referred to in this standard as SAE/EIA-649)
EIA-836	Configuration Management Data Exchange and Interoperability
GEIA-859	Data Management
GEIA-HB-649	Configuration Management Standard Implementation Guide

2.1.2 NAS Publications

Available from Aerospace Industries Association, 1000 Wilson Boulevard, Suite 1700, Arlington, VA 22209-3928, Tel: 703-358-1000, www.aia-aerospace.org.

NAS3500	Technical Data Package: Composition, Communication, and Application
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2.1.3 ASME Publications

Available from ASME, P.O. Box 2900, 22 Law Drive, Fairfield, NJ 07007-2900, Tel: 800-843-2763 (U.S./Canada), 001-800-843-2763 (Mexico), 973-882-1170 (outside North America), www.asme.org.

ASME Y14.24-2020	Types and Applications of Engineering Drawings
ASME Y14.34-2013	Associated Lists
ASME Y14.35-2014	Revision of Engineering Drawings and Associated Documents
ASME Y14.100-2017	Engineering Drawing Practices

2.1.4 IEEE Publications

Available from IEEE Operations Center, 445 and 501 Hoes Lane, Piscataway, NJ 08854-4141, Tel: 732-981-0060, www.ieee.org.

IEEE 828-2012	IEEE Standard for Configuration Management in Systems and Software Engineering
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2.1.5 ISO Publications

Copies of these documents are available online at <https://webstore.ansi.org/>.

ISO 9000:2015	Quality Management Systems - Fundamentals and Vocabulary
ISO 9001:2015	Quality Management Systems - Requirements
ISO 10007:2017	Quality Management Guidelines for Configuration Management
ISO 27002:2022	Information Security, Cybersecurity and Privacy Protection - Information Security Controls

2.1.6 U.S. Government Publications

Copies of these documents are available online at <https://quicksearch.dla.mil>.

MIL-STD-130N	Identification Marking of U.S. Military Property
MIL-STD-1285D	Marking of Electrical and Electronic Parts
MIL-STD-13231	Marking of Electronic Items
MIL-STD-31000B	Technical Data Packages

2.1.7 Other Publications

DRD-STD-AD	Functional Configuration Audit and Physical Configuration Audit (FCA/PCA) Documentation (AD)
DRD-STD-CR	Change Request (CR)
DRD-STD-CDMP	Configuration and Data Management Plan (CDMP)
DRD-STD-CDMPA	Configuration and Data Management Process Audit (CDMPA)
DRD-STD-CSA	Configuration Status Accounting (CSA)
DRD-STD-EDAL	Engineering Drawings and Associated Lists
DRD-STD-MINC	Modification Kit Instructions (MI's) and Installation Notification
DRD-STD-SDT	Specification and Drawing Trees (SDT)
DRD-STD-VDD	Version Description Document (VDD)
DRD-STD-VR	Variance Request (VR)
ECSS-M-ST-40C	Space project management - Configuration and information management

2.2 Related Publications

The following publications are provided for information purposes only and are not a required part of this SAE Technical Report.

2.2.1 ISO Publications

Copies of these documents are available online at <https://webstore.ansi.org/>.

ISO 11892:2012	Space Systems - Subsystems/Units to Spacecraft Interface Control Document
ISO 17401:2023	Space Systems - Spacecraft Interface Requirements Document for Launch Vehicle Services
ISO 17689:2015	Space Systems - Interface Control Documents Between Ground Systems, Ground Support Equipment and Launch Vehicle with Payload

2.2.2 NASA Publications

Available from NASA Technical Services, NASA STI Program STI Support Services, Mail Stop 148, NASA Langley Research Center, Hampton, VA 23681-2199, Tel: 757-864-9658, Fax: 757-864-6500, <http://ntrs.nasa.gov/>.

NASA-HDBK-1004 NASA Digital Engineering Acquisition Framework Handbook

NASA/SP-2016-6105 NASA Systems Engineering Handbook

2.2.3 Other Publications

DI-IPSC-81434A Interface Requirements Specification (IRS)

DI-IPSC-81436A Interface Design Description (IDD)

DI-SESS-81121A Baseline Description Document

DI-SESS-81248B Interface Control Document (ICD)

DI-SESS-81253E Configuration Status Accounting (CSA) Information

DI-SESS-81876 Interface Control Document (ICD). Cancelled and superseded by DI-SESS-81248B but still of valuable guidance

DI-SESS-82019 Product Baseline Index (PBLI)

ECSS-E-ST-10-24C Annex AInterface Requirements Document (IRD)

ECSS-E-ST-10-24C Annex BInterface Control Document (ICD)

ECSS-E-ST-10-24C Annex CInterface Definition Document (IDD) or Single-end Interface Control Document

ECSS-E-ST-10-24C Annex DInterface Identification Document (IID)

3. GENERAL CONFIGURATION MANAGEMENT REQUIREMENTS

3.1 Configuration Management Application

SAE/EIA-649 Principle CM-1: CM implementation requires a balanced and continuous application of CM functions and their underlying principles throughout the product life cycle.

SAE/EIA-649 Principle CMP-1: The foundation for CM planning, which delineates the specific CM application methods and their levels of emphasis, is an understanding of the context and environment of the product to which the CM process is to be applied.

3.1.1 Approach to the Application of Enterprise CM

The Enterprise should design an approach to CM ensuring effective CM of its products, data about the products, and processes used to produce those products addressing all stakeholders and Suppliers. The Enterprise should ensure CM is applied internally and allocated appropriately to Suppliers through Acquirer/Supplier agreement(s), which should include: (1) the transfer of ownership of the data delivered by the Supplier and (2) capabilities procured as a service from Suppliers. GEIA-HB-649 provides additional “how to” guidance for planning, managing, and implementing CM functions and principles.

The following steps should be applied when determining how to best apply CM, and the information should be included in the configuration management plan (CMP):

- a. Identify items to which CM is to be applied.
 1. Consider the organizational context in which CM is being applied. The context includes the scope and boundaries of the Enterprise, Program, or project; organizational boundaries; and interfaces with customer, stakeholder, and Supplier organizations. Identify how information and decisional items flow through the organizations (including to and from Suppliers) and which items should have CM principles applied to them.
 2. Consider the systems being developed, produced, and/or maintained and sustained by the organization and the environment in which the system must operate. Identify system internal and external interfaces and the data, interfaces, and system components to which CM is to be applied.
- b. Identify the reasons and desired outcomes for application of CM to the identified items.
- c. Establish standard process(es) at the onset of the program for applying an appropriate level of CM to the identified items using the five CM functions.
- d. Identify required organizational training on CM processes, tools, and data for inclusion in the CM planning and management section of the CMP. Training should include training for CM personnel, other internal stakeholders, and external organizations (e.g., Suppliers, Quality Engineering, Systems Engineering, and customers).
- e. Develop a strategy for communicating CM-related processes, decisions, and other information both internally and with external customers and stakeholders.
- f. Identify a common CSA system/configuration management data base (CMDB) to be shared between CM sectors, assuring CSA/CMDB interfaces are compatible with other systems used by the organization. For example, spacecraft engine CM tool can interface with launch vehicle CM tool. Ensure that the selected CSA/CMDB system supports the metrics required for process improvement and the system permissions can be configured to properly revision control artifacts.
- g. Identify and develop an approach for achieving configuration verification and audit to ensure the CM system (process, personnel, and tools) meets the Acquirer and Supplier CM requirements and the CM system functions effectively, and Product Configuration Audits verify a product's compliance with the physical, functional, and interface requirements defined in approved product definition information.
- h. Identify the resources (people, tools, training, facilities, and funding) required to develop and maintain an appropriate level of CM across the life cycle of the CI.
- i. Identify and develop any internal or external agreements required to support the consistent execution of CM processes.
- j. Identify roles and responsibilities for internal and external stakeholders, Enterprise, Acquirer, and Supplier(s).

NOTE: Refer to SAE/EIA-649, 5.1.8, for a discussion of the goals of the Enterprise (Acquirer) when utilizing Suppliers.

3.1.1.1 Approach to the Application of Acquirer CM

The Acquirer should plan for and apply a defined, systematic approach for CM covering the life cycle phases, tailored appropriately for the applicable CI(s), their scope and complexity, and the organizational environment in which the CM processes are to be performed.

The following CM functions should be incorporated into and applied consistently across the Acquirer's organization, as required, to implement comprehensive CM throughout all life cycle phases:

- Configuration Management Planning and Management (see 3.1.2).
- Configuration Identification (see 3.2).
- Configuration Change Management (see 3.3).
- Configuration Status Accounting (see 3.4).
- Configuration Verification and Audit (see 3.5).

3.1.1.2 Approach to the Application of Supplier CM

- a. The Supplier's internal CM system shall be tailored appropriately to the Acquirer's requirements and the identified CIs based on consideration of the following factors:
 1. The complexity and nature of the product or the selected CIs.
 2. The information and resource needs of the applicable life cycle phases.
 3. The relevant organizations that may be involved, within and outside of the Supplier's own organization, including any enabling support organizations (e.g., Logistics, QA, Sustaining Engineering).
 4. The interfaces between organizations and activities involved in the Supplier's CM system.
 5. The responsible authority assigned to verify implementation of the Supplier's CM system.
 6. Change Control Boards and other groups, within and external to the Supplier's organization, assigned dispositioning responsibilities for proposed changes and variances and authority over the product's configuration through the CI life cycle.
- b. The Supplier shall comply with the CM requirements contained in this standard as tailored by the applicable agreement requirements.
- c. The Supplier shall require all relevant Sub-Suppliers to comply with the same CM requirements that are being imposed on the Supplier and that are suitably tailored to their assigned CM role and responsibilities.
- d. The Supplier shall comply with and support the Acquirer's requests to audit the Supplier's implemented CM system as required to verify conformance with agreement requirements.

3.1.2 Configuration Management Planning and Management

SAE/EIA-649 Principle CMP-2: CM planning documents how the organization will implement CM throughout the applicable phases of the product life cycle to provide consistency among the product requirements, product configuration information, and the product.
SAE/EIA-649 Principle CMP-3: To implement planned CM functions, resources are identified and applied and responsibilities to perform CM activities are assigned.
SAE/EIA-649 Principle CMP-4: The establishment and maintenance of CM performance and status measurements are necessary for all products where compliance with the CM planning and continuous improvement is critical.
SAE/EIA-649 Principle CMP-5: CM procedures document how each CM function is implemented to accomplish the intent of the CM planning.
SAE/EIA-649 Principle CMP-6: Provide CM training to assure that individuals understand their responsibility, authority, accountability, and the procedures for performing CM.
SAE/EIA-649 Principle CMP-7: Periodic assessment of the effectiveness of CM procedures and tools and of compliance with the CM plan maintains the health of the CM process.
SAE/EIA-649 Principle CMP-8: Performing CM includes responsibility for the CM performance of the supply chain.
SAE/EIA-649 Principle CMP-9: Information processes, including collection and processing, controlling status, providing interoperability and exchange, and long-term preservation, are essential elements of effective CM planning and management.

NOTE: The Acquirer may specify requirements for the delivery of CM data product(s) that derive from meeting the requirements of this section.

CM planning and management identifies how the Supplier will implement CM to provide consistency among the product requirements, product configuration information, and the product throughout the applicable phases of the project life cycle. The CMP, or equivalent planning document, being developed reflects the Supplier's planned application of the CM principles and practices to the Acquirer's identified product context and environment.

3.1.2.1 CM Plan

- a. The Acquirer shall develop a CMP, or equivalent CM planning product, which defines how the CM functions will be implemented in accordance with CM planning principles described in SAE/EIA-649, documented organizational policies, and procedures.

3.1.2.2 General Requirements

- a. The Acquirer shall perform CM planning in accordance with the principles in SAE/EIA-649.
- b. The Acquirer shall ensure that their CMP and any related processes and procedures are maintained in a "current" status and updated at milestones and periodic reviews.

CM Requirements for Suppliers:

- c. The Supplier shall conduct CM planning as required and develop a CMP, or equivalent planning document, for the product in accordance with the requirements defined in this standard, as tailored by the agreement.
- d. The Supplier shall develop a CMP, or equivalent CM planning product, which is appropriately tailored for the scope, magnitude, and complexity of the selected CI(s) and for the organizational environment in which the CM processes are to be applied, the documented organizational policies and procedures, the SOW, or applicable agreement.
- e. The Supplier's CMP, or equivalent CM planning product, shall describe the processes, methods, forms, and procedures to be used for management of the functional, allocated, and physical characteristics of the CIs and for executing each of the functions described in 3.6.
- f. The Supplier shall submit a completed CMP, or equivalent CM planning product, and subsequent changes thereto to the Acquirer for review and approval within the timeframe(s) stated in the agreement.

- g. The Supplier shall maintain their CMP, or equivalent CM planning product, in a “current” status throughout the life of the agreement, updated at milestones or intervals specified in the agreement, and resubmitted for approval when required in accordance with agreement requirements.
- h. The Supplier’s CMP shall describe the processes for submitting change and variance requests, submittal requirements, and approval authority.

3.2 Configuration Identification

SAE/EIA-649 Principle CI-1: Configuration Identification is the basis from which the configuration of products is defined and verified; products and their product configuration information are labeled; changes are managed; and traceability is maintained throughout the product’s life cycle.
SAE/EIA-649 Principle CI-2: Product configuration information serves as the basis for development, production, operation, and maintenance/support of the product.
SAE/EIA-649 Principle CI-3: Enterprise identifiers designating the responsible designer, manufacturer, or preparer provide uniqueness to the identifiers of products and product configuration information.
SAE/EIA-649 Principle CI-4: Product identifiers are assigned so that one product can be distinguished from other products; one configuration of a product can be distinguished from another; and the correct corresponding product information can be retrieved.
SAE/EIA-649 Principle CI-5: Individual units of a product are assigned a unique product unit identifier when there is a need to distinguish one unit of the product from another.
SAE/EIA-649 Principle CI-6: When a product is modified, it retains its original product unit identifier, even though its part identifying number is altered to reflect a new configuration.
SAE/EIA-649 Principle CI-7: A series of like units of a product is assigned a unique product group identifier when it is unnecessary or impractical to identify individual units but necessary to correlate units to a process, date, event, or test.
SAE/EIA-649 Principle CI-8: Product configuration information is uniquely identified so it can be referred to precisely and made accessible.
SAE/EIA-649 Principle CI-9: Establishing product structure to organize product configuration information provides efficient application of the information over its life cycle.
SAE/EIA-649 Principle CI-10: Product release provides the appropriate process(es) and evidence necessary to validate the integrity of the product for its intended use.
SAE/EIA-649 Principle CI-11: A configuration baseline is established by agreeing to the definition of the attributes of a product at a point in time and identifies a known configuration to which changes are addressed.
SAE/EIA-649 Principle CI-12: A baseline for any product or any document, plus the approved changes, is the current approved configuration.
SAE/EIA-649 Principle CI-13: Interfaces between products are managed by mutually agreeing to defined common product attributes, making them part of the product configuration baselines for each product, and applying a process to maintain interface integrity.
SAE/EIA-649 Principle CI-14: CIs are designated where distinct control is appropriate.

NOTE: The Acquirer may cite DRD-STD-SDT, DRD-STD-EDAL, and DRD-STD-VDD (refer to sample data deliverables in Appendix C for specifying the delivery of CM data product(s) that derives from meeting the requirements of this section).

Configuration Identification provides the basis from which the configuration of products or services is defined and verified; products or services and their product configuration information are labeled; changes are managed; and traceability is maintained. Configuration Identification is an iterative process conducted throughout the product life cycle. Activities associated with the Configuration Identification function typically include the selection of CIs (hardware, software, models, or other information sets); the assignment and application of unique identifiers to a product, its components, and associated configuration information; and the maintenance, release, and preservation of both the unique identifiers and the metadata defining the interrelationships that exist among the product configuration information and baseline elements as revisions occur.

The purpose of the Configuration Identification function is to incrementally establish and maintain a definitive basis for configuration control and status accounting for each CI and its associated configuration information as the product evolves throughout all applicable life cycle phases.

a. The Configuration Identification function shall result in:

1. Traceable configurations realized through unique identification of products and product configuration information.
2. Organized composition of the product and associated information (product structure).
3. Verified and released product configuration information.
4. Defined, documented, and baselined product configurations.
5. Managed interfaces between products.
6. CIs where CM governance and control is designated.
7. Consistency between a product and the information about the product over the product's entire life cycle.
8. Parts traceability to the extent required.

The top-level product requirements defined by the Acquirer in a requirements document(s) and/or in performance and interface specifications for acquisitions are utilized by the development organization (e.g., in-house project, Supplier, Sub-Supplier) to create internal design release baselines. When Supplier-delivered design release baselines are approved by the Acquirer through the Acquirer's incremental baselining process or through formal configuration audits, these design release baselines become the formal configuration baselines that are maintained and controlled throughout the product/system life cycle.

- b. The Acquirer shall define how they will perform Configuration Identification and related processes and procedures in their CM plan, or equivalent planning product.
- c. The Acquirer shall document in their CM plan, or equivalent planning product, how Enterprise Configuration Identification interacts with Supplier Configuration Identification, the data to be exchanged with Suppliers, and any approvals required for Supplier Configuration Identifiers.
- d. The Acquirer shall define and document in Acquirer/Supplier agreement(s) any Configuration Identification requirements and tasks allocated to Suppliers.

3.2.1 General Requirements

- a. The Supplier shall implement and execute Configuration Identification activities in accordance with Supplier-defined organizational policies and procedures and the requirements of this standard, as tailored in the agreement.
- b. The Supplier's Configuration Identification procedures and forms referenced in the Supplier's CMP, or equivalent planning document, shall be made available to the Acquirer upon request.

3.2.2 Configuration Item Selection

- a. The Supplier shall select and submit candidate CIs and CSCIs to the Acquirer for review and final selection concurrence.
- b. The Supplier shall identify as a CI any item that satisfies a system end-use function and requires separate CM, because the item either meets or impacts one or more of the following criteria:
 1. The item is critical to the functioning or performance of the product or service, or its failure would have significant performance or operational impact.
 2. The item's failure might result in serious injury, loss of life, or loss of primary product capability.
 3. The item either incorporates or relies on technology that is considered to be complex, high-risk, high-cost, or critical to achieving the Acquirer's performance, operational, or supportability goals.
 4. The item requires integrated logistics or other specialized support (e.g., maintenance or special test equipment).
 5. The item has been designated for separate procurement by the Acquirer.
 6. The item requires the application of specific or unique designations, versions, and/or numbering and naming schemes.
 7. The item interfaces with other systems and/or Acquirer or Sub-Supplier furnished items or is susceptible to change.
 8. There are applicable laws, regulations, or standards that require certification of the item, and the certification relies on the item being configuration controlled (e.g., pressure vessel systems that must be tested at regular intervals).

NOTE: Unless otherwise specified in the agreement or contract, the final selection of CIs is made by the Acquirer.

- c. The Supplier shall describe and graphically depict the structure and hierarchy of each candidate CI in a manner that illustrates the interrelationships of its component parts and associated configuration information.
- d. The candidate CIs and these graphical illustrations shall be submitted as a part of the Supplier's CMP, or equivalent planning document.
 1. CI and CSCI determinations are made as the product requirements are analyzed and decomposed to form an initial product structure.

NOTE: Acceptable methods for depicting this hierarchical structure include, but are not limited to, specification trees, product structure diagrams, functional block diagrams, and system architecture models.

- e. The Supplier shall determine the appropriate configuration control and approval authority for each CI and the requirements for submitting the CIs and their referenced information for review and approval.

3.2.3 Configuration Baselines and their Configuration Information

CM normally employs three types of formal configuration baselines: functional, allocated, and product. These provide for the progressive definition of the requirements and design information describing the various CIs designated for a product or service. The Supplier also establishes and maintains an internal development baseline known as the design release baseline to control the developing product design as it evolves from the allocated baseline (ABL) into the build-to product baseline (PBL).

The Configuration Identification is developed and maintained in three separate evolutions, as follows:

- Development of the functional baseline (FBL)
- Development of the ABL
- Development of the PBL

These provide for the progressive definition and documentation of the requirements and design information describing the various CIs and CSCIs designated for a product.

Upon Acquirer approval and Supplier implementation of the configuration information, each of the formal baselines will be established in successive order. At any time, the current or real-time configuration information will be composed of the last Acquirer-approved baseline and subsequent approved changes.

- a. The Acquirer shall, in collaboration with Suppliers, define their policy and processes related to configuration baselines, including the contents of these baselines and the approval authority for FBL, ABL, and PBL.
- b. Acquirer (Enterprise) baseline management shall comply with the principles in SAE/EIA-649.
- c. The Supplier shall recommend to the Acquirer the types and formats of configuration information that are required to define each CI's performance, functional and physical attributes, and internal and external interfaces.

NOTE: Typically, this recommendation is included within or submitted with the Supplier's initial CMP, or equivalent planning document.

- d. The Supplier shall:
 1. Generate the product definition information that defines the configuration baselines being established by the Acquirer, as tailored in the agreement.
 2. Establish and maintain each succeeding baseline so that it is traceable to, and is a detailed extension of, its predecessor(s).
 3. Reflect accurate product definition information in all applicable testing, manufacturing, operational, troubleshooting, and sustainment information.
 4. Uniquely identify and place each item of configuration and its related technical information under configuration control within established CM repositories or libraries in accordance with agreement requirements.

3.2.3.1 Functional Configuration Information

The functional configuration information (FCI) generally is documented in the form of a system specification and referenced information (e.g., Interface Requirements Specifications) that describe a product's or service's performance requirements (functional, interoperability, and interface characteristics).

Unless otherwise stipulated in the agreement, the FBL is developed and controlled by the Acquirer.

NOTE 1: Once an FBL is established, a formal change process is required to modify the FBL (e.g., ECP or contract change proposal).

NOTE 2: In certain situations, the Supplier may be responsible for creating all or a portion of the configuration information required for defining the product's FBL. When responsibility for developing the functional configuration baseline is assigned to the Supplier, the requirements that follow should be included in the agreement.

- a. The Supplier shall generate the information required for the FBL for each CI by:
 1. Describing the CI's functional, performance, interoperability, and interface requirements.
 2. Describing the verifications required to demonstrate achievement of those requirements.
 3. Identifying the configuration information for key lower-level CIs and selected items that are to be integrated or interfaced with the CI.
 4. Describing the format, software, firmware, and the operating environment, including patch versions for all, that were used to author the above requirements.
 5. Describing any design or operational constraints with rationale for each.

3.2.3.2 Allocated Configuration Information

NOTE: The allocated configuration information (ACI) defines the requirements allocated from the FCI or from a higher-level CI to lower-level CIs. The ACI for each CI is captured in the form of a product requirements specification, other referenced information (e.g., Interface Requirements Specifications, interface control documents [ICDs]), and hardware/software requirements specifications for lower-level CIs.

- a. The Supplier shall generate the information required for the ABL for each CI by:
 1. Describing its physical, functional, environmental, performance, interoperability, and interface requirements that are allocated from a product or system requirement or are allocated from a higher-level CI to a lower-level CI.
 2. Describing the verifications required to demonstrate achievement of the allocated functional requirements.
 3. Describing specialized software, if any, and the operating environment that was used to author the information described in the above requirements.
 4. Describing any additional design constraints.

3.2.3.3 Product Configuration Information

The product configuration information (PCI) prescribes all necessary physical characteristics of a CI, the selected functional and performance characteristics designated for product qualification/acceptance testing, and the product qualification/acceptance test requirements. The Acquirer typically specifies the required detail content and format for the delivery of the PCI in the contract/agreement.

- a. The Supplier shall generate the information required for the PBL for each CI by:
 1. Describing the CI's detailed design, including the necessary physical characteristics (form, fit, interface) and functional/performance requirements of the CI and their verifications.
- b. The Supplier shall identify and document commercial-off-the-shelf (COTS) hardware or software used in the detailed design by:
 1. Describing the selected functional and performance characteristics designated for qualification, acceptance testing, and production testing.
 2. Identifying and documenting either the provisions and specifications for the design of any special follow-on items or activities required for the acquisition, development, installation, operation, maintenance, disposal/retirement, and logistical support phases of the product/system life cycle.
 3. Including any inspection provisions required to accept delivery of the CI (i.e., first article inspection or acceptance inspection).

4. Including any unique process specifications that are required to manufacture, operate, maintain, or calibrate CIs contained in the design.
5. Describing the specialized software, if any, and the operating environment that was used to author the detailed design.
6. Including technical data that provides instructions for the installation, operation, maintenance, disposal/retirement, training, and support of a product and any associated installation, operation, maintenance, and disposal/retirement equipment.

3.2.3.4 Supplier-Developed Items (Supplier Design Release Baseline)

- a. The Supplier shall implement and control the evolving design release configuration for each item and its associated product definition information and the repositories and libraries containing the items' design information.
- b. Preparation, identification, review, and release of specifications, engineering models, and drawings shall be in accordance with the process defined within the Supplier's approved CMP, or equivalent planning document, and all applicable agreement requirements.
- c. The Supplier shall describe all problems to the information comprising the design release configuration and to non-design release products being maintained under internal configuration control in accordance with the corrective action process defined in the Supplier's approved CMP, or equivalent planning document.
- d. The Supplier shall track changes to the information comprising the design release configuration and to non-design release products being maintained under internal configuration control in accordance with the corrective action process defined in the Supplier's approved CMP, or equivalent planning document.

3.2.3.5 Privately Developed Items

Privately developed items are those which are developed and funded independent of the project.

- a. The Supplier shall document the PBL of a privately developed item by including the applicable design disclosure and/or form, fit, and function/performance information and any inspection provisions required to accept delivery of the item.

NOTE: Typically, the Acquirer obtains privately developed items under control of a procurement specification kind of document when system adaptation of existing design is required or off-the-shelf (broadly available for acquisition).

- b. If system adaptation of a privately developed item becomes necessary, the item shall be re-identified as an Acquirer-specified item and thereafter documented and controlled under applicable data requirements of the agreement or contract.

NOTE: If alteration of a privately developed and produced or standardized item is desired, it may be documented by use of an altered item drawing in accordance with ASME Y14.24 or similar document.

3.2.3.6 Approval and Release of Product Configuration Information for Configuration Baselines

- a. The Supplier shall generate the required product configuration information, models, drawings, related engineering, and operational data needed for each of the configuration baselines being established.
- b. The Supplier shall submit the proposed product configuration information to the identified approval authority for review and approval in accordance with the processes defined in the Supplier's approved CMP.

Upon Acquirer approval, the applicable baseline will be formally established and authorized for release by the Supplier for implementation.

3.2.3.7 Maintenance of Product Configuration Information

- a. Once the Acquirer has established a formal baseline for each CI, the Supplier shall manage and update each CI's baseline in accordance with the Configuration Change Management process defined in 3.3.
- b. The Supplier shall incorporate any approved changes to the baseline in accordance with the defined configuration change and release processes along with the timeframe requirements specified in the applicable agreement.
- c. Any new revision to the PCI shall provide traceability by detailing conditions before and after the change is incorporated.
- d. The change, when approved, shall serve as the revision authority.
- e. The Supplier shall associate change approval records with each revision to PCI and provide this data to the Acquirer per the agreement.

3.2.4 Configuration Identifiers

3.2.4.1 General Requirements

- a. The Acquirer shall assign, as required, unique identifiers and naming schemes to each CI and CSCI, its components, and associated product configuration information, to include revision and version numbers where appropriate or required, across the Enterprise and throughout the product life cycle in accordance with the principles in SAE/EIA-649.
- b. The Supplier shall use Acquirer-assigned identifiers as specified in Acquirer CI and CSCI requirements.

NOTE: Acquirers should only include necessary identifier requirements in the Acquirer/Supplier agreement because there is a potential to drive significant cost.

- c. The Supplier shall assign to each CI and CSCI (including both derived CIs/CSCIs and those specified by the Supplier), its components, or for Acquirer CIs/CSCIs without specified identifiers.
 1. Unique identifier
 2. Naming scheme
 3. Associated PCI
 - i. Revision indicator (where appropriate)
 - ii. Version indicator (where appropriate)
- d. The Supplier shall obtain Acquirer approval of the type of designation and naming scheme (nomenclature) being proposed for each CI that the Acquirer has designated to the Supplier for configuration control.

3.2.4.2 Design Activity Identification (DAI)

Multiple schemes exist for identifying organizations that perform design and manufacturing activity. The assignment of an activity identifier is recognized through common government practices. The format of unique identification constructs is desired to ensure consistent application across organizations.

- a. Suppliers and manufacturers shall identify their unique enterprise identifier (EID) such as a registered or government-assigned commercial and government entity (CAGE) code, NATO CAGE (NCAGE) code, data universal numbering system (D-U-N-S) number, system for aware management, trademark, or other recognized and equivalent system of unique identification approved by the Acquirer.
- b. The EID may also be used to identify a design activity or a manufacturing activity. Suppliers and manufacturers shall identify the design activity or manufacturing activity as required by regulation and as approved by the Acquirer.

- c. The Supplier shall establish a process with Acquirer concurrence for transfer of design activity (if needed) from original design activity to current design activity per ASME Y14.100.
- d. The DAI shall precede the part identifying numbers (PINs) of all CIs, associated subordinate traceable parts, and assemblies, and be entered on associated PCI and any data products, including software media, as required by the applicable agreements and standards.

Procedures of MIL-STD-130 relative to DAI application are recommended for implementation as applicable.

3.2.4.3 Document Identifiers

- a. Identification formats are applied to defined content such as documents, drawings, models, or files; generically referred to as documents. If any changes are made to the Supplier's specified numbering and identification formats, the Supplier shall notify the Acquirer in writing with a description and breakdown of the new format.
- b. The Supplier shall assign and apply a unique, non-repetitive document identifier to all documents including, but not limited to, specifications, requirements, engineering drawings, model-based designs, associated lists, ancillary documents, ICDs, other technical information, and to all subsequent revisions of these documents.
- c. A unique document identifier, in conjunction with the DAI, shall be used to uniquely identify each document and to maintain traceability when design ownership is transferred (refer to ASME Y14.100).

3.2.4.4 Product Identification

- a. The Supplier shall assign unique identifiers to all CIs, their sets, groups, units, assemblies, subassemblies, parts, or other items by marking as described in the sections that follow.

3.2.4.4.1 Part or Identifying Number (PIN)

- a. The Supplier shall assign a discrete PIN to each CI and its subordinate parts and assemblies in accordance with ASME Y14.100.
- b. The PIN shall be the same as, or based on, the controlling drawing/model number and, in conjunction with the DAI, uniquely identify a part or item from all dissimilar products or CIs.
- c. The Supplier shall assign a new PIN in accordance with the requirements of ASME Y14.100.
- d. The Supplier shall assign a new PIN when the product is an altered, selected, vendor control, or source control item as defined in ASME Y14.24, and the re-identified item has different usage limitations or constraints (e.g., due to safety or other considerations) and is no longer interchangeable with the product it replaces in all applications.
- e. When required by the Acquirer, UID procedures for item identification shall implement DoDI 8320.03/04 (MIL-STD-130) or ATA Spec2000 as applicable.

NOTE: The identification requirement of MIL-STD-130 alone is not sufficient to apply to electrical, electronic, and electromechanical (EEE) parts, such as microcircuits, transistors, relays, capacitors, etc., because of the risk of doing irreparable damage. In this case, MIL-STD-1285, MIL-STD-13231 (cancelled), or other applicable standards need to be used.

3.2.4.4.2 Type, Model, or Series Identifiers

- a. The Acquirer shall assign type, model, or series designators to the system and its major constituents.
- b. When required by the Acquirer, the Supplier shall apply a type, model, or series designator to uniquely identify a family of like units of a CI that individually satisfy a functional, performance, interface, or logistics requirement.

- c. PCI for an approved type, model, or series with its subsystem(s), assemblies, and parts shall be separated from each version of type, model, or series in order to define configuration baselines for each version; and to prevent lower-level changes from being unintentionally incorporated retroactively into older versions or into new versions under development.
- d. For electronic design systems (e.g., computer aided design [CAD], product life cycle management [PLM]) defining PCI, unique identification assigned within a PLM system shall enable tracing of parts and assemblies to associated types, models, or series.
- e. When an electronic design system is utilized, the Supplier shall define a product structure that meets the requirements of the Acquirer.

3.2.4.4.3 Serial and Lot Identifier

- a. The Supplier shall assign serial and/or lot (or batch) identifiers, as required for proper identification and control of CIs, critical components, parts, and other groups of items, when there is a need to do one or more of the following:
 - 1. Distinguish one unit of a product from another.
 - 2. Identify the source of a product.
 - 3. Uniquely identify a group of items produced under similar conditions from all other groups/lots.
- b. Use of Serial Identifiers - The Supplier shall assign serial numbers (S/Ns) to all completed units of a CI and to critical parts and components when traceability is required or when identified by the Acquirer for serialization and marking.
- c. When serialization is required, S/Ns shall be permanently assigned in a sequential, non-duplicating order for a particular part.
- d. The S/N shall not be changed even when the component, assembly, or part has been identified by a new part number.
- e. The originally assigned S/N shall not be changed even though the part or assembly has been re-identified by a new part number due to modification. Affixing modifier indicators to the original S/N is a recommended means to prevent conflict with the same S/N assigned to a redesigned (interchangeable with the modified) item at a later point in life cycle.
- f. Once assigned, S/Ns shall not be reused for a particular PIN.
- g. The S/N shall be applied to the part in accordance with ASME Y14.100 and other specified agreements and standards and be recorded on all appropriate manufacturing and configuration accounting records.
- h. The Supplier shall record and maintain S/Ns assigned by Sub-Suppliers and applicable Sub-Suppliers.
- i. When required, the Supplier shall develop and maintain a utilization record that cross-references the item, component, or part serial and/or lot number to the next higher assembly to ensure traceability of serial and lot numbers incorporated into next higher assemblies.
- j. Use of Lot (or Batch) Numbers - The Supplier shall assign lot numbers to non-serialized items when a need exists to correlate:
 - 1. Items that have been fabricated from a particular batch of material.
 - 2. Items that have undergone a particular process.
 - 3. Items that have been manufactured or tested in a group with each item in the group having an identical history.

3.2.5 Product Interface Information

First interface requirements will be identified in the top product definition information such as a System Specification. These are initial interface requirements for external interfaces (e.g., other space vehicles, payloads, or launch facilities).

The next step for defining interface requirements will take place at the system requirements allocation. There, both system external interface requirements will be refined, and the system internal interface requirements will be established. At the preliminary design review (PDR) or similar, these interface requirements will be approved and are the basis for preliminary design.

In order to accomplish Interface Management as described in 3.7, product interface characteristics need to be recorded in a controllable manner. Such records relate, but are not limited to:

- Physical interfaces (including material compatibility: e.g., chemical, coefficient of thermal expansion)
- Functional interfaces (including performance interfaces)
- Electrical interfaces
- Electronic interfaces (including signal interfaces)
- Fluid and gas system interfaces
- Optical interfaces
- Operational sequence interfaces
- Operational flight program interfaces
- Software interfaces
- Environmental interfaces
- Logical interfaces (i.e., cyber/communications)

Product interface information is not considered standalone product definition information but ancillary product definition information for enabling an affordable correlation of interfacing product elements. This can be compared with schematic diagrams, which do not define the product but are an aid in understanding.

One may say that a threaded bolt is interfacing with a corresponding nut, but no extra interface information is required for control of these pairing items. This is not necessarily correct, as both the bolt and the nut standard refer to the applicable thread standard, which establishes the tolerances for a certain thread size and thread class. Thus, the thread standard is the product interface information, which is to be used for product inspection.

In general, product interface information can be included in the product definition information with appropriate markers identifying the individual characteristic as to be interface relevant. When doing so, the interface information of the interconnected item needs to be recorded in the same fashion. In this case, both product definition information needs to address the interfacing product in order to provide unambiguous information for interface management.

Another style of product interface information is to create a separate record(s) for describing/listing the interfacing characteristics of either product side. Such procedure requires not only correlation of the interface characteristics but also correlation of the separate interface information with the governing product information.

Experience has shown that product interface information created for development, naturally separate from final product definition information not existing at that project phase, is very often not further maintained after the product baseline is established. An example is product evolution that affects interface information that may still be used by Interface Management. To avoid information mismatch, appropriate engineering/CM procedures need to be in place.

In many projects/programs, a top ICD is used for recording and controlling all product interface information, such as ICDs issued for a project/program. Such a top ICD will be usually under surveillance of the interface control working group (ICWG) when established.

3.2.5.1 Available Guidance for Establishing Product Interface Information

The following standardization documents could be of help in establishing product interface information.

International Organization for Standardization (ISO)

ISO 11892:2012	Space systems - Subsystems/units to spacecraft interface control document
ISO 17689:2015	Space systems - Interface Control Documents between ground systems, ground support equipment and launch vehicle with payload
ISO 17401:2023	Space systems - Spacecraft interface requirements document for launch vehicle services

American Society of Mechanical Engineers (ASME)

ASME Y14.24-2020	Types and Applications of Engineering Drawings (11 Interface Drawings)
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National Aeronautics and Space Administration (NASA)

NASA-HDBK-1004	NASA Digital Engineering Acquisition Framework Handbook
NASA/SP-2016-6105 Rev 2	NASA Systems Engineering Handbook

Interface documentation requirements including the Interface Requirements Document (IRD), Interface Control Document/Drawing (ICD), and Interface Definition Document (IDD) taken from NASA Systems Engineering Handbook

European Cooperation for Space Standardization (ECSS)

ECSS-E-ST-10-24C	Annex A Interface Requirements Document (IRD)
ECSS-E-ST-10-24C	Annex B Interface Control Document (ICD)
ECSS-E-ST-10-24C	Annex C Interface Definition Document (IDD) or Single-end Interface Control Document
ECSS-E-ST-10-24C	Annex D Interface Identification Document (IID)

U.S. Department of Defense Data Item Descriptions

DI-SESS-81248B	Interface Control Document (ICD)
DI-IPSC-81434A	Interface Requirements Specification (IRS)
DI-IPSC-81436A	Interface Design Description (IDD)
DI-SESS-81876	Interface Control Document (ICD). Cancelled and superseded by DI-SESS-81248B but still of valuable guidance.

3.3 Configuration Change Management

SAE/EIA-649 Principle CCM-1: Changes to an approved configuration are accomplished using a systematic, measurable change process.
SAE/EIA-649 Principle CCM-2: Justifying the need for a change provides the rationale to commit resources required to document, process, and, if approved, implement the change.
SAE/EIA-649 Principle CCM-3: A unique change identifier enables tracking of the request for change and the status of implementation and verification of the approved change.
SAE/EIA-649 Principle CCM-4: Classification of a requested change determines the appropriate level of review and the applicable change approval authority.
SAE/EIA-649 Principle CCM-5: As the primary vehicle for referencing and managing a change, the request for change must be clear and comprehensive from technical, cost, and scheduling perspectives.
SAE/EIA-649 Principle CCM-6: In evaluating whether a requested change should be approved for implementation and incorporation in a product and its configuration information, all potential impacts including technical, operational, support, schedule, and cost should be considered.
SAE/EIA-649 Principle CCM-7: After considering all impacts and risk factors, change approval decisions are made by an appropriate authority who can commit resources to implement the change.
SAE/EIA-649 Principle CCM-8: An approved change is implemented in accordance with documented direction approved by the appropriate level of authority.
SAE/EIA-649 Principle CCM-9: If it is necessary to temporarily depart from approved product configuration information, a request for variance should be identified, classified, documented, coordinated, evaluated, and dispositioned.

NOTE: The Acquirer may cite DRD-STD-CR, DRD-STD-VR, DRD-STD-MINC, mod kit instructions (MI), and installation notification for specifying the delivery of CM data product(s) that derive from meeting the requirements of this section.

Configuration Change Management is used to formally manage changes to authorized configuration baselines for each CI and to manage any variances from the requirements or design during the product or service life cycle. Variances to the original requirements can subsequently be dispositioned via deviations (i.e., permission granted prior to production or construction based on adequate technical rationale) or waivers (i.e., forgiveness granted to a nonconforming product found post manufacture or construction based on adequate technical rationale). The purpose of the change management function is to establish, maintain, and apply a systematic process for proposing, justifying, evaluating, coordinating, and dispositioning proposed changes; and for efficient processing of configuration changes and variances so that complete, accurate, and timely changes are made to the configuration baseline(s) and unnecessary changes are avoided. Change management begins with establishing the FBL for the system-level CI and continues to regulate all changes to the subsequent ABL and PBLs. The Configuration Change Management process ensures effective control of all CIs/CSCIs and the approved configuration information.

- a. The Acquirer shall apply configuration control to each CI, its components, and associated configuration information across the Enterprise throughout the product life cycle in accordance with the principles in SAE/EIA-649.
- b. The Acquirer shall allocate Configuration Change Management requirements to Suppliers through the Acquirer/Supplier agreement.
- c. The Supplier shall apply configuration control to each CI, its components, and associated configuration information throughout the product life cycle in accordance with the requirements of this standard, as tailored in the agreement.

- d. The Supplier shall establish and implement procedures for documenting, coordinating, evaluating, dispositioning, recording, and reporting requested changes and variances to baseline CIs. When the Supplier's internal change/variance forms are to be used, the forms are to be submitted to the Acquirer for review and approval as part of the Supplier CMP.

NOTE: The information necessary for requesting a change is described in DRD-STD-CR.

- e. The Supplier shall describe the functions and membership of their configuration control board(s), or equivalent, and identify the authority(s) authorized to approve or reject changes.

NOTE: The Supplier's configuration board may be a configuration control board (CCB) (e.g., Acquirer CCB, Supplier CCB, or Joint CCB), an engineering review board, an individual, or other relevant group.

- f. The procedures established to disposition a request for change not requiring a configuration board shall be defined in the Supplier's CMP.
- g. The Supplier shall maintain the traceability of each proposed change, the rationale for the change, and authorization of the proposed change.
- h. The Supplier shall implement a process addressing unapproved changes that includes identifying the root cause and recurrence prevention of the unapproved change and a process for approving or rolling back unapproved changes.
- i. The Supplier shall apply configuration control to the configuration information by serving as the controlling authority for each CI prior to the time that it becomes a baseline.

NOTE: The Supplier typically limits the initiation of changes to those that meet one or more of the following criteria:

1. Correct safety, design, or performance deficiencies.
 2. Satisfy a change in operational or support requirements.
 3. Affects overall cost savings or cost increase.
 4. Prevent or control program/project schedule slippage.
 5. Implement design improvements.
 6. Implement performance requirements changes.
- j. The Supplier shall ensure that all proposed changes are properly processed through the Supplier's CM system and that proper engineering and management approvals are obtained before submission to the Acquirer.

3.3.1 Configuration Control Boards

Supplier Configuration Control Board:

- a. The Supplier shall establish (a) CCB(s) for control of the internal Configuration Identification information and to review, evaluate, and approve proposed change requests (CRs) and variance requests (VRs) for submission to the Acquirer.

NOTE: For large or complex development efforts, the Supplier's implementation of the CCB function could include a hierarchy of one or more internal CCBs. For small projects, limited-scope agreements, or in-house efforts, the Acquirer may approve an equivalent committee, group, or individual as the authoritative change control entity.

General Requirements:

b. The Supplier shall:

1. Describe the functions, membership, responsibility, scope of authority, and the applicable approval/disapproval authorities for each CCB(s).
2. Describe the charters, operational procedures, and the period of effectivity for each CCB or equivalent.
3. Describe the process for coordinating and interfacing with other CCBs and higher authorities.
4. Define the milestones and schedules for establishing the CCB(s) and for conducting the CCB meetings.
5. Support multi-level hardware, software CCBs, and joint Acquirer-Supplier CCBs.

c. If a formal CCB is not required, the Supplier shall describe the internal processes and procedures to be applied for configuration control of the configuration baselines.

d. The Supplier's CCB shall:

1. Verify that each proposed change has been properly documented and classified in accordance with the criteria specified in the agreement.
2. Assess the total impact (i.e., technical, schedule, cost and risk, or opportunity) of a proposed change in all functional areas.
3. Determine which changes require either higher-level or Acquirer approval.
4. Coordinate and evaluate each proposed change with all affected parties prior to submitting for Acquirer review and approval.
5. Authorize the approved changes to be implemented in the required documentation/media.
6. Authorize the formal release of the changed documentation/media.
7. Communicate proposed changes and their disposition (especially if a new requirement or characteristic is approved). This communication process needs to address communication within and between the Acquirer and Supplier organizations.
8. Maintain status logs of all CCB transactions.

3.3.2 Preparation of Change Requests and Variance Requests

There are two basic types of changes, CR and VR. A CR is a request to change an approved configuration baseline. A VR is a request to depart from a requirement or a design of the current approved configuration information for a limited number of items or period of time and does not involve a change to the configuration baseline. The VR may also be a request to accept an item that departs from a specified set of requirements but still meets the function.

3.3.2.1 Change Request (CR)

Change to an Approved Baseline - The CR is a request to change the approved configuration baseline. The Acquirer or the Supplier may submit the CR.

- a. The Supplier shall assess and describe the need, benefit, feasibility, and cost effectiveness of changes before submitting a CR.
- b. The Supplier shall document each CR separately using the Acquirer-approved closed-loop systematic process.

- c. The Supplier shall uniquely identify each CR and revisions thereto.
- d. The Supplier shall identify, assess, and coordinate all affected technical and programmatic data and activities for the impacts of each CR.
- e. The Supplier shall document and assess potential risks associated with the proposed change.
- f. The Supplier shall document the impacts and potential risks for disapproving a CR.
- g. The Supplier shall submit CRs to the appropriate approval authority for disposition.
- h. The Supplier shall assign a change advocate who will be responsible for integrating and presenting the CR to the CCB with all the descriptive, evaluation, and supporting data.
- i. The Supplier shall verify the accurate and complete incorporation of all approved changes into the affected baseline(s).
- j. CRs shall be prepared using the Supplier's organizational guidelines in the applicable organizational processes and contain the technical information defined in the organizational processes.
- k. The Supplier shall notify all affected users of approved changes.
- l. CRs shall be prepared using the organizational guidelines in the applicable organizational processes and contain the technical information defined in the organizational processes.
- m. When the configuration of critical subsystem hardware and/or software differs from released engineering, digital imagery shall be used to document the nonconformance, including affected S/Ns, PINs, time of day, and an image number. A completed CR, including the digital imagery, is then processed using Acquirer/Supplier CM procedures.
- n. The Supplier shall notify the Acquirer via a CR when there are changes to COTS hardware or software that may affect interface or interoperability characteristics.

3.3.2.2 Variance Request (VR)

Planned Departure from an Approved Baseline - The VR is a request for departure from the current approved configuration for a limited number of items or period of time but does not change a configuration baseline (the former deviation).

Unplanned (Existing) Departure from a Requirement and/or from Design - The VR may also request retroactively the acceptance of an item that departs from a specified requirement or design but is still functional (the former waiver).

NOTE: A "variance" is also known as a "concession" or "deviation/waiver" (refer to definitions in ISO 9000 and SAE/EIA-649). Other terms used for "variance" may be found in ISO 10007:2017.

- a. Prior to submitting a variance to the applicable approval authority, the Supplier shall determine and document the classification of the variance as either minor, major, or critical using SAE/EIA-649, 5.3.4.2.
- b. The Supplier shall assess and describe the need, benefit, feasibility, and cost effectiveness of variances before submitting a VR.
- c. The Supplier shall document each VR separately using the Acquirer-approved closed-loop systematic process.
- d. The Supplier shall uniquely identify each VR and revisions thereto.
- e. The Supplier shall identify, assess, and coordinate all affected technical and programmatic data and activities for impacts of each VR.
- f. The Supplier shall document and assess potential risks associated with the proposed variance.

- g. The Supplier shall document impacts and potential risks for each disapproved VR.
- h. The Supplier shall define/document variances and submit them to the Acquirer for approval.
- i. The Supplier shall account for all approved variances.
- j. The Supplier shall notify all users of approved variances.
- k. When the configuration of critical subsystems differs from released engineering drawings/documents and there is insufficient time to write the description of the VR, then close-out digital imagery shall be used to document the nonconformance with information to provide the S/Ns, PINs, time of day, and image number.
- l. When there is insufficient time to write the description of the VR and close-out digital imagery is used to document the nonconformance, the Supplier shall provide the written description within 15 days after the initial submittal.
- m. The close-out digital imagery (photographs) submitted with a completed VR shall be processed within the CM procedures defined herein.

3.3.2.3 Restrictions on Variance Requests

- a. Requests for critical or major VRs shall be approved or disapproved by the Acquirer or the designated approval authority that controls the baseline requirement where the variance applies.

NOTE 1: Variances should be dispositioned by the approval authority in a timeframe that limits interruption in the development or operational processes. A recommended disposition timeframe is 15 business days of receipt by the designated approval authority.

NOTE 2: The Supplier should not request variances that affect service operation, logistics interoperability, or maintenance (e.g., spare parts, operation, maintenance procedures, or compatibility with trainers and test sets) unless unusual circumstances exist.

NOTE 3: The effectivity of the VR normally does not include the entire remaining number of deliverable units on the agreement, nor does it include multiple Acquirers.

- b. The Supplier shall submit any recurring variances and a justification for using a variance rather than a CR to the Acquirer for approval. A recurring variance is a variance that applies to all remaining units to be provided under the agreement.

NOTE: If it is necessary for a Supplier to generate a planned VR for the same situation with the same item multiple times (“recurring” or “standard repair procedures”)

- c. The Supplier shall assess whether a proposed permanent departure should be approved or permanently incorporated as a change in the configuration information and should initiate a CR. The Supplier submits the assessment to the Acquirer for review with the recurring VR.
- d. Dispositions of use-as-is or repair for the acceptance of nonconforming products shall only be implemented:
 - 1. After approval by an authorized representative of the organization responsible for design or by persons having delegated authority from the design organization; or
 - 2. After authorization by the customer if the nonconformity results in a departure from the contract requirements.

3.3.3 Major and Minor Changes

The Acquirer is the approval authority for all major changes for the CI once the baseline has been approved. Changes that are not minor changes (as described below) are considered major changes. Minor changes do not affect fit, form, or function of the product, nor do they cause programmatic impacts related to cost, schedule, or risks. They are limited to administrative or information clarifications and corrections. Minor changes are considered insignificant changes and do not require Acquirer approval.

- a. The Supplier shall refer to SAE/EIA 649, 5.3.1.3, Table 4. However, if the Supplier using these change classification criteria cannot determine the classification of a given change, then the Supplier will submit the change to the Acquirer for a classification decision.

General Requirements:

- b. The Supplier shall formally document and control changes to their internal design release baseline and to the FBL, ABL, or PBL prior to Acquirer approval.
- c. The Supplier shall classify each CR as a major change or a minor change.

NOTE: Some organizations may classify these CRs as Class I (major) or Class II (minor) changes.

- d. The Supplier shall submit major changes to the Acquirer for disposition.
- e. The Supplier shall submit to the Acquirer for final decision any classification disagreements arising between the Supplier and the Acquirer's designated representative.
- f. The Supplier shall assign a CR priority of emergency, urgent, or routine (as defined in Appendix B), which determines the change management schedule to each proposed major change.
- g. The Supplier shall process changes by formal engineering change action after the establishment of a PBL.

3.3.3.1 Submitting Major Change Requests

- a. The Supplier shall submit all major changes to the approval authority for disposition.
- b. The Supplier shall not implement a major change without specific direction from the approval authority.

3.3.3.2 Submitting Minor Change Requests

- a. The Supplier shall process, disposition, and implement minor changes within the Supplier's CM system.
- b. Concurrent with internal processing, the Supplier shall submit copies of all minor changes to the responsible Acquirer CCB, or its designated representative, for concurrence with the classification.
- c. In the case of notification of non-concurrence with the classification, the Supplier shall resubmit the minor change as a major change.

3.3.4 Change Request Supporting Data

Each submitted CR requires a complete analysis of all programmatic and technical impacts for change implementation, disapproval, and decision deferral. Supporting data should describe effects on the design, development, production, and sustainment of the product, safety, and cost and schedule impacts. This data is necessary for a complete decision package that is used to evaluate and justify disposition of a proposed change.

- a. The Supplier shall establish processes for traceability and evaluation of proposed changes that affect both configuration and non-configuration baselines and information.
- b. The Supplier processes shall allow for comprehensive and traceable evaluations from affected organizations.

- c. For each CR and VR, the Supplier shall provide all supporting data necessary to fully assess the decision, the configuration change, and its impacts.
- d. The Supplier shall present all dissenting opinions and non-concurring change evaluations to the CCB prior to the final decision on a change.
- e. A record of all dissenting opinions shall be retained.

3.3.5 Software Change Control

For software, the Acquirer controls the CSCI requirements (design specifications) and release to include all associated software documentation (i.e., version description document (VDD), manuals, guides) and products (i.e., code, databases, PLDs). The Suppliers have the responsibility to establish hardware and software integrated control authorities (control boards) to ensure the evaluation of all changes affecting the software within an integrated CI/CSCI product structure. Both hardware and software deliverables are released using the same baseline definitions and functions described in this standard.

- a. The Acquirer shall develop a software management plan governing the development, identification, change control, deployment, and maintenance of software throughout the life cycle.
- b. The Supplier shall develop a software management plan governing the development, identification, change control, deployment, and maintenance of software throughout the life cycle.
- c. The Supplier shall prepare a VDD as specified in the agreement (refer to DRD-STD-VDD).
- d. The Supplier shall comply with the following software standard: IEEE 828-2012.

3.3.6 As-Built Change Management

Manufacturing floor changes/redline changes are the expedited means for proposing emergency or urgent engineering changes in the manufacturing, testing, assembly, and integration (as-built) environments on CIs/CSCIs for which the Acquirer retains design responsibility. They are submitted in accordance with agreement requirements and instructions.

- a. Where the ability to allow quick reaction changes to the manufacturing, testing, assembly, and integration (as-built) environments is required, the Supplier shall define and release a floor change redline (FCR) process prior to use and document it in the CMP document.
- b. The FCR process shall include roles, responsibilities, authorities, and procedures.
- c. FCRs shall be:
 - 1. Approved prior to implementation.
 - 2. Initialed and dated by the authorized engineer and QA representative, at a minimum.
 - 3. Be clearly identifiable and legible.
 - 4. Traceable to its released CI/CSCI configuration.
 - 5. Communicated to the affected design/manufacturing and operating parties.
 - 6. Evaluated for incorporation into the approved configuration.

NOTE: No Supplier FCR created on Acquirer-issued documentation will be accepted without prior authorization from the Acquirer.