

# INTERNATIONAL STANDARD

**ISO**  
**10007**

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## Quality management — Guidelines for configuration management

*Management de la qualité — Lignes directrices pour la gestion de  
configuration*  
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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 10007 was prepared by Technical Committee ISO/TC 176, *Quality management and quality assurance*, Subcommittee SC 2, *Quality systems*.

Annex A forms an integral part of this International Standard. Annexes B, C and D are for information only.

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## Introduction

This International Standard provides guidelines for configuration management. This is a management discipline that is applied over the life cycle of a product to provide visibility and control of its functional and physical characteristics. The activities described are a way of satisfying certain requirements found in other International Standards in the ISO 9000 family.

A further goal of the guidelines is to enhance common understanding of the subject, to encourage organizations applying configuration management to improve their performance, to align the approach throughout industry and to improve national and international cooperation.

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# Quality management — Guidelines for configuration management

## 1 Scope

This International Standard gives guidance on the use of configuration management in industry and its interface with other management systems and procedures. It first provides a management overview (clause 4), then describes the process, organization and detailed procedures.

It is applicable to the support of projects from concept through to design, development, procurement, production, installation, operation and maintenance and to the disposal of products. It amplifies the configuration management elements found in ISO 9004-1, while annex B provides a correlation between the guidance found in this International Standard and the quality system standards ISO 9001, ISO 9002, ISO 9003 and ISO 9004-1.

The application of configuration management may be tailored to suit individual projects, taking into account the size, complexity and nature of the work.

NOTE 1 For further guidance related to special applications (e.g. software), refer to the relevant International Standards as listed in annex D.

## 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 8402:1994, *Quality management and quality assurance — Vocabulary*.

ISO 10011-1:1990, *Guidelines for auditing quality systems — Part 1: Auditing*.

ISO 10011-2:1991, *Guidelines for auditing quality systems — Part 2: Qualification criteria for quality systems auditors*.

ISO 10011-3:1991, *Guidelines for auditing quality systems — Part 3: Management of audit programmes*.

## 3 Definitions

For the purposes of this International Standard, the definitions given in ISO 8402 and the following definitions apply.

**3.1 configuration:** Functional and physical characteristics of a product as defined in technical documents and achieved in the product.

**3.2 configuration audit (CA):** Examination to determine whether a configuration item conforms to its configuration documents.

**3.3 configuration baseline:** Configuration of a product, formally established at a specific point in time, which serves as reference for further activities.

**3.4 configuration board (CB):** Group of technical and administrative experts with the assigned authority and responsibility to make decisions on the configuration and its management.

NOTE 2 This group is frequently known as the configuration control board (CCB).

**3.5 configuration control (CC):** Activities comprising the control of changes to a configuration item after formal establishment of its configuration documents.

#### NOTES

3 Control includes evaluation, coordination, approval or disapproval, and implementation of changes.

4 Implementation of changes includes engineering changes and deviations and waivers with impact on the configuration.

**3.6 configuration documents:** Documents that define the requirements, design, build/production and verification for a configuration item.

NOTE 5 Documents can be in the form of any media.

**3.7 configuration identification:** Activities comprising determination of the product structure, selection of configuration items, documenting the configuration item's physical and functional characteristics including interfaces and subsequent changes, and allocating identification characters or numbers to the configuration items and their documents.

**3.8 configuration item (CI):** Aggregation of hardware, software, processed materials, services, or any of its discrete portions, that is designated for configuration management and treated as a single entity in the configuration management process.

**3.9 configuration management (CM):** Technical and organizational activities comprising:

- configuration identification;
- configuration control;
- configuration status accounting;
- configuration auditing.

**3.10 configuration management plan (CMP):** Document setting out the organization and procedures for the configuration management of a specific product or project.

**3.11 configuration status accounting (CSA):** Formalized recording and reporting of the established configuration documents, the status of proposed changes and the status of the implementation of approved changes.

**3.12 interface:** Physical or functional interaction at the boundary between configuration items.

## 4 Configuration management system, description and objectives

### 4.1 General

Configuration management (CM) is a management discipline that applies technical and administrative direction to the development, production and support life cycle of a configuration item. This discipline is applicable to hardware, software, processed materials, services, and related technical documentation. CM is an integral part of life-cycle management. (A typical example thereof is illustrated in annex C.)

Other disciplines involved in the product life cycle (i.e. documentation management, logistic systems, maintenance) may contribute to the CM objectives.

The main objective of CM is to document and provide full visibility of the product's present configuration and on the status of achievement of its physical and functional requirements. Another objective is that everyone working on the project at any time in its life cycle uses correct and accurate documentation.

The following subclause provides an overview of the main elements of a CM system.

### 4.2 Overview

#### 4.2.1 Configuration management process

The CM process comprises the following integrated activities:

- configuration identification;
- configuration control;
- configuration status accounting;
- configuration auditing.

These activities are further described in clause 5.

#### 4.2.2 Organization of configuration management

CM should be organized with defined responsibilities and sufficient independence and authority to achieve the required CM objectives.

These activities are further described in clause 6.

#### 4.2.3 Configuration management procedures and plans

Written procedures should be used to describe com-



pany policies, activities and conventions related to the CM process.

CM policies, activities and conventions that are specific to a particular programme or project should be defined in a configuration management plan (CMP). The plan may make reference to the company's standard CM procedures.

These activities are further described in clause 7.

#### 4.2.4 Configuration management system audit

CM system audits should be performed to assess conformance to the CM procedures and plans.

These activities are further described in clause 8.

## 5 Configuration management process

### 5.1 General

The activities which are performed within the CM process are described below. It is essential that these activities are fully integrated for this process to be effective.

### 5.2 Configuration identification

The configuration identification includes the following.

#### 5.2.1 Product structure and selection of configuration items

The product structure should describe the relationship and the position of configuration items in the breakdown of the product.

Configuration items should be selected by applying a decomposition (i.e. breakdown) process to the product using guidance criteria for the selection of configuration items (see 7.2.1).

#### 5.2.2 Documentation of configuration items

All the necessary functional and physical characteristics of a configuration item including interfaces, changes, deviations and waivers should be contained in clearly identified documents. These are normally categorized as configuration documents.

#### 5.2.3 Numbering

Numbering conventions should be established and applied to the identification of configuration items, their parts and assemblies, documents, interfaces, changes, deviations and waivers.

### 5.2.4 Establishment of configuration baselines

Configuration baselines should be established by formal agreement at specific points in time and used as starting points for the formal control of a configuration.

Configuration baselines plus approved changes to those baselines constitute the current approved configuration.

## 5.3 Configuration control

After the initial release of configuration documents, all changes should be controlled. The impact of the change, customer requirements and the configuration baseline affected will decide the degree of formality in processing the change and may be the basis for any classification system used for classifying/categorizing the change.

Configuration control involves the following activities, which should be documented in detail in a change-control procedure:

- document and justify the change;

- evaluate consequences of the change;

- approve or disapprove the change;

- implement and verify the change;

- process deviations and waivers.

To protect the integrity of the configuration and to provide a basis for the control of change, it is essential that configuration items, their constituent parts and their documentation be held in an environment which:

- is commensurate with the environmental conditions required (e.g. for computer hardware, software, data, documents, drawings, etc.);

- protects them from unauthorized change or corruption;

- provides means for disaster recovery;

- in the case of software, data, documentation and drawings, permits the controlled retrieval of a copy of the controlled master;

- supports the achievement of consistency between the as-built/produced state of a configuration and the as-designed state.

## 5.4 Configuration status accounting (CSA)

Configuration status accounting should commence as and when configuration data are first generated

CSA should provide information of all configuration identifications and all departures from the specified configuration baselines. It thus enables changes to configuration baselines to be traceable.

CSA records and reports should be a by-product of the identification and control activities. Redundant CSA records should be avoided.

## 5.5 Configuration audit (CA)

Configuration audits should be performed before the acceptance of a configuration baseline to assure the product complies with its contracted or specified requirements and to assure the product is accurately reflected by its configuration documents (see annex C).

Normally there are two types of configuration audits as follows.

- a) Functional configuration audit: a formal examination to verify that a configuration item has achieved the performance and functional characteristics specified in its configuration documents.
- b) Physical configuration audit: a formal examination of the "as-built/produced" configuration of a configuration item to verify that it conforms to its product configuration documents.

A CA may be required for the formal acceptance of a configuration item.

## 6 Organization of configuration management

### 6.1 General

Configuration management should be organized to the extent appropriate to maintain impartiality, independence and integrity to achieve the required CM objectives.

### 6.2 Structure of configuration management

To enable effective CM, the organizational structure should be defined.

This structure is normally project-related and adapted as necessary to meet the needs of the different life-cycle stages. It should define the relationships be-

tween activities directly involved in the CM process. It should include the CM function, interfacing organizations, design, procurement and contracting offices, data management, manufacturing, quality assurance, and other disciplines that may be involved, including as necessary subcontractors and vendors.

The CM organizational structure should ensure the coordination of CM activities with these other disciplines and the assignment of the appropriate authorities and responsibilities for all CM activities.

Within a project organization, the authority to approve configuration baselines and any changes therein (normally a "configuration board") should be identified.

For small projects, the CM responsibilities may be delegated by project management to certain individuals in the project.

## 7 Configuration management procedures

### 7.1 General

This clause describes the procedures which comprise an effective CM system. The CM system should be documented in procedures of the organization and referenced in a configuration management plan (CMP). Project-specific procedures and the depth of their application during the life cycle of the product should be defined in a CMP.

### 7.2 Configuration identification procedures

#### 7.2.1 Selection of configuration items (CIs)

Configuration items are selected by a process of decomposition. This top-down process divides the total product structure into logically related and subordinated aggregates of hardware, software, processed materials, services, or a combination thereof which are selected for CM. Selection of the higher level CIs should start at the early stage of the project (e.g. feasibility and definition phases). Selection of lower level CIs should be completed early in the development phase.

Guidance criteria should be used in the selection of CIs.

The selection of too many CIs affects product visibility, hampers management and increases cost. The selection of too few CIs, or insufficient decomposition, creates logistic and maintenance difficulties and limits management possibilities.

The main criterion is to select those items whose performance parameters and physical characteristics can be separately managed to achieve the overall end-use performance of the item.

Other selection criteria which should be applied are:

- criticality in terms of high risks, safety, mission success, etc.;
- new or modified technology, design or development;
- interfaces with other items;
- procurement conditions;
- logistic and maintenance aspects.

### 7.2.2 Documentation of configuration items

All physical and functional characteristics necessary to define a CI throughout its life cycle should be documented.

Document types typically include specifications, design documents, lists, software data and manuals for operation and maintenance.

Documentation required for a CI depends on the level of control needed. However, all documentation should include relevant information on change and traceability.

### 7.2.3 Numbering conventions

Numbering conventions should be established and applied to the identification of configuration items, configuration documents and changes, as well as to parts and assemblies.

The numbering conventions should take into account the existing corporate or supplier numbering procedures. However, identification numbers must be unique.

The numbering conventions or other information management systems should permit the management of:

- hierarchical or subordinate relationships between configuration items within the product structure;
- hierarchical or subordinate relationships of parts and assemblies in each configuration item;
- relationships between items and documents;
- relationships between documents and changes;

- constitution of typical files;
- other grouping requirements.

### 7.2.4 Configuration baselines

A configuration baseline consists of all approved documents that represent the definition of the product at a specific point.

Configuration baselines should be established whenever it is necessary to define a reference configuration during the product life cycle which serves as a starting point for further activities.

The level of detail to which the product is defined in a configuration baseline is dependent on the degree of control required. Functional configuration baselines, for example, may consist of only one document, whereas production configuration baselines may include a full document set, including those for tools and processes.

### 7.3 Configuration board (CB)

The project manager may establish a configuration board with the authority to review and approve/disapprove the CM plan, CM procedures, the selection of configuration items, configuration baselines and changes to those baselines including deviations and waivers.

The members of the CB are typically appointed by the project manager. All required disciplines should be represented on the CB. The CB should be chaired by the project manager or a delegate.

The CB may exist on several levels of authority, for example where contractual requirements need customer involvement in the process, the customer may also establish a CB.

The function of the CB is to verify that:

- it has the correct authority in relation to the relevant configuration baseline;
- the change is necessary;
- the consequences are acceptable;
- the change has been properly documented and classified;
- the plan for the implementation of the change into documents, hardware and/or software is satisfactory.