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Information technology — Guidelines for the documentation of computer-based application systems

Technologies de l'information — Principes généraux relatifs à la documentation des systèmes d'application informatisés

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 734 10 79
E-mail copyright@iso.ch
Web www.iso.ch

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

International Standard ISO/IEC 6592 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 7, *Software engineering*.

This first edition cancels and replaces ISO 6592:1985, which has been technically revised.

Annex A of this International Standard is for information only.

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Introduction

Documentation is essential to the success of any software development project. Management should determine the quantity and content of documents to ensure there is neither too little nor too much. However, the most important factor is to include all relevant information for the users. This International Standard provides a method to define an adequate set of documents to use throughout the life cycle of a software development project, including its definition and use.

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Information technology — Guidelines for the documentation of computer-based application systems

1 Scope

This International Standard gives guidelines for the documentation of information systems (ISs) and is intended for use in that area. This International Standard is applicable to the software of IS. However, some aspects of hardware, e.g. configuration of the system, are included.

This International Standard is not intended to be a guide to the way documents are organized or structured. Instead, it provides a checklist for two parties to use in agreeing on document content.

The guidelines given in this International Standard have been developed with the objectives of:

- obtaining the necessary commitment of the parties involved with the life cycle of the IS to participate in the development process;
- contributing to the production of well-planned, standardized software system documents;
- enabling the production of software system documents in parallel with the software life cycle.

Well-defined rules for documents during the software life cycle facilitates:

- the provision of relevant information;
- the preparation of the documentation itself;
- estimation of the time and resources required for the achievement of a project;
- exchange of information between parties concerned, resulting in:
    - selection of attainable objectives for a system;
    - a more complete and well-considered functional design;
    - fewer misunderstandings and mistakes;
- making decisions and briefing of personnel during the software life cycle.

This International Standard is designed to be applicable to the whole range of ISs and recognizes the software component of a system may vary from a minor part to a major complex component.

This International Standard applies to documents in any natural language or representation and is independent of the medium used for its implementation, i.e., the principles are generally applicable, but in some cases there may be differences in structure and format.

Although this International Standard is intended mainly for use in the software engineering (SE) area, there will be other groups involved less directly with SE including those involved in SE strategy, people with SE requirements, SE customers and SE users. This International Standard is relevant to those groups. The groups will produce some of the documents (e.g., strategy, customer requirements and user documents).

Associated with SE activities are methods, techniques and tools. Many of these products have their own documentation facilities. Software engineers may use documents of this type, but should ensure the principles and practices given in this International Standard are observed.

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2 Normative references

This International Standard has no normative references. Informative references are listed in the bibliography.

3 Terms and definitions

For the purposes of this International Standard, the following definitions apply.

3.1
document
uniquely identified unit of information for human use, such as a report, specification, manual or book

3.2
documentation
collection of one or more related documents

3.3
information item (sub-item)
defined group of elements of information

NOTE A sub-item is a part of an information item.

3.4
documentation profile
table of information items describing the content of one or more documents

3.5
conditional
information supplied with every package to which it is relevant

3.6
optional
information supplied at the discretion of the manufacturer or marketing organization

4 Use of this International Standard

This International Standard may be used for documents in a wide variety of SE areas. Its primary use is documenting software systems during development, but it may also be of use to document other aspects of the life cycle, e.g. system maintenance, system operation and organization (project teams and human resources).

This International Standard supports the preparation of documents for any life cycle model and is independent of the model or methodology.

For a life cycle with a series of interrelated phases where documents provide the means of communication between adjacent phases, documentation provides a record of the work done up to that point.

For an iterative life cycle, where some development processes are repeated before a deliverable is produced, documents may reflect increasing detail as iterations are carried out, or the level of detail may remain constant.

For parallel or model-driven life-cycle development, where separate teams are working in parallel to develop aspects of the total software system, documentation forms the communication between teams or models and specifies the information items used to communicate information and the required level of detail.

Guidance on life-cycle processes is provided in ISO/IEC 12207. If that International Standard is complied with, some tailoring of the information items listed in this International Standard may be needed.

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4.1 Purpose of documentation

There are four main purposes of documenting:

- Describe and record information about a system throughout its life cycle.
- Assist the usability and maintainability of the IS.
- Help control the life-cycle process.
- Communicate information about the system to those who need it.

4.2 Principles of documentation

The primary principle of documenting should be to identify all types of users of the system's documents — "user" in this context includes not only the end-users of the software, but also developers, testers and other people who use the documents prepared during the development process.

Having identified all of the different types of users (this International Standard refers to these users later as "audiences"), it is then necessary to think about their information needs. Different end-user audiences will have different information needs, and different developer audiences will also have different needs, depending on the tasks they will perform. The information should then be translated into a set of "information items" matching, if possible, those given in 5.4.

There are a number of well-developed documentation methodologies to help with this process. This International Standard does not depend on the use of any particular methodology. Documents satisfying user needs require planning.

Having reached agreement on a list of information items, use a documentation profile to map those information items to specific documents. The documents described in this International Standard may be recorded on any medium. Some documentation methodologies will assist in deciding on the appropriate document medium, layout and structure.

4.3 Application of this International Standard to a software system

4.3.1 General application

To apply this International Standard, the information requirements of the users of the documents should be determined. These requirements should be specified in a documentation profile (see 5.2) using the description of information items (see 5.3 and 5.4).

The preparation of a documentation profile is essential to establish the contents of the documents forming the complete set of system documentation. The customer and supplier should agree to the profile so there is prior understanding of the contents of the documentation set to be delivered to the customer.

The development of the documentation profile will enable both parties to agree on document titles and contents.

The content and the complexity of the documents will depend on the application of the software system and the audience for the documents specified in the profile.

Information items to review in determining the content and the complexity of the documents are presented in three levels. These levels may be used in a variety of ways, such as the following:

- Level 1 information items may be required in summary documents or early in the life cycle. Levels 2 and 3 information items may be required in more detailed documents or later in the life cycle.
- Level 1 information items may be the only ones required in simple systems where detailed documents are not needed.
- Levels 2 and 3 information items may be required for software systems considered more critical and sensitive than other software systems.

This International Standard may be used either to define specific types of documents and their contents, or to verify an existing set of document types conforms to this International Standard.

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4.3.2 Specification of document contents

The following steps should be carried out to complete a documentation profile:

I. Identify the documents needed throughout the life cycle. The names of these documents should be listed across the top of the columns on the documentation profile (columns 4 to n).

II. Review the contents of each information item to determine if it is required in that document. Identify whether the information is essential (E), conditional (C) or optional (O).

Check the information items at the different levels of the description of information items to determine which level is necessary for the document and insert the code (E, C or O) into the required level in the documentation profile.

It is recommended that contents be clarified by the use of examples.

In certain circumstances it is acceptable to define a document by listing the information items and/or sub-items included in a document of that type, rather than by completing a documentation profile for that document. This would be appropriate for instance where a customer wishes to define a checklist for the contents of a document forming part of the contractual deliverable for a software project.

Alternatively, a list of items and sub-items could be used to define a document not containing the precise mix of sub-items identified in this International Standard for a given level of detail.

4.3.3 Review of existing document contents

This International Standard may also be used to review the documents from an existing documentation set to determine their compliance with this International Standard.

This process can help verify the documents from an existing documentation set conform to this International Standard or may identify information items missing from those documents. The review may be carried out in the following manner:

I. Prepare a comparison matrix with the paragraph numbers and titles of the existing documents listed down one side and a column on the other side into which will be inserted the item number(s) of the information item(s) from the description of information items (see 5.4).

II. Identify an information item (usually a paragraph title or item within a paragraph) in the existing documentation set and review the list of information items in the description of information items (see 5.4).

III. Identify which information item(s) match the information item in the existing documentation set. Insert the item number(s) of the matching information item(s) into the column beside the matching paragraph number and title from the existing documentation set.

NOTE Several item numbers may relate to one paragraph number and title in the existing documentation set.

IV. Note any information items in the existing documentation set having no corresponding information item from this International Standard.

V. Review the other information items from this International Standard to ensure all necessary information items are included in the documents from the existing documentation set.

4.4 Constraints

A particular document or information item may have no relevance to one system and yet be important to another. The documentation profile developed through use of this International Standard should be used to ensure, if information is omitted from the documentation, the omission is the result of a positive decision and not an oversight.

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Therefore, in applying this International Standard, the following guidelines should be observed constraining use of information items in documents produced:

- Completeness: Each information item required by the documentation profile should be included in the documentation set for a system or a reason should be given why it was not included.
- Relevance: There should be justification for including a given information item in the documentation profile for a particular document.
- Level of detail: For a given information item different levels of detail may occur in the same document. With time and in successive documents there should be a progression from less to more detail as a matter of principle.

4.5 Customization

This International Standard defines a framework in which documents are defined by using a hierarchical profile to define information items for software system documents and concentrates on information items mainly for program and data development. It is not intended to restrict information items to those listed in this International Standard. This International Standard can be tailored by adding, altering or deleting information items as necessary as long as the same framework is used.

5 Documentation method

5.1 Overview of the description of information items

The overview is presented as a tree-structured list (see Figure 1). The list contains the name and item number of the information items detailed in the description of information items (see 5.3 and 5.4).

The item numbers and names shown under the heading “Structure” are group and sub-group headings for the “Information Items” identifying specific information.

5.2 Documentation profile

The documentation profile form (see Figure 2) is provided as a template for creating a documentation profile for a software system.

In the documentation profile, the matrix is divided into a number of columns. Each document required for the software system is represented by a column (e.g. A,B,C). See Annex A for an example of how to identify the documents portrayed in Figure 2.

When completed, the documentation profile can be used to develop a documentation plan and to check that the software system is documented to the correct level of detail.

5.3 Description of information items

The information for the preparation of documents is derived from information items. An information item may comprise a number of sub-items depending on the degree of detail required to describe the item. The sub-items are listed in a hierarchy, the basis for the numbering convention used for information items.

This numbering convention is as follows:

- Each heading has a number to indicate its position in the hierarchy (see Figures 1 and 3).
- Each information item has an item number that may be up to four digits (see Figure 1).
- Each sub-item has an item number comprising the information item number plus a further number separated by a decimal point (e.g. 2311.5).

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Information items are grouped and denoted by headings. A heading includes a number appropriate to its place in the structure. Following the number is the name of the group (may include a short description - see Figure 4).

After the headings, the information items are each proceeded by its item number. The item number provides the classification for the item and its position in the hierarchy. Information items occur in two forms:

I. A single information item comprises its item number, its item name and its item content (see Figure 4). A single information item may either be present in or absent from a document, but may not occur at varying levels of detail.

II. A compound information item consists of a number of sub-items, each comprising its item number, its item name and its item content. A compound information item can therefore occur at varying levels of detail in a document. The degree of detail in the compound information item is expressed by combining the sub-items appropriate to the level required (see Figures 4, 5 and 6). In this International Standard a compound information item consists of two or three levels of detail (see Figure 4).

Shaded columns in Figures 4, 5 and 6 indicate no further levels of detail are expected. In this case, the required details should be given at level 1 or level 2.

Columns (level 1, level 2 or level 3) indicate the levels of detail. For a compound information item, level 2 includes all sub-items from level 1 plus some additional sub-items. Similarly, level 3 includes all sub-items from level 2 plus all remaining sub-items for that compound information item.

That means (see Figure 4, 5 and 6):

- Level 1 information items include all sub-items named in the column "level 1" of the information item;
- Level 2 information items include all sub-items named in the column "level 2" of the information item;
- Level 3 information items include all sub-items named in the column "level 3" of the information item.

With time and in successive documents, a compound information item may occur in increasing detail by including additional sub-items of information on that subject.

This gradual change in the level of detail may necessitate revision of documents produced earlier in the software life cycle. Sub-items themselves (or indeed unitary information items) do not therefore necessarily remain identical in content throughout the life cycle. Experience gained during a project may require that information is corrected or adjusted to reflect the better understanding of the software system that experience has given.

Where the sub-item name occurs across two or more levels (e.g., 212.1 Objective Name), the value of the sub-item may be the same at all levels or may be expanded at level 2 and level 3 if necessary.

A document can therefore comprise information items at different levels of detail depending on the requirements specified in the documentation profile.

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Structure			*Information Item*
1 System Requirement			11 Problem Definition
			12 Objectives
			13 Justification for Proposal
			14 Document References
2 System Description			15 Constraints
			16 Language
			17 Contractual Information
	21 System Identification		211 System Name
	22 Detailed Requirements		212 System Objectives
			221 Functional Requirements
			222 Data
			223 Availability Characteristics
	23 System Components		224 Constraints
			225 Terminology
			226 Information Model
		231 System Organization	2311 Structure
			2312 Interfaces
		232 Software Components	2321 Software Organization
			2322 Data Organization
		233 Physical Components	2331 Processing Units
			2332 Data Peripheral Equipment
			2333 Process Peripherals
			2334 Other Equipment
			2335 Supplies
			2336 Accommodation/Inventory
	24 Testing		241 Test Objectives
			242 Test Methods and Tools
			243 Test Cases/Benchmarks
	25 Installation		251 Installation/Use
			252 Training
	26 Human Resources		261 Personnel
			262 Organization
3 Evaluation Indicators			31 Costs/Benefits
			32 Installation Experience
			33 Strengths/Weaknesses
			34 Evaluation Criteria/Methods
			35 Evaluation Results
4 Conclusions/Recommendations			41 Decision
			42 Justification
			43 Responsibility

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Figure 1 — Overview of the description of information items

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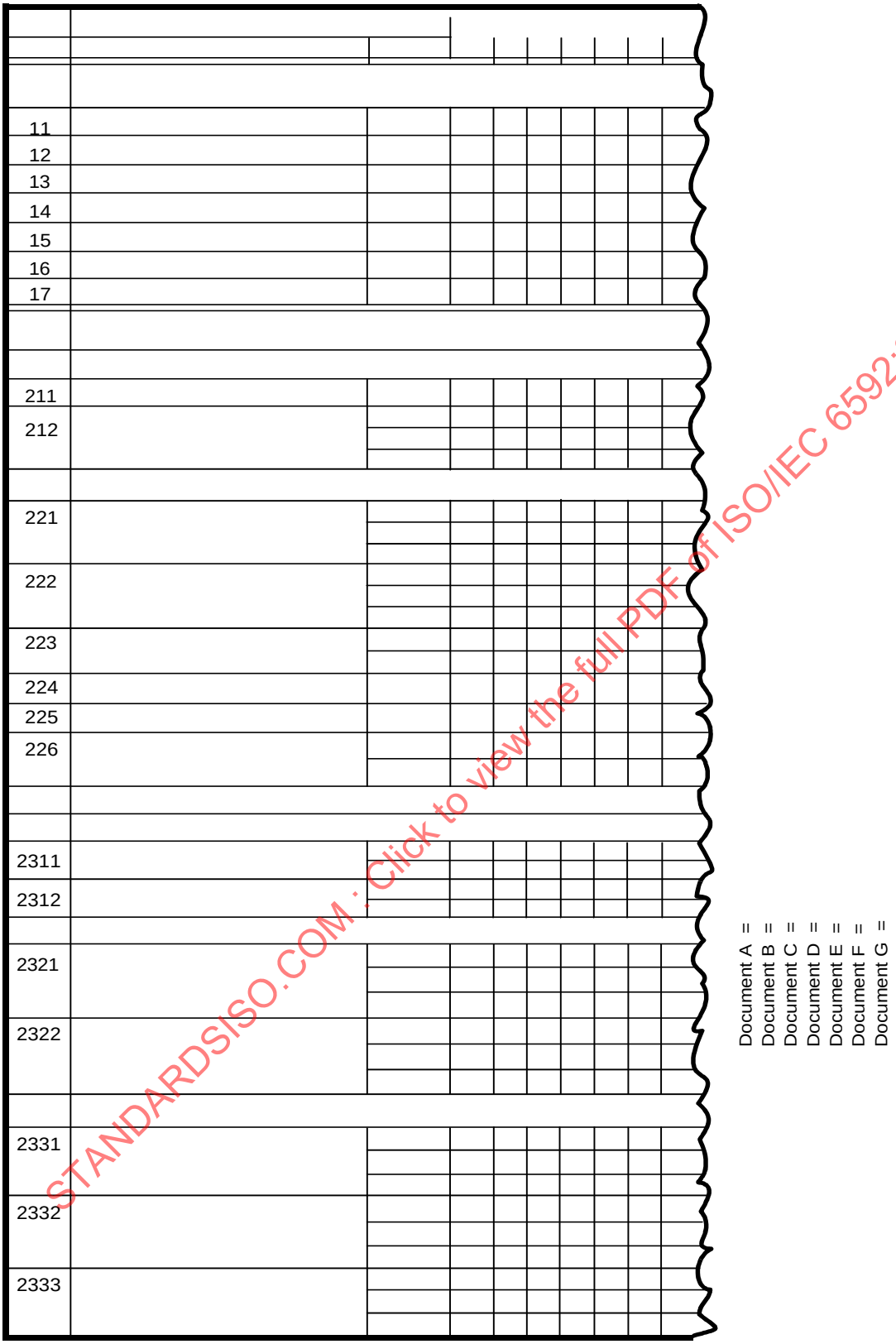

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Figure 2 - Documentation profile

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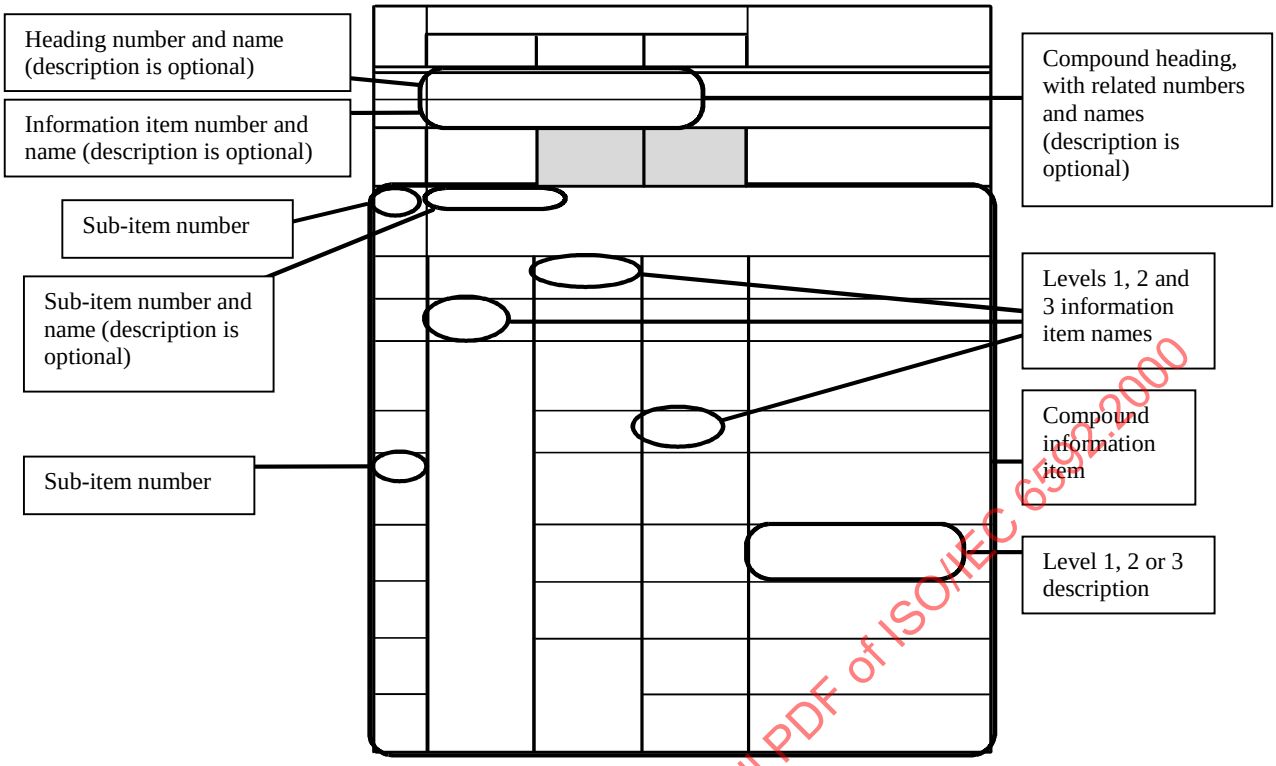

Figure 3 - Illustration of the description of information items

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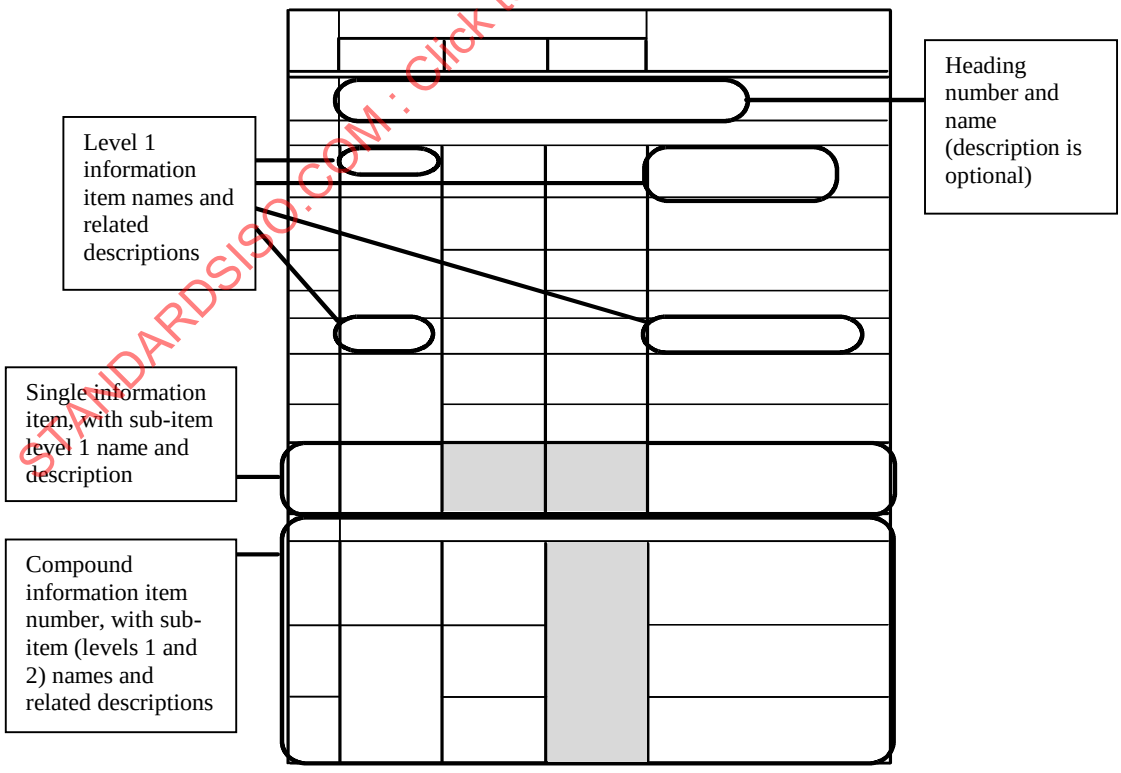

Figure 4 - Illustration of the 1st level of an information item

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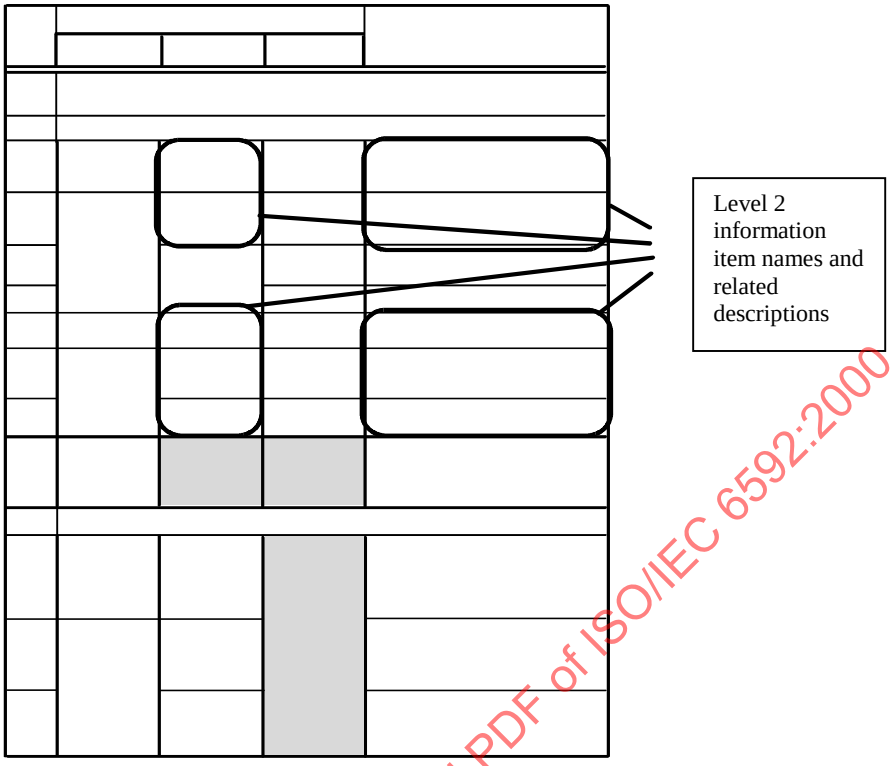

Figure 5 - Illustration of the 2nd level of an information item

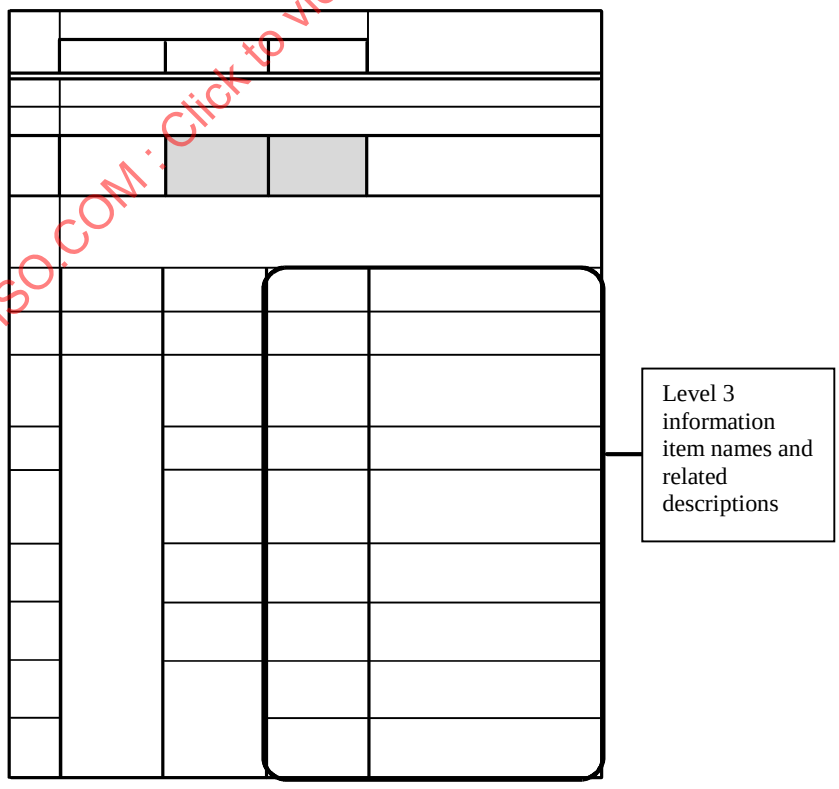

Figure 6 - Illustration of the 3rd level of an information item

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5.4 Detailed description of information items

The following presents the detailed description of information items.

Item No.	Information Item level 1	level 2	level 3	Content Information Item
	1 System Requirement			
11	**Problem Definition**			Statement and delimitation of problem to be solved by the software under development.
12	**Objectives**			Statement of expected results from software and requirements of software.
13	**Justification for Proposal**			Motive and justification for proposal.
14	**Document References**			List of document references for next phase of development, e.g. documentation of current state.
15	**Constraints**			Statement of requirements (e.g., conditions, limitations, quality planning, security) placed on development by an acquirer for next phase, such as: - means to be assigned, e.g., people, material, funding, - method of implementation, - reporting period, - completion date.
16	**Language**			The languages used for the documents should be identified, e.g. Japanese, French, English.
17	**Contractual Information**			Contractual information should be specified. Copyright conditions, licensing terms, conditions of use and the terms of warranty or guarantee should be stated. The guarantor should be named.

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Item No.	Information Item level 1	level 2	level 3	Content Information Item
	2 System Description			
	21 System Identification			
211	**System Name**			Name identifying system and if possible any item number or product code.
212	**System Objectives** System objectives are: - external system effects - requirements on system performance in producing deliverables, e.g. evaluation criteria.			
212.1	Objective Name	Objective Name	Objective Name	Name identifying specific system objective.
212.2	Objective Content	Objective Content	Objective Content	Description of system objectives and purpose of the application.
212.3		Objective Hierarchy	Objective Hierarchy	Representation of higher level or lower level system objectives (partial, individual objectives; or main or related objective).
212.4		Range of Validity	Range of Validity	Range of validity of individual system objectives.
212.5		Objective Conflicts	Objective Conflicts	Conflicting objectives, where achievement of one objective hinders achievement of another objective.
212.6		Completion Date	Completion Date	Point in time at which particular objective was achieved, or is to be achieved.
212.7		Degree of Accomplishment	Degree of Accomplishment	Statement of degree a particular objective was achieved, or is to be achieved.
212.8			Performance Indicators	Statement of indicators to be used for measurement of achievement of objective.
212.9			Weighting	Methods for determination of priorities of objectives and statement of objective priorities.

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Item No.	Information Item level 1	Information Item level 2	Information Item level 3	Content Information Item
	22 Detailed Requirements Description of the physical/logical system to be realized by software development.			
221	**Functional Requirements** Functional requirements include all logical functions to be supported by the system, independent of their technical realization.			
221.1	Task Name	Task Name	Task Name	Brief, application-oriented description of tasks being solved, or to be solved by software.
221.2		Task Hierarchy	Task Hierarchy	Hierarchical structure of tasks, subtasks.
221.3			Task Description	Task to be solved by the software should be described in generally understandable form. In particular describe processing rules and their logical and time dependencies.
221.4		Methods	Methods	Brief description of theories and methods of computation used for solving tasks.
221.5			Theoretical Foundations	State theoretical foundations for problem solution. Describe essential steps of methods used.
221.6			Units of Measurement	State units of measurement and terms used.
221.7		Task Limitations	Task Limitations	Limits of scope of application of software, especially task oriented requirements and restrictions.
221.8			Boundary Conditions	State technical, computational or regulatory related limits of application.
221.9			Processing Time	State maximum time allowed for processing of a task.
221.10	Reference to Laws and Regulations	Reference to Laws and Regulations	Reference to Laws and Regulations	State references to laws, standards, guidelines, ordinances, regulations, restrictions which are, or may become, part of the functional requirement.
221.11			Laws and Regulations	Identify and, if necessary, interpret important parts of laws, standards, guidelines, ordinances, regulations which have, or will have, a bearing on software, including sources. Indicate deviations.

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Item No.	Information Item level 1	Information Item level 2	Information Item level 3	Content Information Item
222	**Data** State all data required by the system.			
222.1	Data Name	Data Name	Data Name	If necessary, state application oriented data name, separated as input and output data.
222.2	Data Content	Data Content	Data Content	State actual content of data, if necessary, by naming data groups with reference to data protection requirements.
222.3		Data Hierarchy	Data Hierarchy	Show data structure, e.g. hierarchy.
222.4		Data Source/ Recipient	Data Source/ Recipient	State data sources. Recipients of data; if necessary, refer to data groups and individual data.
222.5		Data Group Name	Data Group Name	State application oriented names of data groups.
222.6		Data Group Content	Data Group Content	State actual content of data groups, if necessary, by stating data items with reference to data protection requirements.
222.7		Data Group Use	Data Group Use	State use of data groups as applied to problems, e.g. data usage matrix.
222.8			Data Relationships	State relations between data groups, data items and tasks, e.g. input/output matrix, decision table.
222.9			Data Item Name	State application oriented name of individual data items.
222.10			Data Item Content	State actual content, if necessary, value of individual data items, e.g. constant with reference to data protection requirements.
222.11			Data Item Use	State how a data item is used in the solution, e.g. parameters, constants.
222.12	Data Volumes	Data Volumes	Data Volumes	State volume of data to be processed.
222.13			Data Input Frequencies	State frequency and time distribution of input data, with data quantities.
222.14			Data Growth	State expected growth in data volumes within specific time frames.

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Item No.	Information Item level 1	Information Item level 2	Information Item level 3	Content Information Item
223	**Availability Characteristics** Availability characteristics are mainly numerical quantities indicating availability of the system, e.g., frequency, time distribution.			
223.1	System Availability	System Availability		State times, or time periods (e.g. times of day) when system must be available for use.
223.2		Response Time		State maximum time allowed for system to produce results, or partial results, e.g. dialogue replies.
223.3		Schedules/ Deadlines		State time frame when system results must be available.
224	**Constraints** Constraints include security, privacy, safety, useability.			
224.1	Physical Constraints			Requirements for formulation of solution based on organization and facilities available in target environment.
224.2	Technical Constraints			Requirements based on information technology available.
225	**Terminology**			
225.1	Terms			List of application specific information and definitions used in the documents.
225.2	Descriptors			Keywords characterizing the described system and its unique properties and which can be used as search terms.
226	**Information Model**			
226.1	Methods	Methods		Brief description of theories and methods of information modeling used for solving system information requirements.
226.2		Theoretical Foundations		State theoretical foundation for information modeling. Describe data objects, naming conventions and data relationships.
226.3		Database/ Data Dictionary		Describe the organization of functional data objects structure for the database/data dictionary management system.

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Item No.	Information Item level 1	Information Item level 2	Information Item level 3	Content Information Item
	23 System Components Description of the system components fulfilling the requirements as planned or of existing software.			
	231 System Organization			
2311	Structure	Structure		Indicate general structure of the system.
2312	Interfaces	Interfaces		Describe interfaces to other systems and between system components.
	232 Software Components			
2321	**Software Organization**			
2321.1	Software Name	Software Name	Software Name	Name for identification of software used during development, distribution and use. If necessary distinguish through abbreviated names (e.g. used in external or internal correspondence) or during a specific time interval. If the software is part of a software system, the system name should also be stated.
2321.2		Alias Designation	Alias Designation	In addition to software names of several software aliases (in use at the same time) can be differentiated, e.g. in connection with differing sets or under different applications. If necessary, different parts of the documents may deal with different aliases.
2321.3	Version	Version	Version	In addition to software name and alias designation, distinguish between several versions/variants of the software or its aliases. Documents should describe the state of the valid version/variant.
2321.4	Release	Release	Release	Name of release of the first and currently valid version/variant.
2321.5	Release Date	Release Date	Release Date	Date of release of the first and currently valid version/variant.
2321.6		Call Name	Call Name	Statement of software call name used in a programming language, design language (pseudo code) or in free form.
2321.7			Calling Requirements	Conditions for correct calling of software, e.g., permitted parameter combinations, events or triggers.
2321.8	Input Name	Input Name	Input Name	State application oriented name of input. A distinction is made between input data already stored and are processable as a database, and data to be processed.
2321.9		Input Objective	Input Objective	Description of input objectives.
2321.10			Input Detail	In addition to statements about data organization (No. 2322), the required access algorithm and rules should be described or named. This is also required for commands, control instructions and functions. It should be stated whether and what initial values are entered by the software for the static data. For formatted inputs, the data sequence should be specified. For the purpose of clarification, examples should be provided. For unformatted inputs, input conventions should be stated, such as: - separators and their function, - keywords for data identification, - null values.

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Item No.	Information Item level 1	Information Item level 2	Information Item level 3	Content Information Item
2321.11	Output Name	Output Name	Output Name	State application oriented name of output. A distinction is made between data to be stored for further processing and data to be used outside the software systems, e.g. lists, screens, graphics and control commands for control of technical processes.
2321.12		Output Objective	Output Objective	Description of output objectives.
2321.13			Output Detail	In addition to the statements about organization (No. 2322), data intended for use outside of software systems (e.g., user messages) should be described by output examples (e.g., printouts) with appropriate interpretation aids, or by rules describing their formation.
2321.14			Transmitted Data	Description of data transmitted without change.
2321.15	Software Function	Software Function	Software Function	Summary description of software functions and user interfaces.
2321.16		Data Flow Description	Data Flow Description	Data flow should be shown, if necessary, in several detailed levels, e.g., by data flow diagrams. All input and output data and all data transmitted (e.g., messages) between software modules should be recorded as to meaning, time sequence, data carrier and input and output devices.
2321.17		Software Execution Sequence	Software Execution Sequence	The internal execution sequence should be described, if necessary, in several detailed levels; software modules, subroutines, branches, loops and, if necessary, synchronization sectors should be shown. Descriptive means include: - flowcharts, - decision tables, - structure charts. Descriptive means can be combined, if this is useful for software description. The execution description should permit continuous forward and backward tracing of software flow; cross-references to source software and class of functions are required.
2321.18			Algorithms	Description of method of solution and of algorithms, shown in connection with problem statement and with software construction. Name methods used in software construction.
2321.19			Key to Codes Used	Description of formats and meanings of codes used. Show system of construction and admissible values.
2321.20			Error Handling	Show error checking tests and state available error messages and resulting actions.
2321.21			Mode of Operation	Show mode of operation, e.g., batch, online, real-time operation.

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Item No.	Information Item level 1	Information Item level 2	Information Item level 3	Content Information Item
2321.22		Software Structure	Software Structure	Structuring of software in terms of software elements (e.g. programs, subroutines, modules, procedures, common modules/procedures) in relation to problem solution (see No. 2321.14). This structuring can be shown graphically or textually.
2321.23		Software Blocks	Software Blocks	A list should show names, points of entry and interfaces of software blocks and their relationships.
2321.24	Operating System	Operating System	Operating System	State maker, name, release and version of operating systems the software can run under, without modification.
2321.25	Other Software	Other Software	Other Software	State maker, name, release and version of all other software required, e.g. auxiliary, communication programs or other software products required for use of the software.
2321.26			Programming Language	Unambiguous designation of programming language(s) used, including manufacturer, release and version.
2321.27			Development/ Execution Tools	State required tools (e.g. CASE tools, compilers, assemblers or interpreters) including manufacturer, release and version.
2321.28			Source Code	Sequence of instructions and declarations (e.g. initial values and constants) or rules in source language including comments, in the form required by the compiler, assembler, interpreter or commercial off-the-shelf software. Source code can also be part of the listing generated by the compiler, assembler or interpreter.
2321.29			Translator Lists and Link Lists	Documentation provided by compiler, assembler or interpreter and link software, showing translation from source code to loading and runtime form. If possible (for purposes of testing, error detection and maintenance) the following (or reference to their location) should be provided: - listing of compiled, assembled or interpreted software, including error documents, - listing of symbolic addresses and storage allocations, - listing for backwards tracing of address references, - listing of address references for loading.
2321.30		Software Size	Software Size	Total software size in commonly used units, e.g.. bytes, lines of source code. Estimate size, if necessary.
2321.31	Costs	Costs	Costs	State acquisition costs, e.g., purchase/rental price, and operating costs (maintenance costs) of software. Estimate costs, if necessary.

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Item No.	Information Item level 1	Information Item level 2	Information Item level 3	Content Information Item
2322	**Data Organization**			
2322.1	File Name	File Name	File Name	Statement of names for file identification, especially: - application oriented name, - name under which operating system links software with files, - if necessary, name of database which stores data.
2322.2	File Content	File Content	File Content	Application oriented brief description of content and purpose.
2322.3		File Index	File Index	Index of data or data groups of the files differing according to structure or meaning.
2322.4		Relationships	Relationships	Representation of relationships of data or data groups within the files, especially the structure (e.g., hierarchical, relational), data/data group sequence, collating sequence as well as possible key information for access.
2322.5	File Use	File Use	File Use	State use of files, such as: - transaction file, - print file.
2322.6		File Organization	File Organization	Data organization used such as: - sequential, - random with or without key, - associative, - relational. If a standardized method is used for storage, it should be identified. Any non-standard method should be described.
2322.7			File Structure	If the file has structure, this should be described; if not, this should be stated (along with an explanation of "why not").
2322.8		Data Medium	Data Medium	Details of kind and type of recording medium provided for file.
2322.9			File Label	Description or name of labels used, (e.g., for magnetic tapes, hard disk, CD-ROM), if appropriate, for each data medium.
2322.10			Storage Method	For each medium there should be stated the storage method, such as: - blocked/deblocked, - compressed/decompressed.
2322.11			Storage Requirement	Storage requirement of file on medium should be stated in standard units (e.g., byte or word) either in absolute terms or in the form of an algorithm.
2322.12			Code	State code used to represent characters.
2322.13		Access Type	Access Type	For each file the access methods used should be stated.
2322.14		Access Rules	Access Rules	Description/name of measures or methods which determine access by persons or software.
2322.15		Security	Security	Statement of time dependent or physical conditions for file security.
2322.16			Retention Period/ Expiration Date	Statement of retention period or expiration date. If necessary, state additional time periods or points in time for which access is limited.

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Item No.	Information Item level 1	Information Item level 2	Information Item level 3	Content Information Item
2322.17			Security Methods	Description or name of methods used for security.
2322.18		Reorganization	Reorganization	Statement of time dependent or application related conditions for reorganization and name or description of method used.
2322.19		Data Management	Data Management	Name, manufacturer and version of data management system.
2322.20			Maintenance Organization	Address of organization or name of person responsible for actual content of file.
2322.21	Data Group Name	Data Group Name	Data Group Name	Name of data group especially: - application oriented name, - name used for locating record in files.
2322.22	Data Group Content	Data Group Content	Data Group Content	Brief application oriented description of content and purpose.
2322.23	Data Group Structure	Data Group Structure	Data Group Structure	Representation of data structure by listing of data objects, showing their names, and their location in the data group. For variable data groups, length or sequence delimiters should be identified. If data objects are compressed for storage, the method should be described or named.
2322.24		Data Group Format	Data Group Format	State whether data group has fixed or variable length. Other formats should be described.
2322.25			Data Group Length	State data group length in standard units, e.g., byte or word. For variable length state at least maximum permissible length.
2322.26			Data Group Code	State code used to represent characters.
2322.27		Access Rules	Access Rules	Description or name-of-access method by persons or software.
2322.28	Data Object Name	Data Object Name	Data Object Name	State names used to identify data objects or data elements especially: - application oriented name, - name used for data groups.
2322.29	Data Object Content	Data Object Content	Data Object Content	Brief application oriented description of content.
2322.30	Data Object Type	Data Object Type	Data Object Type	State type of data object responsible for the object content, e.g., number, text, pointer, vector, time, table.
2322.31		Data Object Length	Data Object Length	State data object length in standard units (e.g. byte or word); for variable length state at least maximum permissible length.
2322.32			Data Object Code	State code used to represent characters.
2322.33		Range of Values	Range of Values	State range of values valid for data object.
2322.34			Data Format	Describe data format in which data object is stored. Also state fill character used in data object and representation of null data object character, if applicable. Format specification of the programming language is not sufficient.

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Item No.	Information Item level 1	Information Item level 2	Information Item level 3	Content Information Item
2322.35			Character Set	State characters valid in field.
2322.36			External Representation	State how data field should be formatted for external representation, e.g., print masks.
2322.37		Encoding/ Decoding	Encoding/ Decoding	If codes are used to represent data, these should be described in terms of environment/user related meaning. Encoding rules should be stated. Alternatively, reference can be made to a code list.
2322.38		Access Rules	Access Rules	Description or name-of-access method by persons or software.
2322.39		Costs	Costs	State costs for data administration. Estimate costs, if necessary.
	233 Physical Components Physical resources are equipment, materials and accommodation required for system operation.			
2331	**Processing Units** Processing units are the units performing the primary processing, including mainframes, servers, personal computers.			
2331.1	Name	Name	Name	State trade name, e.g., manufacturer/type.
2331.2		Dimensions	Dimensions	State size and number of processing units.
2331.3			Description	Accurate description of processing units (e.g., model, memory, release/version level, connection capability with other equipment) and additional equipment.
2331.4			Configuration	Show interconnection of processing units and other equipment, if possible in graphic form, e.g., configuration diagram.
2331.5	Costs	Costs	Costs	State acquisition costs, e.g., purchase/rental price, and operating costs (maintenance costs) of processing units. Estimate costs, if necessary.
2332	**Data Peripheral Equipment**			
2332.1	Name	Name	Name	State type (e.g., printer, auxiliary storage) and trade name (manufacturer/type).
2332.2		Operating Characteristics	Operating Characteristics	State typical technical characteristics and number of items of equipment.
2332.3			Description	Detailed description of peripherals including: - method of recording, - character density, - character set, - code, - line or block length, - storage capacity, - transmission procedure, - transmission speed.
2332.4		Data Transmission	Data Transmission	Description of transmission network used, if possible in graphic form.
2332.5	Costs	Costs	Costs	State acquisition costs, e.g., purchase/rental price, and operating costs (maintenance). Estimate costs, if necessary.

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Item No.	Information Item level 1	Information Item level 2	Information Item level 3	Content Information Item
2333	**Process Peripherals**			
2333.1	Name	Name	Name	State type (analogue input/output, digital input/output, network) and trade name (manufacturer/ type).
2333.2		Operating Characteristics	Operating Characteristics	State typical technical characteristics and number of equipment.
2333.3			Description	Detailed description of equipment including: - cycle time, - accuracy, - conversion time, - connection of several functional units, - dependence of transmission, - characteristics, due to type of connection, - distance.
2333.4			Processor Connections	Connection of processors or processing units, their relations (e.g., main or auxiliary, star, chain, network connection) and technical detail of interconnection, e.g., by data transmission or common storage.
2333.5	Costs	Costs	Costs	State costs for acquisition and operation of processor. Estimate costs, if necessary.
2334	**Other Equipment** Other necessary equipment including: - copiers, - microfilm, COM equipment, - bookkeeping machines, calculators, word processors, - data entry devices, e.g., offline, - separators, packing machines, - air conditioning, emergency power, alarm installations.			
2334.1	Name	Name	Name	State type and trade name (manufacturer/ type).
2334.2		Characteristics	Characteristics	State typical technical characteristics and number of pieces of equipment.
2334.3			Description	Detailed description of equipment, if possible reference manufacturer's documents.
2334.4		Application	Application	Explanation of how equipment is used in the process, if possible in graphic form.
2334.5	Costs	Costs	Costs	State costs for acquisition and operation of equipment. Estimate costs, if necessary.

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Item No.	Information Item level 1	level 2	level 3	Content Information Item
2335	**Supplies** This includes: - paper, forms, office supplies, - microfilm supplies, - magnetic media, non-magnetic media, - electric power, water.			
2335.1	Name	Name		State type and name of material, e.g., trade name, part number, form number.
2335.2		Characteristics		Technical properties specific to individual materials.
2335.3		Use		Statement on how and where material is to be used.
2335.4	Quantity	Quantity		Volume of material required.
2335.5	Costs	Costs		State cost of material. Estimate costs, if necessary.
2336	**Accommodation/Inventory** Description of the physical environment.			
2336.1	Name	Name		Name, location and description of capital equipment.
2336.2		Characteristics		State technical characteristics such as floor load, air conditioning.
2336.3		Utilization		Purpose of capital equipment.
2336.4	Size, Number	Size, Number		State size and number of capital equipment or inventory.
2336.5	Costs	Costs		State costs for acquisition and maintenance. Estimate costs, if necessary.
	24 Testing Description of requirements, procedures and results of tests based on system objectives and plans.			
241	**Test Objectives**			
241.1	Objective Name	Objective Name		Name of objective, e.g., error checking, acceptance test, system test.
241.2		Objective Content		Description of specific test objective definition to uniquely identify test objects (e.g., requirements specification, software module, overall system) and test scope, e.g., freedom from error, completeness, response time, standards compliance.
241.3		Test Limits		State test limits, including constraints, assumptions and execution sequence. Describe the limits of tests for each software process to be tested.
242	**Test Methods and Tools**			
242.1	Method Name	Method Name	Method Name	State name of test method (method or software) or indicate essential steps of method used.
242.2		Method Description	Method Description	Detailed description of test method used or reference to an external description of the method.
242.3		Test Environment	Test Environment	Detailed description of test bed or simulation environment.
242.4	Tool Name	Tool Name	Tool Name	State name of test tools or simulators used.
242.5		Tool Description	Tool Description	Description of test tools, test structures, test data structures, and test outputs or simulators used or reference an external description.
242.6			Tool Environment	Description of the test tool environment.

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Item No.	Information Item level 1	level 2	level 3	Content Information Item
243	**Test Cases/Benchmarks**			
243.1	Name	Name	Name	Name or description of test cases relative to test objectives, testing correspondence of solution with system objectives and requirements.
243.2		Test Input Description	Test Input Description	Statement of input data in a form permitting testing of results, with target values. Describe the test-input data, its purpose, test routines using the input, expected results and error messages.
243.3			Test Input Format	Description of the test input data format, range of values and data conversion factors. See No. 222 Data and No. 2322 Data Organization.
243.4		Test Output Description	Test Output Description	Statement of output data in a form permitting confirmation of results, with target values. Describe the test output data, its purpose, test routines producing the outputs, expected results, and error messages.
243.5			Test Output Format	Description of the test output data format, range of values and data conversion factors. See No. 222 Data and No. 2322 Data Organization.
243.6			Results	Results of tests in verifiable form.
	25 Installation Description of steps required to install the new system.			
251	**Installation/Use**			
251.1	Installation Method	Installation Method	Installation Method	Explanation of method by which the new system will be installed, e.g., parallel operation, stepwise installation.
251.2		Installation	Installation	Steps required to set up the system, including: - compilation, assembly, link runs, - initial load, - setting up of files, - preparation of hardware, - acquisition of additional materials.
251.3			Installation Control	Documentary evidence showing installation has been completed, including: - compiler, assembler, interpreter listing, - linkage editor listing, - data transfer documentation, - data installation documentation, - report on operational readiness of additional materials.
251.4			Release Authorization	Document certifying release of the system for operation.
251.5			Operation and Maintenance	Technical instructions for operation and for maintenance of the system.
251.6			Use	Instructions on how to use the system.

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