INTERNATIONAL STANDARD

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Software engineering — Systems and software Quality Requirements and Evaluation (SQuaRE) — Requirements for quality of Ready to Use Software Product (RUSP) and instructions for testing

Ingénierie du logiciel — Exigences de qualité et évaluation des systèmes et du logiciel (SQuaRE) — Exigences de qualité pour les progiciels et instructions d'essai

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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. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. 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 document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

ISO/IEC 25051 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 7, *Software and systems engineering*. This second edition cancels and replaces the first edition (ISO/IEC 25051:2006), which has been technically revised. It also incorporates the Technical Corrigendum ISO/IEC 25051:2006/Cor.1:2007.

The main changes are as follows:

— English and French titles corrected;

— modification of RUSP definition, scope and examples;

— harmonization with the current SQuaRE series.

ISO/IEC 25051 is a part of the SQuaRE series of International Standards, which consists of the following divisions:

— Quality Management Division (ISO/IEC 2500n);

— Quality Model Division (ISO/IEC 2501n);

— Quality Measurement Division (ISO/IEC 2502n);

— Quality Requirements Division (ISO/IEC 2503n);

— Quality Evaluation Division (ISO/IEC 2504n);

— Extension Division (ISO/IEC 25050: – ISO/IEC 25099).

Introduction

Ready to Use Software Product (RUSP) are used in an increasingly wide variety of application areas and their correct operation is often vital for business, safety and personal applications.

Ready to Use Software Product (RUSP) are packages sold to the acquirer who had no influence on its features and other qualities. Typically the software is sold pre-wrapped or downloaded via web store with its user documentation. A software product, which a user can use anytime thorough Cloud Computing may be considered as RUSP. The information provided on the cover of the package or the supplier website is often the only means whereby the manufacturer or marketing organization can communicate with the acquirer and user. It is therefore important that essential information is given to enable acquirers to evaluate the quality of the Ready to Use Software Product (RUSP) for their needs.

Selecting high quality Ready to Use Software Product (RUSP) is of prime importance, because Ready to Use Software Product (RUSP) may have to be operational in various environments and selected without the opportunity to compare performance among similar products. Suppliers need a way to ensure confidence in services given by the Ready to Use Software Product (RUSP) to the users. Some suppliers may choose a conformity evaluation group for evaluation or certification to assist them in providing this confidence.

In addition, when users require assurances that business or safety critical risks are involved, those assurances may need to be addressed by the user using techniques chosen by the user after the purchase. It is not the intent of this International Standard to specify minimum safety or business critical quality requirements for RUSP; however, informative guidance is given. (See Annex A.)

ISO/IEC 25051:2006 was developed based on ISO/IEC 9126-1:2001 and replaced ISO/IEC 12119:1994. This second edition of ISO/IEC 25051 is a revision of ISO/IEC 25051:2006, in order to conform to ISO/IEC 25010:2011, which replaced ISO/IEC 9126-1:2001 quality model.

These items are the major points for revising this International Standard, which provides a set of requirements for Ready to Use Software Product (RUSP) and requirements for testing a Ready to Use Software Product (RUSP) against its requirements.

Software engineering — Systems and software Quality Requirements and Evaluation (SQuaRE) — Requirements for quality of Ready to Use Software Product (RUSP) and instructions for testing

1 Scope

This International Standard is applicable to Ready to Use Software Product (RUSP).

In this International Standard, the term "RUSP" is used as an adjective and stands for "Ready to Use Software Product".

NOTE 1　　Examples of Ready to Use Software Product (RUSP) include but are not limited to text processors, spreadsheets, database control software, graphics packages, software for technical, scientific or real-time embedded functions, human resources management software, sales management, smartphone application, freeware and web software such as generators of websites/pages.

NOTE 2　　Open source software is not part of Ready to Use Software Product (RUSP).

This International Standard establishes:

a) Quality requirements for Ready to Use Software Product (RUSP);

b) Requirements for test documentation for the testing of Ready to Use Software Product (RUSP), including test plan, test description, and test results;

　　NOTE　　The collection of documents for test is called "test documentation".

c) Instructions for conformity evaluation of Ready to Use Software Product (RUSP).

It includes also recommendations for safety or business critical Ready to Use Software Product (RUSP).

This International Standard deals only with providing the user with confidence that the Ready to Use Software Product (RUSP) will perform as offered and delivered. It does not deal with the production realization (including activities and intermediate products, e.g. specifications). The quality system of a supplier is outside the scope of this International Standard.

The intended users of this International Standard include:

a) suppliers when:

　　1) specifying requirements for a Ready to Use Software Product (RUSP);

　　2) assessing their own software products against the claimed performance;

　　3) issuing declarations of conformity (ISO/IEC 17050);

　　4) applying for certificates or marks of conformity (ISO/IEC Guide 23);

b) certification bodies that may wish to establish a certification scheme (international, regional or national) (ISO/IEC Guide 28);

c) testing laboratories which will have to follow the instructions for testing when testing for a certificate or a mark of conformity (ISO/IEC 17025);

d) accreditation bodies for accrediting registration or certification bodies and testing laboratories;

e) potential acquirers who may:

1) compare the requirements for the intended work task with the information in product descriptions of existing software products;

2) look for certified Ready to Use Software Product (RUSP);

3) check if the requirements are otherwise met;

f) end users who may profit from better software products;

g) organizations:

1) establishing management and engineering environments based on the quality requirements and methods of this International Standard; and

2) managing and improving their quality processes "and personnel".

h) regulatory authorities who may require or recommend the requirements of this International Standard for Ready to Use Software Product (RUSP) used in safety or business-critical applications.

2 Conformance

A Ready to Use Software Product (RUSP) conforms to this International Standard if:

a) it has the properties specified in Clause 5;

b) it has been tested by producing test documentation that meets the requirements of Clause 6;

c) anomalies found during testing are documented and resolved prior to product release. Anomalies against advertised performance claims must be fixed or the performance claim must be removed. Known anomalies may be considered acceptable if:

1) the anomaly is not a violation of a performance claim; and

2) the supplier has duly considered the nature and the impact of the anomaly on the potential acquirer and deemed it negligible, and has preserved the documentation of the anomalies for future improvement.

Clause 7 and Annex A are optional.

NOTE   To facilitate the conformity evaluation, requirements of the present standard are drafted in a way that they are level 3 subclauses (numbered X.X.X.X). Informative notes complete these clauses and can serve as a guide.

3 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 25000, *Systems and software engineering — Systems and software Quality Requirements and Evaluation (SQuaRE) — Guide to SQuaRE*

ISO/IEC 25010, *Systems and software engineering — Systems and software Quality Requirements and Evaluation (SQuaRE) — System and software quality models*

4 Terms, definitions and abbreviated terms

4.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply:

4.1.1
acquirer
stakeholder that acquires or procures a product or service from a supplier

Note 1 to entry: The acquirer could be one of the following: buyer, customer, owner, purchaser.

[SOURCE: ISO/IEC 12207:2008]

4.1.2
anomaly
any condition that deviates from expectations based on requirements specifications, design documents, standards, etc. or from someone's perceptions or experiences

[SOURCE: IEEE Std 1044-2009]

4.1.3
application administration function
functions performed by users which include installation, configuration, application backup, maintenance (patching and upgrading) and uninstallation

4.1.4
conformity evaluation
systematic examination of the extent to which a product, process or service fulfils specified requirements

[SOURCE: ISO/IEC Guide 2:2004]

4.1.5
conformity evaluation report
document that describes the conduct and results of the evaluation carried out for a Ready to Use Software Product (RUSP)

Note 1 to entry: This was adapted from IEEE Std 610.12–1990.

4.1.6
Ready to Use Software Product
RUSP
software product available for any user, at cost or not, and use without the need to conduct development activities

Note 1 to entry: Ready to Use Software Product (RUSP) includes:

— the product description (including all cover information, data sheet, website information, etc.),

— the user documentation (necessary to install and use the software), including any configurations of the operating system/s or target computer required to operate the product,

— the software contained on a computer sensible media (disk, CD-ROM, internet downloadable, etc.).

Note 2 to entry: Software is mainly composed of programs and data.

Note 3 to entry: This definition applies also to product description, user documentation and software which are produced and supported as separate manufactured goods, but for which typical commercial fees and licensing considerations may not apply.

4.1.7
end user
individual person who ultimately benefits from the Ready to Use Software Product functionalities

Note 1 to entry: The end user may be a regular operator of the software product or a casual user such as a member of the public.

[SOURCE: ISO/IEC 25000:2005]

4.1.8
fault
incorrect step, process, or data definition in a computer program

[SOURCE: IEEE Std 610.12-1990]

4.1.9
maintenance
process of modifying a software system or component after delivery to correct faults, improve performance or others attributes, or adapt to a changed environment

[SOURCE: IEEE Std 610.12-1990]

4.1.10
pass/fail criteria
decision rules used to determine whether a software item or a software feature passes or fails a test

[SOURCE: IEEE Std 829.12-1998]

4.1.11
product description
document stating properties of software, with the main purpose of helping potential acquirers in the evaluation of the suitability for themselves of the software before purchasing it

4.1.12
product identification
software product name, version, variant, and date information

4.1.13
requirements document
document containing any combination of requirements or regulations to be met by a Ready to Use Software Product (RUSP)

Note 1 to entry: These documents may be technical reports, standards, requirements list (or model requirements specification) for a kind of user, or a statute or regulation imposed by a governing or regulatory body.

4.1.14
software function
implementation of an algorithm in the software with which the end user or the software can perform part or all of a work task

Note 1 to entry: A function does not need to be callable by the end user (e.g. automatic backup or saving of data).

4.1.15
software test environment
facilities, hardware, software, firmware, procedures, and documentation needed to perform qualification or other testing of software

[SOURCE: ISO/IEC/IEEE 24765:2010]

4.1.16
supplier
organization or individual that enters into an agreement with the acquirer for the supply of a product or service

Note 1 to entry: The "supplier" could be a contractor, producer, seller, or vendor.

Note 2 to entry: Sometimes the acquirer and the supplier are part of the same organization.

[SOURCE: ISO/IEC 12207:2008]

4.1.17
test
activity in which a system or component is executed under specified conditions, the results are observed or recorded, and an evaluation is made of some aspect of the system or component

[SOURCE: IEEE Std 610.12-1990]

4.1.18
test case
set of inputs, execution conditions, and expected results developed for a particular objective, such as exercise a particular program path or to verify compliance with a specific requirement

[SOURCE: IEEE Std 610.12-1990]

4.1.19
test documentation
collection of the documentation inherent to the testing activities

4.1.20
test objective
identified set of software characteristics to be measured under specified conditions by comparing actual behaviour with the required behaviour

Note 1 to entry: This was adapted from IEEE Std 610.12–1990.

4.1.21
test plan
document describing the scope, approach, resources, and schedule of intended testing activities

Note 1 to entry: This was adapted from IEEE Std 610.12–1990.

4.1.22
test procedure
detailed instructions for the set-up, execution, and evaluation of results for a given test case

[SOURCE: IEEE Std 610.12-1990]

4.1.23
testing
process of operating a system or component under specified conditions, observing or recording the results, and making an evaluation of some aspect of the system or component

[SOURCE: IEEE Std 610.12-1990]

4.1.24
testing description
description of the test execution conditions (i.e. test procedure)

4.1.25
user
individual or group that benefits from a RUSP during its utilization

Note 1 to entry: The role of user and the role of operator may be vested, simultaneously or sequentially, in the same individual or organization.

[SOURCE: ISO/IEC 12207:2008]

4.1.26
user documentation
information that is supplied with the software to help the user in their use of that software

4.2 Abbreviated termss

RUSP   Ready to Use Software Product

CM   Configuration Management

SQA   Software Quality Assurance

SQC   Software Quality Control

5 Requirements for Ready to Use Software Product (RUSP)

5.1 Requirements for product description

NOTE   The paragraph concerning the Cover information of ISO/IEC 9127 Software engineering – User documentation and cover information for consumer software package can be used as input for creating a product description.

5.1.1 Availability

5.1.1.1 The product description shall be available for potential acquirers and users of the product.

5.1.2 Contents

5.1.2.1 The product description should declare the quality characteristics during operating the software.

5.1.2.2 The product description shall contain information needed by potential acquirers to evaluate the suitability of the software for their needs.

5.1.2.3 The product description shall be free from internal inconsistences.

5.1.2.4 The statements included in the product description shall be testable or verifiable.

5.1.3 Identification and indications

5.1.3.1 The product description shall display a unique identification.

5.1.3.2 The Ready to Use Software Product (RUSP) shall be designated by its product identification.

5.1.3.3   The product description shall contain the name and address (postal or web) of the supplier and, if applicable, of the sellers, e-commerce sellers or distributors.

5.1.3.4   The product description shall identify the intended work tasks and services that can be performed with the software.

5.1.3.5   The product description shall identify the requirements documents when the supplier wants to claim conformity to documents defined by a law or by a regulatory body that affects the Ready to Use Software Product (RUSP).

5.1.3.6   The product description shall state whether support for operating the Ready to Use Software Product (RUSP) is offered or not.

5.1.3.7   The product description shall state whether maintenance is offered or not. If offered, the product description shall describe the maintenance services offered.

5.1.4   Mapping

5.1.4.1   All functions mentioned in the product description shall be classified according to the quality requirements for software characteristics (5.3.2 to 5.3.9).

5.1.5   Product quality - Functional suitability

5.1.5.1   The product description shall contain, as applicable, statements on Functional suitability, taking into account functional completeness, functional correctness and functional appropriateness, written such that verifiable evidence of compliance can be demonstrated, based on ISO/IEC 25010.

5.1.5.2   The product description shall provide an overview of end user callable functions of the product.

5.1.5.3   The product description shall describe all functions which the user may be encountered critical defects.

NOTE 1   Critical defects may be:

— data loss;

— deadlock.

NOTE 2   Refer to ISO/IEC 15026 for more information.

5.1.5.4   The product description shall describe all known limitation that the user may encounter.

NOTE   These limitations may be:

— minimum or maximum values;

— lengths of keys;

— maximum number of records in a file;

— maximum number of search criteria;

— minimum sample size.

5.1.5.5   If there are options and versions for software components, they shall be indicated without ambiguity

5.1.5.6   If prevention of unauthorized access, whether inadvertent or deliberate, to the software is provided, the product description shall include this information.

5.1.6   Product quality - Performance efficiency

5.1.6.1   The product description shall include statements of Performance efficiency, taking into account Time behaviour, Resource utilization and Capacity, written such that verifiable evidence of compliance can be demonstrated, based on ISO/IEC 25010.

5.1.6.2   All known conditions to Performance efficiency shall be described.

NOTE   Stated conditions may be:

— system configurations;

— resources needed for efficient working with the Ready to Use Software Product (RUSP), e.g. bandwidth, hard disk space, RAM, video card, wireless network card, CPU speed, etc.

5.1.6.3   The product description shall describe the capacity of the systems, which is particularly relevant to computer systems.

5.1.7   Product quality - Compatibility

5.1.7.1   The product description shall contain, as applicable, statements on Compatibility, taking into account Co-existence and Interoperability, written such that verifiable evidence of compliance can be demonstrated, based on ISO/IEC 25010.

5.1.7.2   The product description shall indicate where the Ready to Use Software Product (RUSP) relies on specific software and/or hardware with appropriate references.

NOTE   The reference may include:

— name of software and/or hardware (Server, Platform, etc...);

— version;

— specific operating system.

5.1.7.3   The product description shall identify user callable interfaces and the related called software.

5.1.8   Product quality - Usability

5.1.8.1   The product description shall contain, as applicable, statements on Usability, taking into account Appropriateness recognizability, Learnability, Operability, User error protection, User interface aesthetics and Accessibility, written such that verifiable evidence of compliance can be demonstrated, based on ISO/IEC 25010.

5.1.8.2   The product description shall specify the type of user interface.

NOTE   These interfaces may be:

— command line;

— menu;

— window;

— function key;

5.1.8.3   The product description shall specify the specific knowledge required for the use and operation of the software.

NOTE   They can be:

— knowledge of the database calls and protocol used;

— knowledge of a technical area;

— knowledge of an operating system;

— knowledge obtainable by special training;

— knowledge of a language other than that in which the product description is written.

5.1.8.4   The product description shall describe functions to protect user from error operation, if applicable.

5.1.8.5   The product description shall state technical protection against copyright infringement that can hamper usability, if applicable.

NOTE   These protections may be:

— programmed expiry dates for usage;

— interactive reminders to pay for copies.

5.1.8.6   The product description shall include provision for accessibility, particularly for users with disabilities and language differences.

5.1.9   Product quality - Reliability

5.1.9.1   The product description shall contain, as applicable, statements on Reliability, taking into account Maturity, Availability, Fault tolerance and Recoverability, written such that verifiable evidence of compliance can be demonstrated, based on ISO/IEC 25010.

NOTE   No statement claiming reliability should be made unless the developer can substantiate the claim with in-service data or other verifiable data.

5.1.9.2   The product description shall address the ability of the software to continue operating (i.e. to be available) in the case of user interface errors, errors in the application's own logic, or errors due to availability of system or network resources.

5.1.9.3   The product description shall include information on data saving and restoring procedures.

NOTE   An indication affirming that data backup may be executed by functions of the operating system is acceptable.

5.1.10 Product quality - Security

5.1.10.1 The product description shall contain, as applicable, statements on Security, taking into account Confidentiality, Integrity, Non-repudiation, Accountability and Authenticity, written such that verifiable evidence of compliance can be demonstrated, based on ISO/IEC 25010.

5.1.11 Product quality - Maintainability

5.1.11.1 The product description shall contain, as applicable, statements on Maintainability, taking into account Modularity, Reusability, Analysability, Modifiability and Testability, written such that verifiable evidence of compliance can be demonstrated, based on ISO/IEC 25010.

5.1.11.2 The product description shall include information on maintenance for the user.

NOTE   Information may be:

— monitoring on-going dynamic performance of the app;

— monitoring unexpected failures and significant conditions;

— monitoring operational indicators such as logs, alert screens;

— monitoring local data which are operated upon by the application.

5.1.11.3 If the user can adapt the software, then the tools or procedures for this adaptation and the conditions of their use shall be identified.

NOTE   Conditions can be:

— changing of parameters;

— changing of algorithms for computation;

— interface customization;

— assignments to function keys.

5.1.12 Product Quality - Portability

5.1.12.1 The product description shall contain, as applicable, statements on Portability, taking into account Adaptability, Installability and Replaceability, written such that verifiable evidence of compliance can be demonstrated, based on ISO/IEC 25010.

5.1.12.2 The product description shall specify the different configurations or supported configurations (hardware, software) for putting the software into use.

NOTE 1   Different configurations may be specified, e.g. for different work tasks, different boundary values or different efficiency requirements.

NOTE 2   These systems may be:

— operating systems;

— processing unit including co-processors;

— main memory size;

— types and sizes of peripheral storage;

— extension cards;

— input and output equipment;

— network environment;

— system software and other software.

5.1.12.3 The product description shall provide information on the installation procedure.

5.1.13 Quality in use - Effectiveness

5.1.13.1 The product description shall contain, as applicable, statements on quality in use Effectiveness written such that verifiable evidence of compliance can be demonstrated, based on ISO/IEC 25010.

5.1.13.2 The product description shall specify any product compliance reference for users to achieve specific goals.

5.1.14 Quality in use - Efficiency

5.1.14.1 The product description shall contain, as applicable, statements on quality in use Efficiency written such that verifiable evidence of compliance can be demonstrated, based on ISO/IEC 25010.

5.1.14.2 The product description shall indicate whether the Ready to Use Software Product (RUSP) is intended for multiple concurrent end users or for a single end user on a single system, and shall state the maximum number of concurrent end users feasible at a stated level of performance on the required system.

5.1.14.3 The product description shall contain information on resources needed for user to achieve specific goals.

5.1.15 Quality in use - Satisfaction

5.1.15.1 The product description shall contain, as applicable, statements on quality in use Satisfaction, taking into account Usefulness, Trust, Pleasure and Comfort, written such that verifiable evidence of compliance can be demonstrated, based on ISO/IEC 25010.

5.1.15.2 The product description shall contain a specific supplier contact for satisfaction guaranty on the use of the product.

5.1.16 Freedom from risk

5.1.16.1 The product description shall contain, as applicable, statements on quality in use Freedom from risk, taking into account Economic risk mitigation, Health and safety risk mitigation, Environmental risk mitigation, written such that verifiable evidence of compliance can be demonstrated, based on ISO/IEC 25010.

5.1.16.2 The product description shall contain the non-disclosure information in case of known risk due to the use of the software or the need of specifics trainings.

5.1.17 Context coverage

5.1.17.1 The product description shall contain, as applicable, statements on quality in use Context coverage, taking into account Context completeness and Flexibility, written such that verifiable evidence of compliance can be demonstrated, based on ISO/IEC 25010.

5.1.17.2 When the product description contains compliance information, the coverage of such compliance shall be clearly indicated.

5.2 Requirements for user documentation

NOTE   The paragraph concerning the Cover information of ISO/IEC 9127 Software engineering – User documentation and cover information for consumer software package can be used as input for creating user documentation.

5.2.1 Availability

5.2.1.1 The user documentation shall be available for users of the product.

5.2.2 Contents

5.2.2.1 The functions included in the user documentation shall be testable or verifiable.

5.2.3 Identification and indications

5.2.3.1 The user documentation shall display a unique identification.

5.2.3.2 The Ready to Use Software Product (RUSP) shall be designated by product identification.

5.2.3.3 The user documentation shall contain the name and address (postal or web) of the supplier.

5.2.3.4 The user documentation shall identify the intended work tasks and services that can be performed with the software.

5.2.4 Completeness

5.2.4.1 The user documentation shall contain the information necessary for the use of the software.

5.2.4.2 The user documentation shall describe all the functions stated in the product description and all the functions that can be called by the end user.

5.2.4.3 The user documentation shall list the errors and defects that are handled and cause application failure or termination, particularly, those conditions ending in application termination which end in loss of data.

5.2.4.4 The user documentation shall give guidance to backup and restoration of the necessary data.

5.2.4.5 The user documentation shall provide complete instructional and reference information for all critical software functions (software whose failure could have an impact on safety, or could cause large financial or social loss).

NOTE   See Annex A for more information.

5.2.4.6 The user documentation shall state the minimum required disk space for installation.

5.2.4.7 The user documentation shall include all information necessary for user performed application administration functions.

NOTE   example of information:

—   Information allowing the user to verify the successful completion of application administration functions.

5.2.4.8 If the user documentation is provided in several parts, at least one item in the set shall identify all the parts.

5.2.5 Correctness

5.2.5.1 All information in the user documentation shall be adequate for the main targeted users.

NOTE   All information in the user documentation should be traceable to an authoritative source for correctness.

5.2.5.2   The user documentation shall present the information free from ambiguities.

5.2.6   Consistency

5.2.6.1   The documents of the user documentation shall be free from contradiction within themselves, with each other, and with the product description.

5.2.7   Understandability

5.2.7.1   The user documentation shall be understandable by the end user population for which the Ready to Use Software Product (RUSP) is primarily targeted by using terminology and style understandable by its specialized audience.

5.2.7.2   Understanding of the user documentation shall be facilitated by an organized document list.

5.2.8   Product quality – Functional suitability

5.2.8.1   The user documentation shall state all limitations given in the product description.

5.2.9   Product quality – Compatibility

5.2.9.1   The user documentation shall provide the necessary information to identify the compatibility to use the software.

5.2.9.2   The user documentation shall indicate where the Ready to Use Software Product (RUSP) relies on specific software and/or hardware with appropriate references.

NOTE   The reference may include:

— name of software and/or hardware;

— version;

— specific operating system.

5.2.9.3   If the user documentation makes reference to known user callable interfaces to other software, these interfaces or software shall be identified.

5.2.10   Product quality – Usability/Learnability

5.2.10.1 The user documentation shall provide the information necessary to learn how to use the software.

NOTE   the user documentation may reference additional information contained within the Ready to Use Software Product (RUSP) itself, or within auxiliary materials such as training.

5.2.11   Product quality – Usability/Operability

5.2.11.1 If user documentation is not provided in printed form, the documentation shall indicate whether it can be printed, and if so, how to obtain a printed copy.

5.2.11.2 User documentation other than cards and quick reference guides shall have a table of contents, or list of topics, and an index.

5.2.11.3 The user documentation shall define terms and acronyms giving definitions necessary for the understanding of certain terms used in the document.

5.2.12 Product quality – Reliability

5.2.12.1 The user documentation shall describe the reliability characteristics and their operations.

5.2.13 Product quality – Security

5.2.13.1 The user documentation shall provide the information necessary to identify the level of security managed by the software for each data managed by the user.

5.2.14 Product quality – Maintainability

5.2.14.1 The user documentation shall state whether maintenance is offered or not. If offered, the user documentation shall describe the maintenance services in accordance with the release plan of the software.

5.2.15 Quality in use – Effectiveness

5.2.15.1 The user documentation shall help the user reaching Quality in use Effectiveness as stated in the product description.

5.2.16 Quality in use – Efficiency

5.2.16.1 The user documentation shall help the user reaching Quality in use Efficiency as stated in the product description.

5.2.17 Quality in use – Satisfaction

5.2.17.1 The user documentation shall help the user reaching Quality in use Satisfaction as stated in the product description.

5.2.17.2 The user documentation shall contain a specific supplier contact for satisfaction feedback on the use of the product.

5.2.18 Quality in use – Freedom from risk

5.2.18.1 The user documentation shall help the user reaching Quality in use Freedom from risk as stated in the product description.

5.2.19 Quality in use – Context coverage

5.2.19.1 The user documentation shall help the user reaching Quality in use Context coverage as stated in the product description.

5.3   Quality requirements for software

5.3.1   Product quality – Functional suitability

5.3.1.1   Following installation, it shall be recognizable whether or not the software can perform a function.

NOTE   The verification of good functioning can be done by using supplied test cases or by self-testing with corresponding messages, or by other tests conducted by the user.

5.3.1.2   All functions mentioned in the user documentation shall be executable with the corresponding facilities, properties, and data, and within the given limitations, according to all the statements in the user documentation.

5.3.1.3   The software shall comply with all the requirements in any requirements document referenced by the product description.

5.3.1.4   The software shall be free from contradictions within itself and with the product description and user documentation.

NOTE   Example: two identical actions shall return the same result.

5.3.1.5   The control of the software operation by the end user following user documentation and the software behaviour shall be consistent.

5.3.2   Product quality – Performance efficiency

5.3.2.1   The software shall conform to the Performance efficiency stated in the product description.

NOTE   Message to end user when time to wait for a response is unreasonable.

5.3.3   Product quality – Compatibility

5.3.3.1   If the user can carry out the installation, the software shall provide a means to control the compatibility of the installed components.

5.3.3.2   The software shall perform in accordance with the Compatibility features defined in the user documentation and the product description.

5.3.3.3   If the software needs parameters or pre-requisite environments to perform compatibility as defined, it shall be stated clearly in the user documentation.

5.3.3.4   The type of compatibility, function, data or flow shall be clearly specified in the user documentation.

5.3.3.5   The software shall identify which components of the software are taking in charge the compatibility.

5.3.3.6   If the user can carry out the installation and the software has any co-existence constraint to any component installed, it shall be stated before installation occurs.

5.3.4 Product quality – Usability

5.3.4.1 The user shall recognize whether the product or system is appropriate for its needs based on the product description or after first manipulation.

5.3.4.2 The messages (questions, instruction, etc...) and results of the software execution shall be understandable.

NOTE 1 The understandability can be achieved:

— by an adequate selection of terms;

— by graphical representations;

— by provision of background information;

— by the explanations of a help function;

— by a visible and easy to read text or graphic output;

— by an easy to hear audio output.

NOTE 2 With respect to usability, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of standards in the ISO 9241 series. In particular parts 1, 2, 10 to 17 of the ISO 9241 series and ISO/IEC 25062 should be considered.

5.3.4.3 Each software error message shall indicate how to correct the error or who to contact to report errors.

NOTE This information can be a reference to an item in the user documentation.

5.3.4.4 Messages from the software shall be so designed that the end user can easily understand the type of message.

NOTE These messages can be:

— acknowledgement;

— queries from software;

— information;

— warnings;

— error messages.

5.3.4.5 Input screen formats, reports, and other outputs shall be clear and understandable by the users.

5.3.4.6 The execution of functions that have serious consequences shall be reversible, or the software shall give a clear warning of the consequences and request confirmation before executing the command.

NOTE Erasure and overwriting of data, as well as interruptions of a lengthy processing operation, having serious consequences.

5.3.4.7 The end user shall be able to learn how to use a function by means provided by the user interface, help function or user documentation.

5.3.4.8 The end user shall be advised when executing a function with response time beyond commonly expected limits is encountered.

5.3.4.9   Each element (data medium, file, etc...) shall bear the product identification and, if there is more than one, an identification number or text.

5.3.4.10   The user interface shall enable pleasing and satisfying for the user.

5.3.5   Product quality – Reliability

5.3.5.1   The software shall perform in accordance with the Reliability features defined in the user documentation.

5.3.5.2   The function related to error handling shall be consistent with corresponding statements in the product description and in the user documentation.

NOTE   The software cannot be held responsible for many kinds of failures originating in the operating system or network.

5.3.5.3   The software shall not lose data when used within the limitations stated in the user documentation.

NOTE   This requirement may be met in the case that:

— capacity is exploited up to the specified limits;

— attempts are made to exploit capacity beyond the specified limits;

— an incorrect input is made by the end user or from other software listed in the product description;

— explicit instructions in the user documentation are violated.

5.3.5.4   The software shall recognize violations of syntactic conditions for input and it shall not process this as permissible input.

5.3.5.5   The software shall have the ability to recover from a fatal error and be transparent to the user.

5.3.6   Product quality – Security

5.3.6.1   The software shall perform in accordance with the Security features stated in the user documentation.

5.3.6.2   The software shall prevent through features unauthorized access (incident or deliberate) to programs and data.

5.3.6.3   The software shall recognize the violations to the integrity of structured databases or files and shall provide means to keep track of such events and means to inform the authorized user.

5.3.6.4   The software shall have the ability to manage access right management regarding security features.

5.3.6.5   The software shall provide a mean to secure the confidentiality of data and limit access to authorized users.

5.3.7   Product quality – Maintainability

5.3.7.1   The software shall perform in accordance with the Maintainability features stated in the user documentation.

NOTE   Examples: capability to diagnose for deficiencies, capability to enable a modification.

5.3.7.2   The software shall be able to identify for each basic component the release number and the associated quality characteristics, parameters, and data model.

5.3.7.3   The software shall be able to identify at any time the release number of each basic component included in the version installed and impacting the features of the software.

NOTE   Basic component can be:

— Data screen

— Database model

— Sub program

— Interface

5.3.8   Product quality – Portability

5.3.8.1   If the user can carry out the installation, the software shall be installed successfully by following the information in the installation documentation.

5.3.8.2   Successful installation and correct operation of the software application shall be verified for all supported platforms and systems listed in the product description.

5.3.8.3   The software shall provide a mean for the user to uninstall all its installed components.

5.3.9   Quality in use - Effectiveness

5.3.9.1   The software shall perform in accordance with the Quality in use Effectiveness features stated in the product description and helped from the user document.

5.3.9.2   The software shall provide means to evaluate the impact of the software on expected compliance goals.

5.3.10   Quality in use - Efficiency

5.3.10.1 The software shall perform in accordance with the Quality in use Efficiency features stated in the product description and helped from the user document.

5.3.10.2 The software shall provide means to evaluate the efficiency of the software in use when goals shall be achieved.

5.3.11   Quality in use - Satisfaction

5.3.11.1 The software shall perform in accordance with the Quality in use Satisfaction features stated in the product description and helped from the user document.

5.3.11.2 The software shall provide a way to contact directly supplier support when under maintenance contract.

5.3.12 Quality in use - Freedom from risk

5.3.12.1 The software shall perform in accordance with the Quality in use Freedom from risk features stated in the product description and helped from the user document.

5.3.12.2 The software shall provide specific validation process and administration right for all function classified as a risk.

5.3.12.3 All functions classified at risk shall have an audit trail.

5.3.13 Quality in use - Context coverage

5.3.13.1 The software shall perform in accordance with the Quality in use Context coverage features stated in the product description and helped from the user document.

5.3.13.2 When the software uses parameters that limit the functional coverage, the user shall know the current coverage in use.

6 Requirements for test documentation

6.1 General Requirements

6.1.1 Purpose

6.1.1.1 The test documentation purpose is to demonstrate the conformity of the software to the requirements defined in the subclause 5.3. It contains all the elements allowing this demonstration.

6.1.2 Consistency

6.1.2.1 Information contained in each document of the test documentation shall be verifiable and correct.

6.1.2.2 Each document of the test documentation shall be free from contradiction within themselves and with product description and user documentation.

6.1.3 Requirements for content

6.1.3.1 The test documentation shall contain:

a) the test plan;

b) the test description;

c) the tests results.

6.1.3.2 The test documentation shall contain a list of all the documents that compose it, with their titles and their identifiers.

6.1.3.3 Each document of the test documentation shall include:

a) a title;

b) the product identification;

c) a history of the modifications or any other element describing the evolution of the document;

d) contents or a description of the content;

e) the identifier of the documents referred to in the body of the document;

f) information relating to the authors and the inspectors;

g) a glossary

6.1.3.4 The test documentation may be composed of one or more documents.

6.1.4 Approach

NOTE   No specific test techniques or methods are recommended.

6.1.4.1 All quality characteristics mentioned in the product description and in subclause 5.3, Quality requirements for software, shall be subject to test cases.

6.1.4.2 Each quality characteristics mentioned in the product description and in subclause 5.3, Quality requirements for software, shall be the objective of at least one test case.

NOTE   The test plan can refer any other document, providing that there is a relation between this document and the user documentation.

6.1.4.3 All the functions described in the user documentation, as well as the combinations of functions representative of the task to be achieved, shall be subject to test cases.

6.1.4.4 Each function described in the user documentation shall be subject to at least one test case.

6.1.4.5 The test cases shall demonstrate the conformity of the software to the statements in the user documentation.

6.1.4.6 When requirements documents are mentioned in the product description, they shall be subject to test cases.

6.1.4.7 The level of functional decomposition selected as the basis for the test case design shall be indicated.

NOTE   A function can be:

— a paragraph of the user documentation;

— a command of a shell;

— a button on the user interface;

— a language command.

6.1.4.8 The method for designing test cases shall be indicated.

NOTE   Possible design methods are:

— boundary value analysis;

— checklist;

— data flow analysis;

— fault insertion;

— volume testing.

6.1.4.9 All the installation procedures shall be subject to test cases.

6.1.4.10 All the operational limits indicated in the product description and user documentation shall be subject to test cases.

6.1.4.11 Identified violations of syntactic conditions for input shall be subject to test cases.

6.1.4.12 If examples are indicated in the user documentation, they shall be used as test cases but the whole test shall not be limited to these examples.

6.1.4.13 If any requirement in Clauses 5.3, Quality requirements for software, is not applicable, the reason shall be stated.

6.1.4.14 The software shall be tested in all the configurations of application mentioned in the product description and/or user documentation.

6.2 Requirements for the test plan

6.2.1 Pass/fail criteria

6.2.1.1 The test plan shall indicate the criteria used to decide if the test results demonstrate the conformity of the software to the product description and user documentation.

6.2.2 Software Test environment

6.2.2.1 The test plan shall specify the software test environment in which the tests are to be executed.

NOTE   Demonstration of equivalence of configurations can be used.

6.2.3 Schedule

6.2.3.1 The test plan shall specify the test milestones and the schedule for each testing activity.

NOTE   examples of test activity are:

— test environment setup.

— test documentation

— test execution

6.2.4 Risk

6.2.4.1 The test plan shall identify, update and record risks on testing activities and their response statuses.

6.2.5 Human Resource

6.2.5.1 The test plan shall indicate the dedicated human resources for each testing activity.

6.2.6 Tool and equipment resource

6.2.6.1 The test plan shall identify the tools necessary for the execution of the test cases.

6.2.6.2 The test plan shall describe, when using specific tool and environment, the reason of selection and expected results.

6.2.7 Communication

6.2.7.1 The test plan shall specify the communication model and methods used to share the test documentation and the test items to the stakeholders.

6.3 Requirements for the testing description

6.3.1 Test case description

6.3.1.1 The description of each test case shall include:

a) its test objective;

b) a unique identifier;

c) input data and test boundaries for test;

d) the detailed steps to perform;

e) the expected behaviour of the system;

f) the expected output from the test case;

g) the criteria for the result interpretation;

h) the criteria used to decide on positive or negative result of the test case;

i) the reference to quality characteristics based on ISO/IEC 25010 can be stated.

6.3.1.2 Test environment and other test conditions (detailed configuration and preliminary works) shall be stated if it is necessary to bring additional information compared to those provided in the test plan.

6.3.2 Test procedures

6.3.2.1 The test procedure shall include:

a) the test preparation;

b) the actions necessary to begin and to execute the test;

c) the actions necessary to record the test results;

d) the conditions and actions to stop and eventually restart the tests.

6.3.2.2 Test procedures shall be sufficiently detailed to provide for repeatability and reproducibility of the tests.

6.3.2.3 Following correction, there shall be a procedure for re-testing of the functions concerned and any related functions.

NOTE   A pseudo-language or a command language may be used to describe the test procedures.

6.4   Requirements for the test results

6.4.1   Execution report

6.4.1.1   The execution report shall include an overall summary of the results of the test cases.

6.4.1.2   The execution report shall demonstrate that all test cases have been executed according to the test plan

6.4.1.3   For each test case, the execution reports shall include:

a)   the identifier of the test case;

b)   the date of the test execution;

c)   the name and the function of the person having carried out the test;

d)   the execution result of the test case;

e)   the list of the found anomalies;

f)   for each anomaly, the reference to the corresponding anomaly report;

g)   the reference to quality characteristics based on ISO/IEC 25010 can be stated.

6.4.2   Anomaly report

6.4.2.1   The anomaly report shall include an overall summary of the anomalies found and, if any, the corrections and the verifications by re-testing.

6.4.2.2   The descriptive part of the anomaly report shall include for each anomaly:

a)   the identifier of the anomaly;

b)   the identifier of the software;

c)   the anomaly description;

d)   the point in the test case the anomaly occurred;

e)   the severity and reproducibility of the anomaly;

f)   the reference to quality characteristics based on ISO/IEC 25010 can be stated.

NOTE 1   The severity may be "crash", "blocking", "major", "minor", "trivial".

NOTE 2   The reproducibility may be "always", "sometimes", "random", "have not tried", "unable to reproduce" "N/A".

6.4.2.3   The correction part of the anomaly report shall demonstrate that all anomalies found have been corrected or the reason why it has not been corrected.

6.4.2.4   The correction part of the anomaly report shall include for each correction:

a)   the identifier of the correction;

b)   the correction date;

c) the name of the corrector;

d) the identifier of the modification corresponding to the correction;

e) the possible impact of the correction;

f) the possible comments of the corrector.

6.4.2.5 The verification part by re-testing of the anomaly report shall demonstrate that all corrected functions have the behaviour defined in the user documentation.

6.4.2.6 The verification part by re-testing of the anomaly report shall include, for each verification:

a) the identifier of the verification;

b) the verification date;

c) the name of the verifier;

d) the test cases used for the verification;

e) the results of verification;

f) the reference to quality characteristics based on ISO/IEC 25010 can be stated.

6.4.3 Assessment of the test results

6.4.3.1 The assessment of the execution report and anomaly report shall demonstrate that all expected behaviours were obtained, within the limits of the criteria used to decide if the test results show the conformity of the software.

7 Instructions for conformity evaluation

7.1 General Principles

The product description, the user documentation, and the software to be delivered, as parts of the Ready to Use Software Product (RUSP), shall be evaluated for conformity with the requirements in Clause 5.

NOTE The term "conformity evaluation" does not imply any technique or tool: testing, validation, verification, review, analysis, etc…

These instructions are primarily aimed at conformity evaluation group evaluation. The conformity evaluation group can be a testing laboratory working in accordance with some certification scheme or an in house testing laboratory that is independent from the supplier of the Ready to Use Software Product (RUSP).

7.2 Conformity evaluation pre-requisites

7.2.1 Presence of Ready to Use Software Product (RUSP) items

For evaluation of a Ready to Use Software Product (RUSP), all items to be delivered (see 5.2.4.8) as well as the requirements documents identified in the product description (see 5.1.3.5) shall be available.

7.2.2 Presence of system elements

All components of the computer systems, if described in the product description, shall exist and be available for conformity evaluation.

7.3 Conformity evaluation activities

NOTE   No specific techniques or tools are recommended.

The evaluation conformity approach should be described in a document.

7.3.1 Product description conformity evaluation

A conformity evaluation is carried out to determine the conformity of the product description to the requirements in subclause 5.1.

7.3.2 User documentation conformity evaluation

A conformity evaluation is carried out to determine the conformity of the user documentation to the requirements in subclause 5.2.

7.3.3 Software conformity evaluation

A conformity evaluation is carried out to determine the conformity of the software to the requirements in subclause 5.3 by producing test documentation conforming to the requirements in Clause 6, but without the part related to anomalies corrections and to verification by re-testing (subclauses 6.4.2.3 to 6.4.2.6).

NOTE   The test documentation includes the descriptive part for the anomalies found, however correction of discovered anomalies is beyond the scope of a conformity evaluation group conformity evaluation.

7.4 Conformity evaluation process

The supplier provides the Ready to Use Software Product (RUSP) to the conformity evaluation group. The supplier can also provide test documentation.

If the supplier provides only the Ready to Use Software Product (RUSP), without the test documentation, the conformity evaluation group shall:

a) carry out a conformity evaluation of the product description, the user documentation, and the software according to subclause 7.3;

b) record the results in a conformity evaluation report, according to subclause 7.5.

If the supplier provides the Ready to Use Software Product (RUSP) and the test documentation, the conformity evaluation group shall:

a) carry out a conformity evaluation of the product description and the user documentation according to subclauses 7.3.1 and 7.3.2;

b) carry out a conformity evaluation to determine the conformity of the test documentation to the requirements in Clause 6;

c) record the results in a conformity evaluation report, according to subclause 7.5.

NOTE 1   The conformity of the test documentation to the requirements in Clause 6 establishes the conformity of the software to the requirements in subclause 5.3.

NOTE 2   Additional test documentation may be produced during conformity evaluation.

7.5 Conformity evaluation report

The conformity evaluation group shall prepare the conformity evaluation report.

The conformity evaluation report shall establish the conformity of a Ready to Use Software Product (RUSP) to the requirements of Clause 5.

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The conformity evaluation report shall contain the following items:

a)   the Ready to Use Software Product (RUSP) identification;

b)   the name of the person who conducted the evaluation;

c)   the date of evaluation completion and, if any, testing completion;

d)   if any, the computer systems used for testing (hardware, software, and their configuration);

e)   the documents used, with their identification;

f)   the summary of conformity evaluation activities and, if any, testing activities;

g)   the summary of conformity evaluation results and, if any, testing results;

h)   the detailed results of conformity evaluation and, if any, testing;

i)   if any, the list of non-conformities to requirements.

The results part of the conformity evaluation report (items f to h in previous paragraph) shall contain the product description and the user documentation conformity evaluation results. According to the supplied elements, it shall also contain one of the two following elements:

a)   the results of the tests of the software to the requirements in subclause 5.3, i.e. the descriptive part of the anomaly report (subclause 6.4.2.2), in case of the supplier provides only the Ready to Use Software Product (RUSP), without the test documentation;

b)   the results of the conformity evaluation of the test documentation to the requirements in Clause 6, in case of the supplier provide the Ready to Use Software Product (RUSP) and the test documentation.

NOTE   The conformity evaluation report contains only the descriptive part of the anomaly report because it is not the responsibility of the conformity evaluation group to correct the anomalies.

For conformity evaluation reports in printed form, the identification of the conformity evaluation report (testing laboratory, Ready to Use Software Product (RUSP) identification, date of the conformity evaluation report) and the total number of its pages shall appear on each page of the conformity evaluation report.

The conformity evaluation report shall include:

a)   a statement to the effect that the evaluation and, if any, test results relate only to the items evaluated and tested;

b)   a statement that the conformity evaluation report shall not be reproduced, except in full, without the written approval of the testing laboratory.

7.6   Follow up conformity evaluation

When a Ready to Use Software Product (RUSP), which has already been evaluated for conformity, is evaluated again, taking into consideration the previous conformity evaluation, then:

a)   all changed parts in the documents and software shall be evaluated as if it were a new Ready to Use Software Product (RUSP);

b)   all unchanged parts that are expected to be influenced by the changed parts or by changes in a required system shall be evaluated as if it were new software;

c)   all other parts shall at least be evaluated by samples.