

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Medical electrical equipment –
Part 1-6: General requirements for basic safety and essential performance –
Collateral standard: Usability**

**Appareils électromédicaux –
Partie 1-6: Exigences générales pour la sécurité de base et les performances
essentielles – Norme collatérale: Aptitude à l'utilisation**



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Edition 3.2 2020-07
CONSOLIDATED VERSION

INTERNATIONAL STANDARD

NORME INTERNATIONALE



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Collateral standard: Usability**

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essentiels – Norme collatérale: Aptitude à l'utilisation**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

MEDICAL ELECTRICAL EQUIPMENT –

Part 1-6: General requirements for basic safety and essential performance – Collateral standard: Usability

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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This consolidated version of the official IEC Standard and its amendment has been prepared for user convenience.

IEC 60601-1-6 edition 3.2 contains the third edition (2010-01) [documents 62A/682/FDIS and 62A/689/RVD], its amendment 1 (2013-10) [documents 62A/890/FDIS and 62A/898/RVD] and its amendment 2 (2020-07) [documents 62A/1391/FDIS and 62A/1406/RVD].

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendments 1 and 2. Additions are in green text, deletions are in strikethrough red text. A separate Final version with all changes accepted is available in this publication.

International Standard IEC 60601-1-6 has been prepared by subcommittee 62A: Common aspects of electrical equipment used in medical practice, of IEC technical committee 62: Electrical equipment in medical practice.

This third edition constitutes a collateral standard to IEC 60601-1: *Medical electrical equipment – Part 1: General requirements for basic safety and essential performance* hereafter referred to as the general standard.

This document cancels and replaces the second edition of IEC 60601-1-6 which has been technically revised. ~~To allow for equipment manufacturers and testing organizations to make products and to equip themselves for conducting revised tests in accordance with this third edition, it is recommended by SC 62A that the content of this document not be adopted for mandatory implementation earlier than 3 years from the date of publication for equipment newly designed and not earlier than 5 years from the date of publication for equipment already in production.~~

This edition of IEC 60601-1-6 was revised to align with the USABILITY ENGINEERING PROCESS in IEC 62366-1.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

In the IEC 60601 series of publications, collateral standards specify general requirements for safety applicable to:

- a subgroup of MEDICAL ELECTRICAL EQUIPMENT (e.g. radiological equipment); or
- a specific characteristic of all MEDICAL ELECTRICAL EQUIPMENT, not fully addressed in the general standard (e.g. alarm systems).

In this collateral standard, the following print types are used:

- Requirements and definitions: roman type.
- *Test specifications or instructions to modify requirements in IEC 62366-1: italic type.*
- Informative material appearing outside of tables, such as notes, examples and references: in smaller type. Normative text of tables is also in a smaller type.
- TERMS DEFINED IN CLAUSE 3 OF THE GENERAL STANDARD, IN THIS COLLATERAL STANDARD OR AS NOTED: SMALL CAPITALS.

In referring to the structure of this standard, the term

- “clause” means one of the numbered divisions within the table of contents, inclusive of all subdivisions (e.g. Clause 4 includes subclauses 4.1, 4.2, etc.);
- “subclause” means a numbered subdivision of a clause (e.g. 4.1 and 4.2 are all subclauses of Clause 4).

References to clauses within this standard are preceded by the term “Clause” followed by the clause number. References to subclauses within this standard are by number only.

In this standard, the conjunctive “or” is used as an “inclusive or” so a statement is true if any combination of the conditions is true.

The verbal forms used in this standard conform to usage described in Annex H of the ISO/IEC Directives, Part 2. For the purposes of this standard, the auxiliary verb:

- “shall” means that compliance with a requirement or a test is mandatory for compliance with this standard;

- “should” means that compliance with a requirement or a test is recommended but is not mandatory for compliance with this standard;
- “may” is used to describe a permissible way to achieve compliance with a requirement or test.

Clauses, subclauses and definitions for which a rationale is provided in informative Annex A are marked with an asterisk (*).

~~To assist the user of this collateral standard in migrating from IEC 60601-1-6:2006 to IEC 62366:2007+A1¹⁾, Table B.1 has been developed. This table maps the clauses and subclause of IEC 60601-1-6:2006 to the comparable clauses and subclauses in IEC 62366:2007+A1¹⁾. To further assist the user of this collateral standard, Table C.1 relates certain elements of IEC 62366 to other standards, such as parts of the ISO 9241 series, which might be useful in meeting the requirements of IEC 62366.~~

To assist the user to implement the USABILITY ENGINEERING PROCESS, the Technical Report IEC TR 62366-2 [1]²⁾ is available. IEC TR 62366-2 contains tutorial information to assist MANUFACTURERS in complying with this standard. The Technical Report also goes beyond safety-related aspects and offers more detailed descriptions of USABILITY ENGINEERING methods that can be applied to the development of ME EQUIPMENT.

A list of all parts of the IEC 60601 series, under the general title: *Medical electrical equipment*, can be found on the IEC website.

The committee has decided that the contents of the base publication and its amendments will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

NOTE The attention of National Committees is drawn to the fact that equipment manufacturers and testing organizations may need a transitional period following publication of a new, amended or revised IEC or ISO publication in which to make products in accordance with the new requirements and to equip themselves for conducting new or revised tests. It is the recommendation of the committee that the content of this publication be adopted for mandatory implementation nationally not earlier than 3 years from the date of publication.

IMPORTANT – The “colour inside” logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this publication using a colour printer.

¹⁾ ~~To be published~~

²⁾ Figures in square brackets refer to the Bibliography.

INTRODUCTION

Medical practice is increasingly using MEDICAL ELECTRICAL EQUIPMENT for observation and treatment of PATIENTS. USE ERRORS caused by inadequate MEDICAL ELECTRICAL EQUIPMENT USABILITY have become an increasing cause for concern. Much of ME EQUIPMENT developed without applying a USABILITY ENGINEERING PROCESS are non-intuitive, difficult to learn and to use. As healthcare evolves, less skilled OPERATORS including PATIENTS themselves are now using MEDICAL ELECTRICAL EQUIPMENT while the MEDICAL ELECTRICAL EQUIPMENT itself is becoming more complicated. In simpler times, the OPERATOR of the MEDICAL ELECTRICAL EQUIPMENT might be able to cope with an ambiguous, difficult-to-use OPERATOR-EQUIPMENT INTERFACE. The design of usable MEDICAL ELECTRICAL EQUIPMENT is a challenging endeavour. The design of the OPERATOR-EQUIPMENT INTERFACE to achieve ~~adequate (safe)~~ safe use (adequate USABILITY) requires a very different skill set than that of the technical implementation of that interface.

The USABILITY ENGINEERING PROCESS is intended to achieve reasonable USABILITY, which in turn is intended to minimise USE ERRORS and to minimise use-associated RISKS. Some, but not all, forms of incorrect use are amenable to be controlled by the MANUFACTURER. The relationship of the USABILITY ENGINEERING PROCESS to the RISK MANAGEMENT PROCESS is described in ~~Figure A.1 of IEC 62366:2007~~ Figure A.4 of IEC 62366-1:2015.

The first and second editions of this collateral standard described a USABILITY ENGINEERING PROCESS that was tailored to the needs of MANUFACTURERS of MEDICAL ELECTRICAL EQUIPMENT. They provided guidance on how to implement and execute the PROCESS to improve the safety of MEDICAL ELECTRICAL EQUIPMENT.

Subclause 1.3 of IEC 60601-1:2005+A1:2012 states that, “Applicable collateral standards become normative at the date of their publication and shall apply together with this standard.” Consequently, the second edition of this collateral standard was developed specifically to align with IEC 60601-1:2005 and published in 2006. All other relevant collateral standards within the jurisdiction of IEC Subcommittee 62A also were updated and republished between 2006 and 2007 except for IEC 60601-1-1 and IEC 60601-1-4. These collateral standards were not revised because their requirements were integrated into IEC 60601-1:2005.

After the second edition of this collateral standard was published, IEC Subcommittee 62A, in partnership with ISO Technical Committee 210, developed and published a general usability engineering standard applicable to all MEDICAL DEVICES—IEC 62366:2007. IEC 62366 is based on IEC 60601-1-6, but was refined using the experience gained with applying the first edition of IEC 60601-1-6. Although the processes described in IEC 60601-1-6:2006 and IEC 62366:2007 are very similar, they are not identical.

At its Auckland meeting in 2008, IEC Technical Committee 62 approved a project to revise IEC 60601-1-6 so that it would reduce or eliminate duplication with IEC 62366 and also create a bridge between IEC 60601-1 and IEC 62366. This third edition of IEC 60601-1-6 creates that bridge and will enable a MANUFACTURER to conform to the requirements in IEC 60601-1:2005 that make normative reference to IEC 60601-1-6 by employing a USABILITY ENGINEERING PROCESS complying with IEC 62366:2007. At a point in the future, that bridge can be eliminated by revising or amending IEC 60601-1 to include a direct reference to IEC 62366 and, as necessary, adding any additional requirements that are specific to medical electrical equipment, such as those contained in Clauses 4 and 5 of this collateral standard, to IEC 60601-1 or as a normative annex to IEC 62366.

This collateral standard is intended to be useful not only for MANUFACTURER(S) of MEDICAL ELECTRICAL EQUIPMENT, but also for technical committees responsible for the preparation of particular MEDICAL ELECTRICAL EQUIPMENT standards. It should be noted that clinical investigations conducted according to ISO 14155-4 [2] and ~~usability testing for verification or validation~~ USABILITY TESTS for FORMATIVE EVALUATION or SUMMATIVE EVALUATION according to this standard are two fundamentally different activities and should not be confused.

Amendment 1 removes the reference to the complete life-cycle process (including post-production monitoring and surveillance). IEC 60601 (the series) is confined to performing a TYPE TEST of ME EQUIPMENT. It does not extend to the entire life cycle including post-production monitoring and periodic maintenance of the USABILITY ENGINEERING PROCESS.

INTRODUCTION to Amendment 1

The third edition of IEC 60601-1-6 was published in 2010. The third edition created a bridge that enables a MANUFACTURER to conform to the requirements in IEC 60601-1 that make normative reference to IEC 60601-1-6 by employing a USABILITY ENGINEERING PROCESS complying with IEC 62366:2007. However, IEC 62366 contains certain life-cycle process elements that are inconsistent with a TYPE TEST.

This amendment is intended to clarify the elements of the USABILITY ENGINEERING PROCESS that are required for compliance with the IEC 60601 series.

INTRODUCTION to Amendment 2

The third edition of IEC 60601-1-6 was published in 2010 and amended in 2013. Since the publication of IEC 60601-1-6:2010+A1:2013, the IEC Subcommittee (SC) 62A Secretariat has been collecting issues from a variety of sources including comments from National Committees. At the November 2015 meeting of IEC/SC 62A in Kobe, Japan, the subcommittee initiated a process to identify high-priority issues that need to be considered in an amendment and should not wait until the fourth edition of IEC 60601-1-6, which is presently targeted for publication sometime after 2024.

Those issues selected for inclusion on the final "short list" to be addressed in Amendment 2 were those approved by a 2/3 majority of the National Committees present and voting at the Frankfurt meeting of SC 62A. At the meeting held on 10 October 2016, nine items were presented to the National Committees present. All nine items received the required 2/3 majority of the National Committees present and voting and have been included in the "short list" for consideration in preparing Amendment 2. All remaining issues have been placed on a "long list" for consideration in the fourth edition of IEC 60601-1-6.

The "short list" of issues was documented in the design specification for Amendment 2. Because these issues are closely related to the application of IEC 62366-1 to MEDICAL ELECTRICAL EQUIPMENT and MEDICAL ELECTRICAL SYSTEMS, the work was assigned to IEC/SC 62A-ISO/TC 210 Joint Working Group (JWG) 4. JWG 4 was directed to consider each issue described in Clause 6 of the design specification and develop an appropriate solution for the identified problem. That final solution in this amendment can encompass any technical solution proposed by the author of the issue or it can involve a different solution developed by the expert group. The expert group can also have recommended that no change to the document was justified by the problem statement.

This amendment updates the references from the now obsolete IEC 62366:2007 to the current USABILITY ENGINEERING PROCESS standard, IEC 62366-1:2015+A1:2020.

Because this is an amendment to IEC 60601-1-6:2010, the style in force at the time of publication of IEC 60601-1-6 has been applied to this amendment. The style specified in ISO/IEC Directives Part 2:2018 has only been applied when implementing the new style guidance would not result in additional editorial changes. For example, references to amendments take the following form: "IEC 60601-1:2005+A1:2012+A2:2020".

Users of this document should note that when constructing the dated references to specific elements in a standard, such as definitions, amendments are only referenced if they modified the text being cited. For example, if a reference is made to a definition that has not been modified by an amendment, then the reference to the amendment is not included in the dated reference.

MEDICAL ELECTRICAL EQUIPMENT –

Part 1-6: General requirements for basic safety and essential performance – Collateral standard: Usability

1 Scope, object and related standards

1.1 * Scope

This International Standard specifies a PROCESS for a MANUFACTURER to analyse, specify, ~~design, VERIFY and VALIDATE USABILITY~~ develop and evaluate the USABILITY, as it relates to BASIC SAFETY and ESSENTIAL PERFORMANCE of MEDICAL ELECTRICAL EQUIPMENT, hereafter referred to as ME EQUIPMENT.

This USABILITY ENGINEERING PROCESS assesses and mitigates RISKS caused by USABILITY problems associated with CORRECT USE and USE ERRORS, i.e., NORMAL USE. It can be used to identify but does not assess or mitigate RISKS associated with ABNORMAL USE.

~~If the USABILITY ENGINEERING PROCESS detailed in this collateral standard has been complied with and the acceptance criteria documented in the USABILITY VALIDATION plan have been met (see 5.9 of IEC 62366:2007), then the RESIDUAL RISKS, as defined in ISO 14971, associated with USABILITY of ME EQUIPMENT are presumed to be acceptable, unless there is OBJECTIVE EVIDENCE to the contrary (see 4.1.2 of IEC 62366:2007).~~

If the USABILITY ENGINEERING PROCESS detailed in this collateral standard has been complied with, then the USABILITY of ME EQUIPMENT as it relates to BASIC SAFETY and ESSENTIAL PERFORMANCE is presumed to be acceptable, unless there is OBJECTIVE EVIDENCE to the contrary.

NOTE Such OBJECTIVE EVIDENCE can subsequently originate from POST-PRODUCTION surveillance.

1.2 Object

The object of this collateral standard is to specify general requirements that are in addition to those of the general standard and to serve as the basis for particular standards.

1.3 Related standards

1.3.1 IEC 60601-1

For ME EQUIPMENT, this collateral standard complements IEC 60601-1.

When referring to IEC 60601-1 or to this collateral standard, either individually or in combination, the following conventions are used:

- "the general standard" designates IEC 60601-1 alone ~~(IEC 60601-1:2005+A1:2012)~~, including any amendments;
- "this collateral standard" designates IEC 60601-1-6 alone ~~(IEC 60601-1-6:2010+A1:2013)~~, including any amendments;
- "this standard" designates the combination of the general standard and this collateral standard.

1.3.2 Particular standards

A requirement in a particular standard takes priority over the corresponding requirement in this collateral standard.

2 Normative references

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

NOTE The way in which these referenced documents are cited determines the extent (in whole or in part) to which they apply.

IEC 60601-1:2005, *Medical electrical equipment – Part 1: General requirements for basic safety and essential performance*
Amendment 1:2012
Amendment 2:2020

~~IEC 60601-1-8:2006, *Medical electrical equipment – Part 1-8: General requirements for basic safety and essential performance – Collateral standard: General requirements, tests and guidance for alarm systems in medical electrical equipment and medical electrical systems*~~
~~Amendment 1:2012~~

~~IEC 62366:2007, *Medical devices – Application of usability engineering to medical devices*~~
~~Amendment 1:—³⁾~~

IEC 62366-1:2015, *Medical devices – Part 1: Application of usability engineering to medical devices*
Amendment 1:2020

ISO 14971:~~2007~~2019, *Medical devices – Application of risk management to medical devices*

3 Terms and definitions

~~For the purposes of this document, the terms and definitions given in IEC 60601-1:2005+A1:2012, IEC 60601-1-8:2006+A1:2012, IEC 62366:2007+A1:—³⁾ and the following definitions apply.~~

For the purposes of this document, the terms and definitions given in IEC 60601-1:2005+A1:2012+A2:2020, IEC 62366-1:2015+A1:2020, ISO 14971:2019 and the following definitions apply.

NOTE An index of defined terms used with this collateral standard is found beginning on page 30.

3.1

* OPERATOR-EQUIPMENT INTERFACE

~~means by which the OPERATOR and the ME-EQUIPMENT communicate~~

~~[ANSI/AAMI HE 74:2001, definition 3.24 modified]~~

~~NOTE The ACCOMPANYING DOCUMENTS are considered part of the ME-EQUIPMENT and the OPERATOR-EQUIPMENT INTERFACE.~~

³⁾-To be published

means by which the OPERATOR and the ME EQUIPMENT interact

Note 1 to entry: The ACCOMPANYING DOCUMENTS are considered part of the ME EQUIPMENT and its OPERATOR INTERFACE.

Note 2 to entry: OPERATOR INTERFACE includes all the elements of the ME EQUIPMENT with which the OPERATOR interacts including the physical aspects of the ME EQUIPMENT as well as visual, auditory, tactile displays and is not limited to a software interface.

Note 3 to entry: For the purposes of this standard, the MANUFACTURER may treat the combination of ME EQUIPMENT and other equipment as a single OPERATOR INTERFACE.

Note 4 to entry: See IEC 62366-1:2015, 3.26.

3.2

OPERATOR PROFILE

~~summary of the mental, physical and demographic traits of the intended OPERATOR population, as well as any special characteristics that can have a bearing on design decisions, such as occupational skills and job requirements~~

summary of the mental, physical and demographic traits of the OPERATOR GROUP, as well as characteristics, such as knowledge, skills and abilities, which can have a bearing on design decisions

[SOURCE: IEC 62366-1:2015+A1:2020, definition 3.29, modified — Replaced "a USER GROUP" with "the OPERATOR GROUP".]

3.3

OPERATOR GROUP

subset of OPERATORS who are differentiated from other OPERATORS by factors that are likely to influence their interactions with the ME EQUIPMENT

Note 1 to entry: Attributes of OPERATOR GROUPS can include age, culture, expertise.

[SOURCE: IEC 62366-1:2015+A1:2020, 3.25, modified — Replaced "USER" with "OPERATOR" and "MEDICAL DEVICE" with "ME EQUIPMENT".]

4 General requirements

4.1 * Conditions for application to ME EQUIPMENT

The ME EQUIPMENT shall provide adequate USABILITY such that the RISKS resulting from ~~NORMAL USE and USE ERROR~~ NORMAL USE, i.e. CORRECT USE and USE ERROR, are acceptable. See also 7.1.1 and 12.2 of the general standard.

Compliance with this subclause is considered to exist when compliance with 4.2 and other clauses and subclauses of this collateral standard is demonstrated.

4.2 * USABILITY ENGINEERING PROCESS for ME EQUIPMENT

~~A USABILITY ENGINEERING PROCESS complying with IEC 62366A1:—⁴⁾— shall be performed except:~~

- ~~— the planning for and execution of production and post-production monitoring in the context of applying the USABILITY ENGINEERING PROCESS within the framework of ISO 14971, and~~
- ~~— maintenance of the USABILITY ENGINEERING PROCESS.~~

⁴⁾ To be published

~~In applying IEC 62366, the terms in this collateral standard and those in IEC 60601-1:2005+A1:2012 shall be used as follows:~~

- ~~• The term "MEDICAL DEVICE" shall assume the same meaning as ME EQUIPMENT.~~
- ~~• The term "USER" shall assume the same meaning as OPERATOR.~~
- ~~• The term "PATIENT" shall include animals.~~
- ~~• The term "SAFETY" shall assume the same meaning as BASIC SAFETY and ESSENTIAL PERFORMANCE.~~
- ~~• The term "USER INTERFACE" shall assume the same meaning as OPERATOR-EQUIPMENT INTERFACE.~~
- ~~• The term "USER PROFILE" shall assume the same meaning as OPERATOR PROFILE.~~

~~Compliance is checked by inspection of the USABILITY ENGINEERING FILE. Evidence of compliance with this clause and all requirements of this standard referring to inspection of the USABILITY ENGINEERING FILE are satisfied if the MANUFACTURER has:~~

- ~~— established a USABILITY ENGINEERING PROCESS;~~
- ~~— established acceptance criteria for USABILITY; and~~
- ~~— demonstrated that the acceptance criteria for USABILITY have been met.~~

A USABILITY ENGINEERING PROCESS complying with IEC 62366-1:2015+A1:2020 shall be performed except:

- the planning for and execution of production and POST-PRODUCTION monitoring in the context of applying the USABILITY ENGINEERING PROCESS within the framework of ISO 14971, and
- maintenance of the USABILITY ENGINEERING PROCESS.

In applying IEC 62366-1:2015+A1:2020, the terms in this collateral standard and those in IEC 60601-1:2005+A1:2012+A2:2020 shall be used as follows.

- The term "ACCOMPANYING DOCUMENTATION" shall assume the same meaning as ACCOMPANYING DOCUMENTS.
- The term "MEDICAL DEVICE" shall assume the same meaning as ME EQUIPMENT.
- The term "USER" shall assume the same meaning as OPERATOR.
- The term "PATIENT" shall include animals.
- The term "SAFETY" shall assume the same meaning as BASIC SAFETY and ESSENTIAL PERFORMANCE.
- The term "USER GROUP" shall assume the same meaning as OPERATOR GROUP.
- The term "USER INTERFACE" shall assume the same meaning as OPERATOR INTERFACE.
- The term "USER PROFILE" shall assume the same meaning as OPERATOR PROFILE.

Compliance is checked by inspection of the USABILITY ENGINEERING FILE. Evidence of compliance with this clause and all requirements of this standard referring to inspection of the USABILITY ENGINEERING FILE are satisfied if the MANUFACTURER has demonstrated compliance with IEC 62366-1:2015+A1:2020.

5 * ~~Replacement of requirements given in IEC 62366~~ ME EQUIPMENT ACCOMPANYING DOCUMENTS

~~In addition to requirements of IEC 62366 the following replacements shall apply:~~

~~Replace the first two paragraphs including NOTES 1 and 2 of Clause 6 of IEC 62366:2007+A1~~⁵⁾ ~~by:~~

The instructions for use shall include a brief description of the ME EQUIPMENT, its physical operating principles and significant physical and performance characteristics relevant to its ~~USABILITY~~ use. The same information shall also be included in the technical description, if this is provided as a separate document.

NOTE An important purpose of this description is to help the OPERATOR to develop a correct mental model of the ME EQUIPMENT.

The instructions for use shall contain a summary of the ~~application specification~~ USE SPECIFICATION as specified in IEC 62366-1:2015+A1:2020, 5.1.

Compliance is checked by inspection.

⁵⁾~~To be published~~

Annex A (informative)

General guidance and rationale

A.1 General guidance

This annex provides a concise rationale for the important requirements of this collateral standard. Its purpose is to promote effective application of the collateral standard by explaining the reasons for the requirements and provide additional guidance where appropriate.

A.2 Rationale for particular clauses and subclauses

The following are rationales for specific clauses and subclauses in this collateral standard, with clause and subclause numbers parallel to those in the body of the document.

Subclause 1.1 – Scope

This collateral standard focuses on the USABILITY of the OPERATOR-~~EQUIPMENT~~ INTERFACE of ME EQUIPMENT. USABILITY, in general, includes attributes such as OPERATOR satisfaction and EFFICIENCY. These attributes might be related to the BASIC SAFETY or ESSENTIAL PERFORMANCE of the ME EQUIPMENT. A degradation of these attributes can increase the probability of USE ERROR. Examples of attributes that are not considered could include the aesthetics of the ME EQUIPMENT or the amount of supplies consumed.

Definition 3.1 – OPERATOR-~~EQUIPMENT~~ INTERFACE

The OPERATOR-~~EQUIPMENT~~ INTERFACE includes all means of communication between the ME EQUIPMENT to the OPERATOR and the OPERATOR to the ME EQUIPMENT. These means include, but are not limited to:

- ~~markings and ACCOMPANYING DOCUMENTS;~~
- ~~lights;~~
- ~~video displays;~~
- ~~push buttons;~~
- ~~touch screens;~~
- ~~auditory and visual INFORMATION SIGNALS;~~
- ~~ALARM SIGNALS;~~
- ~~vibratory signals;~~
- ~~keyboard and mouse; and~~
- ~~haptic controls.~~
- elements that require manual manipulation;
- cables and tubing connections;
- accessories;
- handles;
- force required to move the weight;
- work surface height;
- dimensions that affect reach requirements;

- markings and ACCOMPANYING DOCUMENTS;
- video displays;
- push buttons;
- touch screens;
- auditory, vibratory, tactile, and visual signals to inform OPERATORS;
- voice recognition;
- keyboard and mouse; and
- haptic controls.

Subclause 4.1 – Conditions for application to ME EQUIPMENT

This collateral standard specifies requirements addressing particular ~~RISKS associated with USABILITY~~ use-related RISKS. When these requirements are complied with, the RESIDUAL ~~RISKS associated with USABILITY~~ use-related RISKS are presumed to be acceptable unless there is OBJECTIVE EVIDENCE to the contrary. This follows from 4.2 of the general standard, which states “Where this standard or any of its collateral or particular standards specify verifiable requirements addressing particular RISKS, and these requirements are complied with, the RESIDUAL RISKS addressed by these requirements shall be presumed to be acceptable unless there is OBJECTIVE EVIDENCE to the contrary.”

The criteria for judging RISK acceptability are ~~established by the USABILITY VALIDATION plan, which specifies the criteria for determining successful VALIDATION of the USABILITY of the PRIMARY OPERATING FUNCTIONS~~ described in the SUMMATIVE EVALUATION plan, which specifies the criteria for determining that the OPERATOR INTERFACE can be used safely.

Subclause 4.2 – USABILITY ENGINEERING PROCESS for ME EQUIPMENT

The first edition of this collateral standard was published in 2004, and introduced a USABILITY ENGINEERING PROCESS tailored to ME EQUIPMENT. The second edition was published in 2006 and was intended to align the collateral standard with the third edition of IEC 60601-1 — principally the inclusion in IEC 60601-1:2005 of the requirement to conduct a RISK MANAGEMENT PROCESS following ISO 14971. The USABILITY ENGINEERING PROCESS described in the second edition of IEC 60601-1-6 was little altered from that in the first edition.

Shortly after the publication of the 2004 edition of IEC 60601-1-6, IEC Subcommittee 62A formed a joint project with ISO Technical Committee 210 to develop a general USABILITY ENGINEERING PROCESS standard applicable to all MEDICAL DEVICES as defined in the ISO quality system standard, ISO 13485:2003. This project was similar in scope to the effort that took the RISK MANAGEMENT PROCESS described in IEC 60601-1-4 and generalized it to produce ISO 14971. The result of the joint IEC/SC 62A – ISO/TC 210 USABILITY standard project was IEC 62366:2007.

While the USABILITY ENGINEERING PROCESS described in IEC 62366 is more mature and refined than the PROCESS in the second edition of IEC 60601-1-6, it is fundamentally the same PROCESS ~~involving the same elements~~.

The scope of IEC 60601-1 and of this collateral standard is confined to performing a TYPE TEST of ME EQUIPMENT; it does not extend to life-cycle monitoring. For this reason, the monitoring of production and post-production information and the planning thereof, as required by the ISO 14971 framework, is excluded from the USABILITY ENGINEERING PROCESS described in this standard. The requirement in IEC 62366-1 for periodic maintenance of the USABILITY ENGINEERING PROCESS is also excluded.

As with the RISK MANAGEMENT PROCESS before it, the existence of a generalized standard for USABILITY ENGINEERING eliminates the need for much, but not all, of the content in the second edition of IEC 60601-1-6. For example, IEC 62366 defines the USER as the “person using a

operating or handling, the MEDICAL DEVICE". This definition includes those who clean, maintain or install the MEDICAL DEVICE. In IEC 60601-1:2005+A1:2012+A2:2020, persons performing those functions are described as SERVICE PERSONNEL. This subclause bridges between the general PROCESS requirement in IEC 62366-1 and the specific application to ME EQUIPMENT.

Clause 5—Replacement of requirements given in IEC 62366

~~Clause 6 of IEC 62366:2007 specifies the general requirements for the material to be included in the ACCOMPANYING DOCUMENT, if such a document is provided. The ACCOMPANYING DOCUMENT is required to include a summary of the application specification (see 5.1 of IEC 62366). This replacement paragraph clarifies that for ME EQUIPMENT the summary is described in the same terms used in subclause 7.9.2.5 of IEC 60601-1:2005+A1:2012 to specify the ME EQUIPMENT description.~~

~~In IEC 60601-1, the ACCOMPANYING DOCUMENTS consist of the instructions for use and the technical description. IEC 62366, on the other hand, discusses the ACCOMPANYING DOCUMENT without specifically identifying any sub-parts. IEC 60601-1 anticipates that the instructions for use and the technical description can be provided as separate physical documents. If they are, then the summary of the application specification is required to appear in both documents.~~

Annex B (informative)

Mapping between the elements of IEC 60601-1-6:2006 and the related elements in IEC 62366:2007

This annex contains a mapping of the clauses and subclause of IEC 60601-1-6:2006 to the comparable clauses and subclauses in IEC 62366:2007+A1⁶⁾. Table B.1 is intended to provide a tool to assist users of IEC 60601-1-6:2006 to trace requirements between that edition and their equivalent requirements in IEC 62366:2007+A1⁶⁾.

**Table B.1 – Mapping between the elements of IEC 60601-1-6:2006
and the related elements in IEC 62366:2007+A1⁶⁾**

IEC 60601-1-6:2006		Related elements in IEC 62366:2007+A1 ⁶⁾	
Clause	Title	Clause	Title
4	Scope, object and related standards	4	Scope NOTE—IEC 62366:2007+A1 ⁶⁾ applies to MEDICAL DEVICES as defined in 3.11. That definition is identical to that in ISO 13485:2003.
2	Normative references	2	Normative references
3	Terms and definitions	3	Terms and definitions
3.1	ABNORMAL USE	3.1	ABNORMAL USE
IEC 60601-1: 2005+A1:2012, 3.4	ACCOMPANYING DOCUMENT	3.2	ACCOMPANYING DOCUMENT
IEC 60601-1-8: 2006+A1:2012, 3.3	ALARM LIMIT	3.3	ALARM LIMIT
IEC 60601-1-8: 2006+A1:2012, 3.4	ALARM OFF	3.4	ALARM OFF
IEC 60601-1-8: 2006+A1:2012, 3.9	ALARM SIGNAL	3.5	ALARM SIGNAL
IEC 60601-1-8: 2006+A1:2012, 3.11	ALARM SYSTEM	3.6	ALARM SYSTEM
IEC 60601-1: 2005+A1:2012, 3.10	BASIC SAFETY	ISO 14971: 2007, 2.24	SAFETY NOTE—SAFETY is used as defined term in IEC 62366.
IEC 60601-1: 2005+A1:2012, 3.27	ESSENTIAL PERFORMANCE		
X		3.7	CORRECT USE NOTE—This is a new term in IEC 62366, and is defined as “NORMAL USE without USE ERROR.”
3.2	EFFECTIVENESS	3.8	EFFECTIVENESS
3.3	EFFICIENCY	3.9	EFFICIENCY

⁶⁾ To be published

Table B.1 (continued)

IEC 60601-1-6:2006		Related elements in IEC 62366:2007+A1— 7)	
Clause	Title	Clause	Title
IEC 60601-1: 2005+A1:2012, 3.37	HAND-HELD		NOTE—Not a defined term in IEC 62366.
IEC 60601-1: 2005+A1:2012, 3.38	HARM	ISO 14971: 2007, 2.2	HARM
IEC 60601-1: 2005+A1:2012, 3.39	HAZARD	ISO 14971: 2007, 2.3	HAZARD
IEC 60601-1: 2005+A1:2012, 3.40	HAZARDOUS SITUATION	ISO 14971: 2007, 2.4	HAZARDOUS SITUATION
IEC 60601-1-8: 2006+A1:2012, 3.23	INFORMATION SIGNAL	3.10	INFORMATION SIGNAL
IEC 60601-1: 2005+A1:2012, 3.44	INTENDED USE	ISO 14971: 2007, 2.5	INTENDED USE
IEC 60601-1: 2005+A1:2012, 3.55	MANUFACTURER	ISO 14971: 2007, 2.8	MANUFACTURER
IEC 60601-1: 2005+A1:2012, 3.63	MEDICAL ELECTRICAL EQUIPMENT	3.11	MEDICAL DEVICE
IEC 60601-1: 2005+A1:2012, 3.71	NORMAL USE	3.12	NORMAL USE NOTE—The phrase, “or in accordance with generally accepted practice for these MEDICAL DEVICES provided without instructions for use” has been added to deal with MEDICAL DEVICES, such as simple surgical instruments that are not accompanied by instructions for use.
IEC 60601-1: 2005+A1:2012, 3.72	OBJECTIVE EVIDENCE	ISO 14971: 2007, 2.10	OBJECTIVE EVIDENCE
IEC 60601-1: 2005+A1:2012, 3.73	OPERATOR	3.23	USER NOTE—In IEC 62366, the USER includes but is not limited to cleaners, maintainers and installers. In IEC 60601-1:2005+A1:2012, individuals who install, assemble, maintain or repair ME EQUIPMENT are described as “SERVICE PERSONNEL.”
3.4	OPERATOR-EQUIPMENT INTERFACE	3.24	USER INTERFACE NOTE—The word “communicate” was replaced by “interact”.
3.5	OPERATOR PROFILE	3.25	USER PROFILE
IEC 60601-1: 2005+A1:2012, 3.76	PATIENT	3.13	PATIENT NOTE—“Animal” has been deleted from the IEC 60601-1 definition.
3.6	PRIMARY OPERATING FUNCTION	3.14	PRIMARY OPERATING FUNCTION
IEC 60601-1: 2005+A1:2012, 3.89	PROCESS	ISO 14971: 2007, 2.13	PROCESS
3.7	REASONABLY FORESEEABLE MISUSE		NOTE—Not a defined term in IEC 62366.

7) To be published

Table B.1 (continued)

IEC 60601-1-6:2006		Related elements in IEC 62366:2007+A1— 8)	
Clause	Title	Clause	Title
IEC 60601-1-8:2006 +A1:2012, 3.34	REMINDER SIGNAL	3.15	REMINDER SIGNAL
IEC 60601-1:2005+A1:2012, 3.100	RESIDUAL RISK	ISO 14971:2007, 2.15	RESIDUAL RISK
IEC 60601-1:2005+A1:2012, 3.101	RESPONSIBLE ORGANIZATION	3.16	RESPONSIBLE ORGANIZATION
IEC 60601-1:2005+A1:2012, 3.102	RISK	ISO 14971:2007, 2.16	RISK
IEC 60601-1:2005+A1:2012, 3.103	RISK ANALYSIS	ISO 14971:2007, 2.17	RISK ANALYSIS
IEC 60601-1:2005+A1:2012, 3.105	RISK CONTROL	ISO 14971:2007, 2.19	RISK CONTROL
IEC 60601-1:2005+A1:2012, 3.106	RISK EVALUATION	ISO 14971:2007, 2.21	RISK EVALUATION
IEC 60601-1:2005+A1:2012, 3.107	RISK MANAGEMENT	ISO 14971:2007, 2.22	RISK MANAGEMENT
IEC 60601-1:2005+A1:2012, 3.108	RISK MANAGEMENT FILE	ISO 14971:2007, 2.23	RISK MANAGEMENT FILE
IEC 60601-1:2005+A1:2012, 3.114	SEVERITY	ISO 14971:2007, 2.25	SEVERITY
3.8	TRAINING		NOTE—Not a defined term in IEC 62366.
3.9	USE ERROR	3.21	USE ERROR
3.10	USE SCENARIO	3.22	USE SCENARIO NOTE—The phrase “used to specify and test the USABILITY of the ME EQUIPMENT” is replaced by “as performed by a specified USER in a specified environment” to make the definition more general.
3.11	USABILITY	3.17	USABILITY NOTE 1—The phrase “of the USER INTERFACE” has been inserted into the definition. NOTE 2—Impaired EFFICIENCY can also lead to USE ERRORS. The OPERATOR might be induced to take inappropriate short-cuts if the ME EQUIPMENT does not meet their expectations.
3.12	USABILITY ENGINEERING	3.18	USABILITY ENGINEERING
3.13	USABILITY ENGINEERING FILE	3.19	USABILITY ENGINEERING FILE
3.14	USABILITY SPECIFICATION	3.20	USABILITY SPECIFICATION
3.15	VALIDATION	3.26	VALIDATION

8) To be published

Table B.1 (continued)

IEC 60601-1-6:2006		Related elements in IEC 62366:2007+A1— 9)	
Clause	Title	Clause	Title
IEC 60601-1: 2005+A1:2012, 3.138	VERIFICATION	ISO 14971: 2007, 2.28	VERIFICATION
		3.27	USER INTERFACE OF UNKNOWN PROVENANCE UOUP NOTE—Amendment 1 to IEC 62366 added a new term that was not in IEC 60601-1-6:2006.
4	General requirements	4	Principles
4.1	Conditions for application to ME EQUIPMENT	4.1.2	RESIDUAL RISK This requirement is covered in 4.1 of this collateral standard as well as in 4.1.2 of IEC 62366. NOTE—This subclause in IEC 62366 mimics the statement in the fourth bullet of 4.2 of IEC 60601-1:2005+A1:2012 and closes the loop with respect to the acceptability of RESIDUAL RISKS associated with USABILITY when the process described in IEC 62366 has been complied with and the acceptance criteria document in the USABILITY VALIDATION plan have been met.
4.2	RISK MANAGEMENT PROCESS for ME EQUIPMENT	5.3.1	Identification of characteristics related to SAFETY NOTE—In IEC 62366, the list of items to be considered in that part of the RISK ANALYSIS specified in ISO 14971:2007, 4.2 has been reduced to: — the application specification including the user profile(s); and — the frequently used functions. IEC 62366 explicitly requires the frequently used functions to be identified as an input to the RISK ANALYSIS. In IEC 60601-1-6:2006, this was implicit in the definition of PRIMARY OPERATING FUNCTION.
		5.3.2	Identification of known or foreseeable HAZARDS and HAZARDOUS SITUATIONS NOTE—In IEC 62366, the list of items to be considered has been expanded from that in 4.2 of IEC 60601-1-6:2006. The list now includes: — preliminary use scenarios; and — if an incorrect mental model of the operation of the device can cause a use error resulting in a hazardous situation. IEC 62366 requires that the severity of possible harms be recorded in usability engineering file so that this information is available in case a risk/benefit analysis is required in subclause 5.9 of IEC 62366:2007+A1— 9).
5	ME EQUIPMENT identification, marking and documents		NOTE—There is no equivalent heading in IEC 62366.

9) To be published

Table B.1 (continued)

IEC 60601-1-6:2006		Related elements in IEC 62366:2007+A1—10)	
Clause	Title	Clause	Title
5.1	ACCOMPANYING DOCUMENTS	6	ACCOMPANYING DOCUMENT NOTE—IEC 62366 does not distinguish between the instructions for use and the technical description. It refers only to the ACCOMPANYING DOCUMENTS. This requirement to include a summary of the MEDICAL DEVICE application specification in the technical description, if this is provided as a separate document, is covered in Clause 5 of this collateral standard.
5.2	TRAINING and materials for TRAINING	7	Training and materials for training NOTE—The list of training options in IEC 62366 has been clarified to indicate that the MANUFACTURER is required to do at least one of the following: —provide the training materials; —ensure that the material are available; or —provide the training. In addition, IEC 62366 recommends that the ACCOMPANYING DOCUMENTS include the suggested duration and frequency of required training.
6	USE ERROR and USABILITY		NOTE—There is no equivalent heading in IEC 62366.
6.1	Safety for the PATIENT, OPERATOR and other persons	4.1.1	USABILITY ENGINEERING PROCESS NOTE—This subclause describes the requirement that a USABILITY ENGINEERING PROCESS be established to provide SAFETY for the PATIENT, USER and others related to USABILITY. IEC 62366 contains additional verbiage that states the PROCESS is to address USER interactions according to the ACCOMPANYING DOCUMENTS in situations ranging from transport and storage to final disposal.
6.2	USABILITY ENGINEERING PROCESS	5	USABILITY ENGINEERING PROCESS
6.2.1	General	4.2	USABILITY ENGINEERING FILE NOTE—This subclause of IEC 62366 contains the requirements for the recording of results of the USABILITY ENGINEERING PROCESS in the USABILITY ENGINEERING FILE. The requirements are not substantially altered from those in the first paragraph of 6.2.1 of IEC 60601-1-6:2006.
		4.3	Scaling of the USABILITY ENGINEERING effort NOTE—This subclause of IEC 62366 contains the permissive requirement that allow the USABILITY ENGINEERING PROCESS to be scaled-up or scaled-down based on the nature of the device or the significance of the modification. The requirement is not substantially altered from that in 6.2.1 of IEC 60601-1-6:2006.
6.2.2	Input for the USABILITY ENGINEERING PROCESS		NOTE—There is no equivalent heading in IEC 62366.
6.2.2.1	ME EQUIPMENT application specification	5.1	Application specification NOTE—The application specification now includes the device's operating principle. The operating principle is a description of the physical methods use to accomplish the INTENDED USE and the mechanisms by which it works. IEC 62366 speaks of the "intended medical indication" which IEC 60601-1-6:2006 describes as the "medical purpose."

10) To be published

Table B.1 (continued)

IEC 60601-1-6:2006		Related elements in IEC 62366:2007+A1—11)	
Clause	Title	Clause	Title
		5.2	Frequently used functions NOTE—IEC 62366 contains a specific requirement to identify the frequently used functions that involve user interaction. In IEC 60601-1-6:2006, this requirement is implicit in the definition of PRIMARY OPERATING FUNCTION.
6.2.2.2	PRIMARY OPERATING FUNCTIONS	5.4	PRIMARY OPERATING FUNCTIONS NOTE—This subclause now explicitly identifies that the inputs to the PRIMARY OPERATING FUNCTIONS include the frequently used functions and those functions related to the SAFETY of the MEDICAL DEVICE.
6.2.2.3	Information for safety as a RISK CONTROL	4.1.3	Information for SAFETY NOTE—The requirement to record the results of any RISK ANALYSIS is moved to 5.3.1 and 5.3.2.
6.2.3	USABILITY SPECIFICATION	5.5	USABILITY SPECIFICATION NOTE—The description of the USABILITY SPECIFICATION has undergone substantial refinement. The USABILITY SPECIFICATION now includes: — testable requirements for USABILITY VERIFICATION; and — testable requirements for USABILITY of the PRIMARY OPERATING FUNCTIONS including criteria for determining the adequacy of the RISK CONTROL achieved by the USABILITY ENGINEERING PROCESS. A new informative annex (Annex G) has been added to provide guidance on how testable requirements, expressed as USABILITY goals, might be described. The inputs to the USABILITY SPECIFICATION focus on “known and foreseeable USE ERRORS” rather than describing them as “predictable USE ERRORS.” IEC 62366 does not require that all the USE SCENARIOS be described in the USABILITY SPECIFICATION. IEC 62366 only requires the frequent USE SCENARIOS and the reasonably foreseeable worst case USE SCENARIOS to be described.
		5.7	USER INTERFACE design and implementation NOTE—This is a new subclause in IEC 62366, and simply says that the USER INTERFACE described in the USABILITY SPECIFICATION is to be designed and implemented using appropriate USABILITY ENGINEERING methods and techniques.
6.2.4	USABILITY VERIFICATION	5.8	USABILITY VERIFICATION NOTE—No substantive change in the requirement for USABILITY VERIFICATION.
6.2.5	USABILITY VALIDATION plan	5.6	USABILITY VALIDATION plan NOTE—IEC 62366 focuses on the frequent USE SCENARIOS and reasonably foreseeable worst case USE SCENARIOS described in the USABILITY SPECIFICATION.

11) To be published

Table B.1 (continued)

IEC 60601-1-6:2006		Related elements in IEC 62366:2007+A1—12)	
Clause	Title	Clause	Title
6.2.6	USABILITY VALIDATION	5.9	USABILITY VALIDATION NOTE—IEC 62366 describes in more detail the actions to be taken if the acceptance criteria documented in the USABILITY VALIDATION plan are not met. This provides a connection back to the ISO 14971 RISK MANAGEMENT PROCESS. See IEC 62366:2007+A1—12), Figure A.1. As a RISK/benefit analysis requires that RISK be assessed, it is necessary to understand the SEVERITY of the potential HARM. That is why subclause 5.3 requires that the SEVERITY of the potential HARM be recorded in the USABILITY ENGINEERING FILE.
		5.10	USER INTERFACE OF UNKNOWN PROVENANCE (UOUP) NOTE—Amendment 1 to IEC 62366 added a set of requirements when dealing with user interface or part of a user interface of a medical device previously developed for which records of the usability engineering process of this standard are not available. These requirements are found in Annex K and replace those in subclauses 5.1 to 5.9 for uoup.
Annexes		Annexes	NOTE—The annexes in IEC 62366 have been revised and expanded. However, all the annexes remain informative.
Annex A	General guidance and rationale	Annex A	General guidance and rationale NOTE—This annex has been revised to align with the normative text. An extensive section (Clause 5) and Figure A.1 were added to explain the relationship between IEC 62366 and ISO 14971.
Annex B	A taxonomy of OPERATOR action	Annex B	Categories of USER action NOTE—This annex has been revised and Figure B.1 redrawn to improve the explanation of the relationship between terms such as NORMAL USE, CORRECT USE and USE ERROR.
Annex C	Examples of USE ERRORS, ABNORMAL USE and design flaws potentially leading to USE ERRORS	Annex C	Examples of USE ERROR, ABNORMAL USE and possible causes NOTE—This annex has been only slightly modified to improve some of the examples.
Annex D	Guidance on the usability engineering process	Annex D	Guidance on the USABILITY ENGINEERING PROCESS NOTE—This annex was revised only to the extent needed to align it with the normative requirements.
		Annex E	Questions that can be used to identify MEDICAL DEVICE characteristics associated with USABILITY that could impact on SAFETY NOTE—This is a new annex which contains a list of questions that the MANUFACTURER can use as an aid-memoir in identifying characteristics associated with USABILITY that could impact SAFETY. It is modelled on Annex C of ISO 14971:2007.
		Annex F	Examples of possible USABILITY related HAZARDOUS SITUATIONS NOTE—This is a new annex containing examples that demonstrate the relationship of HAZARDS, scenarios, HARMS and RISK CONTROL measures related to USABILITY.

12) To be published

Table B.1 (continued)

IEC 60601-1-6:2006		Related elements in IEC 62366:2007+A1—13)	
Clause	Title	Clause	Title
		Annex G	USABILITY goals: Illustrative example for a home parenteral infusion pump NOTE—This is a new annex containing an example of USABILITY goals for a home parenteral infusion pump developed through a collaboration between MANUFACTURERS representatives and the US FDA's Center for Devices and Radiological Health.
Annex E	Sample USABILITY SPECIFICATION	Annex H	Sample USABILITY SPECIFICATION and its inputs NOTE—This annex was revised only to the extent needed to align it with the normative requirements.
Annex F	Reference documents	Annex I	Recommended reading list NOTE—No substantive change.
		Annex J	Reference to the essential principles NOTE—This is a new annex that maps the requirements in IEC 62366 to the essential principles of SAFETY and performance of MEDICAL DEVICES in ISO/TR 16142.
		Annex K	Evaluation of a USER INTERFACE OF UNKNOWN PROVENANCE (UOUP) NOTE—Amendment 1 to IEC 62366 added this annex. The annex provides a set of normative requirements when dealing with user interface or part of a user interface of a medical device previously developed for which records of the usability engineering process of this standard are not available.
Bibliography		Bibliography	NOTE—No substantive change.
Index of defined terms used in this collateral standard		Index of defined terms	

¹³⁾—To be published

Annex C **(informative)**

References to items of ~~USABILITY~~ provided in ~~IEC 62366:2007~~ and their use in other standards

C.1 — Introduction

~~This annex is intended to provide references to specific items of ~~USABILITY~~ as given in IEC 62366:2007 as source in comparison to those used in other standards, such as the ISO 9241 series and standards on software. The indicated references are considered as guidance.~~

C.2 — General topics / limitations

~~IEC 62366 is a safety related standard and requires a design and development process on ~~USABILITY~~, and, where applicable, appropriate terms from the ISO 9241 series are used.~~

~~The ISO 9241 series does not specifically address safety issues. Furthermore, the ISO 9241 series started as a collection of ergonomic requirements for office work with visual display terminals. In 2006, the series was renamed “Ergonomics of human — system interaction”. However, it is not yet clear if the series takes adequate account of all the contexts and situations that need to be considered for specific ~~MEDICAL DEVICES~~, such as safe operation in the dark, when wet, when exposed to severe cold or heat, or without external electrical power.~~

~~Nevertheless, the ISO 9241 series provides valuable additional information about ~~USABILITY~~ methods, processes and requirements.~~

C.3 — References to items of ~~USABILITY~~ in ~~IEC 62366~~ and their use in other standards

~~Table C.1 provides references of specific items of ~~USABILITY~~ defined in IEC 62366:2007 in comparison to those used in other standards, e. g. the ISO 9241 series and certain software standards.~~

**Table C.1 — References to items of ~~USABILITY~~ in ~~IEC 62366~~
and their use in other standards**

IEC 62366:2007	ISO 9241 or other standards providing related information*
Definition 3.8 EFFECTIVENESS measure of accuracy and completeness with which USERS achieve specified goals [ISO 9241-11:1998, definition 3.2, modified]	Definition 3.2 effectiveness: Accuracy and completeness with which users achieve specified goals. ISO 9241-11 [2] ¹⁴⁾
Definition 3.9 EFFICIENCY EFFECTIVENESS in relation to the resources expended	Definition 3.3 efficiency: Resources expended in relation to the accuracy and completeness with which users achieve goals. ISO 9241-11 [2]

¹⁴⁾ — Figures in square brackets refer to the Bibliography.

Table C.1 (continued)

IEC 62366:2007	ISO 9241 or other standards providing related information*
Definition 3.17 USABILITY characteristic of the USER INTERFACE that establishes EFFECTIVENESS, EFFICIENCY, ease-of-user learning and user satisfaction	Definition 3.1 usability: Extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use. NOTE See Annex D for other approaches to usability. ISO 9241-11 [2]
a) Definition 3.19 USABILITY ENGINEERING FILE — set of records and other documents that are produced by the USABILITY ENGINEERING PROCESS b) USABILITY ENGINEERING FILE — Clause 4.2 / Annex A subclause 4.2 c) Documenting the USABILITY ENGINEERING activities — Annex D.3.3 d) Research protocols and informed consent — Annex D.4.3.3	ISO/IEC 25062 [26] Intended to be used to report the measures obtained from a test of USABILITY as defined for the items effectiveness, efficiency and satisfaction in a specified context of use Section 5 Report Format Annex A Checklist Annex C Report Template Annex D Example Record of test results empirically identified.—
a) Definition 3.2 ACCOMPANYING DOCUMENT — document accompanying a MEDICAL DEVICE and containing information for those accountable for the installation, use and maintenance of the MEDICAL DEVICE or the user, particularly regarding SAFETY — [ISO 14971:2007, definition 2.1, modified], b) ACCOMPANYING DOCUMENT — Clause 6 / Annex A, clause 6	ISO 9241 does not define an equivalent to accompanying document (accompanying document consist of more than the instructions for use)
See above	ISO/IEC 15910 [23]
See above	ISO/IEC 18019 [25]
See above	ISO 14598-6 [22]
Definition 3.20 USABILITY SPECIFICATION documentation defining the USER INTERFACE requirements related to USABILITY a) USABILITY SPECIFICATION subclause 5.5, — Annex A subclause 5.5 b) USER research, — Design concept development, (conceptual design) — Design requirement/criteria development — Annex D.2.3 — D.2.5 c) Design requirement/criteria development — Annex D.4.4	No definition provided in ISO 9241-11 [2] ISO 9241-11:1998 Clauses 5, 6, 7, Annex A