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INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Industrial-process measurement, control and automation – Evaluation of system properties for the purpose of system assessment – Part 1: Terminology and basic concepts

Mesure, commande et automation dans les processus industriels – Appréciation des propriétés d'un système en vue de son évaluation – Partie 1: Terminologie et principes de base

IEC 61069-1:2016-06(en-fr)

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FOREWORD

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International Standard IEC 61069-1 has been prepared by subcommittee 65A: System aspects, of IEC technical committee 65: Industrial-process measurement, control and automation.

This second edition cancels and replaces the first edition published in 1991. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) Reorganization of the material of IEC 61069-1:1991 to make the overall set of standards more organized and consistent;
b) IEC TS 62603-1:2014 has been incorporated into this edition.

The text of this standard is based on the following documents:

FDIS	Report on voting
65A/788/FDIS	65A/798/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

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

A list of all parts in the IEC 61069 series, published under the general title *Industrial-process measurement, control and automation – Evaluation of system properties for the purpose of system assessment*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website 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- withdrawn,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.

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 document using a colour printer.

INTRODUCTION

IEC 61069 deals with the method which should be used to assess system properties of a basic control system (BCS). IEC 61069 consists of the following parts:

Part 1: Terminology and basic concepts

Part 2: Assessment methodology

Part 3: Assessment of system functionality

Part 4: Assessment of system performance

Part 5: Assessment of system dependability

Part 6: Assessment of system operability

Part 7: Assessment of system safety

Part 8: Assessment of other system properties

Assessment of a system is the judgement, based on evidence, of the suitability of the system for a specific mission or class of missions.

To obtain total evidence would require complete evaluation (for example under all influencing factors) of all system properties relevant to the specific mission or class of missions.

Since this is rarely practical, the rationale on which an assessment of a system should be based is:

– the identification of the importance of each of the relevant system properties;

– the planning for evaluation of the relevant system properties with a cost-effective dedication of effort to the various system properties.

In conducting an assessment of a system, it is crucial to bear in mind the need to gain a maximum increase in confidence in the suitability of a system within practical cost and time constraints.

An assessment can only be carried out if a mission has been stated (or given), or if any mission can be hypothesized. In the absence of a mission, no assessment can be made; however, examination of the system to gather and organize data for a later assessment done by others is possible. In such cases, the standard can be used as a guide for planning an evaluation and it provides methods for performing evaluations, since evaluations are an integral part of assessment.

In preparing the assessment, it can be discovered that the definition of the system is too narrow. For example, a facility with two or more revisions of the control systems sharing resources, e.g., a network, should consider issues of co-existence and inter-operability. In this case, the system to be investigated should not be limited to the “new” BCS; it should include both. That is, it should change the boundaries of the system to include enough of the other system to address these concerns.

The part structure and the relationship among the parts of IEC 61069 are shown in Figure 1.

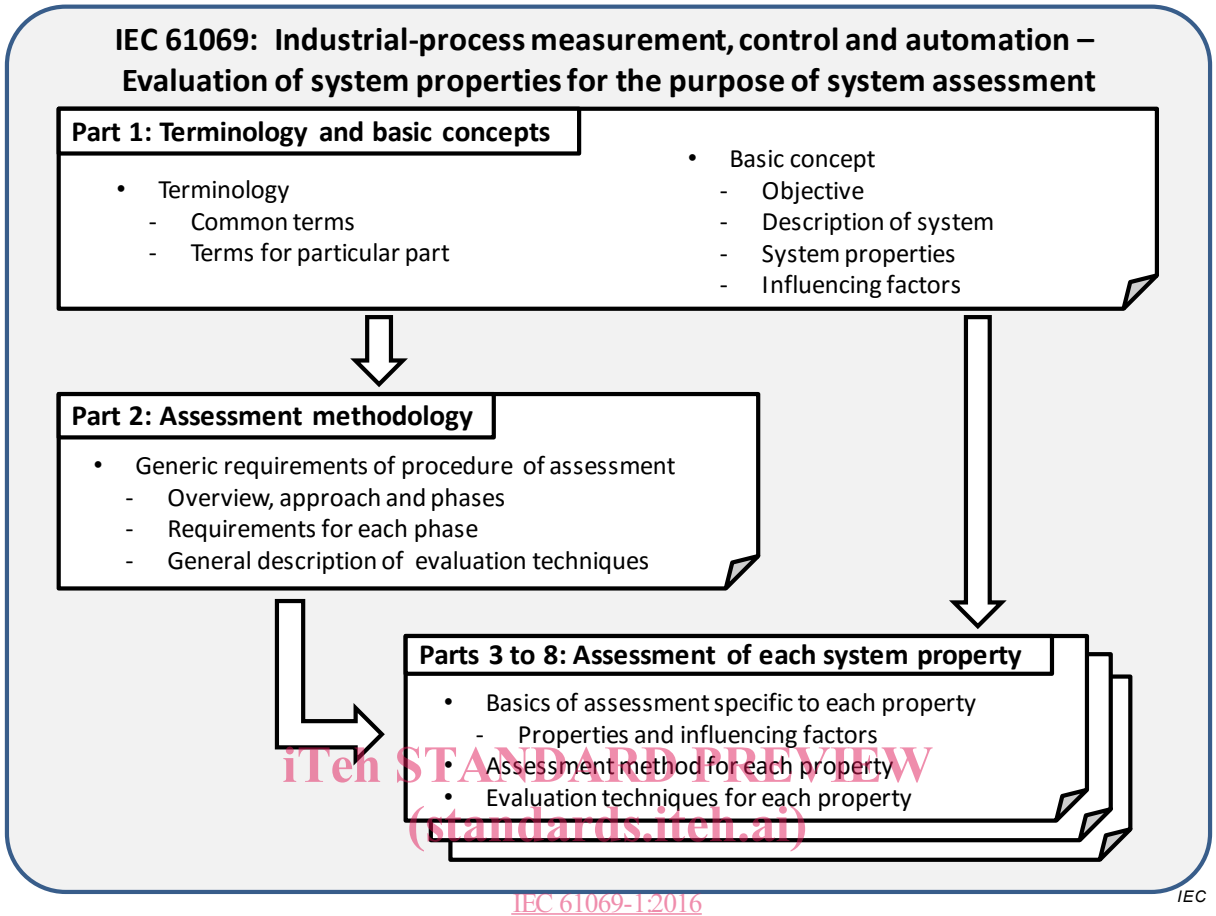

Figure 1 – General layout of IEC 61069

Some example assessment items are integrated in Annex A.

INDUSTRIAL-PROCESS MEASUREMENT, CONTROL AND AUTOMATION – EVALUATION OF SYSTEM PROPERTIES FOR THE PURPOSE OF SYSTEM ASSESSMENT –

Part 1: Terminology and basic concepts

1 Scope

This part of IEC 61069 defines the terminology and outlines basic concepts in the assessment of a basic process control system (BPCS) and a basic discrete control system (BDCS). These two general system types cover the areas of discrete, batch and continuous applications. In IEC 61069 these two, BPCS and BDCS, together are referred to as "basic control system(s)", (BCS).

The treatment of safety in IEC 61069 is confined to hazards that can be present within the BCS itself.

Considerations of hazards that can be introduced by the process or equipment under control, of the BCS to be assessed, are excluded.

Where the BCS risk reduction is intended to be less than 10 (i.e. SIL < 1, per IEC 61508-4), then assessment comes under IEC 61069.

A BCS with a safety integrity level (SIL) or performing any safety instrumented function (SIF) is not covered by IEC 61069, where SIL is defined by IEC 61508-4 and SIF is defined by IEC 61511-1.

This part of IEC 61069 is intended for the users and manufacturers of systems, and also for those who are responsible for carrying out assessments as an independent party.

2 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.

IEC 61000-4-2, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test*

IEC 61000-6-4:2006, *Electromagnetic compatibility (EMC) – Part 6-4: Generic standards – Emission standard for industrial environments*
IEC 61000-6-4:2006/AMD1:2010

IEC 61508-4:2010, *Functional safety of electrical/electronic/programmable electronic safety-related systems – Part 4: Definitions and abbreviations* (see http://www.iec.ch/functionalsafety)

IEC 61511-1:2003, *Functional safety – Safety instrumented systems for the process industry sector – Part 1: Framework, definitions, system, hardware and software requirements*

3 Terms, definitions, abbreviated terms, acronyms, conventions and symbols

3.1 Terms and definitions

For the purpose of this document, the following terms and definitions apply.

3.1.1
accuracy
closeness of agreement between the result of a measurement / output and the (conventional) true value of the quantity being measured / calculated

3.1.2
assessment, <of a system>
process of judgement, based on evidence, suitability of a system, for a specific mission or class of missions

[SOURCE: ISO 15513:2000, 3.3, modified – "competency against prescribed standards of performance" replaced with ", based on evidence, suitability of a system, for a specific mission or class of missions"]

3.1.3
assessment activity
set of actions to evaluate one or more assessment items

3.1.4
assessment authority
body that has legal powers and rights of assessment

[SOURCE: ISO/IEC Guide 2:2004, 4.5, modified – The term itself has been modified (addition of "assessment") and addition of the words "of assessment" at the end of the definition]

3.1.5
assessment item
set of a system property which is evaluated and an influencing factor which is considered for the evaluation

3.1.6
assessment program
documented plan of coordinated set of assessment activities, not necessarily interdependent, that continue over a period of time and are designed to conduct the assessment

3.1.7
assessment protocol
set of formal rules describing the assessment

3.1.8
assessment specification
document which specifies scope, requirements and constraints of the assessment

3.1.9
availability
ability of an item to be in a state to perform a required function under given conditions at a given instant or over a given time interval, assuming that the required external resources are provided

[SOURCE: IEC 60050-192:2015, 192-01-23, modified – The definition has been extended]

3.1.10
base load
loading of the system when no SRD specified tasks are active, but includes system diagnostics and similar functions

3.1.11
basic control system
basic discrete control system (BDCS) and/or basic process control system (BPCS)

3.1.12
basic discrete control system
BDCS
system which responds to input signals from the machine(s), its(their) associated equipment, other programmable systems and/or an operator and generates output signals causing the machine(s) and its(their) associated equipment to operate in the desired manner but which does not perform any functional safety functions with a claimed SIL ≥ 1, realizing the mission(s) and task(s)

[SOURCE: IEC 61511-1:2003, 3.2.3, modified – In the term, "process" replaced by "discrete" and acronym corrected to “BDCS”. In the definition, “the process, its associated equipment” and “safety instrumented functions” replaced with “the machine(s), its (their) associated equipment” and “functional safety functions”, respectively.]

3.1.13
basic process control system
BPCS
system which responds to input signals from the process, its associated equipment, other programmable systems and/or an operator and generates output signals causing the process and its associated equipment to operate in the desired manner

[SOURCE: IEC 61511-1:2003, 3.2.3]

3.1.14
capacity
number of information translations which the system is able to execute without negatively impacting any other system capabilities

Note 1 to entry: Capacity may be e.g.

1) quantity of information translations, of some type within a define period of time or
2) quantity of information translations, of some type or
3) quantity of information translations or
4) task quantity, or
5) task(s) completion within a defined period time.

3.1.15
class
abstraction of a set of similar objects

3.1.16
class of mission
abstraction of a collection of missions which share common requirements

3.1.17
coverage
extent to which the system provides functions to perform industrial-process measurement and control tasks

3.1.18
configurability
extent to which the system facilitates selection, setting up and arrangement of its modules to perform the given tasks

3.1.19
credibility
extent to which a system is able to recognize and signal the state of the system and to withstand incorrect inputs or unauthorized access

3.1.20
cycle time
time span between two consecutive cyclically recurring events

[SOURCE: IEC 61800-7-1:2015, 3.3.5.5]

3.1.21
dead band
finite range of values of the input variable within which a variation of the input variable does not produce any measurable change in the output variable

Note 1 to entry: When this type of characteristic is intentional, it is sometimes called a neutral zone.

[SOURCE: IEC 60050-351:2013, 351-45-15]

3.1.22
dependability
extent to which a system can be relied upon to perform exclusively and correctly a task under given conditions at a given instant of time or over a given time interval, assuming that the required external resources are provided

3.1.23
efficiency
extent to which the operating means provided by the system minimise operator time and effort required in using the system to accomplish his tasks within stated constraints

3.1.24
element
part of system providing a single function that is indivisible and can be individually considered and tested, comprised of hardware and/or software

3.1.25
evaluation, <of a system property>
systematic determination of the extent to which a system property meets its specified criteria

[SOURCE: ISO/IEC 12207:2008, 4.12, modified – Specific use of the term (“<of a system>”) added and “an entity” replaced with “a system property”]

3.1.26
fall-back
functional fall-back: capacity of returning to a known functional level or mode in case of failure or abnormal operation

3.1.27
flexibility
extent to which the system can be adapted

3.1.28
function
operation performed by (a) module(s) which enables the system to perform a task

3.1.29
functionality
extent to which the system provides functions to perform tasks required by the system mission

3.1.30
functional safety
part of the overall safety that depends on functional and physical units operating correctly in response to their inputs

Note 1 to entry: See IEC TR 61508-0 [10][1].

[SOURCE: IEC 60050-351:2013, 351-57-06]

3.1.31
harm
injury or damage to the health of people, or damage to property or the environment

[SOURCE: ISO/IEC Guide 51:2014, 3.1]

3.1.32
hazard
potential source of harm

[SOURCE: ISO/IEC Guide 51:2014, 3.2]

3.1.33
hysteresis
phenomenon represented by a characteristic curve which has a branch, called ascending branch, for increasing values of the input variable, and a different branch, called descending branch, for decreasing values of the input variable

[SOURCE: IEC 60050-351:2013, 351-45-16]

3.1.34
influencing factor
observable qualitative or measurable quantitative item that affects a system property

3.1.35
information translation
conversion or conveyance of information entering the system or module at its boundary into derived information exiting the system or module at its boundary

Note 1 to entry: Information translation is a view of a function which represents a particular aspect of the function.

3.1.36
information translation function
function which executes information translation

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[1] Numbers in square brackets refer to the Bibliography.

3.1.37
integrity
assurance provided by a system that the tasks will be performed correctly, unless notice is given of any state of the system which could lead to the contrary

3.1.38
intuitiveness
extent to which the operating means provided by the system are immediately understandable by the operators

3.1.39
maintainability
ability of a system under given conditions of use, to be retained in, or restored to, a state in which it can perform a required function, when maintenance is performed under given conditions and using stated procedures and resources

3.1.40
measurement
process of experimentally obtaining one or more quantity values that can reasonably be attributed to a quantity

Note 1 to entry: Measurement does not apply to nominal properties.

Note 2 to entry: Measurement implies comparison of quantities, including counting of entities.

Note 3 to entry: The French word "mesure" has several meanings in everyday French language. It is for this reason that the French word "mesurage" has been introduced to describe the act of measurement. Nevertheless, the French word "mesure" occurs many times in forming terms following current usage, and without ambiguity. Examples are: unité de mesure (unit of measurement), méthode de mesure (measurement method), instrument de mesure (measurement instrument). This does not mean that the use of the French word "mesurage" in place of "mesure" in such terms is not permissible when advantageous.

[SOURCE: ISO/IEC Guide 99:2007, 2.1, modified – Note 3 to entry modified.]

3.1.41
mission, <of a system>
collective task assigned to the system to achieve a defined goal in a defined period under defined conditions

3.1.42
model
mathematical or physical representation of a system or a process, based with sufficient precision upon known laws, identification or specified suppositions

[SOURCE: IEC 6005-351:2013, 351-42-26]

3.1.43
module
distinct unit, which is capable of performing distinct function(s), composed of element(s), and which can be easily joined to or arranged with other units

3.1.44
observation
process of monitoring pattern response

[SOURCE: IEC 62528:2007, 3.1.34]