



# SLOVENSKI STANDARD

## SIST EN 61512-1:2001

01-april-2001

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### Batch control - Part 1: Models and terminology

Batch control -- Part 1: Models and terminology

Chargenorientierte Fahrweise -- Teil 1: Modelle und Terminologie

Contrôle-commande des processus de fabrication par lots -- Partie 1: Modèles et terminologie

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English version

**Batch control**  
**Part 1: Models and terminology**  
(IEC 61512-1:1997)

Contrôle-commande des processus  
de fabrication par lots  
Partie 1: Modèles et terminologie  
(CEI 61512-1:1997)

Chargenorientierte Fahrweise  
Teil 1: Modelle und Terminologie  
(IEC 61512-1:1997)

**SIST EN 61512-1:2001**

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European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

**Central Secretariat: rue de Stassart 35, B - 1050 Brussels**

### Foreword

The text of the International Standard IEC 61512-1:1997, prepared by SC 65A, System aspects, of IEC TC 65, Industrial-process measurement and control, was submitted to the formal vote and was approved by CENELEC as EN 61512-1 on 1999-05-01 without any modification.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2000-08-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2002-08-01

Annexes designated "normative" are part of the body of the standard.  
Annexes designated "informative" are given for information only.  
In this standard, annexes A and ZA are normative and annex B is informative.  
Annex ZA has been added by CENELEC.

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### Endorsement notice

The text of the International Standard IEC 61512-1:1997 was approved by CENELEC as a European Standard without any modification.

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**Annex ZA** (normative)

**Normative references to international publications  
with their corresponding European publications**

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

NOTE: When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60848	1988	Preparation of function charts for control systems	-	-
IEC 60902	1987	Industrial-process measurement and control Terms and definitions	-	-

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**Partie 1:  
Modèles et terminologie**

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**Models and terminology**

SIST EN 61512-1:2001

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**BATCH CONTROL –  
Part 1: Models and terminology**

## FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The 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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- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical reports or guides and they are accepted by the National Committees in that sense.
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International Standard IEC 61512-1 has been prepared by subcommittee 65A: System aspects, of IEC technical committee 65: Industrial-process measurement and control.

IEC 61512 consists of the following parts, under the general title *Batch control*:

- Part 1: Models and terminology;
- Part 2: Data structures and guidelines for languages.

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

FDIS	Report on voting
65A/217/FDIS	65A/238/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.

Annex A forms an integral part of this standard.

Annex B is for information only.

## INTRODUCTION

The models and terminology defined in this part of IEC 61512

- emphasize good practices for the design and operation of batch manufacturing plants;
- can be used to improve control of batch manufacturing plants; and
- can be applied regardless of the degree of automation.

Specifically, this standard provides a standard terminology and a consistent set of concepts and models for batch manufacturing plants and batch control that will improve communications between all parties involved; and that will

- reduce the user's time to reach full production levels for new products;
- enable vendors to supply appropriate tools for implementing batch control;
- enable users to better identify their needs;
- make recipe development straightforward enough to be accomplished without the services of a control systems engineer;
- reduce the cost of automating batch processes; and
- reduce life-cycle engineering efforts.

It is not the intent of this standard to

- suggest that there is only one way to implement or apply batch control;
- force users to abandon their current way of dealing with their batch processes; or
- restrict development in the area of batch control.

The models presented in this standard are presumed to be complete as indicated. However, they may be collapsed and expanded as described below. The unit and the control module levels may not be omitted from the physical model. The master recipe and the control recipe may not be omitted from the recipe-type model. Specific rules for collapsing and expanding these models are not covered in this standard.

- Collapsing: elements in the models may be omitted as long as the model remains consistent, and the functions of the element removed are taken into account.
- Expanding: elements may be added to the modules. When they are added between related elements, the integrity of the original relationship should be maintained.

## BATCH CONTROL – Part 1: Models and terminology

### 1 Scope

This part of IEC 61512 on batch control defines reference models for batch control as used in the process industries and terminology that helps explain the relationships between these models and terms. This standard may not apply to all batch control applications.

### 2 Normative references

The following normative documents contain provisions, which through reference in this text, constitute provisions of this part of IEC 61512. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this part of IEC 61512 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60848: 1988, *Preparation of function charts for control systems*

NOTE – Structures defined in IEC 60848 may be useful in the definition of procedural control and, in particular, in the definition of a phase.

IEC 60902: 1987, *Industrial-process measurement and control – Terms and definitions*

### 3 Definitions

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For the purpose of this part of IEC 61512, the following definitions apply. Definitions found in IEC 60902 were used as a basis for definitions in this part of IEC 61512. Where necessary, the specific connotation of terms used in batch control was included.

**3.1 allocation:** A form of coordination control that assigns a resource to a batch or unit.

NOTE – An allocation can be for the entire resource or for portions of a resource.

**3.2 arbitration:** A form of coordination control that determines how a resource should be allocated when there are more requests for the resource than can be accommodated at one time.

**3.3 area:** A component of a batch manufacturing site that is identified by physical, geographical, or logical segmentation within the site.

NOTE – An area may contain process cells, units, equipment modules, and control modules.

**3.4 basic control:** Control that is dedicated to establishing and maintaining a specific state of equipment or process condition.

NOTE – Basic control may include regulatory control, interlocking, monitoring, exception handling, and discrete or sequential control.

### 3.5 batch

- (1) The material that is being produced or that has been produced by a single execution of a batch process.
- (2) An entity that represents the production of a material at any point in the process.

NOTE – Batch means both the material made by and during the process and also an entity that represents the production of that material. Batch is used as an abstract contraction of the words "the production of a batch."

**3.6 batch control:** Control activities and control functions that provide a means to process finite quantities of input materials by subjecting them to an ordered set of processing activities over a finite period of time using one or more pieces of equipment.

**3.7 batch process:** A process that leads to the production of finite quantities of material by subjecting quantities of input materials to an ordered set of processing activities over a finite period of time using one or more pieces of equipment.

**3.8 batch schedule:** A list of batches to be produced in a specific process cell.

NOTE – The batch schedule typically contains such information as what to produce, how much to produce, when or in what order the batches are needed, and what equipment to use.

**3.9 common resource:** A resource that can provide services to more than one requester.

NOTE – Common resources are identified as either exclusive-use resources or shared-use resources (see 3.22 and 3.54).

**3.10 control module:** The lowest level grouping of equipment in the physical model that can carry out basic control.

NOTE – This term applies to both the physical equipment and the equipment entity.

**3.11 control recipe:** A type of recipe which, through its execution, defines the manufacture of a single batch of a specific product.

**3.12 coordination control:** A type of control that directs, initiates, and/or modifies the execution of procedural control and the utilization of equipment entities.

**3.13 enterprise:** An organization that coordinates the operation of one or more sites.

**3.14 equipment control:** The equipment-specific functionality that provides the actual control capability for an equipment entity, including procedural, basic and coordination control, and that is not part of the recipe.

**3.15 equipment entity:** A collection of physical processing and control equipment and equipment control grouped together to perform a certain control function or set of control functions.

**3.16 equipment module:** A functional group of equipment that can carry out a finite number of specific minor processing activities.

#### NOTES

- 1 An equipment module is typically centered around a piece of process equipment (a weigh tank, a process heater, a scrubber, etc.). This term applies to both the physical equipment and the equipment entity.
- 2 Examples of minor process activities are dosing and weighing.

**3.17 equipment operation:** An operation that is part of equipment control.

- 3.18 **equipment phase:** A phase that is part of equipment control.
- 3.19 **equipment procedure:** A procedure that is part of equipment control.
- 3.20 **equipment unit procedure:** A unit procedure that is part of equipment control.
- 3.21 **exception handling:** Those functions that deal with plant or process contingencies and other events which occur outside the normal or desired behaviour of batch control.
- 3.22 **exclusive-use resource:** A common resource that only one user can use at any given time.
- 3.23 **formula:** A category of recipe information that includes process inputs, process parameters and process outputs.
- 3.24 **general recipe:** A type of recipe that expresses equipment and site-independent processing requirements.
- 3.25 **header:** Information about the purpose, source and version of the recipe such as recipe and product identification, creator, and issue date.
- 3.26 **ID:** A unique identifier for batches, lots, operators, technicians, and raw materials.
- 3.27 **line; train:** See definition for train.
- 3.28 **lot:** A unique amount of material having a set of common traits.
- NOTE – Some examples of common traits are material source, the master recipe used to produce the material and distinct physical properties.
- 3.29 **master recipe:** A type of recipe that accounts for equipment capabilities and may include process cell-specific information.
- 3.30 **mode:** The manner in which the transition of sequential functions are carried out within a procedural element or the accessibility for manipulating the states of equipment entities manually or by other types of control.
- 3.31 **operation:** A procedural element defining an independent processing activity consisting of the algorithm necessary for the initiation, organization and control of phases.
- 3.32 **path; stream:** The order of equipment within a process cell that is used, or is expected to be used, in the production of a specific batch.
- 3.33 **personnel and environmental protection:** The control activity that
- prevents events from occurring that would cause the process to react in a manner that would jeopardize personnel safety and/or harm the environment; and/or
  - takes additional measures, such as starting standby equipment, to prevent an abnormal condition from proceeding to a more undesirable state that would jeopardize personnel safety and/or harm the environment.