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Enterprise system integration - Part 1: Models and terminology (IEC 62264-1:2013)

Integration von Unternehmensführungs- und Leitsystemen - Teil 1: Modelle und Terminologie (IEC 62264-1:2013)

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Intégration du système de commande d'entreprise - Partie 1: Modèles et terminologie (CEI 62264-1:2013)

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35.240.50	Uporabniške rešitve IT v industriji	IT applications in industry

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English version

Enterprise-control system integration - Part 1: Models and terminology
(IEC 62264-1:2013)

Intégration des systèmes entreprise-contrôle -
Partie 1: Modèles et terminologie
(CEI 62264-1:2013)

Integration von Unternehmensführungs- und Leitsystemen -
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Foreword

The text of document 65E/285/FDIS, future edition 2 of IEC 62264-1, prepared by SC 65E "Devices and integration in enterprise systems", of IEC/TC 65 "Industrial-process measurement, control and automation", in co-operation with ISO/TC 184/SC5 "Interoperability, integration and architectures for enterprise systems and automation applications" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62264-1:2013.

The following dates are fixed:

• latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2014-03-26
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2016-06-26

This document supersedes EN 62264-1:2008.

EN 62264-1:2013 includes the following significant technical changes with respect to EN 62264-1:2008:

a) the functional hierarchy in 5.2 was extended using the definitions from EN 62264-3;

b) the equipment hierarchy in 5.3 was extended using the definitions from EN 62264-3;

c) a physical asset equipment model was added in 5.3;

d) the generic model of manufacturing operations management categories in Clause 7 was added using information from EN 62264-3;

e) the formal UML models that were in Clause 7 were moved to EN 62264-2 and the remaining data definitions are now in Clause 8;

f) the capacity and capability model in Clause 8 was extended;

g) a new Annex A was moved from EN 62264-3;

h) a new Annex B was moved from EN 62264-3;

i) subclause 5.5 on the decision hierarchy was removed and a reference added to ISO 15704 which is now available;

j) old Annex C was removed and moved to a Technical Report;

k) old Annex D was removed and, moved to a Technical Report;

l) old Annex E was removed and moved to a Technical Report;

m) old Annex F was removed.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

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Endorsement notice

The text of the International Standard IEC 62264-1:2013 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

IEC 61512 series NOTE Harmonised in EN 61512 series.

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Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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.

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

Publication	Year	Title	EN/HD	Year
IEC 61512-1	-	Batch control - Part 1: Models and terminology	EN 61512-1	-
IEC 62264-2	-	Enterprise-control system integration - Part 2: Object model attributes	EN 62264-2	-
IEC 62264-3	-	Enterprise-control system integration - Part 3 Activity models of manufacturing operations management	EN 62264-3	-
IEC 62264-5	-	Enterprise system integration - Part 5: Business to manufacturing transactions	EN 62264-5	-
ISO/IEC 19501	-	Information technology - Open Distributed Processing - Unified Modeling Language (UML)	-	-
ISO 15704	-	Industrial automation systems - Requirements for enterprise-reference architectures and methodologies	-	-

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Part 1: Models and terminology

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ENTERPRISE-CONTROL SYSTEM INTEGRATION –

Part 1: Models and terminology

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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International Standard IEC 62264-1 has been prepared by subcommittee 65E: Devices and integration in enterprise systems, of IEC technical committee 65: Industrial-process measurement, control and automation, in co-operation with ISO technical committee 184/SC5: Interoperability, integration and architectures for enterprise systems and automation applications.

It is published as a double logo standard.

This standard is based upon ANSI/ISA-95.00.01-2010, Enterprise-Control System Integration – Part 1: Models and terminology. It is used with permission of the copyright holder, the Instrumentation, Systems and Automation Society (ISA). ISA encourages the use and application of its industry standards on a global basis.

This second edition cancels and replaces the first edition published in 2003. This edition constitutes a technical revision.

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

a) the functional hierarchy in 5.2 was extended using the definitions from IEC 62264-3;
b) the equipment hierarchy in 5.3 was extended using the definitions from IEC 62264-3;
c) a physical asset equipment model was added in 5.3;
d) the generic model of manufacturing operations management categories in Clause 7 was added using information from IEC 62264-3;
e) the formal UML models that were in Clause 7 were moved to IEC 62264-2 and the remaining data definitions are now in Clause 8;
f) the capacity and capability model in Clause 8 was extended;
g) a new Annex A was moved from IEC 62264-3;
h) a new Annex B was moved from IEC 62264-3;
i) Subclause 5.5 on the decision hierarchy was removed and a reference added to ISO 15704 which is now available;
j) old Annex C was removed and moved to a Technical Report;
k) old Annex D was removed and, moved to a Technical Report;
l) old Annex E was removed and moved to a Technical Report;
m) old Annex F was removed.

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

FDIS	Report on voting
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Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table. In ISO, the standard has been approved by 10 P members out of 10 having cast a vote.

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

A list of all parts in the IEC 62264 series, published under the general title *Enterprise control system integration* 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 web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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- replaced by a revised edition, or
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INTRODUCTION

This part of IEC 62264 is limited to describing the relevant functions in the enterprise and the manufacturing and control domains and which information is normally exchanged between these domains. Subsequent parts will address how this information can be exchanged in a robust, secure, and cost-effective manner preserving the integrity of the complete system. For purposes of IEC 62264-1, the manufacturing and control domain includes manufacturing operations management systems, manufacturing control systems, and other associated systems and equipment associated with manufacturing. The terms “enterprise,” “controls,” “process control,” and “manufacturing” are used in their most general sense and are held to be applicable to a broad sector of industries.

This part of IEC 62264 provides standard models and terminology for describing the interfaces between the business systems of an enterprise and its manufacturing operations and control systems. The models and terminology presented in IEC 62264-1

a) emphasize good integration practices of control systems with enterprise systems during the entire life cycle of the systems;

b) can be used to improve existing integration capabilities of manufacturing operations and control systems with enterprise systems; and

c) can be applied regardless of the degree of automation.

Specifically, IEC 62264 provides a standard terminology and a consistent set of concepts and models for integrating control systems with enterprise systems that will improve communications between all parties involved. Some of the benefits produced will

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a) reduce users' times to reach full production levels for new products;

b) enable vendors to supply appropriate tools for implementing integration of control systems to enterprise systems;

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c) enable users to better identify their needs;

d) reduce the costs of automating manufacturing processes;

e) optimize supply chains; and

f) reduce life-cycle engineering efforts.

This part of IEC 62264 standard is intended for those who are:

a) involved in designing, building, or operating manufacturing facilities;

b) responsible for specifying interfaces between manufacturing and process control systems and other systems of the business enterprise; or

c) involved in designing, creating, marketing, and integrating automation products used to interface manufacturing operations and business systems;

d) involved in specifying, designing or managing product creation, movement and storage within manufacturing enterprises.

It is not the intent of IEC 62264 to

– suggest that there is only one way of implementing integration of control systems to enterprise systems;

– force users to abandon their current methods of handling integration; or

– restrict development in the area of integration of control systems to enterprise systems.

This part of IEC 62264 standard discusses the interface content between manufacturing-control functions and other enterprise functions, based upon the Purdue Reference Model for CIM (hierarchical form) as published by ISA. IEC 62264 presents a partial model or reference model as defined in ISO 15704.

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IEC 62264-1 is limited to describing the relevant functions in the enterprise domain and the manufacturing and control domain and the information that is normally exchanged between these domains.

Clause 4 describes the context of the models in Clause 5 and Clause 6. It gives the criteria used to determine the scope of the manufacturing operations and control system domain. Clause 4 does not contain the formal definitions of the models and terminology but describes the context required to understand the other clauses.

Clause 5 describes the hierarchy models of the activities involved in manufacturing enterprises. It presents in general terms the activities that are associated with manufacturing operations and control and the activities that occur at the business logistics level. It also gives an equipment hierarchy model of equipment associated with manufacturing operations and control. Clause 5 contains format definitions of the models and terminology.

Clause 6 describes a general model of the functions within an enterprise which are concerned with the integration of business and control. It defines, in detail, an abstract model of control functions and, in less detail, the business functions that interface to control. The purpose is to establish a common understanding for functions and data flows involved in information exchange.

Clause 7 defines in detail the information that makes up the information streams defined in Clause 6. The purpose is to establish a common terminology for the elements of information exchanged. Clause 7 contains formal definitions of the models and terminology. The attributes and properties are not formally defined in this clause of IEC 62264-1.

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Clause 8 provides a description of the categories of information structures that are exchanged between applications at Level 4 and those at Level 3. The clause also provides the information categories that are exchanged between the applications within Level 3.

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Clause 9 provides statements regarding the conformance of implementations, the compliance of specifications and the completeness of these specifications and implementations relative to IEC 62264-1.

Annex A defines the relationship of IEC 62264 with other related standardization work in the manufacturing area.

Annex B provides listings of associated standards generally related to enterprise integration.

Annex C describes business drivers and key performance indicators that are the reasons for the information exchange between business and control functions.

Subsequent parts will address how this information can be exchanged in a robust, secure, and cost-effective manner preserving the integrity of the complete system.

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ENTERPRISE-CONTROL SYSTEM INTEGRATION –

Part 1: Models and terminology

1 Scope

This part of the IEC 62264 series describes the manufacturing operations management domain (Level 3) and its activities, and the interface content and associated transactions within Level 3 and between Level 3 and Level 4. This description enables integration between the manufacturing operations and control domain (Levels 3, 2, 1) and the enterprise domain (Level 4). The interface content between Level 3 and Level 2 is only briefly discussed.

The goals are to increase uniformity and consistency of interface terminology and reduce the risk, cost, and errors associated with implementing these interfaces. IEC 62264-1 can be used to reduce the effort associated with implementing new product offerings. The goal is to have enterprise systems and control systems that inter-operate and easily integrate.

The scope of this part of IEC 62264 is limited to:

a) a presentation of the enterprise domain and the manufacturing operations and control domain;

b) the definition of three hierarchical models; a functional hierarchy model, a role-based equipment hierarchy model, and a physical asset equipment hierarchy model;

c) a listing of the functions associated with the interface between manufacturing operations and control functions and enterprise functions; and

d) a description of the information that is shared between manufacturing operations and control functions and enterprise functions.

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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 61512-1, *Batch control – Part 1: Models and terminology*

IEC 62264-2, *Enterprise-control system integration – Part 2: Object model attributes*

IEC 62264-3, *Enterprise-control system integration – Part 3: Activity models of manufacturing operations management*

IEC 62264-5, *Enterprise-control system integration – Part 5: Business to manufacturing transactions*

ISO/IEC 19501, *Information technology – Open Distributed Processing – Unified Modeling Language (UML) – Version 1.4.2*

ISO 15704, *Industrial automation systems – Requirements for enterprise-reference architectures and methodologies*