

# SLOVENSKI STANDARD

## SIST EN 62714-1:2018

01-oktober-2018

Nadomešča:

SIST EN 62714-1:2015

---

**Oblika izmenjave tehničnih podatkov za uporabo v industrijskem inženiringu avtomatizacije sistemov - Označevalni jezik za avtomatizacijo - 1. del: Arhitektura in splošne zahteve (IEC 62714-1:2018)**

Engineering data exchange format for use in industrial automation systems engineering - Automation markup language - Part 1: Architecture and general requirements (IEC 62714-1:2018)

Datenaustauschformat für Planungsdaten industrieller Automatisierungssysteme - Automation markup language - Teil 1: Architektur und allgemeine Festlegungen (IEC 62714-1:2018)

Format d'échange de données techniques pour une utilisation dans l'ingénierie des systèmes d'automatisation industrielle - Automation markup language - Partie 1: Architecture et exigences générales (IEC 62714-1:2018)

**Ta slovenski standard je istoveten z: EN IEC 62714-1:2018**

---

**ICS:**

25.040.40	Merjenje in krmiljenje industrijskih postopkov	Industrial process measurement and control
35.060	Jeziki, ki se uporabljajo v informacijski tehniki in tehnologiji	Languages used in information technology
35.240.50	Uporabniške rešitve IT v industriji	IT applications in industry

**SIST EN 62714-1:2018**

**en,fr,de**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

Full standard:  
<https://standards.iteh.ai/catalog/standards/sist/871e6ff8-2948-4977-a91b-bd0eb8c8aed0/sist-en-62714-1-2018>

EUROPEAN STANDARD

EN IEC 62714-1

NORME EUROPÉENNE

EUROPÄISCHE NORM

June 2018

ICS 25.040.40; 35.060; 35.240.50

Supersedes EN 62714-1:2014

English Version

Engineering data exchange format for use in industrial  
automation systems engineering - Automation markup language  
- Part 1: Architecture and general requirements  
(IEC 62714-1:2018)

Format d'échange de données techniques pour une  
utilisation dans l'ingénierie des systèmes d'automatisation  
industrielle - Automation markup language -  
Partie 1: Architecture et exigences générales  
(IEC 62714-1:2018)

Datenaustauschformat für Planungsdaten industrieller  
Automatisierungssysteme - Automation markup language -  
Teil 1: Architektur und allgemeine Festlegungen  
(IEC 62714-1:2018)

This European Standard was approved by CENELEC on 2018-06-04. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.



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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

**EN IEC 62714-1:2018****European foreword**

The text of document 65E/582/FDIS, future edition 2 of IEC 62714-1, prepared by SC 65E "Devices and integration in enterprise systems" of IEC/TC 65 "Industrial-process measurement, control and automation" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62714-1:2018.

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) 2019-03-04
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2021-06-04

This document supersedes EN 62714-1:2014.

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

**Endorsement notice**

The text of the International Standard IEC 62714-1:2018 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60027 Series	NOTE	Harmonized as EN 60027 Series.
IEC 62264-1	NOTE	Harmonized as EN 62264-1.
IEC 62714-2	NOTE	Harmonized as EN 62714-2.
IEC 62714-3	NOTE	Harmonized as EN 62714-3.
ISO 80000-1	NOTE	Harmonized as EN ISO 80000-1.

## Annex ZA (normative)

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

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: [www.cenelec.eu](http://www.cenelec.eu).

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 62424	2016	Representation of process control engineering - Requests in P&I diagrams and data exchange between P&ID tools and PCE-CAE tools	EN 62424	2016
IEC 62714	Series	Engineering data exchange format for use in industrial automation systems engineering - Automation markup language	EN 62714	Series
ISO/PAS 17506	-	Industrial automation systems and integration - COLLADA digital asset schema specification for 3D visualization of industrial data	-	-
ISO/IEC 29500-2	-	Information technology - Document description and processing languages - Office Open XML File Formats - Part 2: Open Packaging Conventions	-	-
IETF RFC 2046	-	Multipurpose Internet Mail Extensions (MIME) - Part Two: Media Types [viewed 2017-11-13]. Available at < <a href="http://www.ietf.org">http://www.ietf.org</a> >	-	-
IETF RFC 4122	-	A Universally Unique IDentifier (UUID) URN Namespace [viewed 2017-11-13]. Available at < <a href="http://www.ietf.org">http://www.ietf.org</a> >	-	-
IETF RFC 5646	-	Tags for Identifying Languages [viewed 2017-11-13]. Available at < <a href="http://www.ietf.org">http://www.ietf.org</a> >	-	-

COLLADA 1.4.1:March 2008, COLLADA – Digital Asset Schema Release 1.4.1 [viewed 2017-11-13]. Available at <[http://www.khronos.org/files/collada\\_spec\\_1\\_4.pdf](http://www.khronos.org/files/collada_spec_1_4.pdf)>

PLCopen XML 2.0:December 3rd 2008 and PLCopen XML 2.0.1:May 8th 2009, XML formats for IEC 61131-3 [viewed 2017-11-13]. Available at <<http://www.plcopen.org>>

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

Full standard:  
<https://standards.iteh.ai/catalog/standards/sist/871e6ff8-2948-4977-a91b-bd0eb8c8aed0/sist-en-62714-1-2018>



IEC 62714-1

Edition 2.0 2018-04

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE



**Engineering data exchange format for use in industrial automation systems  
engineering – Automation markup language –  
Part 1: Architecture and general requirements**

**Format d'échange de données techniques pour une utilisation dans l'ingénierie  
des systèmes d'automatisation industrielle – Automation markup language –  
Partie 1: Architecture et exigences générales**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
ELECTROTECHNIQUE  
INTERNATIONALE

ICS 25.040.40; 35.060; 35.240.50

ISBN 978-2-8322-5521-6

**Warning! Make sure that you obtained this publication from an authorized distributor.  
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

## CONTENTS

FOREWORD.....	7
INTRODUCTION.....	9
1 Scope.....	11
2 Normative references .....	11
3 Terms, definitions and abbreviations .....	12
3.1 Terms and definitions.....	12
3.2 Abbreviations .....	14
4 Conformity.....	15
5 AML architecture specification .....	15
5.1 General.....	15
5.2 General AML architecture .....	15
5.3 Sub document versions and AML superior document information .....	16
5.4 Meta information about the AML source tool .....	17
5.5 AML relations specification .....	18
5.5.1 General .....	18
5.5.2 Class-instance-relations .....	18
5.5.3 Instance-instance-relations.....	18
5.5.4 Identification of objects.....	20
5.6 AML document reference specification.....	20
5.6.1 General .....	20
5.6.2 Referencing COLLADA documents.....	20
5.6.3 Referencing PLCopen XML documents.....	20
5.6.4 Referencing additional documents in the scope of IEC 62714 (all parts) .....	20
5.6.5 Referencing documents outside of the scope of IEC 62714 (all parts).....	20
5.6.6 Referencing CAEX attributes to items in external documents .....	21
6 AML base libraries.....	21
6.1 General.....	21
6.2 General provisions .....	21
6.3 AML interface class library – AutomationMLInterfaceClassLib.....	22
6.3.1 General .....	22
6.3.2 InterfaceClass AutomationMLBaseInterface.....	24
6.3.3 InterfaceClass Order .....	24
6.3.4 InterfaceClass Port.....	25
6.3.5 InterfaceClass PPRConnector .....	25
6.3.6 InterfaceClass ExternalDataConnector .....	26
6.3.7 InterfaceClass COLLADAInterface .....	26
6.3.8 InterfaceClass PLCopenXMLInterface .....	27
6.3.9 InterfaceClass ExternalDataReference .....	27
6.3.10 InterfaceClass Communication .....	27
6.3.11 InterfaceClass SignalInterface .....	28
6.4 AML basic role class library – AutomationMLBaseRoleClassLib.....	28
6.4.1 General .....	28
6.4.2 RoleClass AutomationMLBaseRole.....	30
6.4.3 RoleClass Group .....	31
6.4.4 RoleClass Facet .....	31
6.4.5 RoleClass Resource .....	31



6.4.6	RoleClass Product .....	32
6.4.7	RoleClass Process .....	32
6.4.8	RoleClass Structure .....	33
6.4.9	RoleClass ProductStructure .....	33
6.4.10	RoleClass ProcessStructure .....	34
6.4.11	RoleClass ResourceStructure .....	34
6.4.12	RoleClass ExternalData .....	34
6.5	AML basic attribute type library .....	35
6.5.1	General .....	35
6.5.2	Attributes of the AutomationMLBaseAttributeTypeLib .....	36
7	Modelling of user-defined data .....	39
7.1	General .....	39
7.2	User-defined attributes .....	39
7.3	User-defined AttributeTypes .....	39
7.4	User-defined InterfaceClasses .....	40
7.5	User-defined RoleClasses .....	41
7.6	User-defined SystemUnitClasses .....	42
7.7	User-defined InstanceHierarchies .....	43
8	Extended AML concepts .....	44
8.1	General overview .....	44
8.2	AML Port interface .....	44
8.3	AML Facet object .....	44
8.4	AML Group object .....	45
8.5	Splitting of AML top-level data into different documents .....	45
8.6	Internationalization, AML multilingual expression .....	45
8.7	Version information of AML objects .....	46
8.8	Modelling of structured attribute lists or arrays .....	46
8.9	AML Container .....	46
Annex A (informative)	General introduction into the Automation Markup Language .....	48
A.1	General Automation Markup Language concepts .....	48
A.1.1	The Automation Markup Language architecture .....	48
A.1.2	Modelling of plant topology information .....	49
A.1.3	Referencing geometry and kinematics information .....	51
A.1.4	Referencing logic information .....	51
A.1.5	Referencing documents outside of the scope of IEC 62714 .....	52
A.1.6	Interlinking CAEX attributes and attributes in external documents .....	53
A.1.7	Modelling of relations .....	54
A.2	Extended AML concepts and examples .....	57
A.2.1	General overview .....	57
A.2.2	AML Port concept .....	57
A.2.3	AML Facet concept .....	60
A.2.4	AML Group concept .....	62
A.2.5	Process-Product-Resource concept .....	66
A.2.6	AML multilingual expression concept .....	74
A.2.7	Attribute lists and arrays .....	75
Annex B (informative)	XML representation of standard AML base libraries .....	79
Bibliography	.....	81

Figure 1 – Overview of the engineering data exchange format AML .....	9
Figure 2 – AML document version information .....	17
Figure 3 – XML text of the AML source tool information .....	17
Figure 4 – Example of a relation as block diagram and as object tree .....	19
Figure 5 – Example relation between the objects “PLC1” and “Rob1” .....	19
Figure 6 – XML text of the example relation between the objects “PLC1” and “Rob1” .....	19
Figure 7 – AML basic interface class library .....	23
Figure 8 – XML description of the AML basic interface class library .....	24
Figure 9 – AML basic role class library .....	29
Figure 10 – AutomationMLBaseRoleClassLib .....	30
Figure 11 – XML text of the AutomationMLBaseRoleClassLib .....	30
Figure 12 – AML basic attribute type library .....	35
Figure 13 – XML text of the AutomationMLBaseAttributeTypeLib .....	36
Figure 14 – Example of a user-defined attribute .....	39
Figure 15 – Examples for user-defined AttributeTypes .....	40
Figure 16 – XML code of the examples for user-defined AttributeTypes .....	40
Figure 17 – Example of a user-defined InterfaceClass in a user-defined InterfaceClassLib .....	41
Figure 18 – XML code of the example of a user-defined InterfaceClass in a user- defined InterfaceClassLib .....	41
Figure 19 – Example of a user-defined RoleClass in a user-defined RoleClassLib .....	42
Figure 20 – XML code of the example of a user-defined RoleClass in a user-defined RoleClassLib .....	42
Figure 21 – Examples for different user-defined SystemUnitClasses .....	42
Figure 22 – XML code of the examples for different user-defined SystemUnitClasses .....	43
Figure 23 – Example of a user-defined InstanceHierarchy .....	43
Figure 24 – AML representation of a user-defined InstanceHierarchy .....	44
Figure A.1 – AML general architecture .....	48
Figure A.2 – Plant topology with AML .....	50
Figure A.3 – Reference from CAEX to a COLLADA document .....	51
Figure A.4 – Reference from a CAEX to a PLCopen XML document .....	51
Figure A.5 – Example of referencing an external document .....	52
Figure A.6 – XML text of the example for referencing an external document .....	52
Figure A.7 – Example of referencing a CAEX attribute to an item in an external document .....	53
Figure A.8 – XML text of the example for referencing a CAEX attribute to an item in an external document .....	54
Figure A.9 – Relations in AML .....	55
Figure A.10 – XML description of the relations example .....	56
Figure A.11 – XML text of the SystemUnitClassLib of the relations example .....	56
Figure A.12 – XML text of the InstanceHierarchy of the relations example .....	57
Figure A.13 – Port concept .....	58
Figure A.14 – Example describing the AML Port concept .....	58
Figure A.15 – XML description of the AML Port concept .....	59
Figure A.16 – XML text describing the AML Port concept .....	60

Figure A.17 – Definition of a user-defined AML Port class “UserDefinedPort” .....	60
Figure A.18 – AML Facet example .....	61
Figure A.19 – XML text of the AML Facet example .....	62
Figure A.20 – AML Group example .....	63
Figure A.21 – XML text for the AML Group example .....	63
Figure A.22 – Combination of the Facet and Group concept .....	64
Figure A.23 – XML text view for the combined Facet-Group example .....	65
Figure A.24 – Generic HMI template “B” visualizing a process variable “Y” of a conveyor .....	66
Figure A.25 – Generated HMI result “B” visualizing both conveyors with individual process variables .....	66
Figure A.26 – Base elements of the Product-Process-Resource concept .....	67
Figure A.27 – PPRConnector interface .....	67
Figure A.28 – Example for the Product-Process-Resource concept .....	68
Figure A.29 – AML roles required for the Process-Product-Resource concept .....	68
Figure A.30 – Elements of the example .....	69
Figure A.31 – Links within the example .....	69
Figure A.32 – Links of the resource centric view on the example .....	70
Figure A.33 – InstanceHierarchy of the example in AML .....	71
Figure A.34 – InternalElements of the example .....	72
Figure A.35 – InternalLinks of the example .....	72
Figure A.36 – InstanceHierarchy of the example in XML .....	73
Figure A.37 – Example describing the AML multilingual expression concept .....	74
Figure A.38 – XML description of the AML multilingual expression concept .....	74
Figure A.39 – XML text describing the AML multilingual expression concept .....	74
Figure A.40 – AML model of a multilingual AttributeType .....	75
Figure A.41 – XML code of the a multilingual AttributeType .....	75
Figure A.42 – Attribute list “SupportedFrequencies” .....	76
Figure A.43 – XML code for the attribute list “SupportedFrequencies” .....	76
Figure A.44 – Example CAEX model of the array “Edges” .....	77
Figure A.45 – XML code for the attribute array “Edges” .....	78
Figure B.1 – XML text of the standard AML interface class library, role class library and attribute type library .....	80
Table 1 – Abbreviations .....	15
Table 2 – Interface classes of the AutomationMLInterfaceClassLib .....	22
Table 3 – InterfaceClass AutomationMLBaseInterface .....	24
Table 4 – InterfaceClass Order .....	25
Table 5 – Optional attributes for AML Port interfaces .....	25
Table 6 – InterfaceClass PPRConnector .....	26
Table 7 – InterfaceClass ExternalDataConnector .....	26
Table 8 – InterfaceClass COLLADAInterface .....	26
Table 9 – InterfaceClass PLCopenXMLInterface .....	27
Table 10 – InterfaceClass ExternalDataReference .....	27

Table 11 – InterfaceClass Communication .....	28
Table 12 – InterfaceClass SignalInterface .....	28
Table 13 – RoleClass AutomationMLBaseRole .....	31
Table 14 – RoleClass Group .....	31
Table 15 – RoleClass Facet .....	31
Table 16 – RoleClass Resource .....	32
Table 17 – RoleClass Product .....	32
Table 18 – RoleClass Process .....	33
Table 19 – RoleClass Structure .....	33
Table 20 – RoleClass ProductStructure .....	33
Table 21 – RoleClass ProcessStructure .....	34
Table 22 – RoleClass ResourceStructure .....	34
Table 23 – RoleClass ExternalData .....	34
Table 24 – Attribute Types of the AutomationMLBaseAttributeTypeLib .....	36
Table 25 – Sub-attributes of the attribute “Cardinality” .....	38
Table 26 – Sub-attributes of the attribute “AssociatedValue” .....	38
Table A.1 – Overview of major extended AML concepts .....	57

**iTeh STANDARD PREVIEW**  
 (standards.iteh.ai)  
 Full standard:  
<https://standards.iteh.ai/catalog/standards/sist/871e608-2948-4977-a91b-bd0eb8c8aed0/sist-en-62714-1-2018>

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ENGINEERING DATA EXCHANGE FORMAT FOR USE IN  
INDUSTRIAL AUTOMATION SYSTEMS ENGINEERING –  
AUTOMATION MARKUP LANGUAGE –****Part 1: Architecture and general requirements**

## 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.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 62714-1 has been prepared by subcommittee 65E: Devices and integration in enterprise systems, of IEC technical committee 65: Industrial-process measurement, control and automation.

This second edition cancels and replaces the first edition published in 2014. This edition constitutes a technical revision.

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

- a) use of CAEX 3.0 according to IEC 62424:2016 which provides technical improvements as attribute libraries, nested interfaces, new fields for indicating the source of an object, a refinement of the mirror concept and native support of multiple roles, native meta information about the CAEX file source tool, identification of instances via unique IDs instead of paths, etc.,