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

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EN IEC 62714-1

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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)

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• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2021-06-04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

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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.

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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.

Publication	Year	Title	EN/HD	Year
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 <http://www.ietf.org>	-	-
IETF RFC 4122	-	A Universally Unique IDentifier (UUID) URN Namespace [viewed 2017-11-13]. Available at <http://www.ietf.org>	-	-
IETF RFC 5646	-	Tags for Identifying Languages [viewed 2017-11-13]. Available at <http://www.ietf.org>	-	-

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>

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>

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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ENGINEERING DATA EXCHANGE FORMAT FOR USE IN INDUSTRIAL AUTOMATION SYSTEMS ENGINEERING – AUTOMATION MARKUP LANGUAGE –

Part 1: Architecture and general requirements

FOREWORD

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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 pathes, etc.,

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b) improved modelling of references to documents outside of the scope of the present standard,

c) modelling of references between CAEX attributes and items in external documents, e.g. within an Excel sheet,

d) revised role libraries,

e) modified Port concept,

f) modelling of multilingual expressions,

g) modelling of structured attribute lists or array,

h) a new AML container format,

i) a new standard AML attribute library.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
65E/582/FDIS	65E/586/RVD

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

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

A list of all parts in the IEC 62714 series, published under the general title *Engineering data exchange format for use in industrial automation systems engineering – Automation markup language*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document 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.

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INTRODUCTION

IEC 62714 is a solution for data exchange focusing on the domain of automation engineering.

The data exchange format defined in the IEC 62714 series (Automation Markup Language, AML) is an XML schema based data format for plant engineering data. AML and has been developed in order to support the data exchange in a heterogeneous engineering tools landscape. The goal of AML is to interconnect engineering tools in their different disciplines, e.g. mechanical plant engineering, electrical design, process engineering, process control engineering, HMI development, PLC programming, robot programming, etc. The application of IEC 62714 is industry independent. It is applicable in all industries that require data exchange in their engineering tool chain, e.g. in discrete industry or process industry.

AML stores engineering information following the object-oriented paradigm and allows modelling of physical and logical plant components as data objects encapsulating different aspects. An object may consist of other sub-objects, and can itself be part of a larger composition or aggregation. Typical objects in plant automation comprise information on topology, geometry, kinematics and logic, whereas logic comprises sequencing, behaviour and control. Therefore, an important focus in the data exchange in engineering is the exchange of object oriented data structures, geometry, kinematics and logic.

AML combines existing industry data formats that are designed for the storage and exchange of different aspects of engineering information. These data formats are used on an “as-is” basis within their own specifications and are not branched for AML needs.

The core of AML is the top-level data format CAEX. CAEX is utilized to interconnect the different data formats. Therefore, AML has an inherent distributed document architecture.

Figure 1 illustrates the basic AML architecture and the distribution of topology, geometry, kinematics and logic information.

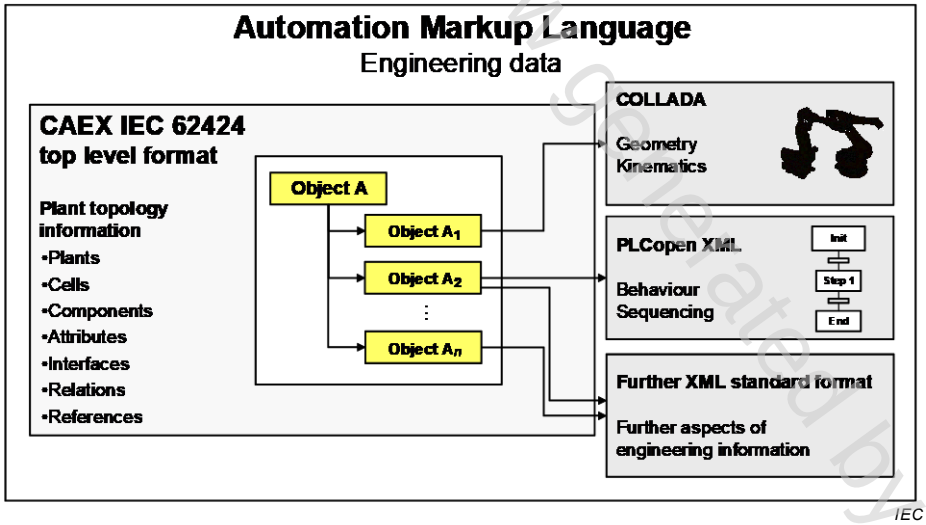

Figure 1 – Overview of the engineering data exchange format AML

Due to the different aspects of AML, the IEC 62714 series consists of different parts focusing on different aspects:

- IEC 62714-1: Architecture and general requirements

  This part specifies the general AML architecture, the modelling of engineering data, classes, instances, relations, references, hierarchies, basic AML libraries and extended AML concepts. It is the basis of all future parts, and it provides mechanisms to reference other subformats.

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- IEC 62714-2: Role class libraries

  This part specifies additional AML libraries.

- IEC 62714-3: Geometry and kinematics

  This part specifies the modelling of geometry and kinematics information.

- IEC 62714-4[1]: Logic

  This part specifies the modelling of logics, sequencing, behaviour and control related information.

Further parts will be added in the future in order to interconnect further data standards to AML.

As long as no further parts describe the integration of further standards, it is important to focus on a limited set of sub data formats. Otherwise, it would open up the usage of any data format and data exchange would not work.

Clause 1 defines the scope for IEC 62714.

Clause 2 provides normative references.

Clause 3 provides terms, definitions and abbreviations.

Clause 4 defines the conformity to IEC 62714.

Clause 5 describes general architecture specifications for IEC 62714.

Clause 6 defines the basic AML libraries.

Clause 7 describes how to model user-defined data.

Clause 8 describes extended AML concepts.

Annex A gives an informative introduction, use cases and examples regarding AML.

Annex B gives an informative XML representation of the libraries defined in this part of IEC 62714.

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1 Under consideration.