

SLOVENSKI STANDARD**SIST EN 62541-3:2015****01-oktober-2015****Nadomešča:****SIST EN 62541-3:2010****Enotna arhitektura OPC - 3. del: Model naslovnega prostora (IEC 62541-3:2015)**

OPC Unified Architecture -- Part 3: Address Space Model (IEC 62541-3:2015)

OPC unified architecture - Part 3: Address Space Model (IEC 62541-3:2015)

iTeh STANDARD PREVIEW

Architecture unifiée OPC - Partie 3: Modèle de l'Espace d'Adressage (IEC 62541-3:2015)

[SIST EN 62541-3:2015](#)**Ta slovenski standard je istoveten z: EN 62541-3:2015 4e4f-b309-560ae5d613e/sist-en-62541-3-2015****ICS:**

25.040.40	Merjenje in krmiljenje industrijskih postopkov	Industrial process measurement and control
35.240.50	Uporabniške rešitve IT v industriji	IT applications in industry

SIST EN 62541-3:2015**en,fr,de**

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN 62541-3:2015](#)

<https://standards.iteh.ai/catalog/standards/sist/f0809c6-e620-4e4f-b309-560ae5d613e/sist-en-62541-3-2015>

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 62541-3

May 2015

ICS 25.040.40; 35.100

Supersedes EN 62541-3:2010

English Version

**OPC unified architecture - Part 3: Address Space Model
(IEC 62541-3:2015)**

Architecture unifiée OPC - Partie 3: Modèle de l'Espace
d'Adressage
(IEC 62541-3:2015)

OPC Unified Architecture - Teil 3: Adressraummodell
(IEC 62541-3:2015)

This European Standard was approved by CENELEC on 2015-04-29. 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.

(standards.iteh.ai)

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, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

<http://standards.iteh.ai/catalog/standards/sist/en/0809c6-e620-4e4f-b309-560ae5d613e/sist-en-62541-3-2015>



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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Foreword

The text of document 65E/374/CDV, future edition 2 of IEC 62541-3, 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 62541-3:2015.

The following dates are fixed:

- latest date by which the document has to be implemented at (dop) 2016-01-29 national level by publication of an identical national standard or by endorsement
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2018-04-29

This document supersedes EN 62541-3:2010.

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.

The STANDARD PREVIEW

(standards.iteh.ai)

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

SIST EN 62541-3:2015

<https://standards.iteh.ai/catalog/standards/sist/f0809c6-e620-4e4f-b309-560ae5d613e/sist-en-62541-3-2015>

Endorsement notice

The text of the International Standard IEC 62541-3:2015 was approved by CENELEC as a European Standard without any modification.

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 1 When 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.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC/TR 62541-1	-	OPC unified architecture - Part 1: Overview and concepts	CLC/TR 62541-1	-
IEC 62541-4		iTeh STANDARD REVIEW OPC Unified Architecture Part 4: Services	EN 62541-4	-
IEC 62541-5	-	OPC unified architecture - Part 5: Information Model	EN 62541-5	-
IEC 62541-6	-	OPC unified architecture - https://standards.iteh.ai/standards/sist/f10809c6-e620-4e4f-b309-560ae5d613e/sist-en-62541-3-2015 Part 6: Mappings	EN 62541-6	-
IEC 62541-8	-	OPC Unified Architecture - Part 8: Data Access	EN 62541-8	-
IEC 62541-11	-	OPC unified architecture - Part 11: Historical Access	EN 62541-11	-
ISO/IEC 10918-1	-	Information technology - Digital compression and coding of continuous-tone still images: Requirements and guidelines	-	-
ISO/IEC 15948	-	Information technology - Computer graphics and image processing - Portable Network Graphics (PNG) - Functional specification	-	-
ISO 639	series	Codes for the representation of names of languages	-	-
ISO 3166	series	Codes for the representation of names of countries and their subdivisions	-	-
ANSI/IEEE 754	1985	IEEE Standard for Binary Floating-Point Arithmetic	-	-

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IETF RFC 3066	-	Tags for the Identification of Languages	-	-
W3C XML Schema Part 1	-	Structures	-	-
W3C XML Schema Part 2	-	Datatypes	-	-
W3C Xpath	-	XML Path Language (XPath)	-	-

iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN 62541-3:2015

<https://standards.iteh.ai/catalog/standards/sist/f0809c6-e620-4e4f-b309-560ae5d613e/sist-en-62541-3-2015>



INTERNATIONAL STANDARD

NORME INTERNATIONALE



OPC unified architecture – iTeh STANDARD PREVIEW
Part 3: Address Space Model
standards.iteh.ai

Architecture unifiée OPC – [SIST EN 62541-3:2015](#)
Partie 3: Modèle de l'Espace d'Adressage <http://systech.iteh.ai/sist/en/62541-3-2015>
[ff0809c6-e620-4e4f-b309-560ae5d613e/sist-en-62541-3-2015](http://systech.iteh.ai/sist/en/62541-3-2015)

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 25.040.40; 35.100

ISBN 978-2-8322-2385-7

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	10
1 Scope	12
2 Normative references	12
3 Terms, definitions, abbreviations and conventions	13
3.1 Terms and definitions	13
3.2 Abbreviations	14
3.3 Conventions	14
3.3.1 Conventions for AddressSpace figures	14
3.3.2 Conventions for defining NodeClasses	14
4 AddressSpace concepts	16
4.1 Overview	16
4.2 Object Model	16
4.3 Node Model	16
4.3.1 General	16
4.3.2 NodeClasses	17
4.3.3 Attributes	17
4.3.4 References	17
4.4 Variables	18
4.4.1 General	18
4.4.2 Properties	18
4.4.3 DataVariables	18
4.5 TypeDefinitionNodes	19
4.5.1 General	19
4.5.2 Complex TypeDefinitionNodes and their InstanceDeclarations	20
4.5.3 Subtyping	20
4.5.4 Instantiation of complex TypeDefinitionNodes	21
4.6 Event Model	22
4.6.1 General	22
4.6.2 EventTypes	22
4.6.3 Event Categorization	23
4.7 Methods	23
5 Standard NodeClasses	23
5.1 Overview	23
5.2 Base NodeClass	24
5.2.1 General	24
5.2.2 NodId	24
5.2.3 NodeClass	24
5.2.4 BrowseName	24
5.2.5 DisplayName	25
5.2.6 Description	25
5.2.7 WriteMask	25
5.2.8 UserWriteMask	26
5.3 ReferenceType NodeClass	26
5.3.1 General	26
5.3.2 Attributes	27
5.3.3 References	28

5.4	View NodeClass.....	29
5.5	Objects	31
5.5.1	Object NodeClass	31
5.5.2	ObjectType NodeClass	33
5.5.3	Standard ObjectType FolderType.....	35
5.5.4	Client-side creation of Objects of an ObjectType	35
5.6	Variables	35
5.6.1	General.....	35
5.6.2	Variable NodeClass	35
5.6.3	Properties	39
5.6.4	DataVariable.....	39
5.6.5	VariableType NodeClass.....	40
5.6.6	Client-side creation of Variables of an VariableType	42
5.7	Method NodeClass.....	42
5.8	DataTypes	44
5.8.1	DataType Model.....	44
5.8.2	Encoding Rules for different kinds of DataTypes	46
5.8.3	DataType NodeClass	47
5.8.4	DataTypeDictionary, DataTypeDescription, DataTypeEncoding and DataTypeSystem	48
5.9	Summary of Attributes of the NodeClasses	50
6	Type Model for ObjectTypes and VariableTypes	51
6.1	Overview.....	51
6.2	Definitions.....	51
6.2.1	InstanceDeclaration	51
6.2.2	Instances without ModellingRules	51
6.2.3	InstanceDeclarationHierarchy	52
6.2.4	Similar Node of InstanceDeclaration	52
6.2.5	BrowsePath	52
6.2.6	Attribute Handling of InstanceDeclarations.....	52
6.2.7	Attribute Handling of Variable and VariableTypes	52
6.2.8	Nodelds of InstanceDeclarations.....	52
6.3	Subtyping of ObjectTypes and VariableTypes	53
6.3.1	Overview	53
6.3.2	Attributes	53
6.3.3	InstanceDeclarations	53
6.4	Instances of ObjectTypes and VariableTypes	56
6.4.1	Overview	56
6.4.2	Creating an Instance	57
6.4.3	Constraints on an Instance	57
6.4.4	ModellingRules	58
6.5	Changing Type Definitions that are already used	66
7	Standard ReferenceTypes	66
7.1	General.....	66
7.2	References ReferenceType.....	67
7.3	HierarchicalReferences ReferenceType	67
7.4	NonHierarchicalReferences ReferenceType	68
7.5	HasChild ReferenceType	68
7.6	Aggregates ReferenceType	68

7.7	HasComponent ReferenceType	68
7.8	HasProperty ReferenceType	69
7.9	HasOrderedComponent ReferenceType	69
7.10	HasSubtype ReferenceType	69
7.11	Organizes ReferenceType	69
7.12	HasModellingRule ReferenceType	70
7.13	HasTypeDefinition ReferenceType	70
7.14	HasEncoding ReferenceType	70
7.15	HasDescription ReferenceType	70
7.16	GeneratesEvent	71
7.17	AlwaysGeneratesEvent	71
7.18	HasEventSource	71
7.19	HasNotifier	71
8	Standard DataTypes	73
8.1	General	73
8.2	NodeId	73
8.2.1	General	73
8.2.2	NamespaceIndex	73
8.2.3	IdentifierType	74
8.2.4	Identifier value	74
8.3	QualifiedName	75
8.4	LocaleId	75
8.5	LocalizedText	76
8.6	Argument	76
8.7	BaseDataType	76
8.8	Boolean	76
8.9	Byte	76
8.10	ByteString	77
8.11	DateTime	77
8.12	Double	77
8.13	Duration	77
8.14	Enumeration	77
8.15	Float	77
8.16	Guid	77
8.17	SByte	77
8.18	IdType	77
8.19	Image	77
8.20	ImageBMP	78
8.21	ImageGIF	78
8.22	ImageJPG	78
8.23	ImagePNG	78
8.24	Integer	78
8.25	Int16	78
8.26	Int32	78
8.27	Int64	78
8.28	TimeZoneDataType	78
8.29	NamingRuleType	78
8.30	NodeClass	79
8.31	Number	79

8.32	String	79
8.33	Structure	79
8.34	UInteger	79
8.35	UInt16	79
8.36	UInt32	79
8.37	UInt64	79
8.38	UtcTime	80
8.39	XmlElement	80
8.40	EnumValueType	80
9	Standard EventTypes	80
9.1	General	80
9.2	BaseEventType	81
9.3	SystemEventType	81
9.4	ProgressEventType	81
9.5	AuditEventType	82
9.6	AuditSecurityEventType	83
9.7	AuditChannelEventType	83
9.8	AuditOpenSecureChannelEventType	83
9.9	AuditSessionEventType	83
9.10	AuditCreateSessionEventType	84
9.11	AuditUrlMismatchEventType	84
9.12	AuditActivateSessionEventType	84
9.13	AuditCancelEventType	84
9.14	AuditCertificateEventType	84
9.15	AuditCertificateDataMismatchEventType	84
9.16	AuditCertificateExpiredEventType	84
9.17	AuditCertificateInvalidEventType	84
9.18	AuditCertificateUntrustedEventType	84
9.19	AuditCertificateRevokedEventType	84
9.20	AuditCertificateMismatchEventType	85
9.21	AuditNodeManagementEventType	85
9.22	AuditAddNodesEventType	85
9.23	AuditDeleteNodesEventType	85
9.24	AuditAddReferencesEventType	85
9.25	AuditDeleteReferencesEventType	85
9.26	AuditUpdateEventType	85
9.27	AuditWriteUpdateEventType	85
9.28	AuditHistoryUpdateEventType	85
9.29	AuditUpdateMethodEventType	85
9.30	DeviceFailureEventType	85
9.31	SystemStatusChangeEvent-Type	86
9.32	ModelChangeEvents	86
9.32.1	General	86
9.32.2	NodeVersion Property	86
9.32.3	Views	86
9.32.4	Event Compression	86
9.32.5	BaseModelChangeEventType	86
9.32.6	GeneralModelChangeEventType	87
9.32.7	Guidelines for ModelChangeEvents	87

iTeh STANDARD PREVIEW
(standards.iteh.ai)

9.33 SemanticChangeEvent Type	87
9.33.1 General.....	87
9.33.2 ViewVersion and NodeVersion Properties	87
9.33.3 Views.....	88
9.33.4 Event Compression.....	88
Annex A (informative) How to use the Address Space Model	89
A.1 Overview.....	89
A.2 Type definitions	89
A.3 ObjectTypes.....	89
A.4 VariableTypes.....	90
A.4.1 General.....	90
A.4.2 Properties or DataVariables	90
A.4.3 Many Variables and / or structured DataTypes.....	90
A.5 Views.....	91
A.6 Methods.....	91
A.7 Defining ReferenceTypes.....	91
A.8 Defining ModellingRules	91
Annex B (informative) OPC UA Meta Model in UML	92
B.1 Background.....	92
B.2 Notation	92
B.3 Meta Model.....	94
B.3.1 Base	94
B.3.2 ReferenceType	94
B.3.3 Predefined ReferenceTypes	96
B.3.4 Attributes	96
B.3.5 Object and ObjectType	97
B.3.6 EventNotifier	98
B.3.7 Variable and VariableType	98
B.3.8 Method	99
B.3.9 DataType	100
B.3.10 View	101
Annex C (normative) OPC Binary Type Description System	102
C.1 Concepts	102
C.2 Schema Description	103
C.2.1 TypeDictionary.....	103
C.2.2 TypeDescription.....	103
C.2.3 OpaqueType	104
C.2.4 EnumeratedType	104
C.2.5 StructuredType	105
C.2.6 FieldType.....	105
C.2.7 EnumeratedValue	107
C.2.8 ByteOrder	107
C.2.9 ImportDirective	107
C.3 Standard Type Descriptions	107
C.4 Type Description Examples.....	108
C.5 OPC Binary XML Schema	110
C.6 OPC Binary Standard TypeDictionary	111
Annex D (normative) Graphical Notation	114

D.1 General	114
D.2 Notation	114
D.2.1 Overview	114
D.2.2 Simple Notation	114
D.2.3 Extended Notation	116
 Figure 1 – AddressSpace Node diagrams	14
Figure 2 – OPC UA Object Model.....	16
Figure 3 – AddressSpace Node Model	17
Figure 4 – Reference Model.....	18
Figure 5 – Example of a Variable defined by a VariableType.....	19
Figure 6 – Example of a Complex TypeDefinition	20
Figure 7 – Object and its Components defined by an ObjectType.....	21
Figure 8 – Symmetric and Non-Symmetric References.....	28
Figure 9 – Variables, VariableTypes and their DataTypes	44
Figure 10 – DataType Model.....	45
Figure 11 – Example of DataType Modelling	50
Figure 12 – Subtyping TypeDefinitionNodes.....	54
Figure 13 – The Fully-Inherited InstanceDeclaration Hierarchy for Beta-type	55
Figure 14 – An Instance and its TypeDefinitionNode	57
Figure 15 – Example for several References between InstanceDeclarations	58
Figure 16 – Example on changing instances based on InstanceDeclarations	60
Figure 17 – Example on changing instances based on an InstanceDeclaration	61
Figure 18 – Use of the Standard ModellingRule New	62
Figure 19 – Example using the Standard ModellingRules Optional and Mandatory	63
Figure 20 – Example on using ExposesItsArray	64
Figure 21 – Complex example on using ExposesItsArray	64
Figure 22 – Example on using OptionalPlaceholder	65
Figure 23 – Example on using MandatoryPlaceholder	66
Figure 24 – Standard ReferenceType Hierarchy.....	67
Figure 25 – Event Reference Example	72
Figure 26 – Complex Event Reference Example	73
Figure 27 – Standard EventType Hierarchy.....	81
Figure 28 – Audit Behaviour of a Server.....	82
Figure 29 – Audit Behaviour of an Aggregating Server.....	83
Figure B.1 – Background of OPC UA Meta Model	92
Figure B.2 – Notation (I)	93
Figure B.3 – Notation (II)	93
Figure B.4 – Base	94
Figure B.5 – Reference and ReferenceType.....	95
Figure B.6 – Predefined ReferenceTypes.....	96
Figure B.7 – Attributes	97
Figure B.8 – Object and ObjectType	98

Figure B.9 – EventNotifier	98
Figure B.10 – Variable and VariableType	99
Figure B.11 – Method	100
Figure B.12 – DataType	100
Figure B.13 – View	101
Figure C.1 – OPC Binary Dictionary Structure	102
Figure D.1 – Example of a Reference connecting two Nodes	115
Figure D.2 – Example of using a TypeDefinition inside a Node	117
Figure D.3 – Example of exposing Attributes	117
Figure D.4 – Example of exposing Properties inline	118
 Table 1 – NodeClass Table Conventions	15
Table 2 – Base NodeClass	24
Table 3 – Bit mask for WriteMask and UserWriteMask	26
Table 4 – ReferenceType NodeClass	27
Table 5 – View NodeClass	30
Table 6 – Object NodeClass	32
Table 7 – ObjectType NodeClass	34
Table 8 – Variable NodeClass	36
Table 9 – VariableType NodeClass	41
Table 10 – Method NodeClass	43
Table 11 – DataType NodeClass	47
Table 12 – Overview of Attributes	51
Table 13 – The InstanceDeclarationHierarchy for BetaType	54
Table 14 – The Fully-Inherited InstanceDeclarationHierarchy for BetaType	55
Table 15 – Rule for ModellingRules Properties when Subtyping	59
Table 16 – Properties of ModellingRules	61
Table 17 – NodId Definition	73
Table 18 – IdentifierType Values	74
Table 19 – NodId Null Values	75
Table 20 – QualifiedName Definition	75
Table 21 – LocaleId Examples	75
Table 22 – LocalizedText Definition	76
Table 23 – Argument Definition	76
Table 24 – TimeZoneDataType Definition	78
Table 25 – NamingRuleType Values	79
Table 26 – NodeClass Values	79
Table 27 – EnumValueType Definition	80
Table C.1 – TypeDictionary Components	103
Table C.2 – TypeDescription Components	104
Table C.3 – OpaqueType Components	104
Table C.4 – EnumeratedType Components	105
Table C.5 – StructuredType Components	105

Table C.6 – FieldType Components	106
Table C.7 – EnumeratedValue Components	107
Table C.8 – ImportDirective Components	107
Table C.9 – Standard Type Descriptions	108
Table D.1 – Notation of Nodes depending on the NodeClass	115
Table D.2 – Simple Notation of Nodes depending on the NodeClass	116

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN 62541-3:2015](#)

<https://standards.iteh.ai/catalog/standards/sist/f10809c6-e620-4e4f-b309-560aef5d613e/sist-en-62541-3-2015>