ICS 33.200 SLOVENSKÁ TECHNICKÁ NORMA Apríl 2014

STN	**Rozhranie aplikačného programu pre systémy riadenia elektrickej energie (EMS-API). Časť 301: Základ všeobecného informačného modelu (CIM).**	**STN EN 61970-301** 33 4621

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Obsahuje: EN 61970-301:2013, IEC 61970-301 ed4,0:2013

Oznámením tejto normy sa od 27.6.2016 ruší
STN EN 61970-301 (33 4621) z júna 2012

118745

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 61970-301

October 2013

ICS 33.200

Supersedes EN 61970-301:2011

English version

Energy management system application program interface (EMS-API) - Part 301: Common information model (CIM) base

(IEC 61970-301:2013)

Interface de programmation d'application pour système de gestion d'énergie (EMS-API) -
Part 301: Base de modèle d'information commun (CIM)
(CEI 61970-301:2013)

Schnittstelle für Anwendungsprogramme für Netzführungssysteme (EMS-API) -
Teil 301: Allgemeines Informationsmodell (CIM), Basismodell
(IEC 61970-301:2013)

CENELEC

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

Ref. No. EN 61970-301:2013 E

Foreword

The text of document 57/1331/FDIS, future edition 4 of IEC 61970-301, prepared by IEC TC 57 "Power systems management and associated information exchange" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61970-301:2013.

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)	2014-04-04
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2016-06-27

This document supersedes EN 61970-301:2011.

EN 61970-301:2013 includes the following significant technical changes with respect to EN 61970-301:2011:

• extensions have been added to support UCTE exchange;

• several classes have been moved from EN 61970 to the Assets package in EN 61968;

• the transformer regulation model has been modified and expanded to support phase shifting transformer models needed by ENTSO-E;

• zero and negative sequence impedance terms have been added where missing;

• new StateVariables package has been added to support exchange of network model solutions from power flow, state estimation, etc.;

• additional classes that have been added included:

– PhaseTapChanger

– RatioTapChanger

– ImpedanceVariationCurve

– RatioVariationCurve

– TapSchedule

– SwitchSchedule

– PhaseVariationCurve

– EquivalentInjection added to the Equivalents package

– WindGeneratingUnit and NuclearGeneratingUnit added as subtypes of GeneratingUnit

• classes that were removed included:

– Company

– HeatExchanger

– MeasurementType class removed and replaced with attribute Measurement.measurementType.

– Datatypes ShortLength and LongLength were removed and replaced with Length.

– Load, CustomerLoad, and InductionMotorLoad.

– Subtytpes of ConformLoad and NonConFormLoad

- various editorial changes to cleanup the UML model.

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.

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association.

Endorsement notice

The text of the International Standard IEC 61970-301:2013 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 61850 series	NOTE	Harmonised in EN 61850 series.
IEC 61850-7-3	NOTE	Harmonised as EN 61850-7-3.
IEC 61968 series	NOTE	Harmonised in EN 61968 series.
IEC 61968-11:2010	NOTE	Harmonised as EN 61968-11:2010 (not modified).
IEC 61970-501	NOTE	Harmonised as EN 61970-501.

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 61850-7-4	-	Communication networks and systems for power utility automation - Part 7-4: Basic communication structure - Compatible logical node classes and data object classes	EN 61850-7-4	-
IEC/TS 61970-2	-	Energy management system application program interface (EMS-API) - Part 2: Glossary	CLC/TS 61970-2	-
ISO 8601	-	Data elements and interchange formats - Information interchange - Representation of dates and times	-	-

IEC 61970-301

Edition 4.0 2013-05

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Energy management system application program interface (EMS-API) – Part 301: Common information model (CIM) base

Interface de programmation d'application pour système de gestion d'énergie (EMS-API) – Partie 301: Base de modèle d'information commun (CIM)

IEC 61970-301:2013

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

Useful links:

IEC publications search - www.iec.ch/searchpub

The advanced search enables you to find IEC publications by a variety of criteria (reference number, text, technical committee,…).
It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available on-line and also once a month by email.

Electropedia - www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing more than 30 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary (IEV) on-line.

Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: csc@iec.ch.

A propos de la CEI

La Commission Electrotechnique Internationale (CEI) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications CEI

Le contenu technique des publications de la CEI est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Liens utiles:

Recherche de publications CEI - www.iec.ch/searchpub

La recherche avancée vous permet de trouver des publications CEI en utilisant différents critères (numéro de référence, texte, comité d'études,…).
Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

Just Published CEI - webstore.iec.ch/justpublished

Restez informé sur les nouvelles publications de la CEI. Just Published détaille les nouvelles publications parues. Disponible en ligne et aussi une fois par mois par email.

Electropedia - www.electropedia.org

Le premier dictionnaire en ligne au monde de termes électroniques et électriques. Il contient plus de 30 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans les langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (VEI) en ligne.

Service Clients - webstore.iec.ch/csc

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: csc@iec.ch.

IEC 61970-301

Edition 4.0 2013-05

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Energy management system application program interface (EMS-API) – Part 301: Common information model (CIM) base

Interface de programmation d'application pour système de gestion d'énergie (EMS-API) – Partie 301: Base de modèle d'information commun (CIM)

INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

PRICE CODE XH
CODE PRIX

ICS 33.200

ISBN 978-2-83220-813-7

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ENERGY MANAGEMENT SYSTEM APPLICATION PROGRAM INTERFACE (EMS-API) –

Part 301: Common information model (CIM) base

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.

International Standard IEC 61970-301 has been prepared by IEC technical committee 57: Power systems management and associated information exchange.

This fourth edition cancels and replaces the third edition, published in 2011. This fourth edition constitutes a technical revision.

Major changes from the third edition include the following:

- extensions have been added to support UCTE exchange;
- several classes have been moved from IEC 61970 to the Assets package in IEC 61968;
- the transformer regulation model has been modified and expanded to support phase shifting transformer models needed by ENTSO-E;
- zero and negative sequence impedance terms have been added where missing;
- new StateVariables package has been added to support exchange of network model solutions from power flow, state estimation, etc.;
- additional classes that have been added included:
  - PhaseTapChanger

  - RatioTapChanger
  - ImpedanceVariationCurve
  - RatioVariationCurve
  - TapSchedule
  - SwitchSchedule
  - PhaseVariationCurve
  - EquivalentInjection added to the Equivalents package
  - WindGeneratingUnit and NuclearGeneratingUnit added as subtypes of GeneratingUnit
- classes that were removed included:
  - Company
  - HeatExchanger
  - MeasurementType class removed and replaced with attribute Measurement.measurementType.
  - Datatypes ShortLength and LongLength were removed and replaced with Length.
  - Load, CustomerLoad, and InductionMotorLoad.
  - Subtytpes of ConformLoad and NonConFormLoad
- various editorial changes to cleanup the UML model.

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

FDIS	Report on voting
57/1331/FDIS	57/1349/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.

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

A list of all parts of the IEC 61970 series, under the general title: *Energy management system application program interface (EMS-API)*, 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

- 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.

INTRODUCTION

This standard is one of several parts of the IEC 61970 series which define an application program interface (API) for an energy management system (EMS). This part of IEC 61970 was originally based upon the work of the EPRI control center API (CCAPI) research project (RP-3654-1). The principle objectives of the EPRI CCAPI project were to

- reduce the cost and time needed to add new applications to an EMS;
- protect the investment of existing applications or systems that are working effectively with an EMS.

The principal objective of the IEC 61970 series of standards is to produce standards which facilitate the integration of EMS applications developed independently by different vendors, between entire EMS systems developed independently, or between an EMS system and other systems concerned with different aspects of power system operations, such as generation or distribution management systems (DMS). This is accomplished by defining application program interfaces to enable these applications or systems access to public data and exchange information independent of how such information is represented internally.

The common information model (CIM) specifies the semantics for this API. The component interface specifications (CIS), which are contained in other parts of the IEC 61970 standards, specify the content of the messages exchanged.

The CIM is an abstract model that represents all the major objects in an electric utility enterprise typically needed to model the operational aspects of a utility. This model includes public classes and attributes for these objects, as well as the relationships between them.

The objects represented in the CIM are abstract in nature and may be used in a wide variety of applications. The use of the CIM goes far beyond its application in an EMS. This standard should be understood as a tool to enable integration in any domain where a common power system model is needed to facilitate interoperability and plug compatibility between applications and systems independent of any particular implementation.

This standard defines the CIM Base set of packages which provide a logical view of the functional aspects of an Energy Management System including SCADA. Other functional areas are standardized in separate IEC documents that augment and reference this base CIM standard. For example, IEC 61968-11 addresses distribution models and references this base CIM standard. While there are multiple IEC standards dealing with different parts of the CIM, there is a single, unified information model comprising the CIM behind all these individual standards documents.

The International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this document may involve the use of a patent concerning a computer-based implementation of an object-oriented power system model in a relational database. As such, it does not conflict with the development of any logical power system model including the Common Information Model (CIM), where implementation of the model is not defined.

The IEC takes no position concerning the evidence, validity and scope of this patent right.

The holder of this patent right has assured the IEC that he/she is willing to negotiate licences either free of charge or under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holder of this patent right is registered with IEC. Information may be obtained from:

ICL
Wenlock Way
West Gorton
Manchester
M12 5DR
United Kingdom (U.K.)

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

ISO (www.iso.org/patents) and IEC (http://www.iec.ch/tctools/patent_decl.htm) maintain on-line data bases of patents relevant to their standards. Users are encouraged to consult the data bases for the most up to date information concerning patents.

ENERGY MANAGEMENT SYSTEM APPLICATION PROGRAM INTERFACE (EMS-API) –

Part 301: Common information model (CIM) base

1 Scope

This part of IEC 61970 deals with the common information model (CIM), an abstract model that represents all the major objects in an electric utility enterprise typically involved in utility operations.

The object classes represented in the CIM are abstract in nature and may be used in a wide variety of applications. The use of the CIM goes far beyond its application in an EMS. This standard should be understood as a tool to enable integration in any domain where a common power system model is needed to facilitate interoperability and plug compatibility between applications and systems independent of any particular implementation.

By providing a standard way of representing power system resources as object classes and attributes, along with their relationships, the CIM facilitates the integration of Energy Management System (EMS) applications developed independently by different vendors, between entire EMS systems developed independently, or between an EMS system and other systems concerned with different aspects of power system operations, such as generation or distribution management. SCADA (supervisory control and data acquisition) is modeled to the extent necessary to support power system simulation and inter-control center communication. The CIM facilitates integration by defining a common language (i.e. semantics) based on the CIM to enable these applications or systems to access public data and exchange information independent of how such information is represented internally.

Due to the size of the complete CIM, the object classes contained in the CIM are grouped into a number of logical Packages, each of which represents a certain part of the overall power system being modeled. Collections of these Packages are progressed as separate International Standards. This particular International Standard specifies a Base set of packages which provide a logical view of the functional aspects of Energy Management System (EMS) information within the electric utility enterprise that is shared between all applications. Other standards specify more specific parts of the model that are needed by only certain applications. Subclause 4.2 below provides the current grouping of packages into standards documents.

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 61850-7-4, *Communication networks and systems for power utility automation – Part 7-4: Basic communication structure – Compatible logical node classes and data object classes*

IEC 61970-2, *Energy management system application program interface (EMS-API) – Part 2: Glossary*

ISO 8601, *Data elements and interchange formats – Information interchange – Representation of dates and times*