



# SLOVENSKI STANDARD

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**Aplikacijski programski vmesnik za sistem upravljanja z energijo (EMS-API) - 452.  
del: Profili CIM za statični model prenosnega omrežja (IEC 61970-452:2015)**

Energy Management System Application Program Interface (EMS-API) - Part 452: CIM  
static transmission network model profiles

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Interface de programmation d'application pour système de gestion d'énergie (EMS-API) -  
Partie 452: Profils du modèle de réseau de transport statique CIM

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**ICS:**

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EUROPEAN STANDARD

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**Energy management system application program interface  
(EMS-API) - Part 452: CIM model exchange specification  
(IEC 61970-452:2015)**

Interface de programmation d'application pour système de  
gestion d'énergie (EMS-API) - Partie 452 : spécification  
d'échange de modèle CIM  
(IEC 61970-452:2015)

Schnittstelle für Anwendungsprogramme für  
Netzführungssysteme (EMS-API) - Teil 452: CIM  
Austauschformat Spezifikation  
(IEC 61970-452:2015)

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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**

**EN 61970-452:2015****Foreword**

The text of document 57/1451/CDV, future edition 2 of IEC 61970-452, 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 61970-452:2015.

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) 2016-02-14
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2018-05-14

This document supersedes EN 61970-452:2013.

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The text of the International Standard IEC 61970-452:2015 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 61970-1	NOTE	Harmonized as EN 61970-1.
IEC TS 61970-2	NOTE	Harmonized as CLC/TS 61970-2.
IEC 61970-552	NOTE	Harmonized as EN 61970-552.

## 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](http://www.cenelec.eu).

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
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IEC 61970-501	-	Energy management system application program interface (EMS-API) - Part 501: Common Information Model Resource Description Framework (CIM RDF) schema	EN 61970-501	-

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# INTERNATIONAL STANDARD



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**Energy management system application program interface (EMS-API) –  
Part 452: CIM model exchange specification**

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INTERNATIONAL  
ELECTROTECHNICAL  
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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ENERGY MANAGEMENT SYSTEM APPLICATION  
PROGRAM INTERFACE (EMS-API) –****Part 452: CIM model exchange specification**

## 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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The present part of International Standard IEC 61970 has been prepared by IEC technical committee 57: Power systems management and associated information exchange.

This second edition cancels and replaces the first edition published in 2013. This edition constitutes a technical revision.

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

- a) subclause 3.3, Transformer modeling – Updated description of transformer modelling to reflect changes in the modelling of transformers to work for both transmission and distribution systems;
- b) subclause 3.5.1, Use of measurement classes – General – Updated to reflect changes to the measurement model;

- c) subclause 3.5.2, ICCP data exchange – Updated to reflect changes to the use of identification in the model (IdentifiedObject, Name, and NameType);
- d) the following detailed changes were made to Clause 4, CIM Equipment Profile:
- Added Measurement.unitMultiplier and Measurement.unitSymbol to replace association to class Unit.
  - Added PowerTransformerEnd to replace TransformerWinding.
  - Made PhaseTapChanger not concrete (abstract) and added PhaseTapChangerNonLinear (also not concrete), PhaseTapChangerSymmetrical, PhaseTapChangerAsymmetrical, and PhaseTapChangerLinear.
  - Added PhaseTapChanger.TransformerEnd to replace PhaseTapChanger.TransformerWinding.
  - Added RatioTapChanger.TransformerEnd to replace RatioTapChanger.TransformerWinding.
  - Added TapChangerControl class to replace direct link TapChanger.RegulatingControl.
  - Added RatioTapChanger.stepVoltageIncrement to replace TapChanger.stepVoltageIncrement.
  - Added PhaseTapChangerTabular, PhaseTapChangerTabularPoint, RatioTapChangerTabular, and RatioTapChangerTabularPoint to replace ImpedanceVariationCurve, PhaseVariationCurve, and RatioVariationCurve.
  - Added Switch.ratedCurrent as optional attribute.
  - Changed all attributes of LoadResponseCharacteristic to optional except for exponentModel.
  - Changed CurveData.y2Value to optional.
  - Added PowerTransformer.vectorGroup as optional attribute.
  - Added note to OperationalLimitSet stating that “Either an association to Equipment or an association to Terminal must be supplied, but not both.”
  - Added SeriesCompensator.r0 and x0 as optional attributes.
  - Added attributes for PhaseTapChangerTabularPoint and RatioTapChangerTabularPoint.
  - Added RotatingMachine to the profile so that ratedS can be inherited by SynchronousMachine as an optional attribute.
  - Changed association between RegulatingCondEq and RegulatingControl to be optional.
  - Made OperationalLimitType attributes direction and acceptableDuration optional.
  - Added classes Name and NameType to profile.
  - Removed PowerTransformer.vectorGroup from the profile.
  - Added PowerTransformerEnd.phaseAngleClock as an optional attribute.
  - Made attributes RegulatingControl.targetRange and targetValue optional and added a note stating that they are not required if a RegulationSchedule is provided.
  - Added TransformerEnd.endNumber to the profile for use with PowerTransformerEnd.phaseAngleClock.
  - Added association OperationalLimit.OperationalLimitSet.
  - Added association Name.IdentifiedObject.
  - Updated PowerTransformer profile description to also refer to Terminals.
  - Changed reference to association RegulatingControl.RegulationSchedule to use RegulationSchedule.RegulatingControl instead.

- Changed TapChanger attributes highStep, lowStep, neutralStep and normalStep to optional, because they are not required if the ltcFlag is false.
- Changed BasicIntervalSchedule.value2Unit and RegularTimePoint.value2 to optional, because they are not required for RegulationSchedule, TapSchedule or SwitchSchedule.
- Changed Analog.positiveFlowIn to be optional, because not all analogs have a flow direction (voltage, for instance).
- Added PowerTransformerEnd.g as optional attribute.
- Added SynchronousMachine.referencePriority as optional attribute.
- Added profile description for AccumulatorValue, AnalogValue, and DiscreteValue explaining that the classes are only used to define measurements available via ICCP, not to supply values for those measurements.
- Added attribute Switch.retained as required.
- Added association TransformerEnd.BaseVoltage as optional.
- Made association ControlArea.energyArea optional.

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

CDV	Report on voting
57/1451/CDV	57/1503/RVC

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table ([standards.iteh.ai](http://standards.iteh.ai))

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

A list of all parts in the IEC 61970 series, published 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.

A bilingual version of this publication may be issued at a later date.

**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 the IEC 61970 series that define an application program interface (API) for an energy management system (EMS).

The IEC 61970-3x series of documents specify a Common Information Model (CIM). The CIM is an abstract model that represents all of the major objects in an electric utility enterprise typically needed to model the operational aspects of a utility. It provides the semantics for the IEC 61970 APIs specified in the IEC 61970-4x series of Component Interface Standards (CIS). The IEC 61970-3x series includes IEC 61970-301, *Common Information Model (CIM) base* and draft standard IEC 61970-302, *Common Information Model (CIM) Financial, Energy Scheduling and Reservations*.

This standard is one of the IEC 61970-4x series of Component Interface Standards that specify the functional requirements for interfaces that a component (or application) shall implement to exchange information with other components (or applications) and/or to access publicly available data in a standard way. The component interfaces describe the specific message contents and services that can be used by applications for this purpose. The implementation of these messages in a particular technology is described in IEC 61970-5.

This part of IEC 61970 specifies the specific profiles (or subsets) of the CIM for exchange of static power system data between utilities, security coordinators and other entities participating in an interconnected power system, such that all parties have access to the modeling of their neighbor's systems that is necessary to execute state estimation or power flow applications. Currently only one profile, the Equipment Profile, has been defined. A companion standard, IEC 61970-552, defines the CIM XML Model Exchange Format based on the Resource Description Framework (RDF) Schema specification language which is recommended to be used to transfer power system model data for the IEC 61970-452 profile.

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