

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE



**Framework for energy market communications –  
Part 351: CIM European market model exchange profile**

**Cadre pour les communications pour le marché de l'énergie –  
Partie 351: Profil de modèle d'échange pour un système de gestion de marché  
de style européen basé sur le CIM**



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## CONTENTS

FOREWORD.....	6
INTRODUCTION.....	8
1 Scope.....	9
2 Normative references .....	9
3 Terms and definitions .....	9
4 European style market concepts .....	11
4.1 From the CIM information model to the European style market profile .....	11
4.1.1 General .....	11
4.1.2 Applying the framework to the European style electricity market .....	12
4.1.3 Examples for building a European style market profile.....	12
4.2 European style market package structure .....	14
4.3 The European electricity market concepts .....	15
4.4 Business process modelling .....	16
4.5 Business rules for the European style market profile .....	17
4.5.1 General .....	17
4.5.2 Identification of an ESMP electronic document .....	17
4.5.3 Time .....	18
4.5.4 Coding scheme identification.....	18
4.5.5 Direction of flow within TimeSeries .....	18
4.5.6 Quantity within a TimeSeries .....	19
5 Detailed model .....	22
5.1 Documentation structure .....	22
5.2 Overview .....	23
6 Package architecture.....	25
6.1 European style market classes .....	25
6.1.1 European style market profile – detailed overview .....	25
6.1.2 IsBasedOn relationships from the CIM Information Model .....	26
6.1.3 Package ESMRClasses .....	26
6.2 European style market DataTypes .....	42
6.2.1 IsBasedOn relationships from the CIM Information Model .....	42
6.2.2 Package ESMPDataTypes .....	43
6.2.3 Enumeration DataTypes .....	53
Annex A (informative) European style market code lists – Package ESMPEnumerations .....	54
Bibliography.....	61
Figure 1 – IEC 62325-450 modelling framework .....	11
Figure 2 – Example of restrictions applied to CIM for a profile.....	13
Figure 3 – Overview of European style market profile dependency.....	14
Figure 4 – Curve – “Points” (24 hour day with a 4 hour resolution).....	20
Figure 5 – Curve – “Sequential fixed size blocks” (24 hour day with a 4 hour resolution).....	20
Figure 6 – Curve – “Variable sized blocks” (24 hour day with a 4 hour resolution).....	21
Figure 7 – Curve – “Non-overlapping breakpoint” (24 hour day with a 4 hour resolution).....	21
Figure 8 – Curve – “Overlapping breakpoint” (24 hour day with a 4 hour resolution).....	22

Figure 9 – Overview of European style market profile .....	24
Figure 10 – European style market profile – classes .....	25
Figure A.1 – Class diagram ESMPEnumerations – example .....	54
Table 1 – Attribute documentation example .....	23
Table 2 – Association Ends documentation example .....	23
Table 3 – Enumeration documentation example .....	23
Table 4 – Compound Datatype documentation example .....	23
Table 5 – IsBasedOn relationship from the CIM information model.....	26
Table 6 – Attributes of ESMPClasses::AceTariffType.....	27
Table 7 – Association ends of ESMPClasses::AceTariffType with other classes.....	27
Table 8 – Attributes of ESMPClasses::AttributeInstanceComponent.....	27
Table 9 – Attributes of ESMPClasses::Auction.....	28
Table 10 – Attributes of ESMPClasses::BidTimeSeries.....	28
Table 11 – Attributes of ESMPClasses::Currency_Unit.....	29
Table 12 – Attributes of ESMPClasses::DateAndOrTime.....	29
Table 13 – Attributes of ESMPClasses::Domain.....	30
Table 14 – Attributes of ESMPClasses::FlowDirection.....	30
Table 15 – Attributes of ESMPClasses::MarketAgreement.....	31
Table 16 – Attributes of ESMPClasses::MarketDocument.....	31
Table 17 – Association ends of ESMPClasses::MarketDocument with other classes.....	32
Table 18 – Attributes of ESMPClasses::MarketEvaluationPoint.....	33
Table 19 – Attributes of ESMPClasses::MarketObjectStatus.....	34
Table 20 – Attributes of ESMPClasses::MarketParticipant.....	34
Table 21 – Association ends of ESMPClasses::MarketParticipant with other classes.....	34
Table 22 – Attributes of ESMPClasses::MarketRole.....	35
Table 23 – Attributes of ESMPClasses::Measure_Unit.....	35
Table 24 – Attributes of ESMPClasses::MktPSRType.....	35
Table 25 – Attributes of ESMPClasses::Point.....	35
Table 26 – Association ends of ESMPClasses::Point with other classes.....	36
Table 27 – Attributes of ESMPClasses::Price.....	36
Table 28 – Attributes of ESMPClasses::Process.....	37
Table 29 – Attributes of ESMPClasses::Reason.....	37
Table 30 – Attributes of ESMPClasses::RegisteredResource.....	37
Table 31 – Association ends of ESMPClasses::RegisteredResource with other classes.....	38
Table 32 – Attributes of ESMPClasses::Series_Period.....	38
Table 33 – Association ends of ESMPClasses::Series_Period with other classes.....	38
Table 34 – Attributes of ESMPClasses::Time_Period.....	38
Table 35 – Association ends of ESMPClasses::Time_Period with other classes.....	39
Table 36 – Attributes of ESMPClasses::TimeSeries.....	39
Table 37 – Association ends of ESMPClasses::TimeSeries with other classes.....	40
Table 38 – IsBasedOn relationship from the CIM information model.....	42
Table 39 – Attributes of ESMPDataTypes::Action_Status.....	43

Table 40 – Attributes of ESMPDataTypes::ESMP_DateTimeInterval. ....	44
Table 41 – Attributes of ESMPDataTypes::AllocationMode_String.....	44
Table 42 – Attributes of ESMPDataTypes::Amount_Decimal. ....	44
Table 43 – Attributes of ESMPDataTypes::AreaID_String. ....	45
Table 44 – Attributes of ESMPDataTypes::AttributeValue_String. ....	45
Table 45 – Attributes of ESMPDataTypes::AuctionKind_String.....	45
Table 46 – Attributes of ESMPDataTypes::BusinessKind_String. ....	45
Table 47 – Attributes of ESMPDataTypes::CapacityContractKind_String.....	46
Table 48 – Attributes of ESMPDataTypes::Category_String. ....	46
Table 49 – Attributes of ESMPDataTypes::ClassificationKind_String.....	46
Table 50 – Attributes of ESMPDataTypes::CurrencyCode_String. ....	46
Table 51 – Attributes of ESMPDataTypes::CurveType_String. ....	46
Table 52 – Attributes of ESMPDataTypes::DirectionKind_String.....	47
Table 53 – Attributes of ESMPDataTypes::EnergyProductKind_String.....	47
Table 54 – Attributes of ESMPDataTypes::ESMP_DateTime.....	47
Table 55 – Attributes of ESMPDataTypes::ESMPBoolean_String.....	47
Table 56 – Attributes of ESMPDataTypes::ESMPVersion_String.....	48
Table 57 – Attributes of ESMPDataTypes::ID_String.....	48
Table 58 – Attributes of ESMPDataTypes::MarketRoleKind_String.....	48
Table 59 – Attributes of ESMPDataTypes::MeasurementPointID_String.....	49
Table 60 – Attributes of ESMPDataTypes::MeasurementUnitKind_String.....	49
Table 61 – Attributes of ESMPDataTypes::MessageKind_String.....	49
Table 62 – Attributes of ESMPDataTypes::ObjectAggregationKind_String.....	49
Table 63 – Attributes of ESMPDataTypes::PartyID_String.....	50
Table 64 – Attributes of ESMPDataTypes::PayloadId_String.....	50
Table 65 – Attributes of ESMPDataTypes::Position_Integer.....	50
Table 66 – Attributes of ESMPDataTypes::PriceCategory_String.....	50
Table 67 – Attributes of ESMPDataTypes::PriceDirection_String.....	50
Table 68 – Attributes of ESMPDataTypes::ProcessKind_String.....	51
Table 69 – Attributes of ESMPDataTypes::PsrType_String.....	51
Table 70 – Attributes of ESMPDataTypes::ReasonCode_String.....	51
Table 71 – Attributes of ESMPDataTypes::ReasonText_String.....	51
Table 72 – Attributes of ESMPDataTypes::ResourceID_String.....	52
Table 73 – Attributes of ESMPDataTypes::RightsKind_String.....	52
Table 74 – Attributes of ESMPDataTypes::Status_String.....	52
Table 75 – Attributes of ESMPDataTypes::TariffKind_String.....	52
Table 76 – Attributes of ESMPDataTypes::YMDHM_DateTime.....	53
Table 77 – List of Enumeration Types.....	53
Table A.1 – Literals of ESMPEnumerations::AllocationModeTypeList.....	54
Table A.2 – Literals of ESMPEnumerations::AssetTypeList.....	55
Table A.3 – Literals of ESMPEnumerations::AuctionTypeList.....	55
Table A.4 – Literals of ESMPEnumerations::BusinessTypeList.....	55
Table A.5 – Literals of ESMPEnumerations::CategoryTypeList.....	55

Table A.6 – Literals of ESMPEnumerations::ClassificationTypeList .....	56
Table A.7 – Literals of ESMPEnumerations::CodingSchemeTypeList .....	56
Table A.8 – Literals of ESMPEnumerations::ContractTypeList .....	56
Table A.9 – Literals of ESMPEnumerations::CurrencyTypeList.....	57
Table A.10 – Literals of ESMPEnumerations::CurveTypeList.....	57
Table A.11 – Literals of ESMPEnumerations::DirectionTypeList .....	57
Table A.12 – Literals of ESMPEnumerations::EnergyProductTypeList.....	58
Table A.13 – Literals of ESMPEnumerations::IndicatorTypeList .....	58
Table A.14 – Literals of ESMPEnumerations::MessageTypeList.....	58
Table A.15 – Literals of ESMPEnumerations::ObjectAggregationTypeList.....	58
Table A.16 – Literals of ESMPEnumerations::ProcessTypeList .....	59
Table A.17 – Literals of ESMPEnumerations::ReasonCodeTypeList.....	59
Table A.18 – Literals of ESMPEnumerations::RightsTypeList.....	59
Table A.19 – Literals of ESMPEnumerations::RoleTypeList.....	60
Table A.20 – Literals of ESMPEnumerations::StatusTypeList.....	60
Table A.21 – Literals of ESMPEnumerations::TariffTypeTypeList.....	60
Table A.22 – Literals of ESMPEnumerations::UnitOfMeasureTypeList .....	60

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**FRAMEWORK FOR ENERGY MARKET COMMUNICATIONS –**

**Part 351: CIM European market model exchange profile**

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

FDIS	Report on voting
57/1373/FDIS	57/1389/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 the parts in the IEC 62325 series, published under the general title *Framework for energy market communications*, can be found on the IEC website.



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## INTRODUCTION

This International Standard is part of the IEC 62325 series for deregulated energy market communications.

The principal objective of the IEC 62325 series of standards is to produce standards which facilitate the integration of market application software developed independently by different vendors into a market management system, between market management systems and market participant systems. This is accomplished by defining message exchanges 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), i.e. IEC 62325-301, IEC 61970-301 and IEC 61968-11 standards, specifies the basis for the semantics for message exchange.

The European style market profile is based on different parts of the CIM IEC standard and specifies the business processes and the content of the messages exchanged.

This part of IEC 62325 provides the European style market profile specifications that support the European style design electricity markets. These electricity markets are based on the European regulations, and on the concepts of third party access and zonal market. This part of IEC 62325 was originally based upon the work of the European Transmission System Operators (ETSO) and then on the work of the European Network of Transmission System Operators (ENTSO-E) on electronic data interchange.

# FRAMEWORK FOR ENERGY MARKET COMMUNICATIONS –

## Part 351: CIM European market model exchange profile

### 1 Scope

This part of IEC 62325 is applicable to European style electricity markets.

This part of IEC 62325 specifies a UML package which provides a logical view of the functional aspects of European style market management within an electricity markets.

This package is based on the common information model (CIM). The use of the CIM goes far beyond its application in a market management system.

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 modelled. Collections of these packages are progressed as separate International Standards.

From the CIM packages, regional contextual models are built to cover the market information interchange requirements for a given region, i.e. the business context. A region may be a continent where common electricity market designs are used for the exchange of information (Europe, North America, Asia, etc.). It may also be a specific country or an organization that has particular needs and wishes to benefit from the CIM.

### 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 61970-2:2004, *Energy management system application program interface (EMS-API) – Part 2: Glossary*

IEC 62325-450:2013, *Framework for energy market communications – Part 450: Profile and context modeling rules*

IEC 62361-100<sup>1</sup>, *Power systems management and associated information exchange – Interoperability in the long term – Part 100: Naming and design rules for CIM profiles to XML schema mapping*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61970-2, as well as the following apply.

#### 3.1

#### **aggregate business information entity**

#### **ABIE**

re-use of an aggregate core component (ACC) in a specified business

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<sup>1</sup> To be published.

**3.2**  
**aggregate core component**  
**ACC**

collection of related pieces of business information that together convey a distinct business meaning, independent of any specific business context

Note 1 to entry: Expressed in modelling terms, this is the representation of an object class, independent of any specific business context.

[SOURCE: ISO/TS 15000-5:2005, Clause 9]

**3.3**  
**application program interface**  
**API**

set of public functions provided by an executable application component for use by other executable application components

[SOURCE: IEC 61970-2:2004, 3.4]

**3.4**  
**based on**  
**IsBasedOn**

use of an artefact that has been restricted according to the requirements of a specific business context

[SOURCE IEC 62325-450:2013, 3.4]

**3.5**  
**business context**

specific business circumstance as identified by the values of a set of context categories, allowing different business circumstances to be uniquely distinguished

[SOURCE: ISO/TS 15000-5:2005, 4.6.2]

**3.6**  
**information model**

information model is a representation of concepts, relationships, constraints, rules, and operations to specify data semantics for a chosen domain of discourse

Note 1 to entry: It can provide shareable, stable, and organized structure of information requirements for the domain context.

**3.7**  
**internal European market**  
**IEM**

market of any commodity, service, etc. within the European Community

Note 1 to entry: In particular, European Directives and Regulation are defining the energy IEM.

**3.8**  
**market management system**  
**MMS**

computer system comprised of a software platform providing basic support services and a set of applications that provide the functionality needed for the effective management of the electricity market

Note 1 to entry: These software systems in an electricity market may include support for capacity allocation, scheduling energy, ancillary or other services, real-time operations and settlements.

### 3.9 profile

basic outline of all the information that is required to satisfy a specific environment

## 4 European style market concepts

### 4.1 From the CIM information model to the European style market profile

#### 4.1.1 General

The European style market profile is a regional contextual model as defined in IEC 62325-450. IEC 62325-450 provides the contextual derivation rules to be applied from the abstract CIM core concepts to generate the regional contextual model.

The common information model (CIM) is an abstract model. A CIM-compliant implementation does not need to include all classes, attributes, or associations in the CIM standard. Profiles are defined to specify which elements shall be included, i.e. mandatory elements, in a particular use of the CIM, as well as which elements are optional.

As stated in IEC 62325-450 and outlined in Figure 1, the definition of CIM profiles follows a layered modelling framework from the CIM information model down to the specification of messages based on CIM concepts through the definition of different regional contextual models and their subsequent contextualized documents for information exchange.

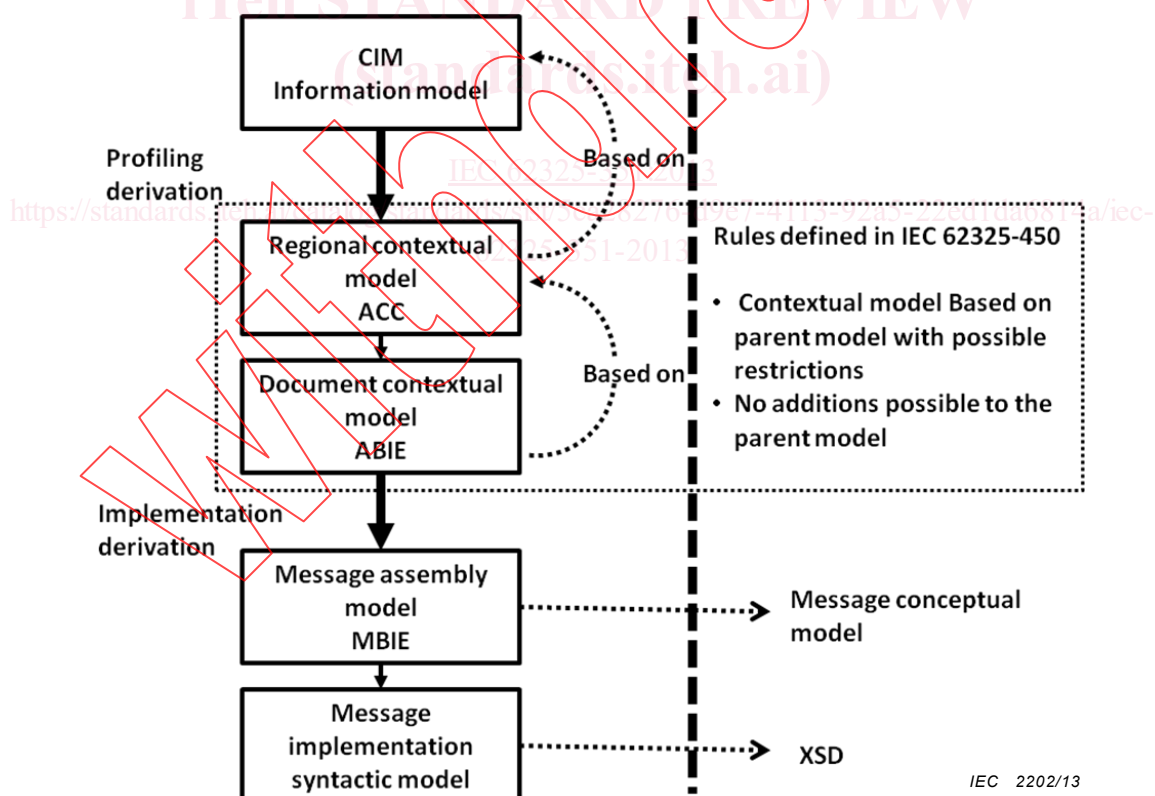


Figure 1 – IEC 62325-450 modelling framework

From the CIM which provides the overall semantic model for the electricity industry, regional contextual models are built to cover the electricity market information interchange requirements for a given region, i.e. the business context, in compliance with IEC 62325-450 rules.

The European style market profile (ESMP) is a regional contextual model based on the CIM artefacts where some particular artefacts are refined respecting a set of defined rules to cater for specific European style market requirements. These artefacts are based on the CIM artefacts on which they are built.

The European style market profile is the cornerstone to derive contextualized documents catering for specific information interchange functional requirements. These document contextual models are defined in other standards of the IEC 62325 series; and a dedicated IEC 62325-451-x<sup>2</sup> (x going from 1 to n) per main business process describes the related information interchange requirements. Additional constraints are thus introduced on the European style market profile on which they are built.

The final modelling step applies standardized message assembly rules in order to provide an information structure for information interchange. All syntactic specific electronic documents are built from the message assembly models. This last level is covered by IEC 62361-100.

#### 4.1.2 Applying the framework to the European style electricity market

Within Europe a target has been defined for the implementation of the energy internal European market (IEM) and in particular the electricity market. The harmonization of business processes has been carried out in particular for the data interchange between market participants such as transmission system operators (TSO), distribution system operators (DSO), balance responsible parties, etc. These business processes address a number of energy market activities such as congestion management, scheduling, reserve resource management, explicit auction for transmission capacity, settlement, reconciliation, etc.

The result of this harmonization work has been taken into account to define the European style market profile based on the CIM UML model. The European style market profile is thus a regional contextual model as defined in IEC 62325-450.

The European style market profile is a first level of contextual model that covers generically all the required information conveyed in the different exchanged messages gathered by the defined business processes.

The European style market profile is therefore the smallest sub-set of the CIM information model, derived by restrictions, from which all the exchanges of information are derived for all the European market business processes.

#### 4.1.3 Examples for building a European style market profile

Each UML artefact can be potentially restricted in order to refine and define the business requirements applied to the current European style market profile.

The example in Figure 2 illustrates how the CIM information model is restricted into a profile for the European style market.

- a) Classes: it is possible to restrict each class of the CIM by selecting a subset of its attribute list since all CIM attributes are optional (i.e. their multiplicity is 0..1). For example, the CIM MarketDocument class is restricted into the profile class with only two attributes, mRID and type.
- b) Attributes: it is possible to restrict each attribute in the profile by applying restrictions to its related datatypes (see Datatypes below) and its multiplicity. The new multiplicity shall be included in the multiplicity from the parent BasedOn class. For example, in the European style market profile, the attribute mRID from MarketParticipant is mandatory (i.e. multiplicity = 1..1) while in the parent BasedOn class from the CIM, the attribute is optional (i.e. multiplicity = 0..1).

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<sup>2</sup> To be published.

- c) Relationships: it is possible to restrict each relationship between CIM Classes at the profile level. The kinds of restriction uniquely concern the multiplicity and qualification of the end role.
- d) Datatypes: it is possible to restrict the CIM Datatypes by defining facets on the value space of the datatype. For example, the CIM attribute type of MarketDocument is a CIM String while in the profile it is restricted by an enumeration (i.e. MessageTypeList) to indicate the list of valid types for a MarketDocument.

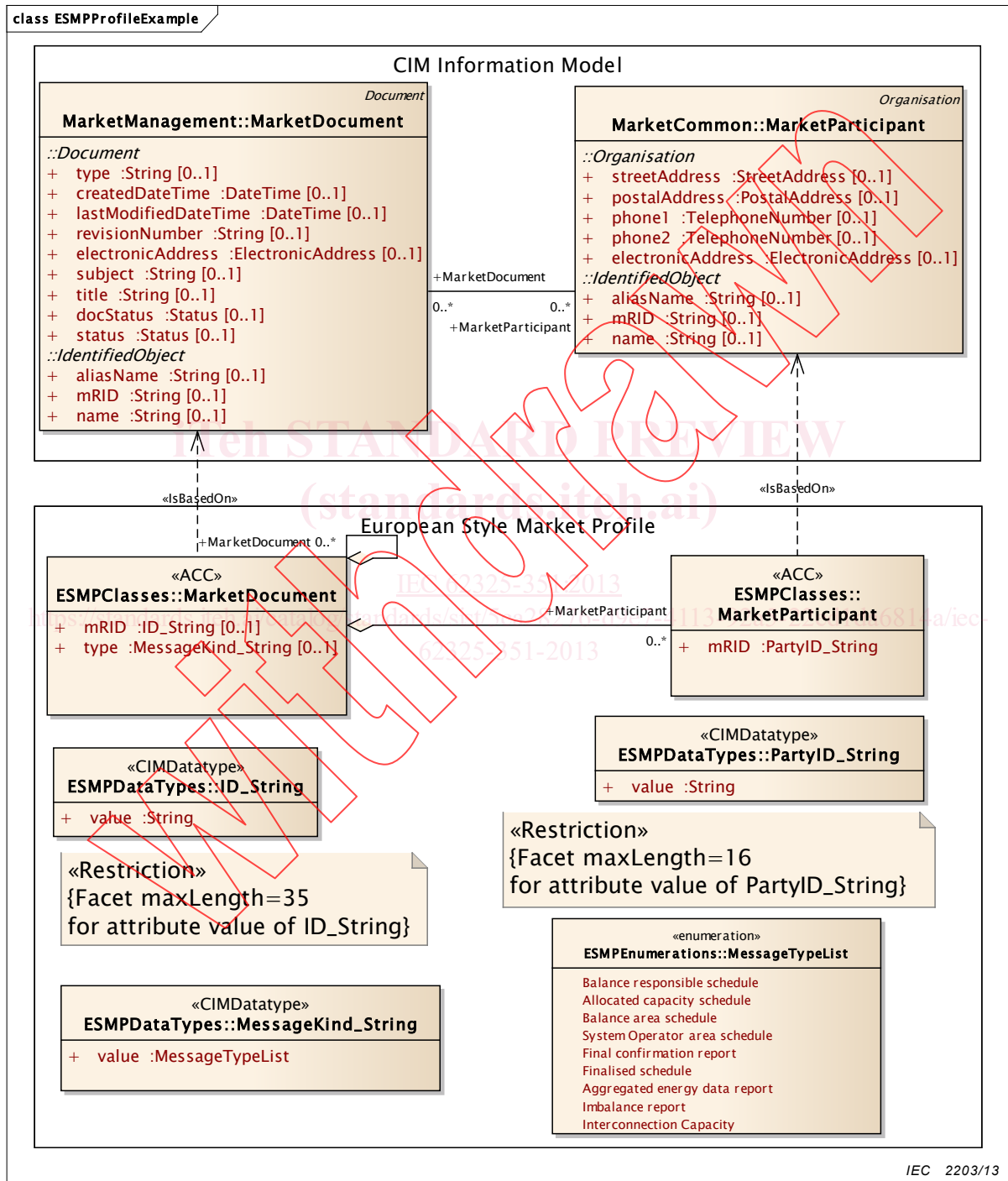


Figure 2 – Example of restrictions applied to CIM for a profile

NOTE in the examples, the list of attributes and enumerated literals are not complete. They are just given as examples.