

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE



Communication networks and systems for power utility automation –  
Part 7-3: Basic communication structure – Common data classes

Réseaux et systèmes de communication pour l'automatisation des systèmes  
électriques –  
Partie 7-3: Structure de communication de base – Classes de données  
communes



**THIS PUBLICATION IS COPYRIGHT PROTECTED**  
**Copyright © 2010 IEC, Geneva, Switzerland**

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester.

If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de la CEI ou du Comité national de la CEI du pays du demandeur.

Si vous avez des questions sur le copyright de la CEI ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de la CEI de votre pays de résidence.

IEC Central Office  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland  
Email: [inmail@iec.ch](mailto:inmail@iec.ch)  
Web: [www.iec.ch](http://www.iec.ch)

## 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.

- Catalogue of IEC publications: [www.iec.ch/searchpub](http://www.iec.ch/searchpub)

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 It also gives information on projects, withdrawn and replaced publications.

- IEC Just Published: [www.iec.ch/online\\_news/justpub](http://www.iec.ch/online_news/justpub)

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

- Electropedia: [www.electropedia.org](http://www.electropedia.org)

The world's leading online dictionary of electronic and electrical terms containing more than 20 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary online.

- Customer Service Centre: [www.iec.ch/webstore/custserv](http://www.iec.ch/webstore/custserv)

If you wish to give us your feedback on this publication or need further assistance, please visit the Customer Service Centre FAQ or contact us:

Email: [csc@iec.ch](mailto:csc@iec.ch)

Tel.: +41 22 919 02 11

Fax: +41 22 919 03 00

## 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.

- Catalogue des publications de la CEI: [www.iec.ch/searchpub/cur\\_fut-f.htm](http://www.iec.ch/searchpub/cur_fut-f.htm)

Le Catalogue en-ligne de la CEI vous permet d'effectuer des recherches en utilisant différents critères (numéro de référence, texte, comité d'études,...). Il donne aussi des informations sur les projets et les publications retirées ou remplacées.

- Just Published CEI: [www.iec.ch/online\\_news/justpub](http://www.iec.ch/online_news/justpub)

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

- Electropedia: [www.electropedia.org](http://www.electropedia.org)

Le premier dictionnaire en ligne au monde de termes électroniques et électriques. Il contient plus de 20 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans les langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International en ligne.

- Service Clients: [www.iec.ch/webstore/custserv/custserv\\_entry-f.htm](http://www.iec.ch/webstore/custserv/custserv_entry-f.htm)

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions, visitez le FAQ du Service clients ou contactez-nous:

Email: [csc@iec.ch](mailto:csc@iec.ch)

Tél.: +41 22 919 02 11

Fax: +41 22 919 03 00

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE



Communication networks and systems for power utility automation –  
Part 7-3: Basic communication structure – Common data classes

Réseaux et systèmes de communication pour l'automatisation des systèmes  
électriques –  
Partie 7-3: Structure de communication de base – Classes de données  
communes

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
ELECTROTECHNIQUE  
INTERNATIONALE

ICS 33.200

ISBN 978-2-88912-258-5

## CONTENTS

FOREWORD.....	6
INTRODUCTION .....	8
1 Scope.....	9
2 Normative references.....	9
3 Terms and definitions.....	10
4 Abbreviated terms .....	10
5 Conditions for attribute inclusion .....	10
6 Constructed attribute classes.....	11
6.1 General.....	11
6.2 Quality .....	11
6.2.1 Overview.....	11
6.2.2 Validity.....	12
6.2.3 Detail quality .....	13
6.2.4 Source.....	14
6.2.5 Test.....	14
6.2.6 Frozen by operator.....	14
6.2.7 Quality in the client server context .....	15
6.2.8 Relation between quality identifiers.....	16
6.3 Analogue value.....	18
6.4 Configuration of analogue value .....	18
6.5 Range configuration .....	19
6.6 Step position with transient indication.....	19
6.7 Pulse configuration.....	20
6.8 Originator.....	20
6.9 Unit definition .....	21
6.10 Vector definition.....	21
6.11 Point definition.....	22
6.12 CtlModels definition.....	22
6.13 SboClasses definition.....	22
6.14 Cell.....	22
6.15 CalendarTime definition .....	23
7 Common data class specifications.....	25
7.1 General.....	25
7.2 Name spaces.....	25
7.3 Common data class specifications for status information .....	25
7.3.1 Application of services.....	25
7.3.2 Single point status (SPS) .....	26
7.3.3 Double point status (DPS).....	27
7.3.4 Integer status (INS).....	27
7.3.5 Enumerated status (ENS).....	28
7.3.6 Protection activation information (ACT) .....	28
7.3.7 Directional protection activation information (ACD) .....	29
7.3.8 Security violation counting (SEC).....	30
7.3.9 Binary counter reading (BCR).....	30
7.3.10 Histogram (HST) .....	31

7.3.11	Visible string status (VSS).....	31
7.4	Common data class specifications for measurand information.....	32
7.4.1	Application of services.....	32
7.4.2	Measured value (MV) .....	33
7.4.3	Complex measured value (CMV).....	34
7.4.4	Sampled value (SAV) .....	35
7.4.5	Phase to ground/neutral related measured values of a three-phase system (WYE).....	36
7.4.6	Phase to phase related measured values of a three-phase system (DEL).....	37
7.4.7	Sequence (SEQ) .....	38
7.4.8	Harmonic value (HMV).....	39
7.4.9	Harmonic value for WYE (HWYE) .....	40
7.4.10	Harmonic value for DEL (HDEL) .....	41
7.5	Common data class specifications for controls .....	42
7.5.1	Application of services.....	42
7.5.2	Controllable single point (SPC).....	43
7.5.3	Controllable double point (DPC) .....	44
7.5.4	Controllable integer status (INC).....	45
7.5.5	Controllable enumerated status (ENC) .....	46
7.5.6	Binary controlled step position information (BSC).....	47
7.5.7	Integer controlled step position information (ISC) .....	48
7.5.8	Controllable analogue process value (APC) .....	49
7.5.9	Binary controlled analog process value (BAC).....	50
7.6	Common data class specifications for status settings.....	51
7.6.1	Application of services.....	51
7.6.2	Single point setting (SPG).....	51
7.6.3	Integer status setting (ING) .....	52
7.6.4	Enumerated status setting (ENG).....	52
7.6.5	Object reference setting (ORG) .....	53
7.6.6	Time setting group (TSG).....	53
7.6.7	Currency setting group (CUG) .....	54
7.6.8	Visible string setting (VSG) .....	54
7.7	Common data class specifications for analogue settings .....	55
7.7.1	Application of services.....	55
7.7.2	Analogue setting (ASG) .....	56
7.7.3	Setting curve (CURVE).....	57
7.7.4	Curve shape setting (CSG) .....	58
7.8	Common data class specifications for description information.....	59
7.8.1	Application of services.....	59
7.8.2	Device name plate (DPL) .....	60
7.8.3	Logical node name plate (LPL) .....	61
7.8.4	Curve shape description (CSD).....	62
8	Data attribute semantic .....	63
Annex A	(normative) Value range for units and multiplier .....	78
Annex B	(informative) Functional constraints .....	81
Annex C	(normative) Tracking of configuration revisions.....	83
Annex D	(normative) SCL enumerations .....	84

Bibliography.....	90
Figure 1 – Quality identifiers in a single client-server relationship.....	15
Figure 2 – Quality identifiers in a multiple client-server relationship.....	15
Figure 3 – Interaction of substitution and validity.....	17
Figure 4 – Configuration of command output pulse.....	20
Figure 5 – Cell definition.....	23
Figure 6 – Two-dimensional curve represented by CSG.....	58
Figure 7 – Two-dimensional shape created by multiple CSG.....	59
Table 1 – Conditions for presence of attributes.....	10
Table 2 – Quality.....	12
Table 3 – Relation of the detailed quality identifiers with invalid or questionable quality.....	13
Table 4 – Analogue value.....	18
Table 5 – Configuration of analogue value.....	18
Table 6 – Range configuration.....	19
Table 7 – Step position with transient indication.....	19
Table 8 – Pulse configuration.....	20
Table 9 – Originator.....	21
Table 10 – Values for orCat.....	21
Table 11 – Unit.....	21
Table 12 – Vector.....	21
Table 13 – Point.....	22
Table 14 – Cell.....	23
Table 15 – CalendarTime.....	24
Table 16 – Semantic interpretation of calendar time settings.....	24
Table 17 – Name space attributes.....	25
Table 18 – Basic status information template.....	26
Table 19 – Single point status common data class definition.....	26
Table 20 – Double point status common data class specification.....	27
Table 21 – Integer status common data class specification.....	27
Table 22 – Enumerated status common data class specification.....	28
Table 23 – Protection activation information common data class specification.....	28
Table 24 – Directional protection activation information common data class specification.....	29
Table 25 – Security violation counting common data class specification.....	30
Table 26 – Binary counter reading common data class specification.....	30
Table 27 – Histogram common data class specification.....	31
Table 28 – Visible string status common data class definition.....	31
Table 29 – Basic measurand information template.....	32
Table 30 – Measured value.....	33
Table 31 – Complex measured value.....	34
Table 32 – Sampled value.....	35

Table 33 – WYE .....	36
Table 34 – Delta .....	37
Table 35 – Sequence .....	38
Table 36 – Harmonic value .....	39
Table 37 – Harmonic values for WYE .....	40
Table 38 – Harmonic values for delta .....	41
Table 39 – Basic controllable status information template .....	42
Table 40 – Controllable single point .....	43
Table 41 – Controllable double point .....	44
Table 42 – Controllable integer status .....	45
Table 43 – Controllable enumerated status .....	46
Table 44 – Binary controlled step position information .....	47
Table 45 – Integer controlled step position information .....	48
Table 46 – Controllable analogue process value .....	49
Table 47 – Binary controlled analog process value .....	50
Table 48 – Basic status setting template .....	51
Table 49 – Single point setting .....	51
Table 50 – Integer status setting .....	52
Table 51 – Enumerated status setting .....	52
Table 52 – Object reference setting common data class specification .....	53
Table 53 – Time setting group common data class specification .....	53
Table 54 – Currency setting group common data class specification .....	54
Table 55 – Visible string setting group common data class specification .....	54
Table 56 – Basic analogue setting template .....	55
Table 57 – Analogue setting .....	56
Table 58 – Setting curve .....	57
Table 59 – Curve shape setting .....	58
Table 60 – Basic description information template .....	59
Table 61 – Device name plate common data class specification .....	60
Table 62 – Logical node name plate common data class specification .....	61
Table 63 – Curve shape description common data class specification .....	62
Table 64 – Semantics of data attributes and data .....	63
Table A.1 – SI units: base units .....	78
Table A.2 – SI units: derived units .....	78
Table A.3 – SI units: extended units .....	79
Table A.4 – SI units: industry specific units .....	79
Table A.5 – Multiplier .....	80
Table B.1 – Functional constraints .....	82



# INTERNATIONAL ELECTROTECHNICAL COMMISSION

## COMMUNICATION NETWORKS AND SYSTEMS FOR POWER UTILITY AUTOMATION –

### Part 7-3: Basic communication structure – Common data classes

#### 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.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61850-7-3 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 2003.

Compared to the first edition, this second edition:

- defines new common data classes used for new standards defining object models for other domains based on IEC 61850 and for the representation of statistical and historical data,
- provides clarifications and corrections to the first edition of IEC 61850-7-3.



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

FDIS	RVD
57/1087/FDIS	57/1095/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 in the IEC 61850 series, published under the general title: *Communication networks and systems for power utility automation*, can be found on the IEC website.

The general title of the series was *Communication networks and systems in substations*. To address the extension of the scope of IEC 61850, it has been changed to *Communication networks and systems for power utility automation*.

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.

**ITeH STANDARD PREVIEW**  
(standards.iteh.ai)

IEC 61850-7-3:2010

**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 document is part of a set of specifications, which details layered substation communication architecture. This architecture has been chosen to provide abstract definitions of classes and services such that the specifications are independent of specific protocol stacks and objects. The mapping of these abstract classes and services to communication stacks is outside the scope of IEC 61850-7-x and may be found in IEC 61850-8-x (station bus) and IEC 61850-9-x (process bus).

IEC 61850-7-1 gives an overview of this communication architecture. This part of IEC 61850 defines constructed attributed classes and common data classes related to applications in the power system using IEC 61850 modeling concepts like substations, hydro power or distributed energy resources. These common data classes are used in IEC 61850-7-4 to define compatible dataObject classes. The SubDataObjects, DataAttributes or SubAttributes of the instances of dataObject are accessed using services defined in IEC 61850-7-2.

This part of IEC 61850 is used to specify the abstract common data class and constructed attribute class definitions. These abstract definitions are mapped into concrete object definitions that are to be used for a particular protocol (for example MMS, ISO 9506 series).

Note that there are common data classes used for service tracking, that are defined in IEC 61850-7-2.

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[IEC 61850-7-3:2010](https://standards.iteh.ai/catalog/standards/sist/b510f7d9-5231-4e57-a907-b37526fb1afd/iec-61850-7-3-2010)

<https://standards.iteh.ai/catalog/standards/sist/b510f7d9-5231-4e57-a907-b37526fb1afd/iec-61850-7-3-2010>

## COMMUNICATION NETWORKS AND SYSTEMS FOR POWER UTILITY AUTOMATION –

### Part 7-3: Basic communication structure – Common data classes

#### 1 Scope

This part of IEC 61850 specifies constructed attribute classes and common data classes related to substation applications. In particular, it specifies:

- common data classes for status information,
- common data classes for measured information,
- common data classes for control,
- common data classes for status settings,
- common data classes for analogue settings and
- attribute types used in these common data classes.

This International Standard is applicable to the description of device models and functions of substations and feeder equipment.

This International Standard may also be applied, for example, to describe device models and functions for:

- substation to substation information exchange
- substation to control centre information exchange,
- power plant to control centre information exchange,
- information exchange for distributed generation, or
- information exchange for metering.

#### 2 Normative references

The following referenced documents are indispensable for the application 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.

IEC/TS 61850-2, *Communication networks and systems in substations – Part 2: Glossary*

IEC 61850-7-1, *Communication networks and systems for power utility automation – Part 7-1: Basic communication structure – Principles and models*<sup>1</sup>

IEC 61850-7-2, *Communication networks and systems for power utility automation – Part 7-2: Basic information and communication structure – Abstract communication service interface (ACSI)*

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*

---

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

IEEE C37.118:2005, *IEEE Standard for Synchrophasors for Power Systems*

ISO 4217, *Codes for the representation of currencies and funds*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC/TS 61850-2 and IEC 61850-7-2 apply.

### 4 Abbreviated terms

CDC	common data class
dchg	trigger option for data-change
dupd	trigger option for data-update
FC	functional constraint
qchg	trigger option for quality-change
TrgOp	trigger option

NOTE Abbreviations used for the identification of the common data classes and as names of the attributes are specified in the specific clauses of this document and are not repeated here.

### 5 Conditions for attribute inclusion

This clause lists general conditions that specify the presence of an attribute. Table 1 gives the conditions for presence of attributes.

IEC 61850-7-3:2010  
<https://standards.iteh.ai/catalog/standards/sist/b37526fb-1afd-4007-b37526fb-1afd/iec-61850-7-3-2010>  
**Table 1 – Conditions for presence of attributes**

Abbreviation	Condition
M	Attribute is mandatory. Attribute shall exist on any CDC type instance.
O	Attribute is optional. Attribute may or may not exist on any CDC type instance.
PICS_SUBST	Attribute is mandatory, if substitution is supported (for substitution, see IEC 61850-7-2), otherwise forbidden.
GC_1	At least one of the attributes shall be present for a given instance of DataObject / SubDataObject.
GC_2_n	All or none of the data attributes belonging to the same group (n) shall be present for a given instance of DataObject / SubDataObject.
GC_1_EXCL	At most one of the data objects shall be present for a given instance.
GC_CON_attr	A configuration data attribute shall only be present, if the (optional) specific data attribute (attr) to which this configuration relates is also present.
GC_2_XOR_n	All or none of a group (n) shall be present. Groups are exclusive, but one group shall be present.
AC_LN0_M	The attribute shall be present if the DataObject NamPit belongs to LLN0; otherwise it may be optional.
AC_LN0_EX	The attribute shall be present only if the DataObject NamPit belongs to LLN0 (applies to IdNs in CDC LPL only).
AC_DLD_M	The attribute shall be present, if LN name space of this LN deviates from the LN name space referenced by IdNs of the logical device in which this LN is contained (applies to InNs in CDC LPL only).
AC_DLN_M	The attribute shall be present, if the data name space of this data deviates from the data name space referenced by either InNs of the logical node in which the data is contained or, if there is no InNs, IdNs of the logical device in which the data is contained (applies to dataNs in all CDCs only).
AC_DLND_A_M	The attribute shall be present, if CDC name space of this data deviates from the CDC

Abbreviation	Condition
	name space referenced by either the dataNs of the data, the lnNs of the logical node in which the data is defined or ldNs of the logical device in which the data is contained (applies to cdcNs and cdcName in all CDCs only).
AC_SCAV	The presence of the configuration data attribute depends on the presence of <i>i</i> and <i>f</i> of the Analog Value of the data attribute to which this configuration attribute relates. For a given data object, that attribute 1) shall be present, if both <i>i</i> and <i>f</i> are present, 2) shall be optional if only <i>i</i> is present, and 3) is not required if only <i>f</i> is present. NOTE If only <i>i</i> is present in a device without floating point capabilities, the configuration parameter may be exchanged offline.
AC_ST	The attribute is mandatory, if the controllable status class supports status information.
AC_CO_O	If the controllable status class supports control, this attribute is available and an optional attribute.
AC_CO_SBO	If the controllable status class supports control and if the control model supports the values "sbo-with-normal-security" or "sbo-with-enhanced-security" or both, that attribute shall be mandatory.
AC_SG_M	The attribute is mandatory, if this data shall be member of a setting group.
AC_SG_O	The attribute is optional, if this data shall be member of a setting group.
AC_SG_C1	One of the attributes is mandatory, if this data shall be member of a setting group.
AC_NSOG_M	The attribute is mandatory, if this data shall be a setting outside a setting group.
AC_NSOG_O	The attribute is optional, if this data shall be a setting outside a setting group.
AC_NSOG_C1	One of the attributes is mandatory, if this data shall be a setting outside a setting group.
AC_RMS_M	The attribute is mandatory when the harmonics reference type is rms.
AC_CLC_O	The attribute shall be optional, when the calculation type (according to data ClcMth) for this LN is Peak fundamental or RMS fundamental. The attribute shall not be available, if ClcMth is TRUE RMS.

## 6 Constructed attribute classes

### 6.1 General

Constructed attribute classes are defined for the use in common data classes (CDC) in Clause 7.

IEC 61850-7-1 provides an overview of all IEC 61850-7 documents (IEC 61850-7-2, IEC 61850-7-3, and IEC 61850-7-4). IEC 61850-7-1 also describes the basic notation used in IEC 61850-7-3 and the description of the relations between the IEC 61850-7 documents.

NOTE The common ACSI type "TimeStamp" is specified in IEC 61850-7-2.

### 6.2 Quality

#### 6.2.1 Overview

Quality type shall be as defined in Table 2.

**Table 2 – Quality**

Quality type definition			
Attribute name	Attribute type	Value/Value range	M/O/C
	PACKED LIST		
validity	CODED ENUM	good   invalid   reserved   questionable	M
detailQual	PACKED LIST		M
overflow	BOOLEAN	DEFAULT FALSE	M
outOfRange	BOOLEAN	DEFAULT FALSE	M
badReference	BOOLEAN	DEFAULT FALSE	M
oscillatory	BOOLEAN	DEFAULT FALSE	M
failure	BOOLEAN	DEFAULT FALSE	M
oldData	BOOLEAN	DEFAULT FALSE	M
inconsistent	BOOLEAN	DEFAULT FALSE	M
inaccurate	BOOLEAN	DEFAULT FALSE	M
source	CODED ENUM	process   substituted DEFAULT process	M
test	BOOLEAN	DEFAULT FALSE	M
operatorBlocked	BOOLEAN	DEFAULT FALSE	M

The DEFAULT value shall be applied, if the functionality of the related attribute is not supported. The mapping may specify to exclude the attribute from the message, if it is not supported or if the DEFAULT value applies.

Quality shall be an attribute that contains information on the quality of the information from the server. Quality of the data is also related to the mode of a logical node. Further details can be found in IEC 61850-7-4. The different quality identifiers are not independent. Basically, there are the following quality identifiers:

- validity;
- detail quality;
- source;
- test;
- frozen by operator.

### 6.2.2 Validity

Validity shall be good, questionable or invalid.

good: The value shall be marked good if no abnormal condition of the acquisition function or the information source is detected.

invalid: The value shall be marked invalid when an abnormal condition of the acquisition function or the information source (missing or non-operating updating devices) is detected. The value shall not be defined under this condition. The mark invalid shall be used to indicate to the client that the value may be incorrect and shall not be used.

EXAMPLE If an input unit detects an oscillation of one input, it will mark the related information as invalid.

questionable: The value shall be marked questionable if a supervision function detects an abnormal behaviour, however the value could still be valid. The client shall be responsible for determining whether or not values marked "questionable" should be used.

### 6.2.3 Detail quality

The reason for an invalid or questionable value of an attribute may be specified in more detail with further quality identifiers. If one of these identifiers is set then validity shall be set to invalid or questionable. Table 3 shows the relation of the detailed quality identifiers with invalid or questionable quality.

**Table 3 – Relation of the detailed quality identifiers with invalid or questionable quality**

detailQual	invalid	questionable
overflow	X	
outOfRange	X	X
badReference	X	X
oscillatory	X	X
failure	X	
OldData		X
inconsistent		X
inaccurate		X

overflow: this identifier shall indicate a quality issue that the value of the attribute to which the quality has been associated is beyond the capability of being represented properly (used for measurand information only).

EXAMPLE A measured value may exceed the range that may be represented by the selected data type, for example the data type is a 16-bit unsigned integer and the value exceeds 65 535.

outOfRange: this identifier shall indicate a quality issue that the attribute to which the quality has been associated is beyond a predefined range of values. The server shall decide if validity shall be set to invalid or questionable (used for measurand information only).

<https://standards.iteh.ai/catalog/standards/sist/b510f7d9-5231-4e57-a907-7a9d30700000/iec-61850-7-3-2010>

EXAMPLE A measured value may exceed a predefined range, however the selected data type can still represent the value, for example the data type is a 16-bit unsigned integer, the predefined range is 0 to 40 000, if the value is between 40 001 and 65 535 it is considered to be out of range.

badReference: this identifier shall indicate that the value may not be a correct value due to a reference being out of calibration. The server shall decide if validity shall be set to invalid or questionable (used for measurand information and binary counter information only).

oscillatory: to prevent overloading of event driven communication channels, it is desirable to detect and suppress oscillating (fast changing) binary inputs. If a signal changes in a defined time ( $t_{osc}$ ) twice in the same direction (from 0 to 1 or from 1 to 0) then it shall be defined as an oscillation and the detail quality identifier “oscillatory” shall be set. If a configured number of transient changes is detected, they shall be suppressed. In this time, the validity status “questionable” shall be set. If the signal is still in the oscillating state after the defined number of changes, the value shall be left in the state it was in when the oscillatory flag was set. In this case, the validity status “questionable” shall be reset and “invalid” shall be set as long as the signal is oscillating. If the configuration is such that all transient changes should be suppressed, the validity status “invalid” shall be set immediately in addition to the detail quality identifier “oscillatory” (used for status information only).

failure: this identifier shall indicate that a supervision function has detected an internal or external failure.