

TECHNICAL SPECIFICATION

**Electricity metering data exchange – The DLMS/COSEM suite –
Part 1-1: Template for DLMS/COSEM communication profile standards**

IECNORM.COM : Click to view the full PDF of IEC TS 62056-1-1:2016



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2016 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.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
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.

IEC Catalogue - webstore.iec.ch/catalogue

The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

IEC publications search - www.iec.ch/searchpub

The advanced search enables 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 It also gives information on projects, replaced and withdrawn publications.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 online and also once a month by email.

Electropedia - www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing 20 000 terms and definitions in English and French, with equivalent terms in 15 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary

65 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

IEC 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.

IECNORM.COM : Click to view the full text of IEC 60567-1:2016

TECHNICAL SPECIFICATION

**Electricity metering data exchange – The DLMS/COSEM suite –
Part 1-1: Template for DLMS/COSEM communication profile standards**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 17.220; 35.110; 91.140.50

ISBN 978-2-8322-3327-6

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD.....	3
INTRODUCTION.....	5
1 Scope.....	6
2 Normative references.....	6
3 Terms, definitions and abbreviations	7
3.1 Terms and definitions	7
3.2 Abbreviations	8
4 Targeted communication environments	8
5 Use of the communication layers for this profile.....	9
5.1 Information related to the use of the standard specifying the lower layers.....	9
5.2 Structure of the communication profiles	9
5.3 Lower protocol layers and their use	10
5.3.1 Overview	10
5.3.2 Physical Layer	10
5.3.3 MAC layer.....	11
5.3.4 xxx layer	11
5.4 Service mapping and adaptation layers.....	11
5.5 Registration and connection management.....	11
6 Identification and addressing schemes	11
7 Specific considerations for the application layer services.....	12
7.1 Overview.....	12
7.2 Application Association establishment and release: ACSE services.....	12
7.3 xDLMS services	12
7.4 Security mechanisms	12
7.5 Transferring long application messages	13
7.6 Media access, bandwidth and timing considerations.....	13
7.7 Other considerations	13
8 Communication configuration and management.....	13
9 The COSEM application process.....	13
10 Additional considerations for the use of this profile	13
Annex A (informative) Examples.....	14
A.1 Example 1: xxx.....	14
A.2 Example 2: xxx.....	14
Annex B (normative) New COSEM interface classes and OBIS codes	15
Index.....	16
Figure 1 – Entities and interfaces of a smart metering system using the terminology of IEC 62056-1-0	9
Figure 2 – The DLMS/COSEM xxx communication profile(s)	10
Table 1 – Client and server SAPs.....	12

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ELECTRICITY METERING DATA EXCHANGE –
THE DLMS/COSEM SUITE –****Part 1-1: Template for DLMS/COSEM communication profile standards****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.

The main task of IEC technical committees is to prepare International Standards. In exceptional circumstances, a technical committee may propose the publication of a technical specification when

- the required support cannot be obtained for the publication of an International Standard, despite repeated efforts, or
- the subject is still under technical development or where, for any other reason, there is the future but no immediate possibility of an agreement on an International Standard.

Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC TS 62056-1-1, which is a technical specification, has been prepared by IEC technical committee 13: Electrical energy measurement and control.

The text of this technical specification is based on the following documents:

Enquiry draft	Report on voting
13/1643A/DTS	13/1656/RVC

Full information on the voting for the approval of this technical specification 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 62056 series, published under the general title *Electricity metering data exchange – The DLMS/COSEM suite*, 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 website under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- transformed into an International standard,
- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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

IECNORM.COM : Click to view the full PDF of IEC TS 62056-1-1:2016

INTRODUCTION

This Technical Specification defines a communication profile template, to be used for establishing IEC 62056 communication profile standards which follow the IEC 62056-1-0 standardization framework.

NOTE It is foreseen that this TS will be integrated into IEC 62056-1-0 as an informative Annex at the next revision of that standard.

In particular, this template is suited for establishing communication profile standards that specify how DLMS/COSEM is used on a specific communication technology where it is assumed that the specific communication technology is already defined by a specific communication standard. The purpose of this template is:

- to improve the readability of the standards;
- to improve the efficiency to develop communication profile standards.

In the Introduction of an IEC 62056 communication profile standard, remove the text above (starting with "This Technical Specification defines ..." and ending with "...to improve the efficiency to develop communication profile standards") and add the following text:

As defined in IEC 62056-1-0, the IEC 62056 DLMS/COSEM suite provides specific communication profile standards for communication media relevant for smart metering.

Such communication profile standards specify how the COSEM data model and the DLMS/COSEM application layer can be used on the lower, communication media specific protocol layers.

Communication profile standards refer to communication standards that are part of the IEC 62056 DLMS/COSEM suite or to any other open communication standard.

This International Standard specifies DLMS/COSEM communication profiles for *<add a brief description of the communication technology and the smart metering interfaces covered>*.

It follows the rules defined in IEC 62056-5-3:2016, Annex A.

Add one paragraph to justify the relevance of the standard by summarising the main use cases of this profile.

ELECTRICITY METERING DATA EXCHANGE – THE DLMS/COSEM SUITE –

Part 1-1: Template for DLMS/COSEM communication profile standards

The title of an IEC 62056 communication profile standard shall be:

ELECTRICITY METERING DATA EXCHANGE – THE DLMS/COSEM SUITE –

Part x-x: XXXX communication profile for YYYY networks

Where:

- *XXXX identifies the communication technology as it appears in the lower layer standard(s) referenced);*
- *YYYY identifies the smart metering network section(s) (WAN, NN, LN) the communication technology is used for.*

1 Scope

This part of IEC 62056 defines a template for IEC 62056 communication profile standards.

It provides the “Table of contents” of such standards and provides guidance to develop the content of the relevant clauses and subclauses.

NOTE The parts of the standard providing guidance are written in italic font.

In the Scope of an IEC 62056 communication profile standard, remove the text above and add the following:

This International Standard specifies DLMS/COSEM communication profiles for *<add a brief description of the communication technology and the smart metering interfaces covered>*.

The scope of this communication profile standard is restricted to aspects concerning the use of communication protocols in conjunction with the COSEM data model and the DLMS/COSEM application layer. Data structures specific to a communication protocol are out of the Scope of the communication profile standard.

They should be specified in the specific protocol standards.

Any project specific definitions of data structures and data contents may be provided in project specific companion specifications.

Add any other relevant information identifying what is and what is not in the Scope of the communication profile standard.

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.

List here the standards which are normatively referenced in this document.

IEC 62056-1-0, *Electricity metering data exchange – The DLMS/COSEM suite – Part 1-0: Smart metering standardisation framework*

IEC 62056-4-7, *Electricity metering – Data exchange for meter reading, tariff and load control: DLMS/COSEM transport layers for IP networks*

IEC 62056-5-3:2016, *Electricity metering data exchange – The DLMS/COSEM suite – Part 5-3: DLMS/COSEM application layer*

IEC 62056-6-1, *Electricity metering data exchange – The DLMS/COSEM suite – Part 6-1: Object Identification System (OBIS)*

IEC 62056-6-2, *Electricity metering data exchange – The DLMS/COSEM suite – Part 6-2: COSEM interface classes*

IEC 62056-9-7, *Electricity metering data exchange – The DLMS/COSEM SUITE – Part 9-7: Communication profile for TCP-UDP/IP networks*

3 Terms, definitions and abbreviations

Include here the relevant terms, definitions and abbreviations as shown below:

3.1 Terms and definitions

For the purposes of this document, the terms and definitions in IEC 60050-300, IEC 62051, IEC 62051-1, IEC 62056 (all parts) as well as the following apply.

Where there is a difference between the definitions in the glossaries and those contained in communication profile standards established by TC 13, then the latter shall take precedence in applications of the relevant standard.

For terms and definitions, use the format below:

3.1.1

term 1

definition 1

EXAMPLE 1 First example for term 1.

EXAMPLE 2 Second example for term 1.

Note 1 to entry: First note for term 1.

Note 2 to entry: Second note for term 1.

[SOURCE: where definition 1 was found]

3.1.2

term 2

definition 2

EXAMPLE Only one example for term 2 – no numbering.

Note 1 to entry: Only one note for term 2 – still needs to be numbered.

Examples (to be deleted):

3.1.3

new system

server system, which is in the unconfigured state: its MAC address equals "NEW-address"

[SOURCE: IEC 61334-4-511:2000, 3.9.3]

3.1.4

new system title

system-title of a new system

[SOURCE: IEC 61334-4-511:2000, 3.9.4]

Note 1 to entry: This is the system title of a system, which is in the new state.

3.2 Abbreviations

Include here all abbreviations used in the text:

Examples (to be deleted if not used):

AA	Application Association
APDU	Application Layer Protocol Data Unit
COSEM	Companion Specification for Energy Metering
DLMS	Device Language Message Specification
HDLC	High-level Data Link Control
IP	Internet Protocol
TCP	Transmission Control Protocol
xDLMS_ASE	Extended DLMS Application Service Element

4 Targeted communication environments

Define the communication environment – with respect to the smart metering architecture used in IEC 62056-1-0 – for which the communication profile standard is specified. In the text, identify the entities and interfaces implementing the communication profile standard. See Figure 1.

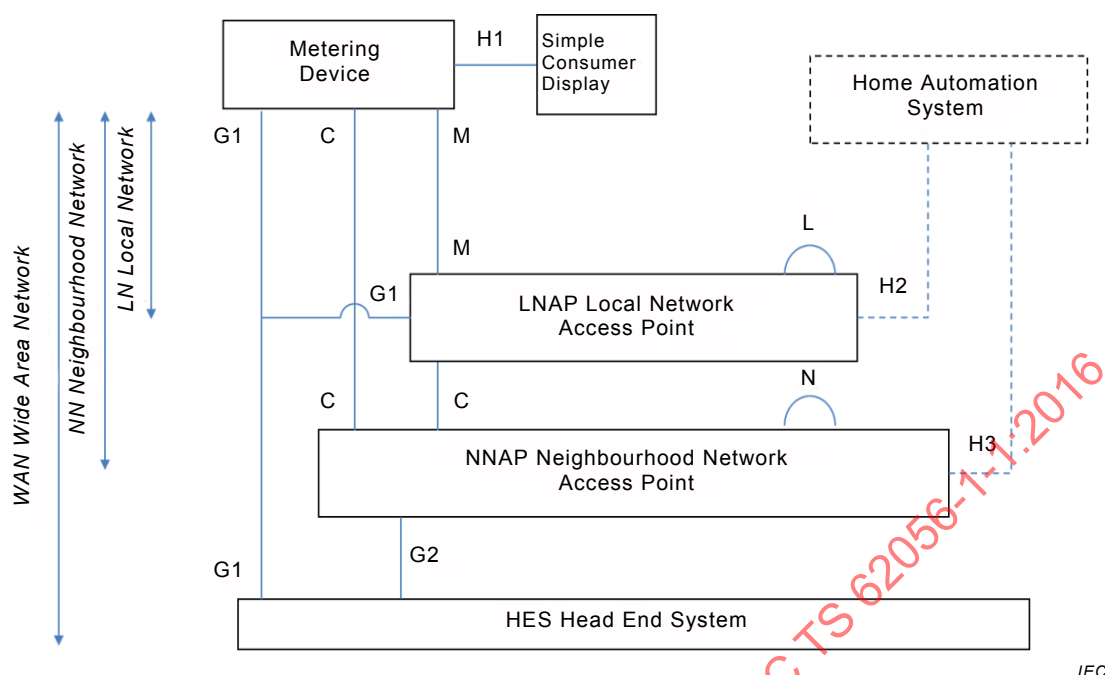


Figure 1 – Entities and interfaces of a smart metering system using the terminology of IEC 62056-1-0

5 Use of the communication layers for this profile

5.1 Information related to the use of the standard specifying the lower layers

Provide here all information that is relevant for using the communication standard in the communication profile standard but which is **not part** of the communication standard referenced:

- selection from the options which are foreseen by the communication standard;
- parts of the communication standard which are not used;
- restrictions concerning the use of the communication standard in the communication profile standard;
- addressing (apart from the elements specified in Clause 6).

Extensions to the existing communication standards should be avoided. Modifications to the existing communications standards shall be avoided.

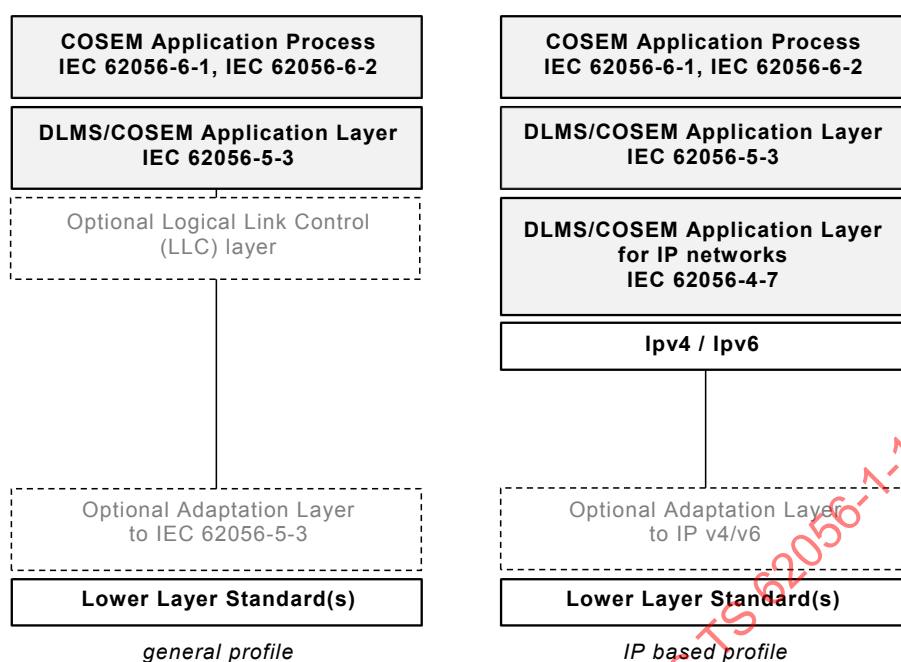
Additional details may be specified in 5.3.

5.2 Structure of the communication profiles

This subclause specifies the structure of the communication profile, i.e. the protocol layers included.

If DLMS/COSEM can be used over the lower layers specified by the protocol standard in different ways, several communication profiles can be specified in the standard.

Define the reference architecture according to Figure 2 below:



IEC

Figure 2 – The DLMS/COSEM xxx communication profile(s)

In the case of IP based communication profiles, the DLMS/COSEM transport layer specified in IEC 62056-4-7 shall be present supporting the DLMS/COSEM application layer. The DLMS/COSEM communication profile for TCP-UDP/IP networks is specified in IEC 62056-9-7.

NOTE That standard leaves the selection and use of lower layers open.

The layers below the DLMS/COSEM application or the IPv4 / IPv6 layer are specific to the communication profile standard.

All lower layers shall be specified in existing open standards.

If necessary, an adaptation layer may be introduced:

- *In case of the general profile: the adaptation layer is placed either immediately below the DLMS/COSEM application layer or, if the optional LLC layer is present, the adaptation layer is placed below the LLC layer.*
- *In case of the IP based profile: the adaptation layer is placed below the IPv4 / IPv6 layer.*

5.3 Lower protocol layers and their use

5.3.1 Overview

If necessary, provide an overview here on using the protocol standard and justify the choice of the options.

List then all layers which are specified in the referenced standard(s).

5.3.2 Physical Layer

<Add>

5.3.3 MAC layer

<Add>

5.3.4 xxx layer

<Add any additional protocol layer that is specified in the protocol standard>.

5.4 Service mapping and adaptation layers

In the case of a “general profile” – see Figure 2 – specify how the DLMS/COSEM application layer uses the services provided by the highest layer of the communication standard used by this profile.

NOTE This may be the data link layer which, in the OSI model, consists of the MAC layer and the LLC layer.

In the case of an “IP based” profile” – see Figure 2 – specify how the highest layer of the communication standard transports IP packets.

If necessary, specify an adaptation layer that can support the DLMS/COSEM application layer or the IPv4 / IPv6 layer and that can use the services of the highest layer of the communication standard.

For the adaptation layer, specify their services and the protocol of those services.

Several service mappings / adaptation layers may be specified for example for communication profiles using IP or not, using IPv4 or IPv6, using TCP or UDP.

5.5 Registration and connection management

If necessary, specify the way the devices hosting DLMS/COSEM servers and implementing the communication profile join/leave the network, get registered, obtain their network address and get the lower communication layers connected.

If this is specified by the communication standard, then reference the relevant Clauses of that standard.

Specify also how the COSEM application process and the DLMS/COSEM application layers are informed about the network and connection status as well as the current address(es) of the devices.

For COSEM interface classes used to set up the communication media and to manage, see Clause 8.

6 Identification and addressing schemes

Specify here how the client and server COSEM Application Process are identified and addressed in this communication profile, so that Application Associations can be established and released.

At least the following elements need to be identified / addressed:

- Physical devices hosting clients and servers;
- Client and server SAPs (Service Access Points).

Specify addressing needed at the intermediate layers.

Table 1 provides an example of specifying client and server SAPs.

Table 1 – Client and server SAPs

Client SAPs	
No-station	0x00
Client Management Process	0x01
Public Client	0x10
Open for client SAP assignment	0x02 ...0x0F
	0x11... 0xFF
Server SAPs	
No-station	0x00
Management Logical Device	0x01
Reserved for future use	0x02...0x0F
Open for server SAP assignment	0x10...0x7E
All-station (Broadcast)	0xFF

7 Specific considerations for the application layer services

7.1 Overview

Specify constraints and options as appropriate, resulting from the choice of the specific communication layers in using DLMS/COSEM application layer services.

7.2 Application Association establishment and release: ACSE services

Specify here, with reference to IEC 62056-5-3 how Application Associations are established and released using the ACSE services.

Specify the use of confirmed, unconfirmed and pre-established AAs.

Specify the values and use of the communication profile specific parameters of the COSEM-OPEN service, specified in IEC 62056-5-3, including the following parameters:

- Protocol_Connection_Parameters;
- User_Information;
- Service_Class.

7.3 xDLMS services

Specify here how the various solicited (request/response type) and unsolicited, confirmed and unconfirmed, unicast / multicast / broadcast xDLMS services can be used.

7.4 Security mechanisms

Specify here how the security mechanisms provided by the COSEM object model and the DLMS/COSEM application layer can be used in the communication profile.

Specify the particularities of establishing and updating security keys and public key Certificates.

Describe also if and how (by reference) security features provided by the lower layer protocol standard are used.

7.5 Transferring long application messages

Specify here how long application messages can be transferred using DLMS/COSEM application layer level block transfer and/or segmentation and reassembly provided by the lower layers or the adaptation layers.

This subclause may refer to the specification of the lower layers or the adaptation layers if segmentation / reassembly are provided by them.

7.6 Media access, bandwidth and timing considerations

Specify here any media access, bandwidth and timing related considerations on using DLMS/COSEM.

7.7 Other considerations

Specify here, as needed, any other elements.

8 Communication configuration and management

For all aspects visible to the COSEM application process existing configuration COSEM interface classes specified in IEC 62056-6-2 shall be referenced.

If new COSEM Interface Classes or new OBIS codes are needed then they shall be defined in Annex B.

9 The COSEM application process

Specify here, as needed, all communication profile specific features/restrictions concerning the COSEM application process.

If the communication profile does not affect the COSEM AP then this clause shall be empty.

10 Additional considerations for the use of this profile

Specify here all aspects which cannot be covered by the other clauses. Ideally this clause shall be empty.

Annex A (informative)

Examples

Add here examples illustrating all aspects treated in the main part:

- *Configuration of the lower layers*
- *Encoding examples of 62056-5-3 APDUs transported through the lower communication layers*

A.1 Example 1: xxx

A.2 Example 2: xxx

IECNORM.COM : Click to view the full PDF of IEC TS 62056-1-1:2016