This is a free page sample. Access the full version online.

NSAI Standards

Irish Standard
I.S. EN 13757-1:2014

Communication systems for meters - Part 1: Data exchange

© CEN 2014 No copying without NSAI permission except as permitted by copyright law.

This is a free page sample. Access the full version online.

I.S. EN 13757-1:2014

Incorporating amendments/corrigenda/National Annexes issued since publication:

The National Standards Authority of Ireland (NSAI) produces the following categories of formal documents:

I.S. xxx: Irish Standard — national specification based on the consensus of an expert panel and subject to public consultation.

S.R. xxx: Standard Recommendation — recommendation based on the consensus of an expert panel and subject to public consultation.

SWiFT xxx: A rapidly developed recommendatory document based on the consensus of the participants of an NSAI workshop.

This document replaces/revises/consolidates the NSAI adoption of the document(s) indicated on the CEN/CENELEC cover/Foreword and the following National document(s):

NOTE: The date of any NSAI previous adoption may not match the date of its original CEN/CENELEC document.

This document is based on:	*Published:*
EN 13757-1:2014	2014-10-29

This document was published under the authority of the NSAI and comes into effect on:	ICS number:
2014-11-26	33.200 35.100.70
	NOTE: If blank see CEN/CENELEC cover page

NSAI	T +353 1 807 3800	Sales:
1 Swift Square,	F +353 1 807 3838	T +353 1 857 6730
Northwood, Santry	E standards@nsai.ie	F +353 1 857 6729
Dublin 9	W NSAI.ie	W standards.ie

Údarás um Chaighdeáin Náisiúnta na hÉireann

This is a free page sample. Access the full version online.

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 13757-1

October 2014

ICS 33.200; 35.100.70

Supersedes EN 13757-1:2002

English Version

Communication systems for meters - Part 1: Data exchange

Systèmes de communication et de télérelevé de compteurs - Partie 1 : Echange de données

Kommunikationssysteme für Zähler - Teil 1: Datenaustausch

This European Standard was approved by CEN on 30 August 2014.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

© 2014 CEN All rights of exploitation in any form and by any means reserved worldwide for CEN national Members.

Ref. No. EN 13757-1:2014 E

This is a free page sample. Access the full version online.

Contents

Page

Foreword 9

Introduction 10

1 Scope 11

2 Normative references 11

3 Terms and definitions 13

4 General description and security 15
4.1 Basic vocabulary 15
4.2 Layered protocols 15
4.2.1 General 15
4.2.2 7 Layer Protocol 15
4.2.3 IP Protocol 16
4.2.4 3 Layer Protocol 17
4.3 Security 18
4.3.1 General 18
4.3.2 Security Requirement Analysis/ Threat Analysis 19
4.3.3 Key Management 19
4.3.4 COSEM Upper Layer Security 20
4.3.5 Lower Layer Security 21

5 Network Architecture 22
5.1 M/441 Mandate 22
5.2 General 23
5.3 Basic architecture 23
5.4 Metering Architecture 24
5.5 One unique access point at any time: a tree structure 26
5.6 Self-configurable network 26
5.7 Hand Held Unit for local access 26
5.8 Network layers 26
5.9 Multiple access 26

6 Application Layers for Metering 27
6.1 General 27
6.2 COSEM Application Layer for Metering 27
6.3 Companion Specification 27
6.4 COSEM Basic Principles 28
6.5 Management of a COSEM Device 29
6.6 Lower layers 29

7 Data Exchange 30
7.1 General 30
7.2 Data exchange using direct local connection 30
7.2.1 General 30
7.2.2 Security 31
7.2.3 Physical layer 31
7.2.4 Link Layer 31
7.3 Data exchange using wired local area network (LAN) 31
7.3.1 General 31
7.3.2 Twisted pair, baseband signalling 32
7.3.3 Twisted pair, baseband limited systems 32
7.3.4 Twisted pair, carrier signalling 32
7.4 Data exchange using wide area network (WAN) 32

This is a free page sample. Access the full version online.

7.4.1 General ... 32
7.4.2 PSTN based connection ... 32
7.4.3 IP connection ... 36
7.5 Data exchange using M-Bus radio communication ... 37
7.5.1 General ... 37
7.5.2 Basic M- Bus radio networks ... 38
7.5.3 Routed M-Bus radio networks ... 38
7.6 Data Exchange using HDLC for some innovative communications technologies and local interfaces ... 38
7.6.1 General ... 38
7.6.2 Security ... 38
7.6.3 Physical layer ... 38
7.6.4 Link Layer ... 39

8 Upper Layer Protocols ... 39
8.1 Introduction ... 39
8.2 Transport sub-layer ... 39
8.2.1 Introduction ... 39
8.2.2 EN 62056-46 related Transport sub-layer ... 40
8.2.3 EN 62056-47 related Transport sub-layer ... 40
8.2.4 Transport sub-layer ... 40
8.3 Application sub-layer ... 42
8.3.1 Introduction ... 42
8.3.2 Application layer structure ... 42
8.3.3 Service specification ... 42
8.3.4 Protocol specification ... 43

9 Cross-application data handling ... 43
9.1 General ... 43
9.2 Data tunnelling ... 43
9.2.1 General ... 43
9.2.2 M-Bus Application Layer transferred by DLMS ... 44
9.3 Data translation ... 48

10 Extensions to COSEM ... 49
10.1 Introduction ... 49
10.2 Dedicated Interface classes ... 49
10.3 Specific object types — Error reporting object ... 56
10.3.1 Introduction ... 56
10.3.2 General error object ... 57
10.3.3 Media specific error object ... 58
10.3.4 Manufacturer specific error object ... 58

11 Object Identification System (OBIS) ... 58
11.1 Object Identification System (Variable naming rules) ... 58
11.1.1 Introduction ... 58
11.1.2 Structure ... 58
11.1.3 Manufacturer, utility, consortia and country specific codes ... 59
11.1.4 Common value groups ... 60
11.2 Abstract Objects (A = 0) ... 63
11.2.1 Abstract objects, general service entries ... 63
11.2.2 Error registers, alarm registers and alarm filters – Abstract ... 68
11.2.3 List objects – Abstract ... 68
11.2.4 Register table objects – Abstract ... 69
11.2.5 Data profile objects – Abstract ... 69
11.3 Media specific value groups ... 69
11.3.1 General ... 69
11.3.2 Value groups specific to Heat Cost Allocators ... 69
11.3.3 Value groups specific to Heat or Cooling Meters ... 73

This is a free page sample. Access the full version online.

11.3.4 Value groups specific to Gas Meters ... 79
11.3.5 Value groups specific to Water Meters (A = 8 and A = 9) ... 108
11.4 Other media (Value group A = F) ... 111
11.4.1 General ... 111
11.4.2 Value group C codes – Other media ... 112
11.4.3 Value group D codes – Other media ... 112
11.4.4 Value group E codes – Other media ... 112
11.4.5 Value group F codes – Other media ... 112
11.5 Code presentation ... 112
11.5.1 Reduced ID codes (e.g. for EN 62056-21) ... 112
11.5.2 Display ... 113
11.5.3 Special handling of value group F ... 113

Annex A (normative) **Basic class meters** ... 115
A.1 General ... 115
A.2 Basic requirements for Heat Cost Allocators ... 115
A.3 Basic requirements for Heat/ Cooling meters ... 116
A.4 Basic requirements for Gas meters ... 116
A.5 Basic requirements for Cold/ Hot water meters ... 117

Annex B (informative) **DLMS Glossary** ... 118
B.1 Introduction ... 118
B.2 Activation mask ... 118
B.3 Activity calendar ... 118
B.4 Association LN ... 118
B.5 Association SN ... 118
B.6 Automatic capturing ... 118
B.7 Billing Period in COSEM ... 118
B.8 Capture ... 119
B.9 Channel ... 119
B.10 Clock ... 119
B.11 Current and last average value objects ... 120
B.12 Date and time ... 120
B.13 Daylight saving ... 120
B.14 Demand Register ... 120
B.15 Device ID ... 122
B.16 Error values ... 122
B.17 High level security ... 123
B.18 Interface modelling ... 123
B.19 I/O Control Signals ... 123
B.20 Interoperability ... 123
B.21 Logical device ... 123
B.22 Logical name referencing ... 124
B.23 Low level security ... 124
B.24 Manufacturer defined ID-s ... 124
B.25 Manufacturer specific abstract objects ... 124
B.26 Manufacturer specific class id ... 124
B.27 Manufacturer specific data and parameters ... 124
B.28 Manufacturer specific OBIS codes ... 125
B.29 Maximum and minimum value objects ... 125
B.30 Measurement of different media ... 125
B.31 Measurement method and tariffs ... 125
B.32 Measurement values series ... 125
B.33 Missing measurement values ... 125
B.34 Node ... 125
B.35 Password ... 126
B.36 Physical device ... 126
B.37 Power failure handling ... 126

This is a free page sample. Access the full version online.

B.38 Power failure monitoring 126
B.39 Preferred readout-values 127
B.40 Profile objects 127
B.41 Profile for billing periods 127
B.42 Profile generic interface class 127
B.43 Register interface class 127
B.44 Reset, IC Demand register 127
B.45 Reset, IC Extended register 128
B.46 Reset, IC Profile generic 128
B.47 Reset, IC Register 128
B.48 Reset, indication of source 128
B.49 Scaler 128
B.50 Scaler-unit 128
B.51 Schedule 128
B.52 Script 128
B.53 Script table interface class 129
B.54 Season 129
B.55 Selective access 129
B.56 Set date 129
B.57 Short name referencing 129
B.58 Special days table interface class 129
B.59 Standard readout definitions 129
B.60 Tariff 129
B.61 Tariffication 129
B.62 Threshold 130
B.63 Time integral value objects 130
B.64 Time setting, in relation with IC Schedule 130
B.64.1 General 130
B.64.2 Time setting forward 130
B.64.3 Time setting backward 130
B.64.4 Time synchronization 131
B.64.5 Daylight Saving 131
B.65 Time stamps (in relation with IC PSTN Auto dial) 131
B.66 Time stamp (in relation with billing periods) 131
B.67 Time synchronization 131
B.68 Unique identifier 131
B.69 Unit 131
B.70 Utility tables 134

Annex C (informative) **Gas Volume Conversion** 135
C.1 Introduction 135
C.2 Foreword to abstract data model of gas volume converter 135
C.3 Abstract data model of gas volume converter — Common objects in gas conversion and energy calculation 136
C.4 Principle of measurement for volume conversion and energy calculation 137
C.5 Data flow in volume conversion and energy calculation 139

Annex D (normative) **Country specific identifiers** 140

Bibliography 142

Tables

Table 1 — Typical Client Access Levels 21

Table 2 — M-Bus Port Setup Object 44

Table 3 — Description of Class ID “Data” 45

Table 4 — Tunnelling, Value group E 46

This is a free page sample. Access the full version online.

Table 5 — M-Bus slave port setup 49
Table 6 — M-Bus client 51
Table 7 — Wireless Mode Q channel 55
Table 8 — M-Bus master port setup 56
Table 9 — OBIS code structure and use of value groups 59
Table 10 — Reserved OBIS codes 60
Table 11 — Value group A 61
Table 12 — Value group B 61
Table 13 — Value group C codes where A = 0 (abstract objects) 62
Table 14 — Abstract objects, general service entries 64
Table 15 — Codes for error registers, alarm registers and alarm filters – Abstract 68
Table 16 — OBIS codes for list objects – Abstract 68
Table 17 — OBIS codes for register table objects – Abstract 69
Table 18 — OBIS codes for data profile objects – Abstract 69
Table 19 — Value group C codes where A = 4 (HCA objects) 70
Table 20 — Value group D codes where A = 4, C < > 0, 96 .. 99 (HCA objects) 71
Table 21 — OBIS codes for general and service entry objects – HCA 71
Table 22 — OBIS codes for error register objects – HCA 72
Table 23 — OBIS codes for data profile objects – HCA 73
Table 24 — OBIS codes for HCA related objects (examples) 73
Table 25 — Value group C codes where A = 5 or A = 6 (Heat/cooling objects) 74
Table 26 — Value group D codes where A = 5 or A = 6 and C < > 0, 96…99 (Heat/cooling objects) 75
Table 27 — OBIS codes for general and service entry objects – Heat/cooling 76
Table 28 — OBIS codes for error register objects – Heat/ cooling 78
Table 29 — OBIS codes for data profile objects – Heat/ cooling 78
Table 30 — OBIS codes for heat/ cooling related objects (examples) 79
Table 31 — Value group C codes where A = 7 – Gas 81
Table 32 — Value group D codes for Gas – Indexes and index differences (A = 7, C = 1…8, 11…16, 21…26, 31…36, 61…66) 84
Table 33 — Value group D codes – Gas – Flow rate: A = 7, C = 43 88
Table 34 — Value group D codes – Gas – Process values (A = 7, C = 41, 42, 44…49) 90
Table 35 — Value group D codes – Gas – Correction, conversion and compressibility values (A = 7, C = 51…55) 93
Table 36 — Value group D codes – Gas – Natural gas analysis values (A = 7, C = 70) 93
Table 37 — Value group E codes – Gas – Indexes and index differences – Tariff rates for A = 7, C = 1...8, 11...16, 21...26, 31...36, 61...66, D = 0…3, 6…98 95
Table 38 — Value group E codes – Gas – Correction, conversion and compressibility values – Averages: A = 7, C = 51...55, D = 0, 2, 3, 10, 11 95
Table 39 — Value group E codes – Gas – Calculation methods A = 7, C = 51...55, D = 12 97

This is a free page sample. Access the full version online.

Table 40 — Value group E codes – Gas – Natural gas analysis values – Averages: A = 7, C = 70, D = 8...20, 60...84 98
Table 41 — OBIS codes for general and service entry objects – Gas 99
Table 42 — OBIS codes for error register objects – Gas 106
Table 43 — OBIS codes for list objects - Gas 107
Table 44 — OBIS codes for data profile objects – Gas 108
Table 45 — Value group C codes where A = 8 or A = 9 (Water volume objects) 109
Table 46 — Value group D codes where A = 8 or A = 9, C < > 0, 96…99 (Water volume objects) 109
Table 47 — OBIS codes for general and service entry objects – Water 110
Table 48 — OBIS codes for error register objects – Water 111
Table 49 — OBIS codes for data profile objects – Water 111
Table 50 — OBIS codes for water related objects (examples) 111
Table 51 — Value group C codes – Other media 112
Table 52 — Example of display code replacement – Value group C 113
Table 53 — Value group F – Billing periods 114
Table A.1 — Basic requirements for Heat Cost Allocators 115
Table A.2 — Basic requirements for Heat/ Cooling meters 116
Table A.3 — Basic requirements for Gas meters 116
Table A.4 — Basic requirements for Cold/ Hot water meters 117
Table B.1 — Enumerated values for physical units 132
Table C.1 — OBIS-Value group A = 7, B = X, E = 0, *F* = FF 136
Table D.1 — Value group D codes — Country specific identifiers C = 94 140

Figures

Figure 1 — The OSI 7-layer model 16
Figure 2 — Connection method independent Application Layers 17
Figure 3 — IEC 3-layer model 17
Figure 4 — Link and Physical layers in the 3 layer model 18
Figure 5 — Network Architecture — The architecture diagram in CEN/CLC/ETSI TR 50572 22
Figure 6 — System and physical architecture 24
Figure 7 — Basic Metering architecture 25
Figure 8 — Scope of Companion Specifications 27
Figure 9 — Companion Specification in relation to lower layers (3 layer model) 28
Figure 10 — An interface class and its instances 29
Figure 11 — Full protocol stack 30
Figure 12 — Typical PSTN configuration 33
Figure 13 — The location of the Physical Layer 34
Figure 14 — COSEM over IP 36
Figure 15 — EN 60870-5-2-related Transport PDU format 40

This is a free page sample. Access the full version online.

Figure 16 — CI field format 41
Figure 17 — The structure of the COSEM Application Layers 42
Figure 18 — Transporting DLMS/COSEM APDU's via M-Bus 44
Figure 19 — Reduced ID code presentation 113
Figure B.1 — The generalized time concept 119
Figure B.2 — The attributes when measuring sliding demand 120
Figure B.3 — Attributes when measuring current_average_value if number of periods is 1 121
Figure B.4 — The attributes if number of periods is 3 122
Figure B.5 — The COSEM server model 126
Figure C.1 — Energy Conversion Calculation flow chart 139

This is a free page sample. Access the full version online.

Foreword

This document (EN 13757-1:2014) has been prepared by Technical Committee CEN/TC 294 “Communication systems for meters and remote reading of meters”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2015, and conflicting national standards shall be withdrawn at the latest by April 2015.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 13757-1:2002.

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

This document has been revised in order to reflect the 7 – layer OSI model, significant updates in Security practices, and updates to the OBIS model to reflect the state of the art.

EN 13757 comprises the following parts:

— *Part 1: Data exchange* [the present document];

— *Part 2: Physical and link layer*;

— *Part 3: Dedicated application layer*;

— *Part 4: Wireless meter readout (Radio meter reading for operation in SRD bands)*;

— *Part 5: Wireless relaying*;

— *Part 6: Local Bus*.

This document is referred to in the CEN/CLC/ETSI TR 50572:2011, *Functional Reference Architecture for Communications in Smart Metering Systems*, as a standard for communications between elements in the Smart Metering Architecture. The M/441 Mandate, which led to the CEN/CLC/ETSI TR 50572, is driving significant development of standards in smart metering.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

This is a free page sample. Access the full version online.

Introduction

There are a number of other activities taking place in the smart metering and smart grid environment. The reader's attention is drawn to M/490, the mandate for standardization for smart grid, available from http://ec.europa.eu/energy/gas_electricity/smartgrids/doc/2011_03_01_mandate_m490_en.pdf, and C(2012) 1342, "Guidelines for conducting a cost-benefit analysis of Smart Grid projects", available from http://ec.europa.eu/energy/gas_electricity/smartgrids/doc/20120427_smartgrids_guideline.pdf.

This document describes the data exchange and communications for meters and remote reading of meters in a generic way. It is Part 1 of EN 13757.

The main use of EN 13757-1 is to provide an overview of the protocols at the different levels and to provide a specification for the DLMS/COSEM application Layer for meters.

Additional parts to the series of standard EN 13757 are:

— *Part 2: Physical and link layer*;

— *Part 3: Dedicated application layer*;

— *Part 4: Wireless meter readout (radio meter reading for operation in SRD bands)*;

— *Part 5: Wireless relaying*;

— *Part 6: Local Bus*.

The world of metering is going through a period of rapid change, and it is anticipated that this and other parts of the standard will require amendment in a short period of time.

NOTE 1 This document makes reference to EN 62056 standards repeatedly. An exercise is taking place to reissue and renumber these standards, and it is anticipated that CEN-listed versions of these standards will be confirmed shortly. References to older versions of these standards will be comprehensively updated as part of the response to comments to this draft.

NOTE 2 Some of the ISO/IEC documents listed under Clause 2 may be available only from ISO or IEC directly. If the document you require is not available from your national standards organization, it is recommended that you contact ISO or IEC to establish the status of the document and it is availability. ISO can be contacted via www.iso.org.

NOTE 3 Clause 3 contains the terms and definitions special to remote reading of meters. Annex B is used to explain terms related to the object oriented model used in COSEM, detailed in EN 62056–6-2 and OBIS, detailed in EN 62056–6-1.

This is a free page sample. Access the full version online.

1 Scope

This European Standard specifies data exchange and communications for meters and remote reading of meters in a generic way.

This European Standard establishes a protocol specification for the Application Layer for meters and establishes several protocols for meter communications which may be applied depending on the application being fulfilled.

NOTE Electricity meters are not covered by this standard, as the standardization of remote readout of electricity meters is a task for CENELEC.

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.

EN 834, *Heat cost allocators for the determination of the consumption of room heating radiators — Appliances with electrical energy supply*

EN 1434-1, *Heat meters — Part 1: General requirements*

EN 1434-2, *Heat meters — Part 2: Constructional requirements*

EN 1434-3, *Heat Meters — Part 3: Data exchange and interfaces*

EN 13757-2:2004, *Communication systems for and remote reading of meters — Part 2: Physical and link layer*

EN 13757-3:2013, *Communication systems for and remote reading of meters — Part 3: Dedicated application layer*

EN 13757-4:2013, *Communication systems for meters and remote reading of meters — Part 4: Wireless meter readout (Radio meter reading for operation in SRD bands)*

EN 13757-5:2008, *Communication systems for meters and remote reading of meters — Part 5: Wireless relaying*

EN 13757-6, *Communication systems for meters and remote reading of meters — Part 6: Local Bus*

CEN/CLC/ETSI TR 50572, *Functional Reference Architecture for Communications in Smart Metering Systems*

EN 60870-5-2, *Telecontrol equipment and systems — Part 5: Transmission protocols — Section 2: Link transmission procedures (IEC 60870-5-2)*

EN 61334-4-1, *Distribution automation using distribution line carrier systems — Part 4: Data communication protocols — Section 1: Reference model of the communication system (IEC 61334-4-1)*

EN 61334-4-41, *Distribution automation using distribution line carrier systems — Part 4: Data communication protocols — Section 41: Application protocols — Distribution line message specification (IEC 61334-4-41)*

EN 62056-3-1, *Electricity metering data exchange — The DLMS/COSEM suite — Part 3-1: Use of local area networks on twisted pair with carrier signalling (IEC 62056-3-1)*

EN 62056-5-3, *Electricity metering data exchange — The DLMS/COSEM suite — Part 5-3: DLMS/COSEM application layer (IEC 62056-5-3)*

SAI GLOBAL

This is a free preview. Purchase the entire publication at the link below:

Product Page

Looking for additional Standards? Visit Intertek Inform Infostore

Learn about LexConnect, All Jurisdictions, Standards referenced in Australian legislation