



Open Metering System Conformance Test

Volume 1 General Part

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Release

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1 Scope

This document describes the general rules and frame conditions for the conformance test of the Open Metering System (OMS). The detailed test description is given in the higher volumes. The OMS-Conformance Test (OMS-CT) shows the following structure:

Table 1: Open Metering Conformance Test Documents

Volume	Description	Content
Vol.1	General Part (GEN)	This volume declares requirements and conditions for OMS-CT (e.g. Manufacturer declaration or Test report)
Vol.2	Technical Properties (PHY)	These volumes describes tests of Physical and Medium Access layer (e.g. radio parameters and Timing)
Vol.3	Data Transmission (DLL)	This volume describes tests of the Data Link layer (e.g. the framing and timing)
Vol.4	Protocol (APL)	This volume describes in part 1 tests of the general application header (e.g. use of configuration field and encryption) and in part 2 the M-Bus Application layer (the M-Bus data point content)

This issue of OMS-Conformance Test is applicable only to unidirectional metering devices which claim the conformity according to [OMSS-Vol2].

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document applies.

[DSMR P2]	Dutch Smart Meter Requirements v3.0 final P2
[EN13757-1]	CEN EN 13757-1:2002 Communication system for meters and remote reading of meters -Part 1: Data Exchange
[EN13757-2]	CEN EN 13757-2:2004 Communication systems for meters and remote reading of meters Part 2: Physical and link layer
[EN13757-3]	CEN EN 13757-3:2013 Communication systems for meters and remote reading of meters Part 3: Dedicated application layer
[EN13757-4]	CEN EN 13757-4:2013 Communication systems for meters and remote reading of meters Part 4: Wireless meter readout (Radio meter reading for operation in the 868 MHz to 870 MHz SRD band)
[EN13757-6]	CEN EN 13757-6:2008 Communication systems for meters and remote reading of meters Part 6: Local Bus
[EN 300 220-1]	ETSI EN 300 220-1 V3.1.1 (2017-02) Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD) operating in the frequency range 25 MHz to 1 000 MHz; Part 1: Technical characteristics and methods of measurement.
[EN 301 489-1]	ETSI EN 301 489-1 V2.2.3 (2019-11) Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC)

		standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard for ElectroMagnetic Compatibility
5	[EN 301 489-3]	ETSI EN 301 489-3 V2.1.1 (2019-03) Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 246 GHz; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU
	[FLAG]	Flag Manufacture ID: WWW by https://www.dlms.com/flag-id/
10	[IEC62056-53]	IEC 62056-53:2006 Electricity metering - Data exchange for meter reading, tariff and load control - Part 53: COSEM application layer
	[OMSS-Vol1]	OMS Open Metering System Specification, Volume 1, General Part, Issue 1.4.0 / 2011-01-31
15	[OMSS-Vol2]	OMS Open Metering System Specification, Volume 2, Primary Communication, Issue 4.1.2 / 2016-12-16
	[OMSCT-GEN]	OMS Open Metering System – Conformance Test Volume 1 – General Part; Issue 4.0.5 / 2019-12-22 (this document)
	[OMSCT-PHY]	OMS Open Metering System – Conformance Test Volume 2 - PHY (Radio Parameters); Issue 4.0.4 / 2019-12-22
20	[OMSCT-DLL]	OMS Open Metering System – Conformance Test Volume 3 - Data Link Layer, Issue 4.0.2 / 2017-10-07
	[OMSCT-APL]	OMS Open Metering System – Conformance Test Volume 4 - Application layer; Issue 4.0.7 / 2019-01-23
25	[OMSCT-ManDec]	OMS Open Metering System – Conformance Test; Manufacturer Declaration; Issue 4.0.4 / 2019-12-22

3 Definitions, symbols and abbreviations

This subclause presents an overview of used term definitions, symbols and abbreviations.

3.1 Definitions

Device under Test (DUT)

- 5 The device under test (DUT) is the device of which conformance with OMS specification is to be tested.

Application frame

- 10 The Application frame is the payload that is transmitted over different physical layers. It excludes physical layer specific information as preamble, synchronisation word, CRC and more.

Fixed part of Application frame

- 15 The Application frame has to be separated into a fixed and a variable part. The fixed part consists of the Application header. The Application header is independent from the selected application protocol. The length of the fixed part depends on the type of CI-Field and is listed in [OMSS-Vol2] Table 5.

Golden receiver unit

- 20 A receiver device that has been proven against fundamental specifications, especially with respect to Manchester, 3-of-6 and NRZ decoding, chip/bit/byte order, CRC decoding, and S2/T2/C2 mode response transmission window. The response transmission window of the golden receiver shall be configurable for minimum and maximum values.

Golden transmitter unit

A transmitter device that has been proven against fundamental specifications, especially with respect to Manchester, 3-of-6 and NRZ coding, chip/bit/byte order, and CRC encoding.

M-Bus-String

- 25 When M-Bus Application protocol is applied the collection of all bytes in the variable part of the application frame are called M-Bus-String.

Marginal transmitter unit

A transmitter device that can be tuned to the extreme specifications with respect to transmitter frequency offset and chip rate offset.

- 30 ***Packet Generator***

A packet generator is part of the conformance testing tool set. It is used to generate wireless M-Bus packets, especially requests and commands, in order to evaluate the reaction of the DUT.

Sniffer Tool

- 35 A sniffer tool is part of the conformance testing tool set. It is used to intercept all wireless M-Bus messages sent and received and to assess the conformance of the messages sent by the DUT. For documentation purposes, all packets that are received by the sniffer tool are logged together with a timestamp.

Variable part of the Application frame

The Application frame has to be separated into a fixed and a variable part. The variable part consists of the Application protocol bytes starting at the next byte behind the fixed part until the end of the datagram (without CRC, Check sum etc.). Symbols

[T(vol)(part)-(test)(index)(revision¹)]

- 5 Test index to reference the criteria within the OMS-CT, with
 vol = number of volume within the OMS-CT
 part = number of part within the referenced volume
 test = characters to indicate the test item
 index = unique index of test point²
 10 revision = single character ('a'-'z') to indicate revision index.

3.2 Abbreviations

Table 2: List of abbreviations used

Abbreviation	Explanation
ABS	Absolute Value (without sign)
AFL	Authentication and Fragmentation Layer
APL	Application Layer of OSI-Communication model
ACN	Access Number
ADR	Address Field
BDM	Bidirectional Meter
CW0	Permanent transmission of frequency for symbol 0 (Continuous Wave 0)
CW1	Permanent transmission of frequency for symbol 1 (Continuous Wave 1)
DC	Duty Cycle
DLL	Data Link Layer of OSI-Communication model
DIF	Data Information Field (refer to[EN13757-3])
DIFE	Data Information Field Extension (refer to[EN13757-3])
DSMR	Dutch Smart Metering Requirement
DUT	Device Under Test
ELL	Extended Link Layer
GW ³	Gateway
Lo-Bus	Local Bus – A low voltage bus for short range, which may be used as physical layer instead of M-Bus. The Lo-Bus is standardized in [EN13757-6].
M-Bus	Meter Bus – A Bus with higher voltage for meter communication up to several kilometres. The M-Bus is standardized in [EN13757-2].

¹ The field "revision" is optional and will be added only, if more than one version of the same test point exists.

² A "*" can be used to refer to the complete set of test points within the test item.

³ In earlier specifications the term „Multi Utility Controller (MUC) has been used.

M-Bus Protocol	A Protocol specification for the transmission of meter data via the M-Bus, wM-Bus or other communication systems. The M-Bus-Protocol is standardised in [EN13757-3]
MSB	Most Significant Bit
OMS	Open Metering System
OMS-CT	Open Metering System – Conformance Test
OMS-CTR	OMS-CT Receiver
OMS-CTT	OMS-CT Transeiver
OMSS	Open Metering System Specification
PER	Packet Error Rate - number of lost packets referred to all transmitted packets
PHY	Physical layer of the OSI-Communication model
UDM	Unidirectional Meter
UDR	Unidirectional Repeater
VIF	Value Information Field (refer to [EN13757-3])
VIFE	Value Information Field Extension (refer to [EN13757-3])
wM-Bus	Wireless M-Bus – A specification for a wireless transmission of meter data for a short range. The wM-Bus is standardized in [EN13757-4]. A detailed specification is given in [OMSS-Vol1] and [OMSS-Vol2]

3.3 Number Formats

Hexadecimal numbers are marked with a suffix "h". Binary coded numbers are marked with a suffix „b". Numbers without suffix are decimal numbers unless another coding is explicitly declared.

4 Test Preparation

4.1 Items for Test

To prepare the OMS-Conformance test, a vendor has to provide following items in advance:

1. Manufacturer declaration
- 5 2. At least two DUT (of normal production) for the conformance test (if the DUT are always running in test mode then two additional DUT with disabled test mode are also required)
3. Software and Interface (if necessary)
4. Test description explaining how to start special services on the DUT

10 The test description is not necessary if the manufacturer attends the tests. This shall be stated in the test documentation. The manufacturer declaration is always mandatory.

4.2 Manufacturer Declaration of DUT

15 Based on the manufacturer declaration the applicable conformance tests will be selected by the testing laboratory. The manufacturer shall declare the following properties according to [OMSCT-ManDec].

4.2.1 Declaration of the OMS-Interface

The following table declares OMS-Interfaces for data exchange with a Gateway or another communication unit. (It does not declare the local service interface (e.g. optical interface)!)

Table 3: Declaration of standardised OMS-Interfaces

Decla- ration	Type	Explanation
LB	Twisted Pair - Lo-Bus	Wired Lo-Bus interface (Local bus) conforming to [EN13757-6]
MB	Twisted Pair - M-Bus	Wired M-Bus interface conforming to [EN13757-2] and [OMSS-Vol2]
S1	Radio S1-mode (unidirectional)	Wireless radio interface conforming to [EN13757-4] and [OMSS-Vol2]
S2	Radio S2-mode (bidirectional)	wireless radio interface conforming to [EN13757-4] and [OMSS-Vol2]
T1	Radio T1-mode (unidirectional)	wireless radio interface conforming to [EN13757-4] and [OMSS-Vol2]
T2	Radio T2-mode (bidirectional)	wireless radio interface conforming to [EN13757-4] and [OMSS-Vol2]
C1	Radio C1-mode (unidirectional)	wireless radio interface conforming to [EN13757-4] and [OMSS-Vol2]
C2	Radio C2-mode (bidirectional)	wireless radio interface conforming to [EN13757-4] and [OMSS-Vol2]

Note that one OMS-device might use more than one OMS-interface!

4.2.2 Declaration of Application Protocol

For the transport of application data one of the following application protocols may be selected.

Table 4: Declaration of selected application protocol

Declaration	Explanation
M-BUS	M-Bus-Application layer conforming to [EN13757-3] and [OMSS-Vol2]
DLMS/COSEM	DLMS-Application protocol transports COSEM-Object conforming to [EN13757-1] and [IEC62056-53]
SML	SML-Application protocol conforming to Smart Message Language specification. (refer to http://www.t-l-z.org/eng/sml-spezi_eng.html)

4.2.3 Security Mode and Encryption Key

If the DUT supports data encryption the manufacturer has to declare the security mode and the encryption key in [OMSCT-ManDec]. The security mode shall be one of the listed security modes in [OMSS-Vol2]. The format of the encryption key shall be conforming to [OMSS-Vol2].

4.2.4 Declaration of Transmission Rate

The manufacturer shall declare the average transmission interval which is configured in the DUT. The average transmission interval declares the typical distance between the transmission of two datagrams. The transmission interval should be declared in seconds.

4.2.5 Declaration of Installation Datagrams

The manufacturer shall declare, if the DUT supports installation datagrams (manually triggered datagrams with C-Field 46h). If this feature is supported the way of starting the installation datagram shall be described in the Test documentation. If tools are necessary to start the installation datagrams they have to be provided by the manufacturer for the duration of the test.

4.2.6 Declaration of Data Points

The manufacturer should⁴ declare all mandatory and optional data points which are conforming to [OMSS-Vol2] Annex A to ensure and document the interoperability.

The manufacturer may also declare additional data points which are not conforming to [OMSS-Vol2] Annex A or are provided in other datagrams. The declaration of these additional data points is optional.

The data points can be transmitted with either SND-NR (for wireless M-bus) or with REQ-UD2 (for wired M-Bus).

The manufacturer shall state if a declared data point is transmitted only in special conditions of the DUT (e.g. error state). For certification it is required that the manufacturer provides the certification laboratory with the required tools to set the DUT to this special conditions.

The test result of the data points in relation to [OMSS-Vol2] and [EN13757-3] is shown in Figure 1.

				Mandatory data points		Optional data points			
		Applicable Specifications		Listed in OMS-DPL as <u>mandatory</u>		Listed in OMS-DPL as <u>optional</u>		not Listed in OMS-DPL	
		EN13757	OMS	declared in [OMSCT-ManDec]:Table2	not declared in [OMSCT-ManDec]:Table2	declared in [OMSCT-ManDec]:Table2	not declared in [OMSCT-ManDec]:Table2	declared in [OMSCT-ManDec]:Table3	not declared in [OMSCT-ManDec]:Table3
Message received	datarecord found	datarecord complies to EN13757	datarecord complies to OMS	OK	OK	OK	OK	N/A	N/A
			datarecord does not comply to OMS datarecord	NOK	NOK	NOK	N/A	OK	OK
		datarecord does not comply to EN13757	<not relevant>	NOK	NOK	NOK	NOK	NOK	NOK
	datarecord not found	<not relevant>	<not relevant>	NOK	NOK	NOK	N/A	NOK	N/A

Figure 1: Evaluation of data points

⁴ While the [OMSS-Vol2] is an application specification based on [EN13757-3] there is no reason to limit the implementation of possible features that are in line with EN13757.

4.2.7 Declaration of the Test Command

For several tests it is necessary to check if the meter or actuator is able to receive a message from the test master. A Test command is required to verify if the message has been received and executed. The Test command should be defined by the manufacturer itself (e.g. shows Symbol on LCD e.g. "tEST" for 2 seconds or switches a valve). The complete test command (including authorisation sequence (if existing)) shall be described in the test documentation.

4.2.8 Test Mode

The DUT might use a special configuration (i.e. test mode) to run the OMS conformance test which is different to the normal operation configuration in the field. In this case, the manufacturer shall declare the differences between the special and the normal operation mode with reference to the OMS specification. The manufacturer shall describe how the special configuration is enabled / disabled. Alternatively, a subset of the DUT can use the special configuration permanently. In this case the manufacturer shall identify these devices in the test documentation using their identification numbers.

4.2.9 List of the Test Equipment

The manufacturer shall provide a complete list of the test equipment (hardware, software and test documentation).

4.2.10 Declaration of DUT Parametrization

It is common practice that the manufacturer provides the customer with the possibility to change the parametrization of the DUT, e. g. transmission period or content of the radio datagrams (data records). It is possible that a change of this parametrization results in a non OMS compliant device so the OMS Certificate is not valid anymore.

The change of the parametrization can be done during the production process of the meter, during installation or if the meter is already in operation. Typically there are a lot of possible tools with different user rights available to change the parametrization.

To avoid a highly complex certification procedure including complete tool chain and all combinations of possible parameter settings it was agreed that the manufacturer shall configure the DUT in a way that it will pass the certification process. In addition he shall state in the manufacturer declaration that

- Devices without the Label for OMS conformity can be delivered to the customer with OMS-compliant parametrization or non-compliant
- All devices that are produced and marked with the Label for OMS conformity should leave the company with OMS compliant parametrization.
- If devices with Label for OMS conformity leave the company with a non-compliant parametrization this shall be explicitly communicated to the customer. This can be done using the delivery notes.
- If the manufacturer offers the possibility to change the parametrization after production they shall state that changing the parametrization of the device can result in a non-compliant device and therefore the OMS certificate is not valid anymore. This statement can be done in the data sheet or the configuration software for example.

4.2.11 Setup of Conformance Test Environment

The setup of the Conformance Test Environment consists at least of the OMS CT Software (OMS-CTS) and a radio device.

An OMS CT Receiver (OMS-CTR) shall be used for unidirectional tests.

An OMS CT Transceiver (OMS-CTT) shall be used for bidirectional tests.

The operator of the tests shall ensure before executing the test

- The OMS-CTS shall be installed successfully
- The OMS-CTS shall be updated to the latest released version
- The used radio device (OMS-CTR or OMS-CTT) is compatible with the OMS-CTS
- The used radio device (OMS-CTR or OMS-CTT) shall be qualified by the manufacturer using a golden radio device

A compatibility list for OMS Generation, OMS-CTS, OMS-CTR and OMS-CTT is available from the OMS Homepage. (Note: 1st version will be released asap.)

5 Test Execution

5.1 Test of the Technical Properties (PHY)

5.1.1 wM-Bus Interface (S1, S2, T1, T2, C1, C2)

5 The radio test for interfaces S1, S2, T1, T2, C1, C2 shall be executed only by an accredited test laboratory for short range devices (Testing field A06 and A08). The test laboratory shall be accredited according to ISO/IEC 17025. It shall prove its accreditation by listing its own accreditation number in the test report (e.g. the DAR- or DAkkS-Registration No.). All tests shall be executed according to [OMSCT-PHY]!

5.1.2 M-Bus Interface (MB, LB)

10 To be defined!

5.2 Test of the Data Transmission (DLL)

5.2.1 wM-Bus Interface

The radio test for the unique wireless data link layer of the OMS shall be tested by a test laboratory listed by the certification body.

15 All tests shall be executed according to [OMSCT-DLL]!

5.2.2 M-Bus/Lo-Bus Interface

To be defined!

5.3 Test of Application Layer (APL)

20 The test of the M-Bus Application protocol shall be executed by a test laboratory listed by the certification body.

5.3.1 Generic Application Header

The test of the generic Application header shall always be executed independently from the selected type of application protocol. All tests shall be executed according to [OMSCT-APL]

5.3.2 M-Bus-Protocol

25 If the manufacturer declares the Application protocol "M-Bus" all tests shall be executed according to [OMSCT-APL]!

6 Test Results

For every volume of OMS-CT a separate Test report shall be generated to record the test results. The Test report shall be conform to EN 17025 and shall contain the following items:

1. Section "Details of the test laboratory"

- Name and address of test laboratory
- Registration number of accredited test laboratory
- Name and phone for contact purposes
- Name, Date and Sign of involved Testing personnel

2. Section "Declaration of the tested device"

- Name and address of Manufacturer of tested device
- Name and product identifier of the DUT (e.g. Gas meter BKG4)
- Software version of the DUT
- Tested OMS-Interfaces

3. Section "References of performed tests"

- Applied version of OMS-Specification
- Applied version of OMS-Conformance Test Specifications
- Additional references
- Deviations from the OMS-Conformance Test Specification

4. Section "Test Results"

- a. Summary of test results (Pass/Fail)
- b. Detailed description of every tests, with
 - Reference of performed test (Test name, Test-ID)
 - Applied limits for this test
 - Test result for every test (pass / fail / not applicable)

5. Section "Test Equipment"

- Complete list of the measurement equipment (e.g. type of spectrum analyser)
- Complete list of the test equipment (e.g. reference receiver) including Software version of test equipment

7 Certificate

The OMS-Certificate requires all test reports for the OMS-CT volumes 2, 3 and 4.

The OMS-Certificate certifies a passed conformance test with references to

- Manufacturer
- Product name and product identifier
- Certified OMS-Interface e.g. T2
- Applied version of OMS-Specification and
- Applied version of OMS-Conformance Test
- Executing Test laboratory

The OMS-Certificate will be issued based on an existing contract between OMS e. V. and a certification body. Currently the following certification bodies are in contract:

1. Certification body:

DVGW CERT GmbH
Josef-Wirmer-Str. 1
53123 Bonn
Germany

2. Certification body:

VDE Prüf- und Zertifizierungsinstitut GmbH
Merianstr. 28
63069 Offenbach
Germany

(This list will be updated according to the contractual status.)

Appendix A: Differences to [OMSS-Vol2]

Not testable requirements of [OMSCT-GEN]:

- Different parametrizations of the DUT can lead to a loss of OMS Certification.
 - A warning to the user that changing the parameters can lead to a loss of OMS Certificate is required. The manufacturer shall state in the [OMSCT-ManDec] how this information is given to the user.

Not testable requirements of [OMSCT-DLL]:

- „The start of the first synchronous transmission shall be stochastic. It is not allowed to fix the synchronous transmission exactly to a common event like a special time or a power on after a central voltage drop.“The existence of an ELL in case of a meter with internal encryption function and an external RF-Adapter as specified in [OMSS-Vol2] subclause 5.3.4 is not tested.
- The structure and presence of the ELLA in the ELL is not tested in case of unidirectional meters. This is in contradiction to [OMSS-Vol2] subclause 3.1.3.2, Line 28. It is intended to adopt the OMS-S accordingly.
- Static datagram content is not tested for the content due to missing definition of management data (data points); therefore only the timing is checked.

Correction of [OMSS-Vol2]:

- For latest adoptions of the [OMSS-Vol2] please refer to the actual errata sheet published on the OMS Homepage.

Requirements not covered by this OMS-CT

- [OMSS-Vol2] Annex K – “Descriptors”