Yellow Book Edition 8.0 – V1.0

TECHNICAL REPORT

DLMS/COSEM

Compliance requirements and conformance assessment

DLMS User Association

◢DLMS™

CONTENTS

Foreword

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Acknowledgement

The actual document has been established by the DLMS UA Qualification Working Group.

Revision history

Versions kept within the DLMS UA Qualification WG.

Version	Date	Author	Status	Comment
Edition 1.0	2001-05-01	DLMS-UA	Released	In line with: - DLMS UA 1000-1 (Blue Book) Edition 4.0; - DLMS UA 1000-2 (Green Book) Edition 2.0.
Edition 2.0	2002-06-04	DLMS-UA	Released	In line with: - DLMS UA 1000-1 (Blue Book) Edition 4.0; - DLMS UA 1000-2 (Green Book) Edition 2.0; - CTT v1.0.
Edition 2.0 Amd. 1	2003-01-09	DLMS UA	Released	Brought in line with CTT v1.01
Edition 3.0	2007-08-28	DLMS UA	Released	In line with: - DLMS UA 1000-1 (Blue Book) Edition 8.0; - DLMS UA 1000-2 (Green Book) Edition 6.0; - CTT v2.0.
Edition 4.0	2010-12-15	DLMS UA	Released	In line with: - DLMS UA 1000-1 (Blue Book) Edition 10.0; - DLMS UA 1000-2 (Green Book) Edition 7.0; (except security) - CTT v2.3.
Edition 5.0	2015-06-19	DLMS UA	Released	In line with: - DLMS UA 1000-1 (Blue Book) Edition 11.0; - DLMS UA 1000-2 (Green Book) Edition 7.0 + Amendment 3; - CTT v3.0.
Edition 6.0	2017-05-29	DLMS UA	Released	Updated to be in line with: - DLMS UA 1000-1 (Blue Book) Edition 12.2; - DLMS UA 1000-2 (Green Book) Edition 8.2; - CTT v3.0 and CTT v3.1.
Edition 6.1	2018-04-30	DLMS UA	Released	Updated to be in line with: - DLMS UA 1000-1 (Blue Book) Edition 12.2; - DLMS UA 1000-2 (Green Book) Edition 8.3.
Edition 7.0	2020-09-01	DLMS UA	Released	Updated to be in line with: - DLMS UA 1000-1 (Blue Book) Edition 13.0; - DLMS UA 1000-2 (Green Book) Edition 9.0; - CTT 3.1 r108.
Edition 7.1	2021-01-27	DLMS UA	For technical comments by the Qualification WG	- In Table 3, Item LogicalDevice "three-letter manufacturer ID (FLAG ID)" replaced by "three-letter FLAG ID; - Document links from Annex B are removed. The test plans are delivered with and can be viewed form the CTT.
Edition 8.0 V0.6	2021-02-10	DLMS UA	Marked up with proposed changes	- Comments of DLMS UA Operations on YB Ed. 7.0 - Conformance testing related definitions removed - Clause 4.4 removed

				- Information that can be found in the CTT Help File marked up for removal
Edition 8.0 release 0.7	2021-03-10	DLMS UA G. Kmethy	For technical comments by the WG Qualification	The whole document reworked following the QB guidelines.
Edition 8.0 release 0.8	2021-03-24	G. Kmethy	Comments from CA considered	The following parts need specific attention / approval: - The title of the document; - The definitions in 3.1, based on the IR /B; - Clause 4, Overview of the DLMS UA Qualification Program: approve or remove; - links to the DLMS UA Qualification and CTT/DTT subdomains need to be completed; - Clause 8.1, description of the content of the Certificate has to be done by a person familiar with the certificate and with the test result submission process. Alternatively, it can be omitted. - Annex A is a placeholder of the Certificate. Alternatively, it can be removed.
Edition 8.0 Release 0.81	2021-03-25	G. Kmethy		Subclause 8.1, The content of the certificate: explanation of the use and meaning of the fields of the Certificate added; Subclause 9.2 and 9.6: the possibility of referencing earlier Certificates removed note that this will cause problems with the applicant); Annex A, Certification template added, with comments.
Edition 8.0 Release 0.82	2021-03-31	G. Kmethy		Figure 5 amended
Edition 8.0 Release 0.83	2021-04-08	A.Smith		CTT and conformance test tool replaced with CTT/DTT and Conformance test tool/Development test tool where applicable.
Edition 8.0 V1.0	2021-04-16	DLMS UA	Marked up as proposed	Text and comments to describe qualification program in line with current Bylaws (October 2020). Text and comments to describe test tools.

1 Scope

Correct implementation of the DLMS/COSEM specification – described in the DLMS UA Blue Book and Green Book – is an important prerequisite of achieving interoperability.

To this end, the DLMS User Association provides a Qualification Program that allows products to be certified as *compliant with* the DLMS/COSEM specification. The Qualification Program is described in the DLMS UA Internal Regulations (Bylaws). Additional information is provided by DLMS UA Qualification website at https://qualification.dlms.com/home.

This document, Yellow Book 8.0, is part of the DLMS UA Qualification Program. It specifies high-level requirements for products implementing DLMS/COSEM server functionality to be certified as DLMS/COSEM compliant. It also describes the DLMS UA conformance testing scheme and the conformance assessment procedure, as well as the assurances a product certified as compliant gives towards interoperability.

The intended audience includes all members of the Association producing or using DLMS/COSEM systems.

For prospective members and other interested parties an extract is available.

This document cancels and replaces Edition 7.1, published in January 2021.

2 Referenced documents

Reference No.	Title
DLMS UA 1000-1	COSEM Interface Classes and OBIS Identification System, the Blue Book
DLMS UA 1000-2	DLMS/COSEM Architecture and Protocols, the Green Book
DLMS UA 1002	Glossary of terms, the White Book
DLMS UA Internal Regulations (Bylaws)	DLMS UA Internal Regulations (Bylaws)
DLMS UA 1001-7	COSEM conformance testing – Object definition tables
DLMS UA 1001-9: V4.0	Test Tools Abstract Test Suites *Document is delivered with the Conformance Test Tools..*
IEC 62056-21	Electricity metering – Data exchange for meter reading, tariff, and load control – Part 21: Direct local data exchange
ITU-T X.290 (04/1995)	OSI conformance testing methodology and framework for protocol recommendations for ITU-T applications – General concepts

3   Terms, definitions and abbreviations

For the purposes of this document, the following terms and definitions apply.

3.1   Definitions related to conformance testing

3.1.1
base specification
A specification of a protocol, abstract syntax, encoding rules, or information object.

Note 1 to entry: The DLMS/COSEM base specification is described in the Blue Book and in the Green Book.

[ITU-T X.290 3.3.10 modified, with Note added.]

3.1.2
implementation under test (IUT)
An implementation of one or more OSI protocols in an adjacent user/provider relationship, being that part of a real open system, which is to be studied by testing.

Note 1 to entry: In the DLMS/COSEM conformance testing scheme, IUTs are products implementing DLMS/COSEM server functions.

[ITU-T X.290 3.3.43, modified, with Note added]

3.1.3
test laboratory
An organization that carries out conformance testing. This can be a third party, a user organization, a telecommunications administration or recognized private operating agency or an identifiable part of a supplier organization.

[ITU-T X.290 3.3.113]

3.1.4
means of testing
(MOT) (IUTs)
The combination of equipment and procedures that can perform the derivation, selection, parameterization, and execution of test cases, in conformance with a reference standardized ATS, and can produce a conformance log.

[ITU-T X.290 3.3.54]

3.1.5
test case
An abstract or executable test case.

[ITU-T X.290 3.3.107 modified, with the Note omitted]

3.1.6
inapplicable test case
A test case, which cannot be performed because the necessary conditions are not available.

3.1.7
test purpose

A prose description of a well-defined objective of testing, focusing on a single conformance requirement or a set of related conformance requirements as specified in the appropriate OSI specification (e.g., verifying the support of a specific value of a specific parameter).

[ITU-T X.290 3.3.118]

3.1.8
idle testing state
A stable testing state in which there is no established connection of the relevant protocol(s) and in which the state of the IUT is independent of any previously executed test cases.

[ITU-T X.290 3.3.38]

3.1.9
(test) preamble
The sequences of test events from the starting stable testing state of the test case up to the initial testing state from which the test body will start.

[ITU-T X.290 3.3.117]

3.1.10
initial testing state
The testing state in which a test body starts.

Note 1 to entry: This may be either a stable testing state or a transient state.

[ITU-T X.290 3.3.47]

3.1.11
test body
The sequences of test events that achieve the test purpose.

[ITU-T X.290 3.3.105]

3.1.12
test step
subtest
A named subdivision of a test case constructed from test events and/or other test steps.

[ITU-T X.290 3.3.122]

3.1.13
test event
An indivisible unit of test specification at the level of abstraction of the specification (e.g., sending or receiving a single PDU).

[ITU-T X.290 3.3.110]

3.1.14
(test) postamble
The sequences of test events from the end of the test body up to the finishing stable testing state(s) for the test case.

[ITU-T X.290 3.3.116]

3.1.15
stable testing state
A testing state which can be maintained, without prescribed Lower Tester behaviour, sufficiently long enough to span the gap between one test case and the next in a test session.

[ITU-T X.290 3.3.93 modified, the word "session" is used instead of "campaign"]

3.1.16
test case error
The term used to describe the result of execution of a test case when an error is detected in the test case itself.

[ITU-T X.290 3.3.108]

3.1.17
test group
A named set of related test cases.

[ITU-T X.290 3.3.111]

3.1.18
test group objective
A description of the common objective, which the test purposes within a specific test group are designed to achieve.

[ITU-T X.290 3.3.112]

3.1.19
abstract test case
A complete and independent specification of the actions required to achieve a specific test purpose, defined at the level of abstraction of a particular Abstract Test Method, starting in a stable testing state and ending in a stable testing state. This specification may involve one or more consecutive or concurrent connections.

Note 1 to entry: The specification should be complete in the sense that it is sufficient to enable a verdict to be assigned unambiguously to each potentially observable outcome (i.e., sequence of test events).

Note 2 to entry: The specification should be independent in the sense that it should be possible to execute the derived executable test case in isolation from other such test cases (i.e., the specification should always include the possibility of starting and finishing in the "idle" state).

[ITU-T X.290 3.3.3]

3.1.20
parameterized abstract test case
An abstract test case in which all relevant parameters have been supplied with values in accordance with a specific CTI.

[ITU-T X.290 3.3.59, modified referring to the CTI instead of the ICS(s) and IXIT(s)]

3.1.21
abstract test case error
A test case error resulting from an error in the abstract test case.

[ITU-T X.290 3.3.4]

3.1.22
abstract test suite (ATS)
A test suite composed of abstract test cases.

[ITU-T X.290 3.3.6]

3.1.23
executable test case
A realization of an abstract test case.

[ITU-T X.290 3.3.31]

3.1.24
parameterized executable test case
An executable test case, in which all appropriate parameters have been supplied with values in accordance with a specific CTI and corresponding to a parameterized abstract test case.

[ITU-T X.290 3.3.61, modified referring to the CTI instead of the ICS(s) and IXIT(s).]

DLMS User Association	2021-04-16	DLMS UA 1001-1 Ed. 8.0 V1.0	10/35

3.1.25
conformance test information (CTI)
A statement made by the supplier or implementer of an IUT stating the capabilities and options that have been implemented and additional information necessary to select and parameterize the executable test cases.

Note 1 to entry   Part of this information on the implementation may be taken from the IUT itself.

Note 2 to entry: X.290 uses the terms Protocol Implementation Conformance Statement (PICS, ITU-T X.290 3.3.80) and Protocol Implementation Extra Information for Testing (PIXIT, ITU-T X.290 3.3.81).

3.1.26
executable test case error
A test case error in the realization of an abstract test case.

[ITU-T X.290 3.3.32]

3.1.27
executable test suite (ETS)
A test suite composed of executable test cases.

[ITU-T X.290 3.3.33]

3.1.28
capability (of an implementation)
A set of functions in the relevant protocol(s) that is supported by the implementation.

[ITU-T X.290 3.3.13]

3.1.29
capability test
A test to verify the existence of one or more claimed capabilities of an IUT.

Note 1 to entry: Capability testing involves checking all mandatory capabilities and those optional ones that are stated in the CTI as supported, but not checking those optional ones that are stated in the CTI as not supported by the IUT.

[ITU-T X.290 3.3.14, modified, reference is made to the CTI instead of the ICS.]

3.1.30
conformance testing
Testing the extent to which an IUT is a conforming implementation.

[ITU-T X.290 3.3.23]

3.1.31
conforming implementation
An IUT that satisfies both static and dynamic conformance requirements, consistent with the capabilities stated in the CTI.

Note 1 to entry: DLMS/COSEM does not specify dynamic conformance requirements on the application layer and COSEM object model level.

[ITU-T X.290 3.3.25, modified, with Note added.]

3.1.32
conformance assessment process
The complete process of accomplishing all conformance testing activities necessary to assess the conformance of an implementation or a system to one or more OSI specifications.

Note 1 to entry: For DLMS/COSEM the relevant specifications are the Blue Book and the Green Book.

[ITU-T X.290 3.3.19 modified with Note added.]

3.1.33
static conformance review

A review of the extent to which the static conformance requirements are claimed to be supported by the IUT, by comparing the answers in the CTI with the static conformance requirements expressed in the relevant specification(s).

[ITU-T X.290 3.3.96 modified referring to the CTI instead of the ICS(s) and IXIT(s).]

3.1.34
(conformance) test suite

A complete set of test cases, possibly combined into nested test groups, which is needed to perform dynamic conformance testing for one or more OSI protocols.

Note 1 to entry: It should cover both capability testing and behaviour testing. It may be qualified by the adjectives: abstract or executable, as appropriate. Unless stated otherwise, an "abstract test suite" is meant.

[ITU-T X.290 3.3.22]

3.1.35
test session

The process of executing the Parameterized Executable Test Suite for a particular IUT and producing the conformance log.

[ITU-T X.290 3.3.106 modified, the word "session" is used instead of "campaign".]

3.1.36
valid test event

A test event which is allowed by the protocol specification, being both syntactically and semantically correct, and occurring when allowed to do so by the protocol specification.

[ITU-T X.290 3.3.130]

3.1.37
invalid test event

A test event that violates at least one conformance requirement of the relevant specification(s) to which conformance is being tested.

[ITU-T X.290 3.3.49 modified, with Note omitted.]

3.1.38
semantically invalid test event

A test event which is neither inopportune nor syntactically invalid but which contains a semantic error with respect to the relevant protocol specification (e.g., a PDU containing a parameter value outside the negotiated range for that parameter).

[ITU-T X.290 3.3.90]

3.1.39
syntactically invalid test event

A test event which is not allowed syntactically by the relevant specification(s) to which conformance is claimed.

[ITU-T X.290 3.3.99]

3.1.40
inopportune test event

A test event which occurs when not allowed to do so by the relevant specification(s) to which conformance is being tested.

[ITU-T X.290 3.3.48]

3.1.41
(observed) test outcome

The sequence of test events, together with associated data and/or parameter values, which occurred during test execution of a specific parameterized executable test case.

[ITU-T X.290 3.3.58]

3.1.42
foreseen test outcome

An observed test outcome identified in the abstract test case.

Note 1 to entry: A foreseen test outcome may include an unidentified test event.

[ITU-T X.290 3.3.35]

3.1.43
unforeseen test outcome

An observed test outcome not specified in the abstract test case.

Note 1 to entry: An unforeseen test outcome can only lead to a test case error or an abnormal test case termination.

[ITU-T X.290 3.3.127]

3.1.44
(test) verdict

Statement of "pass", or "fail" as specified in an abstract test case, concerning conformance of an IUT with respect to that test case when it is executed.

[ITU-T X.290 3.3.124 with "inconclusive" omitted]

3.1.45
pass (verdict)

A test verdict given when the observed test outcome gives evidence of conformance to the conformance requirement(s) on which the test purpose of the test case is focused and when no invalid test event has been detected.

[ITU-T X.290 3.3.63]

3.1.46
fail (verdict)

A test verdict given when the observed test outcome either demonstrates non-conformance with respect to (at least one of) the conformance requirement(s) on which the test purpose of the test case is focused, or contains at least one invalid test event, with respect to the relevant specification(s).

[ITU-T X.290 3.3.34]

3.1.47
conformance log

A human-readable record of information produced as a result of a test session, which is sufficient to record the observed test outcomes and verify the assignment of test results (including test verdicts).

[ITU-T X.290 3.3.20]

3.1.48
protocol conformance test report (PCTR)

A document produced at the end of a conformance assessment process, giving the details of the testing carried out using a particular ATS. It lists all of the abstract test cases and identifies those for which corresponding executable test cases were run, together with the verdicts assigned.

[ITU-T X.290 3.3.79]

3.1.49
repeatability (of results)
Characteristics of a test case, such that repeated executions on the same IUT lead to the same verdict and by extension a characteristic of a test suite.

[ITU-T X.290 3.3.86]

3.2 Abbreviations (to be selected)

Abbreviation	Explanation
AA	Application Association
AL	Application Layer
AP	Application Process
APDU	Application Protocol Data Unit
ATC	Abstract Test case
ATS	Abstract Test Suite
COSEM	Companion Specification for Energy Metering
COSEM object	An instance of a COSEM interface class
CO	Connection oriented
CTI	Conformance Test Information
CTT/DTT	Conformance Test Tool/Development Test Tool
DLMS	Device Language Message Specification
ETS	Executable Test Suite
GBT	General Block Transfer (a DLMS/COSEM AL mechanism to transport long messages)
HDLC	High-level Data Link Control
IC	Interface Class
IEC	International Electrotechnical Commission
IP	Internet Protocol
ITU	International Telecommunication Union
IUT	Implementation Under Test
LD	Logical Device
MOT	Means of Testing
OBIS	OBject Identification System
OSI	Open System Interconnection
PDU	Protocol Data Unit
QP	(DLMS UA) Qualification Program
SAP	Service Access Point
TCP	Transmission Control Protocol
UDP	User Datagram Protocol

4   Overview of the DLMS UA Qualification Program

The DLMS UA Qualification Program is a service provided by the Association to its members to guarantee that the products tested hit the market with the highest degree of interoperability. To achieve this, for each new release of the DLMS UA Specifications, DLMS UA will publish the new criteria a product should meet for being considered Qualified. DLMS UA attaches an extremely high importance to rigorous verification to ensure that the DLMS UA Member's Qualification Application is eligible and that the tested product has passed the testing criteria. Only if both conditions are fulfilled will the product receive the Qualification Certificate for Compliance and be added into the DLMS UA list of Certified Products. It will then have to carry the DLMS UA Certification Trademark, which is the publicly visible sign that recognizes successful qualification.

The DLMS UA Qualification Program provides the ability for DLMS UA to qualify products for Compliance against its DLMS/COSEM Standard but also for Compatibility with the DLMS UA Companion Generic Profiles that each DLMS UA Working Group releases on a regular basis. The DLMS UA Qualification Program is structured so that the service creates value for the Members with a high degree of integrity but not at the expense of time-to-market.

It has been DLMS UA's ambition to ensure the Qualification process used to obtain the Certification for Compliance is organized in such a way as to be operated in full autonomy by each Member within the shortest time. For this, the DLMS UA Qualification Program is designed to be fully digitalized and available online and the Test Tools are licensable and usable by each DLMS UA Member with full autonomy. To learn more about the DLMS UA Qualification Program, please visit the DLMS UA Qualification portal here https://qualification.dlms.com/home.

The program covers products implementing DLMS/COSEM server functionality as specified in the DLMS UA Blue Book and the Green Book. Such products exchange data with systems implementing DLMS/COSEM client functionality.

A certified product carries the DLMS UA Certification Trademark and is listed by the DLMS UA on the list of certified products.

For more information on the DLMS UA Qualification Program please refer to the DLMS UA Internal Regulations (Bylaws) and to the DLMS UA Qualification portal: https://qualification.dlms.com/home

5   DLMS/COSEM compliance requirements

5.1   General

The DLMS UA Blue Book and the Green Book specify a wide range of functions that enable building smart communicating devices. The Books specify some mandatory elements but beyond that, the selection of functions and their parametrization are left to the implementer to meet targeted market requirements. Such requirements are generally project specific and may be developed by utilities, manufacturers, or consortia in Companion Specifications.

The purpose of this sub clause is to present a high level model of DLMS/COSEM servers and to recapitulate – on each level of the model – the main requirements that products providing DLMS/COSEM server functionality shall meet in order to pass conformance testing and be certified as DLMS/COSEM compliant.

The generic model of DLMS/COSEM servers is illustrated in Figure 1.

The application functions are modelled by application processes (APs). They are realized with COSEM interface objects as specified in the Blue Book.

The communication functions are provided by the DLMS/COSEM application layer (AL) as specified in the Green Book. The AL comprises two Application Service Elements (ASEs):

the Application Control Service Element (ACSE); and

the xDLMS ASE.

The ACSE provides services to establish and release application layer level connections between servers and clients. The xDLMS ASE provides services to access the attributes and methods of COSEM objects. The ACSE and xDLMS services are carried by Application Protocol Data Units (APDUs).

Cryptographic security functions are available:

on the COSEM application process level, to protect COSEM data;

> NOTE   COSEM data are COSEM object attribute values, method invocation and response parameters.

on the DLMS/COSEM application layer level, to protect the messages (APDUs).

To transport the messages – the APDUs – over the network, the application layer is supported by common and media-specific lower layers.

The client is able to discover the functions implemented in the servers through negotiating contexts, retrieving the list of COSEM objects implemented, reading, and interpreting the value of specific attributes.
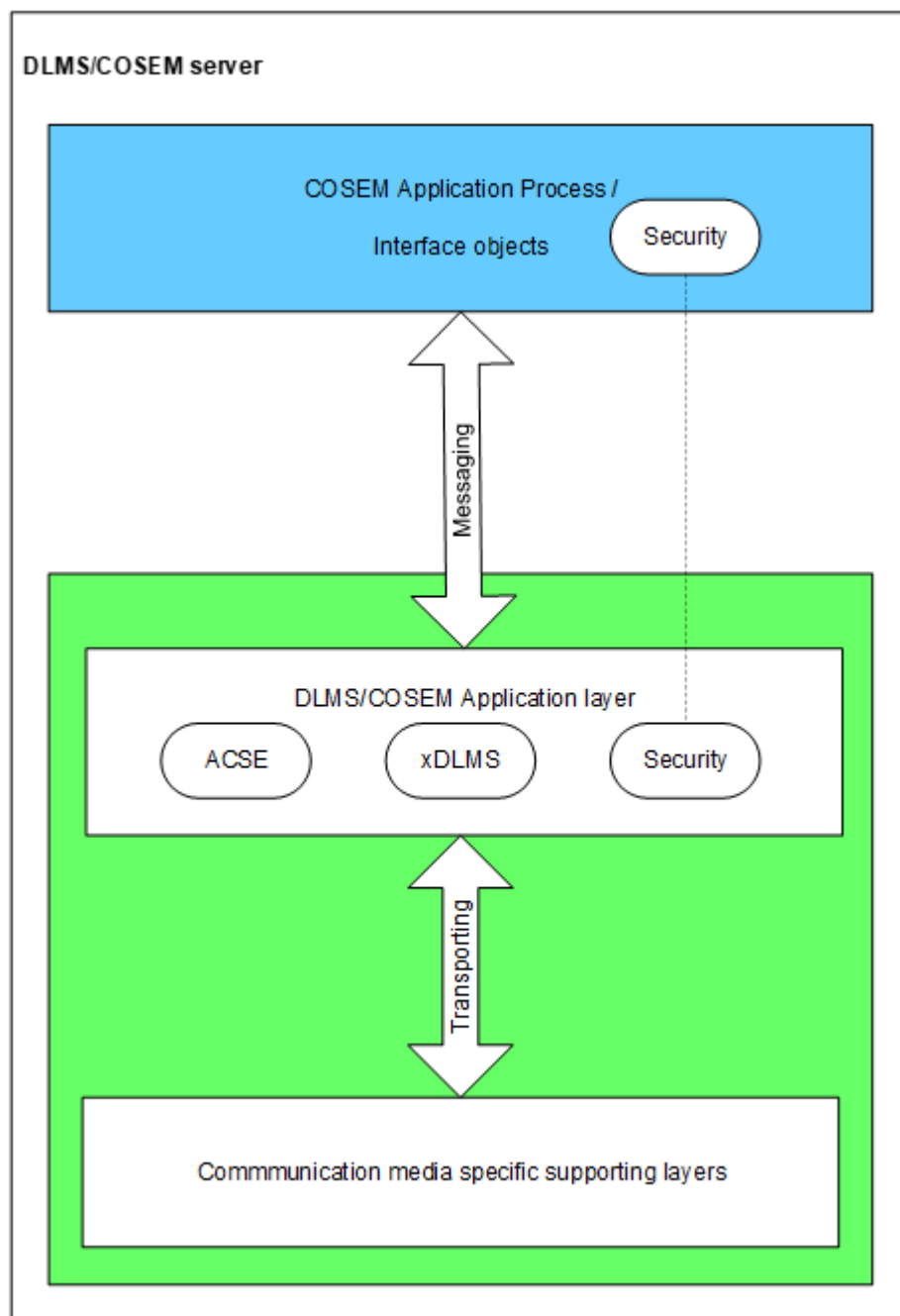
Figure 1 – Generic DLMS/COSEM server model

5.2   COSEM application process requirements

The COSEM objects implemented that realize the required application functionality shall meet the following main requirements:

the logical name of each object (AKA OBIS code) shall be correct;

the attributes and methods of each COSEM object shall be accessible as stipulated by the access rights – that comprise the required cryptographic protection – retrieved from the IUT, and by the security policy;

the data type used for each attribute shall be as specified in the relevant interface class (IC) specification and in the Blue Book clause "Relation to OBIS";

the value of each attribute shall be within the range specified in the relevant IC specification;

accessing the methods with correct method invocation parameters shall return the result SUCCESS and correct return data;

it shall be possible to establish and manage cryptographic keys using the methods of the "Security setup" object.

5.3 DLMS/COSEM application layer requirements

The DLMS/COSEM application layer shall meet the following main requirements:

it shall support establishing and releasing Application Associations (AAs) using the mechanisms and contexts declared in the CTI file;

NOTE 1   This requirement does not apply to pre-established AAs.

it shall support the xDLMS services indicated by the negotiated conformance block to access attributes and methods of the COSEM objects;

NOTE 2   In the case of pre-established AAs, the parties have to know the relevant application context, xDLMS context and security context.

when supported, it shall be able to compress and decompress ADPUs;

it shall be able to apply, verify, and remove cryptographic protection of the APDUs;

it shall be able to transport long messages using the service specific or general block transfer (GBT) mechanisms as indicated by the negotiated conformance block;

5.4 Lower layers requirements

The communication media specific lower layers shall correctly transport the APDUs.

6 OSI and DLMS/COSEM conformance testing

6.1 OSI conformance testing

The concept and methodology of OSI conformance testing is described in the Recommendation ITU-T X.290.

The objective of conformance testing is to establish whether the Implementation Under Test (IUT) conforms to the relevant specification(s).

Practical limitations make it impossible to be exhaustive and economic considerations may restrict testing still further.

The primary purpose of conformance testing is to increase the probability that different implementations are able to interwork. While conformance is a necessary condition, it is not on its own a sufficient condition to guarantee interworking capability. Even if two implementations conform to the same protocol specification, they may fail to interwork fully.

What conformance testing does is it gives confidence that an implementation has the required capabilities and that its behaviour conforms consistently in representative instances of communication.

6.2 DLMS/COSEM conformance testing

6.2.1 General

DLMS/COSEM conformance testing – illustrated in Figure 2 – follows the principles of OSI conformance testing.
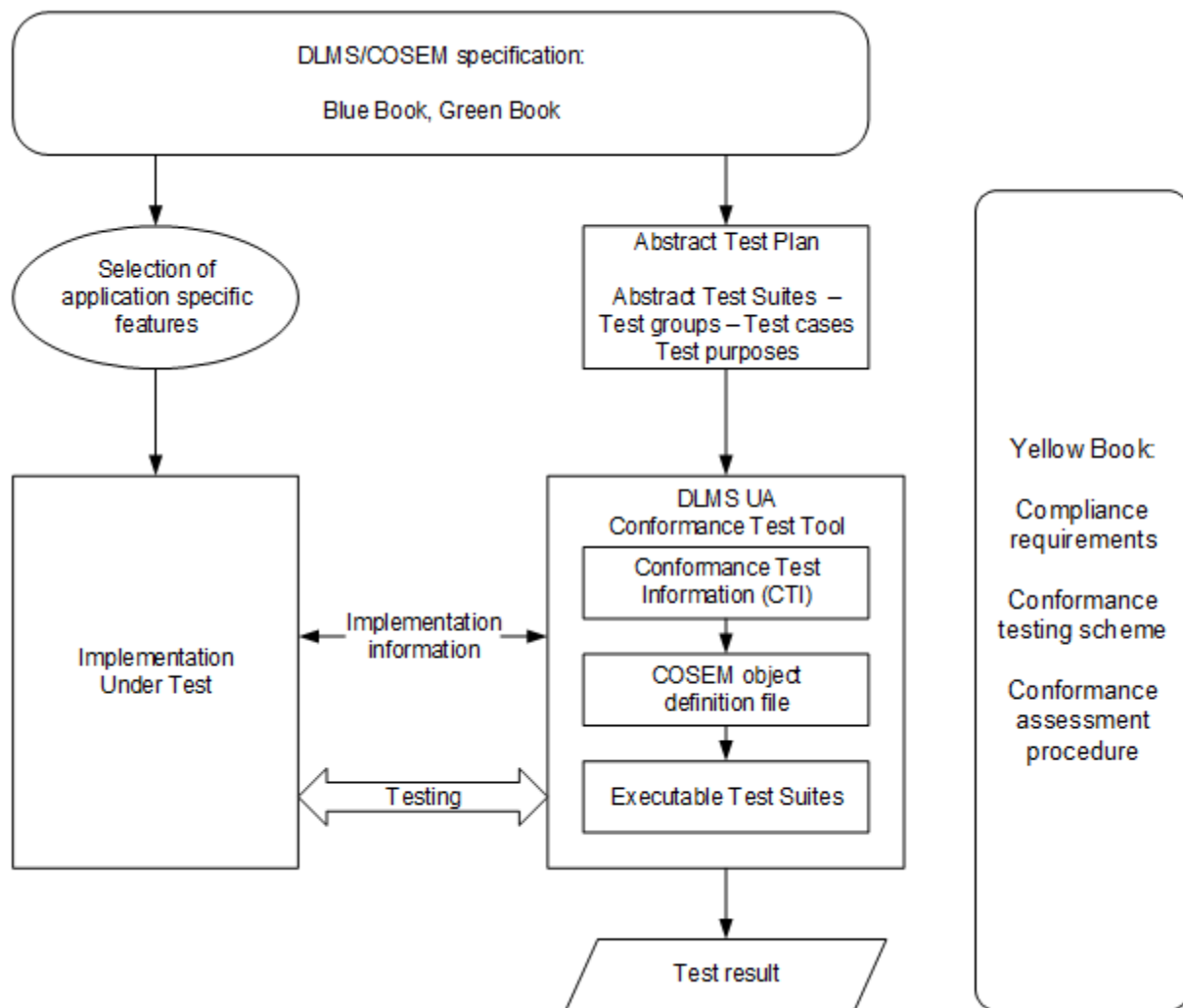
Figure 2 – DLMS/COSEM conformance testing

Its objective is to establish that the Implementation Under Test (IUT) correctly implements the features selected by the implementer from the DLMS/COSEM specification, and if not, to show which parts of the specification are not correctly implemented.

It is not the objective to ascertain that features required for a given application – generally specified in project specific Companion Specifications – are present in the IUT.

Conformance testing is limited to the server's functionality as presented at the communication interface(s). Other functions of the server are out of the scope.

Successful conformance testing gives confidence that it is possible to establish communication with the product, data can be exchanged in a secure way and the behaviour is consistent in representative instances of communication.

The base specification is the DLMS/COSEM described in the Blue Book and the Green Book.

The implementer selects a set of features required for the application targeted and implements them in the product.

The Abstract Test Plan specifies Abstract Test Suites (ATSs) derived from the requirements specified in the Green Book and the Blue Book. It covers all features specified in the Blue Book and the Green

Book. Each ATS focuses on a specific part of the specification and has a well-defined test purpose. Each ATS comprises a number of Abstract Test Cases (ATCs).

Each ATC has a test purpose, describes the test strategy, specifies the prerequisites and the expected result, and comprises one or more subtests specifying the test events and conditions to issue a verdict. ATCs may be organized to abstract test groups.

The Abstract Test Suites are implemented in the Conformance Test Tool/Development Test Tool in the form of Executable Test Suites comprising Executable Test Groups and Test Cases. Each Executable Test Case corresponds to the respective Abstract Test Case.

The IUT is one specimen of the product to be certified.

Before running a test session, the Executable Test Suites have to be parameterized to select and perform the applicable test cases with the correct parameters for the IUT. This parameterization takes place partly through declarations in the Conformance Test Information (CTI) file, and partly during the test through retrieving information from the IUT.

At the end of the test session the Test Tools generates the test result file that can be submitted to the DLMS UA for examination.

If the test result is correct, and all other conditions specified in the DLMS UA Qualification Program are met, the DLMS UA issues the Certificate of Compliance.

6.2.2 The DLMS/COSEM abstract test plan

6.2.2.1 Overview of the DLMS/COSEM Abstract Test Suites

The abstract test plan comprises several Abstract Test Suites as illustrated in Figure 3.
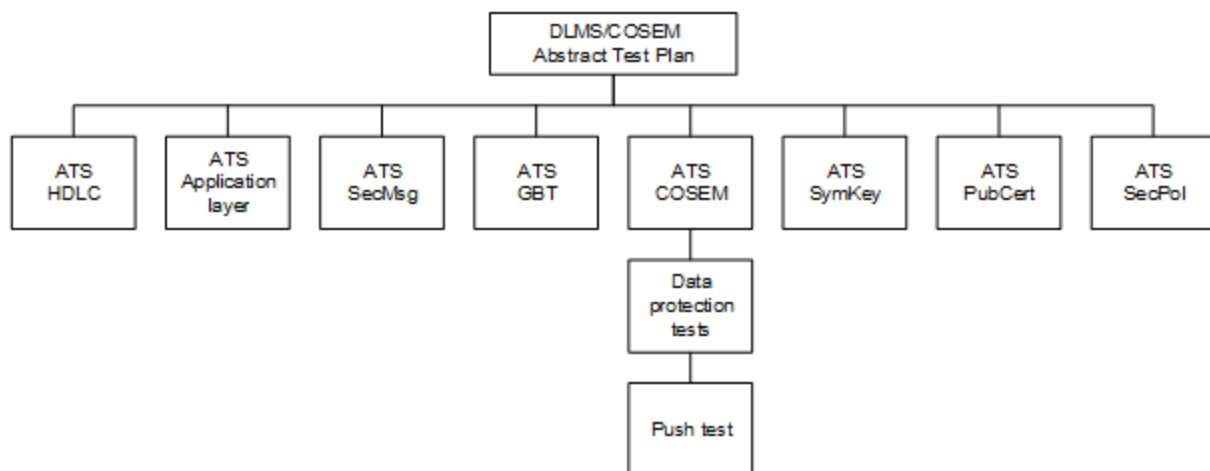
Figure 3 – DLMS/COSEM Abstract Test Suites

In the following subclauses the purpose of each ATS is presented. For details, please refer to the Abstract Test Plan document DLMS UA 1001-9: V4.0.

6.2.2.2 The ATS HDLC based data link layer

Its purpose is to verify that the HDLC based data link layer is correctly implemented in IUTs supporting the 3-layer, connection-oriented HDLC based communication profile. It is tested that it is possible to connect and disconnect the data link layer level and exchange supervisory and information frames in line with the operating mode.

6.2.2.3 The ATS DLMS/COSEM application layer

Its purpose is to verify that the mechanisms and services of the DLMS/COSEM application layer are correctly implemented meaning that IUT is capable of establishing and releasing application associations (AAs) using the required mechanisms and contexts and when an AA is established, it is possible exchanging APDUs carrying xDLMS services.

6.2.2.4 The ATS Secure message exchange

Its purpose is to verify that COSEM object attributes can be accessed with APDUs correctly protected and cannot be accessed if the protection is not correct.

6.2.2.5 The ATS General Block Transfer (GBT)

Its purpose is to verify that the IUT correctly handles the transfer of long application layer level messages using the General Block Transfer mechanism specified in the Green Book.

6.2.2.6 The ATS COSEM interface objects

Its purpose is to verify that the COSEM interface objects specified in the Blue Book are correctly implemented.

For all interface objects the validity of the logical device name, the type of the attributes and – when applicable – the range of the values are tested.

For some interface classes, like "Profile generic", "Data protection" and "Push setup" specific test cases are specified.

6.2.2.7 The ATS Symmetric keys

Its purpose is to verify that the IUT can correctly handle:

the transfer of dedicated keys;

the transfer of the global keys GUEK, GAK and KEK;

agreement on the global keys GUEK, GAK and KEK.

6.2.2.8 The ATS Public key Certificates

Its purpose is to verify that the IUT can correctly handle public key Certificates.

6.2.2.9 The ATS Security Policy

Its purpose is to verify that security policies can be activated, data exchange takes place in line with the security policy in force and that security policy cannot be weakened using the "Security setup".**security_policy** method.

6.3 The Conformance Test Tool

6.3.1 General

The Test Tool is a Means Of Testing (MOT) as defined in 3.2.4, i.e., an implementation of the Abstract Test Suites (ATS) in the form of Executable Test Suites (ETSs). It is software or a combination of hardware and software that acts as a DLMS/COSEM test client whereas the Implementation Under Test (IUT) acts as a DLMS/COSEM server.

The Test Tool can also act as Third Party, that exchanges ciphered APDUs with the IUT via the client.

The Test Tool can perform the following:

connection to the IUT;

the selection of the communication parameters;

the parametrization of the test cases taking information from an IUT specific Conformance Test Information (CTI) file, the COSEM Object definition file, and from the IUT itself;

the selection of test options;

the selection of test cases to be performed;

running test sessions, i.e., automatically executing the test cases selected;

showing the progress of the test;

the generation and saving of the Test Result.

For the purposes of cryptographic security tests, the Test Tool also acts as the Root Certification Authority issuing public key Certificates.

In the case of the DTT (Development Test Tool), the log file shows all messages, human-readable, XML like format, enabling development engineers using it, to debug the IUT in case of test errors.

For more information about DLMS UA Test Tools, please visit the DLMS UA Test Tools portal here: https://ctt.dlms.com/home.

6.4 Test method

A single IUT acting as a DLMS/COSEM server is tested against a single test source, which is the Test Tool acting as a DLMS/COSEM client.

A test session consists of running the Executable Test Suites: the messages specified in the test cases are sent by the Test Tool to the IUT and the response of the IUT is observed and analysed. Based on the result, the verdict is issued.

As access to protocol layer boundaries is not available, the interface object model and the protocol stack are tested in combination. Therefore, the following assumptions are made:

in the case of IUTs implementing the 3-layer, connection-oriented HDLC based profile, for testing the data link layer it is assumed that the physical layer works correctly;

for testing the DLMS/COSEM Application layer it is assumed that all supporting layers work correctly;

for testing the COSEM Interface object model, it is assumed that the protocol stack works correctly.

6.5 Parameterization of the Executable Test Suites

6.5.1 General

Before and during a test session, the ETSs have to be parameterized. This takes place by:

the Conformance Test Information (CTI) file;

the information retrieved from the IUT;

the COSEM object definition file.

6.5.2 The Conformance Test Information file

The Conformance Test Information (CTI) file is prepared by / under the responsibility of the Applicant. It contains information on the test environment, the parties involved and on the IUT. This information is used by the Test Tool for selecting and performing the test cases. The CTI is reproduced in the test result file.

Test cases or subtests that have been selected but could be run under the prevailing conditions are reported as INAPPLICABLE.

For each type, firmware, and configuration a specific CTI file has to be prepared.

The CTI file is a plain text file that can be written using any text editor. However, the best tool for editing the CTI file is the Test Tool itself, which offers an integrated editor. The Test Tool CTI pane highlights the syntactic elements and checks syntactic errors. This pane also allows saving and loading CTI files.

The Test Tool delivery package includes a file CTI-specifications.pdf that provides guidance on the preparation of the CTI file.

The CTI file syntax is described in the Test Tool Help menu.

6.5.3 Information taken from the IUT

Information on the IUT is also taken by the Test Tool during the test session:

for explicitly established AAs, the Test Tool negotiates with the IUT the authentication mechanism, the application context, and the xDLMS context using the relevant CTI declarations;

for each AA, the Test Tool reads the object_list from the IUT together with access_rights to attributes and methods.

For details, please refer to the procedures "Establish a confirmed AA with the parameters declared" and "Initialize AA" in the Abstract Test Plan.

6.5.4 The COSEM object definitions file

The COSEM object definition file DLMS UA 1001-7 is a spreadsheet that contains all information used by the Test Tool for testing the COSEM objects. It has a worksheet for Abstract, Electricity, HCA, Thermal energy, Gas and Water metering related objects. It includes:

all valid OBIS codes with the corresponding textual name and the interface class_id(s) that can be used, together with a cross reference to the relevant clauses of the Blue Book;

all country, consortia, and manufacturer OBIS code ranges;

for interface objects where the Blue Book specifies a choice of data types, the data types allowed.

The COSEM object definition file is updated by DLMS UA whenever new COSEM objects (OBIS codes and/or interface classes) are defined. The various versions are publicly available by visiting the Request Specifications Download section of our DLMS UA Qualification portal here: https://qualification.dlms.com/home

The Test Tool uses a ".dat" file generated from the spreadsheet file. It is delivered with the Test Tool.

As the Object definitions file may be updated between two Test Tool releases, it is recommended to check for the latest version before testing, by visiting the Test Tool portal:

https://ctt.dlms.com/which_version_should_i_use

which is accessible only through Member login into the DLMS UA Qualification portal. The Test Report contains the file name and the hash value of the Object definitions spreadsheet file.

6.6 Test outcomes and test verdicts

The test outcome is the series of events that occurred during execution of a test case; it includes all input to and all output from the IUT.

A foreseen test outcome is one that has been identified by the abstract test case, i.e., the events that occurred during execution of the test case matched a sequence of test events defined in the abstract test case. A foreseen test outcome may include unidentified test events and always results in the assignment of a test verdict to the test case.

The test verdict may be PASSED or FAILED:

PASSED – Means that the observed test outcome gives evidence of conformance to the conformance requirement(s) on which the test purpose of the test case is focused, and is valid with respect to the relevant specification(s);

FAILED – Means that the observed test outcome either demonstrates non-conformance with respect to (at least one of) the conformance requirement(s) on which the test purpose of the test case is focused, or contains at least one invalid test event, with respect to the relevant specification(s);

An unforeseen test outcome is one that has not been identified by the abstract test case, i.e., the events that occurred during execution of the test case did not match any sequence of test events defined in the abstract test case. An unforeseen test outcome always results in the recording of a test case error or an abnormal test case termination for the test case.

A test case error is recorded if an error is detected either in the abstract test case itself (i.e., an abstract test case error) or in its realization (i.e., an executable test case error).

An abnormal test case termination is recorded if the execution of the test case is prematurely terminated by the test system for reasons other than test case error.

The results of executing the relevant individual test cases are recorded in the conformance Test Result.

6.7 Conformance testing quality assurance

6.7.1 General

An important element of the DLMS/COSEM conformance testing procedure is the quality program. It includes:

validation of the conformance test plans and the Test Tool;

the support provided to users;

maintenance.

6.7.2 Validation of the Abstract Test Plan and Test Tool

The validation of the Abstract Test Plan and its implementation, the Test Tool, is done in two steps:

1) the Abstract Test Plan is developed based on the Blue Book and the Green Book. It is peer reviewed by members of the DLMS UA Working Group Qualification and approved by the DLMS UA Qualification Board to ascertain that the test purposes, the test strategies, the expected results, the messages to be sent by the Test Tool and expected from the IUT as well as the conditions to issue the verdicts are in line with the requirements of the Blue Book and Green Book;

2) the Test Tool is validated by running test sessions on several implementations and evaluating the test events and test outcomes. This is done by reviewing the report and the log against the Abstract Test Plan to ascertain that the test events are as specified in Abstract Test Cases and the verdicts are correctly issued. If any discrepancies are found the reasons are analysed and the necessary corrections are made.

6.8 Support provided to users

Support to use the Test Tool is provided as described in 7.9. DLMS UA pays particular attention to supporting its Members and escalates to the highest level any problem a Member may report that could contribute to improving and facilitating other Members' experience. To be more efficient in providing this support service, DLMS UA has introduced a new support portal that is accessible through either the "Support" widget on our website or by calling DLMS on the following number +41 41 539 11 86. Both support channels offer Members access to specific support services depending on the type of problem encountered. In addition, the online support via our "Support" widget gives Members access to a knowledge database that will grow over time as a consequence of Member feedback. In the initial stages the minimum required support will be delivered to members in an autonomous way.

6.9 Test Tool maintenance

The maintenance of the Abstract Test Plan and the Test Tool takes place whenever a test problem is identified that can be attributed to the Abstract Test Plan or its implementation. This activity may be initiated by the DLMS UA itself or by any Test Tool users. See also 7.9.

When new elements are added to the DLMS/COSEM specification affecting the Abstract Test Plan or the Test Tool the relevant parts are revised and validated before issuing a new release.

6.10 General

The conformance assessment procedure includes all activities required to enable the compliance of the IUT to be fully assessed. An overview is given in Figure 4. The steps of the conformance assessment procedure are described in subclauses 7.3 to 7.9.

The test laboratory shall be independent of the Applicant or if this is not the case, it shall be an identifiable part of the organization performing the test.
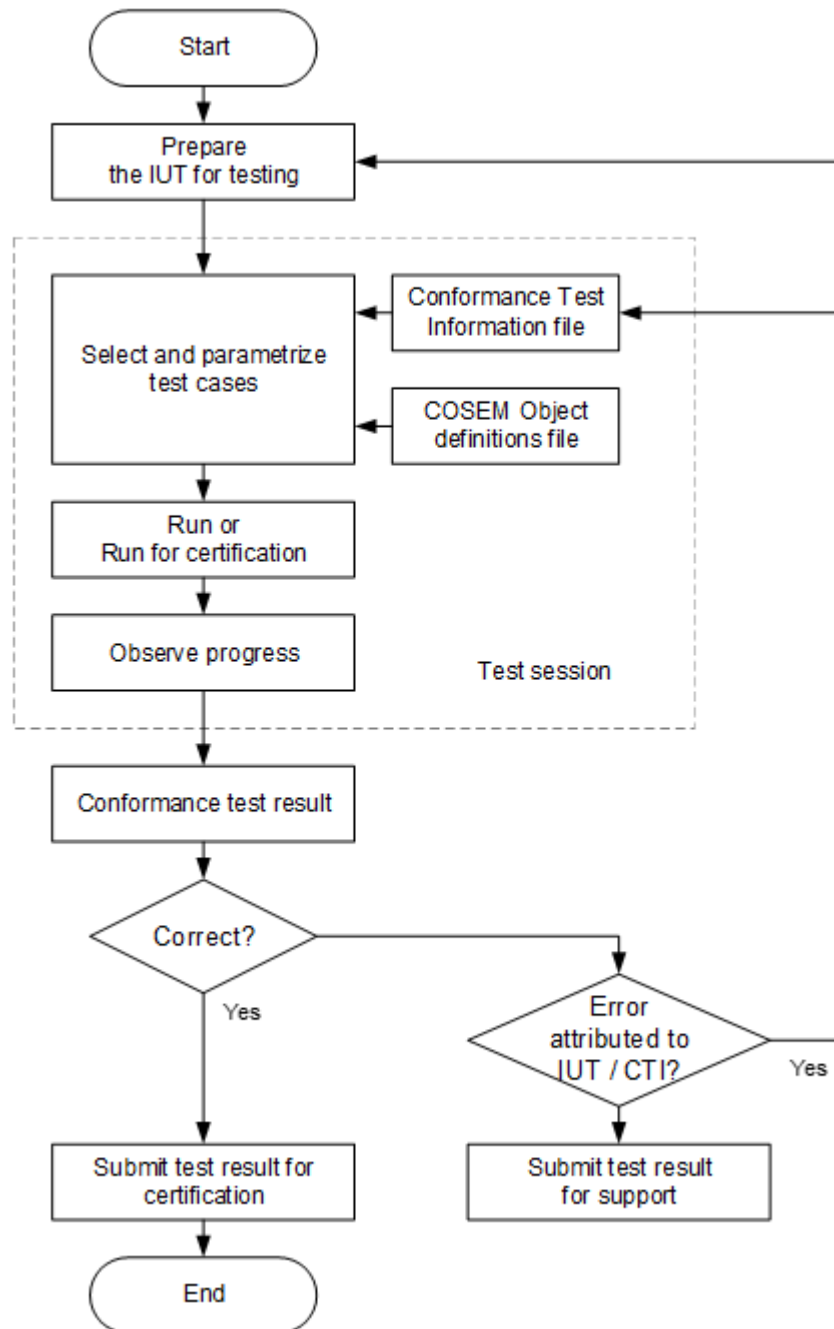
Figure 4 – Conformance Assessment procedure

6.11 Self-testing and third party testing, test laboratories

The conformance assessment procedure may be performed by the Applicant; this is known as self-testing. Alternatively, it may be performed by another DLMS UA member; this is known as third party testing.

For more information, please refer to https://qualification.dlms.com/home. .

6.12 Preparation of the IUT for testing

6.12.1 General

Before performing the test, the IUT shall be prepared for testing.

To facilitate system integration, it is advisable that the test(s) are performed on an IUT with features representative for the intended application(s) so that all such features needed for the application are tested, thus reported as compliant in the test report. Conformance can be claimed only to the features listed in the Certificate.

The following subclauses provide a guideline.

6.12.2 Logical devices

It is possible declaring several Logical Devices (LDs). If the IUT supports several LDs then at least two LDs should be declared in the CTI and their testing shall be enabled.

The IUT may be a complete device – fully integrated or modular – or just a communication module:

If the IUT is a complete device then the mandatory Management LD (Server SAP = 0x01) shall be present;

If the IUT is a communication module – this can be declared in the CTI – then the Management LD (Server SAP = 0x01) does not have to be present: it is assumed that it is present in the base device.

6.12.3 Application Associations

Each LD may support one or more Application Associations (AAs) with their respective authentication mechanisms, application contexts, xDLMS contexts or security contexts.

If the IUT supports several authentication mechanisms, application contexts, xDLMS contexts or security contexts, then the set of AAs declared in the CTI and their testing enabled shall cover each mechanism and context implemented. These AAs may belong to the same logical device or spread across several logical devices.

An AA between the same client and server – as identified by their SAPs – may be declared several times with different authentication mechanisms, application contexts, xDLMS contexts and security contexts as needed.

The management LD shall support an AA with the public client (Client SAP = 0x10, Server SAP = 0x01, no ciphering, no authentication security).

The LD of a communication module shall support an AA with the public client.

6.12.4 xDLMS context

The set of xDLMS services and capabilities supported – i.e., the conformance block – should be representative for the intended application.

6.12.5 Security features

The set of security features – the security suite, the security services, access rights and security policies – should be representative for the intended application.

6.12.6 COSEM object model

The set of COSEM interface objects implemented should be representative for the intended application.

The AAs shall provide access to the objects and attributes as stipulated by the prevailing access rights and security policies.

Access rights to attributes shall be restricted so that the Test Tool cannot unduly modify them. This can be achieved by providing interface class and/or instance related extra information in the CTI.

If load profiles with selective access are to be tested, then a sufficient amount of data shall be present. The conditions are specified in the COSEM interface objects ATS.

If push operation is supported, then it shall be possible to configure the push operation and there shall be a sufficient amount of data to test selective access.

6.13 Connection of the IUT to the Test Tool

The connection of the IUT to the Test Tool depends on the communication profile to be tested:

a) when the 3-layer, CO, HDLC based communication profile is used, the IUT can be connected to a communication port of the host computer running the Test Tool through an RS232 or RS485 interface, or via an optical probe.

Battery operated meters can also be tested using the wake-up sequence specified in IEC 62056-21.

To connect the IUT via a pair of modems, the connection Test Tool Host – MODEM – MODEM – IUT has to be established before testing, i.e., the dialling of (and the connection to) the remote modem has to be done before testing;

b) when the TCP/IP or UDP/IP based communication profile is used over the GPRS network, then the connection Test Tool host – GPRS terminal – GPRS terminal – IUT has to be established before testing.

c) Testing of IUTs implementing other communication profiles is possible by using a suitable communication media specific communication unit – AKA "Golden Unit" – supporting one of the communication profiles listed above.

6.14 Test sessions

The test sessions shall always be performed with the latest version of the Test Tool and that of the COSEM Object definitions file. Older versions may be used for re-testing an earlier implementation.

Before starting a test session, the appropriate CTI file has to be loaded, the appropriate COSEM Object definition file has to be selected and the appropriate communication parameters shall be set.

A test session can be started from the Run menu in two ways:

"Run": the test session runs the test cases selected on the Logical Devices and AAs enabled for testing, with the media and "Do not test" options selected. Test cases not selected are marked in the Test Report and Log as "SKIPPED";

 "Run for Certification": when the purpose of the testing is to obtain a Certificate, all test cases shall be selected, and there shall be no "Do not test" options specified.

If the IUT supports more than one communication profile then a test session shall be performed for each communication profile for which compliance is claimed.

An IUT may support several AAs with various combinations of the authentication mechanism, the application context, the xDLMS context, and the security context in each AA so that all these combinations may be tested in a single test session. However, such combinations may also be tested in different test sessions, using appropriate CTI files.

6.15 Observing the progress of the test

6.15.1 General

During a test session the Test Tool runs each test suite in the following order:

- in the case of the 3-layer, connection-oriented, HDLC based communication profile the HDLC test suite – see 6.2.2.2 – is run;

- in the case of TCP – UDP / IPv4 – IPv6 profiles the TCP, UDP and IP layers are implicitly tested;

- the Application layer (APPL) test suite – see 6.2.2.3 – is run;

- compression is implicitly tested;

- the Secure message exchange (SecMsg) test suite – see 6.2.2.4 – is run;

- the General Block Transfer (GBT) test suite – see 6.2.2.5 – is run;

- the COSEM interface objects (COSEM) test suite – see 6.2.2.6 – is run;

- the symmetric keys (SymKey) test suite – see 6.2.2.7 – is run;

- the Public key Certificates (PubCert) test suite – see 6.2.2.8 – is run;

- the Security policy (SecPol) test suite – see 6.2.2.9 – is run.

Each test case within an ATS is run for each logical device and within a logical device for one or more AAs as determined by the AA filters defined in the test cases, before moving to the next test case.

The progress of the test can be followed via:

- the line traffic shown in the line traffic window will display the data exchanged between the Test Tool and the IUT;
- the log shown in the Log pane will display the test performed;
- the report shown in the Report pane will display the result of each test while the test is progressing.

6.15.2   The line traffic

The line traffic can be viewed in the Test Tool line traffic window. It shows all messages sent by the Test Tool and received from the IUT with their timestamp:

in the case of the 3-layer, CO, HDLC-based profile the HDLC frames and the APDUs carried by I frames or UI frames;

in the case of the TCP – UDP / IPv4 – IPv6 profile the TCP streams / UDP packets and the APDUs carried by them.

At the end of the test session, the user selects "File/Save Test-Result..." and a test-result (zip) file is created that contains several files. The log

The log can be viewed in the Test Tool LOG pane. It shows all actions performed with their timestamp, including the identifier of the LD and the AA, the name of the test case and the subtest performed, the messages sent by the Test Tool and received from the IUT, as well as the verdict for each subtest.

6.15.3   The report

The report can be viewed in the Test Tool REPORT pane. It contains the following information:

the conditions of the test session;

the identification of the applicant, the manufacturer, and that of the IUT;

a summary report that is reproduced in the Certificate, see below;

the result of each test case in the various Test Suites with the verdict;

the object_list in each AA;

the content of the CTI file;

the name and the hash value of the COSEM Object definitions file used for testing.

The summary report is generated when the test session is successfully completed. It provides the following information derived from the result of running the test suites in all LDs and AAs:

the PASSED, FAILED and total number of tests in each test suite;

the communication profile;

the logical device(s) found with its (their) SAP;

the active firmware ID(s);

the features supported across all logical devices and AAs:

- the authentication mechanisms;

- the Application Context Names;
- the ACSE and xDLMS ASE features;
- the message security and COSEM data security features;
- the COSEM interface classes and their versions.

6.16 The test result

A test-result file is created with the command "File/Save Test-Result...". A test-result is usually created after a test-session. It is a zip file which contains the report, the log, the traffic, the CTI, and possibly other files needed by the DLMS UA to check the validity of the content of the file.

The test result .zip file shall be submitted during the Qualification process by accessing the DLMS UA Qualification Portal: https://qualification.dlms.com/home

It is recommended to give to the test result .zip file a name that is informative regarding the applicant, the IUT type, the tests performed and the date and time of testing.

Example: MyMeterV99_LN_Sec1_TCP_YYMMDD.

All test result files submitted are handled confidentially by the DLMS UA, however the Certified Product owner has the possibility to permit access, under strict access control and for a limited 5 days time window, to Third Parties who may require access to them from the Certified Product portal.

6.17 Repeatability of results

In order to achieve the objective of credible conformance testing, it is clear that the result of executing a test case on an IUT should be the same whenever it is performed. Experience shows that it may not be possible to execute a complete conformance test suite and observed test outcomes that are identical to those obtained on another occasion.

Nevertheless, at the test case level, every effort has been made to minimize the possibility that a test case produces different test outcomes on different occasions.

6.18 Errors during a test session and technical support

Errors during a test session may occur. There are three cases:

1) a subtest in a test case results in a FAILED verdict. In this case, the remaining subtests of the test case are not run, but the test session continues;

2) a failure occurs that is deemed by the Test Tool as fatal. In this case, the tester can decide if he / she wants to continue the test session or not;

3) an exception occurs. In this case the Test Tool provides some diagnostics and may generate a specific file that can be submitted to the DLMS UA with a request for technical support.

In the case of 3), the summary report is not generated.

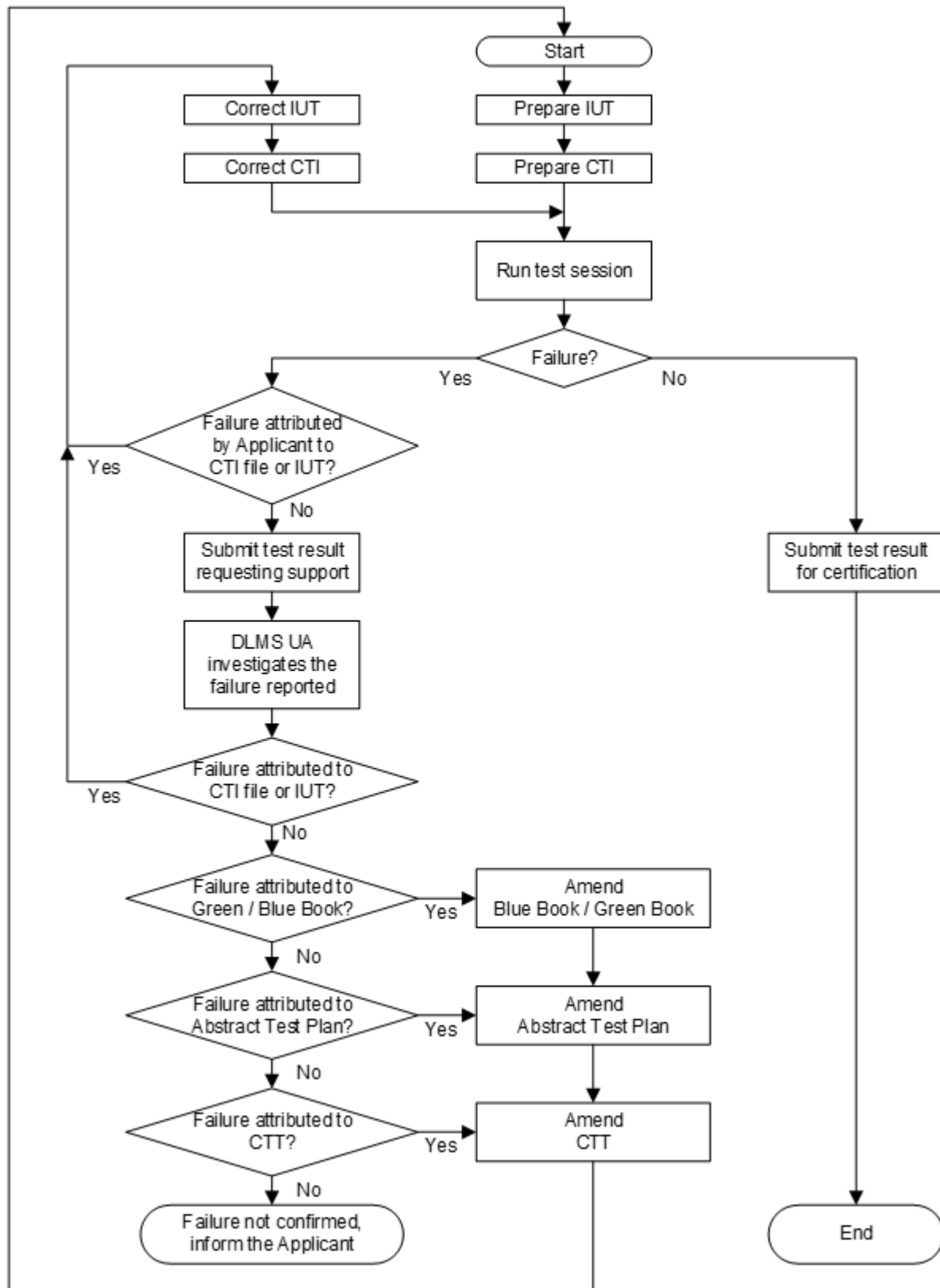The process to follow to pinpoint and fix the problem is illustrated in Figure 5.

Figure 5 – Test problem fixing process

For the submission and follow up of support requests please go to: https://qualification.dlms.com/home and while you are logged into the DLMS UA Qualification Portal click on the support widgets to issue a support ticket that will be processed within the shortest delays.

7 The Certificate

7.1 The content of the Qualification "Certificate of Compliance"

A sample Certificate is shown in Annex A.

Most information elements that appear in the Certificate are taken either from the application for certification or from the test result file(s) submitted as appropriate.

The values of the various fields of the Certificate are described below:

Certificate No: a number allocated by the DLMS UA;

Issue date: the date when the certificate is issued by the DLMS UA;

Applicant: the references of the owner of the product being qualified;

Issued to: the references of the recipient at which name the Qualification Certificate for Compliance is issued;

Model: The Qualified Product Model as entered by the applicant in the CTI file (applicable as of CTT4.1 / DTT4.1);

Type: The Qualified Product Type as entered by the applicant in the CTI file;

Firmware ID: Holds the firmware ID of the product taken from the test report;

Mgmt LDN (SAP = 1): Holds the SAP of the Management Logical device. It uniquely identifies the test specimen on which conformance testing was performed;

Manufacturer: the name of the manufacturer as entered by the applicant in the CTI file;

Media identifiers: holds the name of value group A of the OBIS codes of the objects implemented: one or more of Abstract (0), Electricity (1), HCA (4), Thermal (5 – 6), Gas (7), Water (8-9);

Device ID class: This term is currently not defined and does not appear in the test result file submitted. It is proposed to remove this field until device ID classes and their use will have been defined as documented by the DLMS UA;

COSEM IF Classes and OBIS Codes: Holds the version of the Blue Book that is supported by the CTT/DTT version;

DLMS/COSEM Protocol: Holds the version of the Green Book that is supported by the Test Tool version;

Test specification: Holds the version of the Yellow Book that is supported by the CTT/DTT version;

Test Tool version: Holds the version of the test tool that was used for testing as found in the test result file;

Test Tool Licensee: Holds the name of the Test Tool licensee as found in the test result file;

COSEM object definition file: Holds the name of the COSEM object definition file as found in the test result file;

Communication profiles: Holds the name of the communication profiles, taken from the CTI files of the test results files submitted;

Test Report No: Hold the number of the application for certification

7.2 Scope and validity of the Qualification Certificate of Compliance

Compliance to DLMS/COSEM can be claimed only for the features tested.

The Certificates issued for a given type – that comprises the firmware version – are valid for the life of the Certified Product.

It is the responsibility of the Applicant to initiate a new certification process when the hardware and/or the firmware of the device type determining the DLMS/COSEM features supported are changed. This applies also in the case when the firmware is updated in the field via the COSEM Image transfer mechanism.

The Certificate serves as documentary evidence of what has been tested under what conditions. For this reason, a Certificate – once issued – cannot be withdrawn, changed, or replaced.

8   Managing changes

8.1   General

Clause 9 specifies the procedures – presented via use cases – to be followed when the product or the stakeholders involved changes.

8.2   Use case 1: Re-testing the same product with a different Test Tool

If a product exactly of the same type, firmware identifiers and DLMS/COSEM features is re-tested with a new version of the Test Tool or with a different object definitions file, the entire qualification procedure shall be repeated.

However, often the reason to re-test is that the product supports additional or different DLMS/COSEM features. This leads to Use case 2.

8.3   Use case 2: Change of the product

If the product is changed so that its DLMS/COSEM features are affected, the entire qualification procedure shall be repeated. The type and the firmware identifiers should reflect the changes.

8.4   Use case 3: Change of the product type or firmware identifiers

The product type and the firmware IDs uniquely identify the product certified.

If either the product type or the firmware IDs change, the entire qualification procedure shall be repeated.

8.5   Use case 7: Change of the Manufacturer

The information on the Manufacturer is part of the CTI file, thus it is part of the Test Result file.

Therefore, if the Manufacturer changes, the entire qualification procedure shall be repeated.

8.6   Disclaimer

The DLMS UA takes all possible effort to ensure that the conformance test plans and the Test Tool are aligned with the relevant DLMS/COSEM Specification versions and provide its best efforts to permit achieving a reasonable depth of testing, however this "Compliance requirements and conformance assessment" document does not guarantee that an absolute proof of conformance can be reached.

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Annex A
Sample Certificate of Compliance

◢DLMS®

CERTIFICATE OF COMPLIANCE

Certificate N°:	[Certificatenumber]	**Issue date:**	[DateQualIssue_IntFormat}
Applicant:	[QualAppCompanyname]	**Issued to:**	[QualRecCompanyname]
	[QualAppDepartment]		[QualRecDepartment]
	[QualAppAddress1]		[QualRecAddress1]
	[QualAppAddress2]		[QualRecAddress2]
	[QualAppPostcode]-		[QualRecPostcode]-[QualRecCity]
	[QualAppCity]		[QualRecCountry]
	[QualAppCountry]		

The certified product listed below is eligible to bear the DLMS UA Mark shown

DL MS®

PRODUCT

Model:	[ProdModel]
Type:	[ProdType]
Firmware ID:	[CTTTest_FirmwareId]
Mgmt LDN (SAP = 1):	[CTTTest_MgmtLDN]
Manufacturer:	[CTTTest_Manufacturer]
Media Identifiers:	[CTTTest_MediaIdentifier]
Device ID Class:	[CTTTest_DeviceIDClass]

CONFORMANCE SPECIFICATION

COSEM IF Classes and OBIS Codes:	Blue Book Ed.
DLMS/COSEM Protocol:	Green Book Ed.

TEST TOOL & SPEC.

Test Specification:	Yellow Book Ed.
Test Tool Version:	[CTTToolVersion]
Test Tool Licensee:	[CTTLicensee]
COSEM Object definition file:	[CTTTest_COSEMObjectDefFile]
Communication profiles:	[CTTTest_ComProfile]
Test Report N°:	[CTTTest_ReportNo]

This Certificate of Compliance is based on an evaluation of a test report based on a single test executed on one specimen of the product, as identified by the Product data above. This Certificate is issued on the condition that the holder complies and will continue to comply with the requirement and procedures issued by DLMS UA..
The authenticity of the test report has been verified by the DLMS User Association and the equipment identified above is listed on its web site at: www.dlms.com.