

TECHNICAL SPECIFICATION



Telecontrol equipment and systems –
Part 5-604: Conformance test cases for the IEC 60870-5-104 companion standard

<https://standards.iteh.ai>
Document Preview

[IEC TS 60870-5-604:2016](https://standards.iteh.ai/catalog/standards/iec/7ae218f6-eae6-4988-9768-6a516285bbde/iec-ts-60870-5-604-2016)

<https://standards.iteh.ai/catalog/standards/iec/7ae218f6-eae6-4988-9768-6a516285bbde/iec-ts-60870-5-604-2016>



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2016 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

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

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

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

IEC Catalogue - webstore.iec.ch/catalogue

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

IEC publications search - www.iec.ch/searchpub

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 It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

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

Electropedia - www.electropedia.org

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

IEC Glossary - std.iec.ch/glossary

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

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: csc@iec.ch.

<https://standards.iteh.ai/catalog/standards/iec/7ae218f6-eae6-4988-9768-6a516285bbde/iec-ts-60870-5-604-2016>

<https://standards.iteh.ai/catalog/standards/iec/7ae218f6-eae6-4988-9768-6a516285bbde/iec-ts-60870-5-604-2016>



TECHNICAL SPECIFICATION



Telecontrol equipment and systems –
Part 5-604: Conformance test cases for the IEC 60870-5-104 companion standard

(<https://standards.iteh.ai>)
Document Preview

[IEC TS 60870-5-604:2016](https://standards.iteh.ai/catalog/standards/iec/7ae218f6-eae6-4988-9768-6a516285bbde/iec-ts-60870-5-604-2016)

<https://standards.iteh.ai/catalog/standards/iec/7ae218f6-eae6-4988-9768-6a516285bbde/iec-ts-60870-5-604-2016>

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 33.200

ISBN 978-2-8322-3457-0

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

CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references.....	7
3 Terms and definitions	8
4 Abbreviated terms	8
5 Conformance testing for IEC 60870-5-104.....	8
5.1 Overview and legend.....	8
5.2 Configuration parameters IEC 60870-5-104	10
5.3 Verification of IEC 60870-5-104 communication	10
5.4 Conformance test procedures.....	51
5.5 Test results chart	107
5.6 Test results of command transmission	121
5.6.1 General	121
5.6.2 Test results of single command transmission	122
5.6.3 Test results of double command transmission.....	125
5.6.4 Test results of regulating step command transmission.....	128
5.6.5 Test results of setpoint command transmission.....	131
Figure 1 – Test procedure.....	9
Table 1 – Run the Conformance Test Procedures for each of the following supported configuration parameter values	10
Table 2 – Tests on transport provider level (1 of 5).....	11
Table 3 – Tests on data unit identifier.....	16
Table 4 – Verification of ASDUs for process information in monitor (normal) direction (1 of 18)	17
Table 5 – Verification of ASDUs for process information in control (normal) direction (1 of 8)	35
Table 6 – Verification of ASDUs for system information in monitor (normal) direction.....	43
Table 7 – Verification of ASDUs for system information in control (normal) direction (1 of 3)	43
Table 8 – Verification of ASDUs for parameters in control (normal) direction (1 of 2)	46
Table 9 – Verification of ASDUs for file transfer (in monitor (normal) and control direction) (1 of 4)	48
Table 10 – Data unit identifier conformance test procedures (1 of 2)	52
Table 11 – Information object address conformance test procedures.....	53
Table 12 – Station initialisation function conformance test procedures (1 of 3)	54
Table 13 – Redundant link conformance test procedures (1 of 3)	57
Table 14 – Cyclic data transmission function conformance test procedures	59
Table 15 – Data acquisition through read function conformance test procedures	61
Table 16 – Acquisition of events function conformance test procedures	62
Table 17 – General interrogation function conformance test procedures (1 of 5).....	63
Table 18 – Clock synchronisation function conformance test procedures.....	72

Table 19 – Command transmission function conformance test procedures (1 of 9)	74
Table 20 – Transmission of integrated totals (telecounting) function conformance test procedures (1 of 4)	88
Table 21 – Parameter loading function conformance test procedures	95
Table 22 – Test procedure function conformance test procedures	97
Table 23 – File transfer procedure function conformance test procedures (1 of 3)	98
Table 24 – Additional conformance test procedures	103
Table 25 – Negative conformance test procedures.....	105
Table 26 – PIXIT related conformance test procedures	107
Table 27 – Test results chart.....	108
Table 28 – Test results of single command transmission (1 of 3).....	122
Table 29 – Test results of double command transmission (1 of 3)	125
Table 30 – Test results of regulating step command transmission (1 of 3)	128
Table 31 – Test results of setpoint command transmission (1 of 2).....	131

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[IEC TS 60870-5-604:2016](#)

<https://standards.iteh.ai/catalog/standards/iec/7ae218f6-eae6-4988-9768-6a516285bbde/iec-ts-60870-5-604-2016>

INTERNATIONAL ELECTROTECHNICAL COMMISSION

TELECONTROL EQUIPMENT AND SYSTEMS –

**Part 5-604: Conformance test cases for
the IEC 60870-5-104 companion standard**

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

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

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

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

IEC 60870-5-604, which is a technical specification, has been prepared by IEC technical committee 57: Power systems management and associated information exchange.

This second edition cancels and replaces the first edition published in 2007. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) Resolution of ambiguities between IEC 60870-5-104:2006 and IEC TS 60870-5-604:2016 (together with IEC 60870-5-104/AMD1);
- b) Refinement of some test cases to enhance operability between tested devices;
- c) Additional test cases (mainly negative test cases) added.

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

Enquiry draft	Report on voting
57/1614/DTS	57/1683/RVC

Full information on the voting for the approval of this technical specification can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts of IEC 60870 series, published under the general title *Telecontrol equipment and systems*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

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

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

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

This part of IEC 60870, which is a technical specification, describes test cases for conformance testing of telecontrol equipment or systems using ~~the IEC 60870-5 companion standard 104 based on~~ the IEC 60870-5-104 companion standard and IEC 60870-5-6, *Guidelines for conformance testing for the IEC 60870-5 companion standards*.

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[IEC TS 60870-5-604:2016](https://standards.iteh.ai/catalog/standards/iec/7ae218f6-eae6-4988-9768-6a516285bbde/iec-ts-60870-5-604-2016)

<https://standards.iteh.ai/catalog/standards/iec/7ae218f6-eae6-4988-9768-6a516285bbde/iec-ts-60870-5-604-2016>

TELECONTROL EQUIPMENT AND SYSTEMS –

Part 5-604: Conformance test cases for the IEC 60870-5-104 companion standard

1 Scope

This part of IEC 60870, which is a technical specification ~~which is part of the IEC 60870-5 series~~, describes test cases for conformance testing of telecontrol equipment, Substation Automation Systems (SAS) and telecontrol systems, including front-end functions of SCADA, using the IEC 60870-5-104 companion standard and IEC 60870-5-6, *Guidelines for conformance testing for the IEC 60870-5 companion standards*.

The use of this part of IEC 60870 facilitates interoperability by providing a standard method of testing protocol implementations, but it does not guarantee interoperability of devices. It is expected that using this specification during testing will minimize the risk of non-interoperability.

The goal of this part of IEC 60870 is to enable unambiguous and standardised evaluation of IEC 60870-5 companion standard protocol implementations. The guidelines and conditions for the testing environment are described in IEC 60870-5-6. The detailed test cases per companion standard, containing among others mandatory and optional mandatory test cases per Basic Application Function, ASDU and transmission procedure, will become available as a technical specification. Other functionality may need additional test cases but this is outside the scope of this part of IEC 60870. For proper testing, it is recommended to define these additional test cases. This document is such a Technical Specification for the mentioned companion standard.

This part of IEC 60870 deals mainly with communication conformance testing; therefore other requirements, such as safety or EMC are not covered. These requirements are covered by other standards (if applicable) and the proof of compliance for these topics is done according to these standards.

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.¹

IEC 60870-5-4:1993, *Telecontrol equipment and systems – Part 5: Transmission protocols – Section 4: Definition and coding of application information elements*

IEC 60870-5-5:1995, *Telecontrol equipment and systems – Part 5: Transmission protocols – Section 5: Basic application functions*

¹ The base standard always takes precedence. In case of ambiguity between this technical specification and the base standards (IEC 60870-5-1 to IEC 60870-5-5, IEC 60870-5-104), this part of IEC 60870 needs to be clarified or amended.

When testing, negative behaviour is not described in the base standard, the behaviour described in this document prevails and should be observed.

The conformance statement produced after testing indicates any lack of conformance to either the test plan or the base standard.

IEC 60870-5-6:2006, *Telecontrol equipment and systems – Part 5-6: Guidelines for conformance testing for the IEC 60870-5 companion standards*

IEC 60870-5-101:2003, *Telecontrol equipment and systems – Part 5-101: Transmission protocols – Companion standard for basic telecontrol tasks*

IEC 60870-5-104:2006, *Telecontrol equipment and systems – Part 5-104: Transmission protocols – Network access for IEC 60870-5-101 using standard transport profiles*

IETF RFC2200, *Internet Official Protocol Standards*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60870-5-6 apply.

4 Abbreviated terms

For the purposes of this document, the abbreviations given in IEC 60870-5-6 apply.

5 Conformance testing for IEC 60870-5-104

5.1 Overview and legend

An overview of tests is given in Tables 1 to 26. Procedural and functional testing ~~must~~ shall always start with the Station Initialisation function and proceeds with the next Basic Application Functions. The procedure in each test case ~~must~~ shall be followed, which means that the DUT is able to function as described in the specific test case.

The test procedures in Tables 1 through 11 ~~must~~ shall be carried out with no errors detected during testing of all the Basic Application Functions in Tables 12 through 26. These tests are preferably automatically performed by the used test platform.

In addition to the performance criteria listed in the test procedures, 5.3 lists the protocol specifications that ~~must~~ shall be verified automatically by the testing software or verified manually by review of the test history log after execution of the test procedures. The verification ~~must~~ shall result in no errors detected during the complete test procedure.

This test plan has a direct reference to the PICS and possibly a PIXIT. Without a reference to a PICS or PIXIT this test plan is obsolete.

Test case numbering syntax is subclause number + table number + test case number.

Test cases are mandatory depending on the description in the column 'Required'. The following situations are possible:

M = Mandatory test case regardless if enabled in the PICS/PIXIT, not only in one situation but during execution of all the tests as in the PICS and/or PIXIT

PICS, x.x = Mandatory test case if the functionality is enabled in the PICS (by marking the applicable check box), with a reference to the section number of the PICS (x.x);

NOTE PICS 9.x always refers to 60870-5-104:2006, Clause 9.

PIXIT = Mandatory test case if the functionality is enabled/described in the PIXIT. Verification of these test cases by the user/owner of the PIXIT is required before the test is started.

For each test case the test results ~~need to~~ shall be marked in the appropriate column of the test result chart in 5.5 and 5.6. Each test case can either pass the test (Passed), fail the test (Failed), not applicable, when the configuration value is not supported by the device (N.A.), or the test case was not performed (Empty). Ideally, there should be no empty boxes when testing is complete.

For testing reverse direction, the same test procedures apply in the opposite direction (replace "Controlling" with "Controlled" and vice versa), except for COT44-47 which are only defined in Monitor direction (only a controlled station is allowed to send these COT).

The test tables are divided into 5 subclauses:

- Subclause 5.2 Configuration parameters IEC 60870-5-104
- Subclause 5.3 Verification of IEC 60870-5-104 communication
- Subclause 5.4 Conformance test procedures
- Subclause 5.5 Test result chart
- Subclause 5.6 Test results of command transmission

The procedure to perform all the mandatory test cases, according to the PID, is shown in Figure 1.

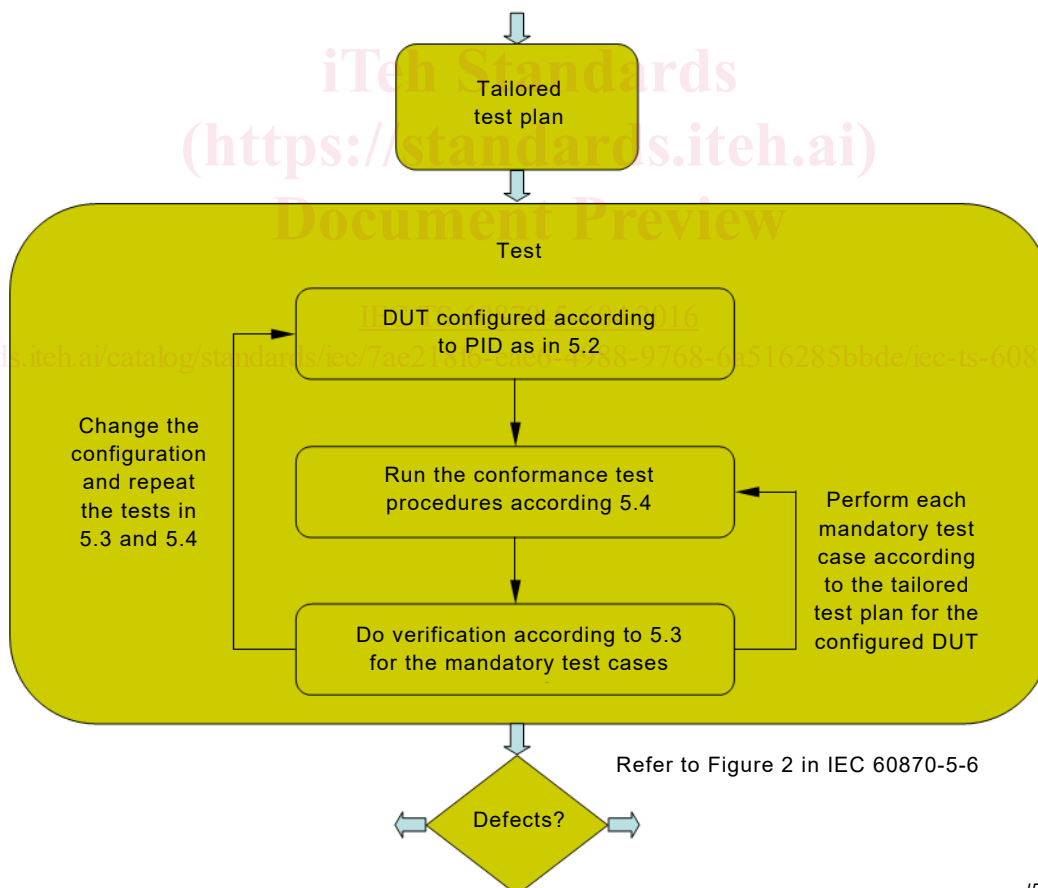


Figure 1 – Test procedure

5.2 Configuration parameters IEC 60870-5-104

Since IEC 60870-5-104 contains a number of configuration parameters affecting protocol behaviour, the conformance test procedures in 5.4 and verification in 5.3 **must shall** be performed at least once for each supported value of the parameters listed in Table 1. Basically the DUT **must shall** be tested if the functionality in 5.3 and 5.4 behaviour is correct for the configuration(s) in Table 1.

Table 1 – Run the Conformance Test Procedures for each of the following supported configuration parameter values

No.	Test	Description	Reference	Required
5.2.1.1	System definition	Controlling station test (Master)		PICS, 9.1
5.2.1.2		Controlled station test (Slave)		PICS, 9.1
5.2.1.50	Frame length	Maximum length L (control direction)	IEC 60870-5-101:2003, 6.2	PICS, 9.4
5.2.1.51		Maximum length L (monitor direction)	IEC 60870-5-101:2003, 6.2	PICS, 9.4
5.2.1.70	COMMON ADDRESS of ASDU	Two (2) octets for Common Address of ASDU (CASDU)	IEC 60870-5-101:2003, 7.2.4	PICS, 9.5
5.2.1.80	INFORMATION OBJECT ADDRESS	Three (3) octets for Information Object Address (structured or unstructured)	IEC 60870-5-101:2003, 7.2.5	PICS, 9.5
5.2.1.90	CAUSE OF TRANSMISSION	Two (2) octets for COT field (2 nd octet is Originator address)	IEC 60870-5-101:2003, 7.2.3	PICS, 9.5

5.3 Verification of IEC 60870-5-104 communication

This subclause lists the protocol specifications that **must shall** be verified automatically by the testing software or verified manually by review of the test history log after execution of the test procedures. Every test case describes functionality that has passed the test if the functionality as in the description column was shown to be correct. Correct means: the functionality **must shall** be checked either automatically or manually, and also be checked by the test engineer in a human readable format log-file. For example to test the IV qualifier of some information elements, the ASDU containing this element **must shall** be sent with the IV=1. Every test case marked “Passed”, has to be verifiable during testing and archived in log-files for post assessment.

To identify if a test case is mandatory, it is necessary to read 5.1 carefully.

Table 2 – Tests on transport provider level (1 of 5)

No.	Test	Description	Reference	Required
5.3.2.1	IP FRAME	IP Header, IP Fragment Re-assembly	IETF RFC2200	M
5.3.2.2		Source Address, Destination address	IETF RFC2200	M
5.3.2.3	TCP FRAME	TCP Header, TCP Control field (specifically ACK, RST, SYN, FIN), TCP Sequencing	IETF RFC2200	M
5.3.2.4		[The server (controlled station) uses the] port number 2404 [(confirmed by IANA) in all cases, both for the listening port and established connections. The client (controlling station) is free to use ephemeral port number, e.g. as allocated by the client's TCP/IP implementation]	IEC 60870-5-104:2006, 5.4 IMOM-WG03-15-June-2004 4.2.2.4] (Especially marked because it is not yet in the standard!)	M
5.3.2.5		Actively opening a new TCP connection starts with a TCP frame containing (SYN) from the node that takes the initiative to establish the TCP connection. This is answered by the other node with (SYN, ACK), which in turn is answered by the initiating node with (ACK). Thereinafter the TCP connection is established	IETF RFC2200 IEC 60870-5-104:2006, 7.1	M
5.3.2.6		Actively closing an established TCP connection starts with a TCP frame containing (FIN) from the node that takes the initiative to close the TCP connection. This is answered by the other node (ACK) followed by a TCP frame from this same other node containing also (FIN). This in turn is answered by the initiating node with (ACK). Thereinafter the TCP connection is closed. It can be accepted if a node combines an (ACK) and a (FIN) in a single TCP frame in reply to a TCP frame with a (FIN).	IETF RFC2200 IEC 60870-5-104:2006, 7.1, Figure 19	M
5.3.2.7		TCP Data stream on an established TCP connection contains APDU's. APDU's are correctly assembled when divided over multiple TCP frames During the test no problems should be detected on TCP/IP level	IEC 60870-5-104, Clause 5 IETF RFC2200	M
5.3.2.10	CS104 APDU FRAME LAYOUT	Start character of APDU: 68 _H	IEC 60870-5-104:2006, Clause 5	M
5.3.2.11		Configured number of octets L as the maximum number of Data octets (ASDU + Control field) in APDU: The maximum length of APDU for both directions is 253. It is a fixed system parameter.	IEC 60870-5-104:2006, Clause 5	PCS-9-4 M
5.3.2.12		4-octet Control field	IEC 60870-5-104:2006, Clause 5	M

Table 2 (2 of 5)

No.	Test	Description	Reference	Required
5.3.2.20	CS104 I-FORMAT APDU Information transfer frame	Control field octet 1 bit 1 (LSB) = 0	IEC 60870-5-104:2006, Clause 5	M
5.3.2.21		Control field octets 1-2, bit 2..16 contain end sequence number N(S) range 0..Maximum value 32767	IEC 60870-5-104:2006, Clause 5	M
5.3.2.22		Control field octet 3 bit 1 (bit 17) = 0	IEC 60870-5-104:2006, Clause 5	M
5.3.2.23		Control field octets 3-4, bit 18..32 contain Receive sequence number N(R) range 0..maximum value 32767	IEC 60870-5-104:2006, Clause 5	M
5.3.2.24	CS104 S-FORMAT APDU Numbered Supervisory function frame	I-format frame contains exactly one ASDU	IEC 60870-5-104:2006, Clause 5	M
5.3.2.25		Control field octet 1, bit 1-2 have value 01 _B	IEC 60870-5-104:2006, Clause 5	M
5.3.2.26		Control field octets 1-2, bit 3..16 all contain value 0	IEC 60870-5-104:2006, Clause 5	M
5.3.2.27		Control field octet 3 bit 1 (bit 17) = 0	IEC 60870-5-104:2006, Clause 5	M
5.3.2.28	CS104 U-FORMAT APDU Unnumbered Control function frame	Control field octets 3-4, bit 18..32 contain Receive sequence number N(R) range 0..maximum value 32767	IEC 60870-5-104:2006, Clause 5	M
5.3.2.29		S-frame APDU only contains a single APCI field	IEC 60870-5-104:2006, Clause 5	M
5.3.2.30	CS104 U-FORMAT APDU Unnumbered Control function frame	Control field octet 1, bit 1-2 have value 11 _B	IEC 60870-5-104:2006, Clause 5	M
5.3.2.31		Control field octet 1, bit 3 used for control function STARTDT Activation	IEC 60870-5-104:2006, Clause 5	M
5.3.2.32		Control field octet 1, bit 4 used for control function STARTDT Confirmation	IEC 60870-5-104:2006, Clause 5	M
5.3.2.33		Control field octet 1, bit 5 used for control function STOPDT Activation	IEC 60870-5-104:2006, Clause 5	M
5.3.2.34		Control field octet 1, bit 6 used for control function STOPDT Confirmation	IEC 60870-5-104:2006, Clause 5	M
5.3.2.35		Control field octet 1, bit 7 used for control function TESTFR Activation	IEC 60870-5-104:2006, Clause 5	M
5.3.2.36		Control field octet 1, bit 8 used for control function TESTFR Confirmation	IEC 60870-5-104:2006, Clause 5	M
5.3.2.37		Control field bit 3..8 contains exactly one active (bit with value 1) Control function (TESTFR, STARTDT, STOPDT, either Activation or Confirmation) per U-frame	IEC 60870-5-104:2006, Clause 5	M
5.3.2.38		Control field octets 2-4, bit 9..32 all contain value 0	IEC 60870-5-104:2006, Clause 5	M
5.3.2.39		U-frame APDU only contains a single APCI field	IEC 60870-5-104:2006, Clause 5	M