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CONSOLIDATED VERSION

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

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

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This consolidated version of the official IEC Standard and its amendment has been prepared for user convenience.

IEC 60870-5-604 edition 2.1 contains the second edition (2016-06) [documents 57/1614/DTS and 57/1683/RVC] and its amendment 1 (2026-09) [documents 57/2939/DTS and 57/2979/RVDTS].

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendment 1. Additions are in green text, deletions are in strikethrough red text. A separate Final version with all changes accepted is available in this publication.

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- 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 document and its amendment will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

# 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 60870-5-104 companion standard and IEC 60870-5-6, *Guidelines for conformance testing for the IEC 60870-5 companion standards*.

## 1 Scope

This part of IEC 60870, which is a technical specification, 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*

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*

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[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 60870-5-104:2006, *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 shall always start with the Station Initialisation function and proceeds with the next Basic Application Functions. The procedure in each test case 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 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 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 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 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.