



NSAI
Standards

Irish Standard
I.S. EN 16603-10-03:2014

Space engineering - Testing

I.S. EN 16603-10-03:2014

Incorporating amendments/corrigenda/National Annexes issued since publication:

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Foreword

This document (EN 16603-10-03:2014) has been prepared by Technical Committee CEN/CLC/TC 5 “Space”, the secretariat of which is held by DIN.

This standard (EN 16603-10-03:2014) originates from ECSS-E-ST-10-03C.

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of an identical text or by endorsement, at the latest by February 2015, and conflicting national standards shall be withdrawn at the latest by February 2015.

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

This document will supersede EN 14824:2003.

This document has been developed to cover specifically space systems and has therefore precedence over any EN covering the same scope but with a wider domain of applicability (e.g. : aerospace).

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

Introduction

The requirements on the systems engineering process are gathered in ECSS-E-ST-10; while specific aspects are further elaborated in dedicated standards, in particular: ECSS-E-ST-10-06, ECSS-E-ST-10-02 and the present standard (ECSS-E-ST-10-03)

In the System Engineering branch (ECSS-E-10) this standard aims at a consistent application of on ground testing requirements to allow proper qualification and acceptance of space products

Experience has demonstrated that incomplete or improper on ground testing approach significantly increase project risks leading to late discovery of design or workmanship problem(s) or in-orbit failure(s).

Testing is part of the system engineering process as defined in ECSS-E-ST-10. This starts at the early phase of the mission when defining verification process in terms of the model philosophy and test sequence and ends at the last testing phase prior launch.

In the level of decomposition of a space system, this standard addresses the requirements for space segment element and space segment equipment.

The document is organised such that:

- clause 4 provides requirements for overall test programme, test management and test conditions, tolerances and accuracy;
- clause 5 provides requirements for Space segment equipment;
- clause 6 provides requirements for Space segment element;
- clause 7 provides requirements for Pre-launch testing.

Clauses 5 and 6 are organised as follows:

- general requirements for the products under test applicable to all models (clause 5.1 or 6.1);
- requirements applicable to qualification model (clause 5.2 or 6.2);
- requirements applicable to acceptance model (clause 5.3 or 6.3);
- requirements applicable to protoflight model (clause 5.4 or 6.4);
- detailed implementation requirements (clause 5.5 or 6.5);

In the clause providing requirements for each model (i.e. clauses 5.2, 5.3, 5.4, 6.2, 6.3 and 6.4), the first table of the clause:

- lists all types of test and defines their applicability and conditions;
- links to the second table of the clause that defines tests level and duration;
- provides reference to the clause defining the detailed implementation requirements for the given test (clause 5.5 or 6.5).

For space segment equipment, the required sequence of test, for each model, is defined after the two tables in clause 5.2, 5.3 or 5.4.

Since testing activities are part of the overall verification activities, test documentation to be produced (DRD's) are either specified in the ECSS-E-ST-10-02 (case of the test report) or in this document.

Annex D gives guidelines for performing the tailoring of this standard as well as the generation of the compliance and verification matrices.

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Scope

This standard addresses the requirements for performing verification by testing of space segment elements and space segment equipment on ground prior to launch. The document is applicable for tests performed on qualification models, flight models (tested at acceptance level) and protoflight models.

The standard provides:

- Requirements for test programme and test management,
- Requirements for retesting,
- Requirements for redundancy testing,
- Requirements for environmental tests,
- General requirements for functional and performance tests,

NOTE Specific requirements for functional and performance tests are not part of this standard since they are defined in the specific project documentation.

- Requirements for qualification, acceptance, and protoflight testing including qualification, acceptance, and proto-flight models' test margins and duration,
- Requirements for test factors, test condition, test tolerances, and test accuracies,
- General requirements for development tests pertinent to the start of the qualification test programme,

NOTE Development tests are specific and are addressed in various engineering discipline standards.

- Content of the necessary documentation for testing activities (e.g. DRD).

Due to the specific aspects of the following types of test, this Standard does not address:

- Space system testing (i.e. testing above space segment element), in particular the system validation test,
- In-orbit testing,
- Testing of space segment subsystems,

NOTE Tests of space segment subsystems are often limited to functional tests that, in some case, are run on dedicated models. If relevant, qualification tests for space segment subsystems are assumed to be covered in the relevant discipline standards.

- Testing of hardware below space segment equipment levels (including assembly, parts, and components),
- Testing of stand-alone software,

NOTE For verification of flight or ground software, ECSS-E-ST-40 and ECSS-Q-ST-80 apply.

- Qualification testing of two-phase heat transport equipment,

NOTE For qualification testing of two-phase heat transport equipment, ECSS-E-ST-31-02 applies.

- Tests of launcher segment, subsystem and equipment, and launch facilities,
- Tests of facilities and ground support equipment,
- Tests of ground segment.

This standard may be tailored for the specific characteristic and constraints of a space project in conformance with ECSS-S-ST-00. Annex D gives guidelines for performing this tailoring.

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