BS EN 16602-70-37:2014

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Space product assurance — Determination of the susceptibility of metals to stress-corrosion cracking

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee ACE/68, Space systems and operations.

A list of organizations represented on this committee can be obtained on request to its secretary.

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English version

Space product assurance - Determination of the susceptibility of metals to stress-corrosion cracking

Assurance produit des projets spatiaux - Détermination de la susceptibilité des métaux à la fissuration par corrosion sous contrainte

Raumfahrtproduktsicherung - Bestimmung der Anfälligkeit von Metallen für Spannungsrisskorrosion

This European Standard was approved by CEN on 25 October 2014.

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Full document details: BS EN 16602-70-37:2014

Table of contents

Foreword **5**

1 Scope **6**

2 Normative references **7**

3 Terms, definitions and abbreviated terms **9**

3.1 Terms defined in other standards 9

3.2 Terms specific to the present standard 9

3.3 Abbreviated terms 10

3.4 Symbols 11

4 Principles **12**

4.1 Overview 12

4.2 Tensile test 12

4.3 Fracture toughness test 12

4.3.1 Overview 12

4.3.2 Determination of fracture toughness using the K_{Ic} test method 12

4.3.3 Determination of fracture toughness using the J_{Ic} test method 13

4.3.4 Characterization of fracture toughness using the R-curve test method 13

4.3.5 Characterization of fracture toughness using the CTOD test method 13

4.4 Fatigue test 14

4.4.1 General 14

4.4.2 Force controlled constant amplitude axial fatigue test 14

4.4.3 Strain-controlled fatigue test 14

4.5 Fatigue crack propagation test 14

4.5.1 Stable crack growth rate 14

4.5.2 Crack propagation threshold 15

4.6 Fracture and fatigue test in special environment 15

4.7 Stress corrosion cracking test 15

4.7.1 Overview 15

4.7.2 Stress corrosion cracking test using smooth specimens 15

4.7.3 Stress corrosion cracking test using pre-cracked specimens 16

Documents
Document Sharing Hub

Full document details: BS EN 16602-70-37:2014

4.8 Creep test 16
4.9 Test results presentation 16

5 Requirements 17

5.1 Customer agreement 17
5.2 Tensile testing 17
5.2.1 General 17
5.2.2 Tensile testing of weldments 17
5.3 Fracture toughness test 18
5.3.1 K_{Ic} test method 18
5.3.2 J_{Ic} test method 18
5.3.3 R-curve test method 18
5.3.4 CTOD test method 18
5.4 Fatigue test 19
5.4.1 Force controlled constant amplitude axial fatigue test 19
5.4.2 Strain-controlled fatigue test 19
5.5 Fatigue crack propagation test 20
5.5.1 Determination of fatigue crack growth rate 20
5.5.2 Determination of a fatigue crack propagation threshold 20
5.6 Fracture and fatigue tests in special environments 21
5.7 Stress corrosion cracking test 21
5.7.1 Stress corrosion cracking test using smooth specimens 21
5.7.2 Stress corrosion cracking test using pre-cracked specimens 21
5.8 Creep test 21
5.9 Evaluation of test results 21
5.10 Storage 22
5.11 Reporting 22
5.12 Quality assurance 22
5.12.1 General 22
5.12.2 Calibration 22
5.12.3 Quality control of raw materials 23
5.12.4 Nonconformance 23
5.12.5 Traceability and records 23

Annex A (normative) **Request for mechanical testing of materials – DRD 24**

Annex B (normative) **Proposal for mechanical testing of materials – DRD 26**

Annex C (normative) **Report of mechanical testing of materials – DRD 28**

Documents
Document Sharing Hub

Full document details: BS EN 16602-70-37:2014

Annex D (informative) **References** **31**

Bibliography **32**

Documents
Document Sharing Hub

Full document details: BS EN 16602-70-37:2014

Foreword

This document (EN 16602-70-37:2014) has been prepared by Technical Committee CEN/CLC/TC 5 "Space", the secretariat of which is held by DIN.

This standard (EN 16602-70-37:2014) originates from ECSS-Q-ST-70-45C.

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 April 2015, and conflicting national standards shall be withdrawn at the latest by April 2015.

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1 Scope

This Standard specifies requirements for mechanical testing of metallic materials to be used in the fabrication of spacecraft hardware.

This Standard establishes the requirements for most relevant test methods carried out to assess the tensile, fatigue and fracture properties of metallic materials. It does not give a complete review of all the existing test methods for the evaluation of mechanical properties of metallic materials.

Furthermore, this Standard specifies requirements for the evaluation, presentation and reporting of test results.

This standard may be tailored for the specific characteristic and constrains of a space project in conformance with ECSS-S-ST-00.

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Full document details: BS EN 16602-70-37:2014

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this ECSS Standard. For dated references, subsequent amendments to, or revision of any of these publications do not apply, However, parties to agreements based on this ECSS Standard are encouraged to investigate the possibility of applying the more recent editions of the normative documents indicated below. For undated references, the latest edition of the publication referred to applies.

EN reference	Reference in text	Title
EN 16601-00-01	ECSS-S-ST-00-01	ECSS system — Glossary of terms
EN 16602-10-09	ECSS-Q-ST-10-09	Space product assurance — Nonconformance control system
EN 16602-70	ECSS-Q-ST-70	Space product assurance — Materials, mechanical parts and processes
EN 16602-70-37	ECSS-Q-ST-70-37	Space product assurance — Determination of the susceptibility of metals to stress-corrosion cracking
EN 16602-70-46	ECSS-Q-ST-70-46	Space product assurance — Requirements for manufacturing and procurement of threaded fasteners
	ASTM E 139	Standard test methods for conducting creep, creep-rupture, and stress-rupture tests of metallic materials
	ASTM E 399	Standard test method for plane-strain fracture toughness of metallic materials
	ASTM E 466	Standard practice for conducing force controlled constant amplitude axial fatigue tests of metallic materials
	ASTM E 561	Standard practice for R-curve determination
	ASTM E 606	Standard practice for strain-controlled fatigue testing
	ASTM E 647	Standard test method for measurement of fatigue crack growth rates
	ASTM E 739	Standard practice for statistical analysis of linear or linarized stress-life (S-N) and strain-life (e-N) fatigue data

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	ASTM E 1290	Standard test method for crack-tip opening displacement (CTOD) fracture toughness measurement
	ASTM E 1820	Standard test method for measurement of fracture toughness
	EN 10002-1	Metallic materials — Tensile testing — Part 1: Method of test at ambient temperature
	EN 10002-2	Metallic materials — Tensile testing — Part 2: Verification of the force measuring system of the tensile testing machines
	EN 10002-4	Metallic materials — Tensile testing — Part 4: Verification of the extensometers used in uniaxial testing
	ESDU 96013:1996	Fracture toughness (K_{Ic}) values of some aluminium alloys
	ISO 7539-6:2003	Corrosion of metals and alloys — Stress corrosion testing — Part 6: Preparation and use of pre-cracked specimens for tests under constant load or constant displacement

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3 Terms, definitions and abbreviated terms

3.1 Terms defined in other standards

For the purpose of this Standard, the terms and definitions from ECSS-S-ST-00-01 and ECSS-Q-ST-70 apply.

3.2 Terms specific to the present standard

3.2.1 crack tip plastic zone

plastically deformed region in a material adjacent to a crack tip

3.2.2 creep

time-dependent increase in strain in a material resulting from force

3.2.3 damage tolerance

in a material or structure, the capability to withstand stresses or loads in the presence of defects

3.2.4 failure

condition generally caused by break or collapse so that a structural element can no longer fulfil its purpose

3.2.5 fatigue

in a material, the failure phenomenon which results from repeated fluctuation of stress

3.2.6 fracture toughness

inherent resistance of a material in the presence of a crack-like defect

3.2.7 finite life range

life range, in which all test pieces before a predetermined number of cycles fail

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