DIN EN 16602-70-45:2015-05 (E)

Space product assurance - Mechanical testing of metallic materials; English version EN 16602-70-45:2014

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

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

Annex D (informative) References 31

Bibliography.....32