

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

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

---

<b>Foreword</b> .....	<b>5</b>
<b>1 Scope</b> .....	<b>6</b>
<b>2 Normative references</b> .....	<b>7</b>
<b>3 Terms, definitions and abbreviated terms</b> .....	<b>9</b>
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
<b>4 Principles</b> .....	<b>12</b>
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
<b>5</b>	<b>Requirements.....</b>	<b>17</b>
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
	<b>Annex A (normative) Request for mechanical testing of materials – DRD.....</b>	<b>24</b>
	<b>Annex B (normative) Proposal for mechanical testing of materials – DRD.....</b>	<b>26</b>
	<b>Annex C (normative) Report of mechanical testing of materials – DRD.....</b>	<b>28</b>

**Annex D (informative) References .....31**  
**Bibliography.....32**