

## Table of contents

---

<b>European Foreword</b> .....	<b>7</b>
<b>1 Scope</b> .....	<b>8</b>
<b>2 Normative references</b> .....	<b>9</b>
<b>3 Terms, definitions and abbreviated terms</b> .....	<b>10</b>
3.1 Terms for other standards.....	10
3.2 Terms specific to the present standard .....	10
3.3 Abbreviated terms.....	16
3.4 Nomenclature .....	18
<b>4 Space system software product assurance principles</b> .....	<b>19</b>
4.1 Introduction.....	19
4.2 Organization of this Standard .....	20
4.3 Tailoring of this Standard .....	22
<b>5 Software product assurance programme implementation</b> .....	<b>23</b>
5.1 Organization and responsibility .....	23
5.1.1 Organization.....	23
5.1.2 Responsibility and authority .....	23
5.1.3 Resources.....	24
5.1.4 Software product assurance manager/engineer .....	24
5.1.5 Training.....	24
5.2 Software product assurance programme management.....	25
5.2.1 Software product assurance planning and control.....	25
5.2.2 Software product assurance reporting.....	26
5.2.3 Audits.....	27
5.2.4 Alerts.....	27
5.2.5 Software problems .....	27
5.2.6 Nonconformances.....	28
5.2.7 Quality requirements and quality models.....	29

5.3	Risk management and critical item control.....	29
5.3.1	Risk management.....	29
5.3.2	Critical item control.....	29
5.4	Supplier selection and control.....	30
5.4.1	Supplier selection.....	30
5.4.2	Supplier requirements.....	30
5.4.3	Supplier monitoring.....	30
5.4.4	Criticality classification.....	31
5.5	Procurement.....	31
5.5.1	Procurement documents.....	31
5.5.2	Review of procured software component list.....	31
5.5.3	Procurement details.....	32
5.5.4	Identification.....	32
5.5.5	Inspection.....	32
5.5.6	Exportability.....	32
5.6	Tools and supporting environment.....	32
5.6.1	Methods and tools.....	32
5.6.2	Development environment selection.....	33
5.7	Assessment and improvement process.....	34
5.7.1	Process assessment.....	34
5.7.2	Assessment process.....	34
5.7.3	Process improvement.....	35
<b>6</b>	<b>Software process assurance.....</b>	<b>37</b>
6.1	Software development life cycle.....	37
6.1.1	Life cycle definition.....	37
6.1.2	Process quality objectives.....	37
6.1.3	Life cycle definition review.....	37
6.1.4	Life cycle resources.....	37
6.1.5	Software validation process schedule.....	38
6.2	Requirements applicable to all software engineering processes.....	38
6.2.1	Documentation of processes.....	38
6.2.2	Software dependability and safety.....	39
6.2.3	Handling of critical software.....	41
6.2.4	Software configuration management.....	43
6.2.5	Process metrics.....	45
6.2.6	Verification.....	46
6.2.7	Reuse of existing software.....	49

6.2.8	Automatic code generation.....	52
6.3	Requirements applicable to individual software engineering processes or activities.....	53
6.3.1	Software related system requirements process.....	53
6.3.2	Software requirements analysis .....	53
6.3.3	Software architectural design and design of software items .....	55
6.3.4	Coding .....	56
6.3.5	Testing and validation .....	57
6.3.6	Software delivery and acceptance.....	62
6.3.7	Operations .....	63
6.3.8	Maintenance .....	64
<b>7</b>	<b>Software product quality assurance.....</b>	<b>66</b>
7.1	Product quality objectives and metrication .....	66
7.1.1	Deriving of requirements .....	66
7.1.2	Quantitative definition of quality requirements.....	66
7.1.3	Assurance activities for product quality requirements.....	66
7.1.4	Product metrics .....	66
7.1.5	Basic metrics.....	67
7.1.6	Reporting of metrics .....	67
7.1.7	Numerical accuracy.....	67
7.1.8	Analysis of software maturity.....	68
7.2	Product quality requirements .....	68
7.2.1	Requirements baseline and technical specification .....	68
7.2.2	Design and related documentation.....	69
7.2.3	Test and validation documentation.....	69
7.3	Software intended for reuse .....	70
7.3.1	Customer requirements.....	70
7.3.2	Separate documentation .....	70
7.3.3	Self-contained information.....	70
7.3.4	Requirements for intended reuse .....	70
7.3.5	Configuration management for intended reuse.....	70
7.3.6	Testing on different platforms.....	71
7.3.7	Certificate of conformance .....	71
7.4	Standard ground hardware and services for operational system.....	71
7.4.1	Hardware procurement .....	71
7.4.2	Service procurement.....	71
7.4.3	Constraints.....	72

7.4.4	Selection .....	72
7.4.5	Maintenance .....	72
7.5	Firmware .....	72
7.5.1	Device programming .....	72
7.5.2	Marking .....	73
7.5.3	Calibration .....	73
<b>Annex A (informative) Software documentation.....</b>		<b>74</b>
<b>Annex B (normative) Software product assurance plan (SPAP) - DRD .....</b>		<b>80</b>
B.1	DRD identification .....	80
B.1.1	Requirement identification and source document .....	80
B.1.2	Purpose and objective.....	81
B.2	Expected response .....	82
B.2.1	Scope and content .....	82
B.2.2	Special remarks .....	86
<b>Annex C (normative) Software product assurance milestone report (SPAMR) - DRD .....</b>		<b>87</b>
C.1	DRD identification .....	87
C.1.1	Requirement identification and source document .....	87
C.1.2	Purpose and objective.....	88
C.2	Expected response .....	88
C.2.1	Scope and content .....	88
C.2.2	Special remarks .....	89
<b>Annex D (normative) Tailoring of this Standard based on software criticality.....</b>		<b>90</b>
D.1	Software criticality categories .....	90
D.2	Applicability matrix.....	91
<b>Annex E (informative) List of requirements with built-in tailoring capability.....</b>		<b>102</b>
<b>Annex F (informative) Document organization and content at each milestone.....</b>		<b>103</b>
F.1	Introduction.....	103
F.2	ECSS-Q-ST-80 Expected Output at SRR .....	103
F.3	ECSS-Q-ST-80 Expected Output at PDR .....	105
F.4	ECSS-Q-ST-80 Expected Output at CDR .....	110
F.5	ECSS-Q-ST-80 Expected Output at QR .....	112
F.6	ECSS-Q-ST-80 Expected Output at AR.....	113

F.7 ECSS-Q-ST-80 Expected Output not associated with any specific milestone review .....	115
--	-----

**Bibliography.....117**

**Figures**

Figure 4-1: Software related processes in ECSS Standards.....	20
Figure 4-2: Structure of this Standard.....	21
Figure A-1 : Overview of software documents .....	74

**Tables**

Table A-1 : ECSS-E-ST-40 and ECSS-Q-ST-80 Document requirements list (DRL) .....	75
Table B-1 : SPAP traceability to ECSS-E-ST-40 and ECSS-Q-ST-80 clauses .....	80
Table C-1 : SPAMR traceability to ECSS-Q-ST-80 clauses .....	87
Table D-1 : Software criticality categories.....	90
Table D-2 : Applicability matrix based on software criticality .....	91