

Table of contents

Foreword	9
1 Scope	10
2 Normative references	11
3 Terms, definitions and abbreviated terms	12
3.1 Terms from other standards.....	12
3.2 Terms specific to the present standard	12
3.3 Abbreviated terms.....	18
4 Requirements	20
4.1 Overview	20
4.2 Mission	20
4.2.1 Lifetime	20
4.2.2 Natural and induced environment.....	21
4.2.3 Mechanical environment	21
4.2.4 Microgravity, audible noise and human induced vibration.....	22
4.2.5 Load events	22
4.2.6 Combined loads	23
4.2.7 Limit loads.....	24
4.2.8 Design limit loads.....	24
4.3 Functionality	24
4.3.1 Overview.....	24
4.3.2 Strength	24
4.3.3 Local yielding	25
4.3.4 Buckling	25
4.3.5 Stiffness	25
4.3.6 Dynamic behaviour	25
4.3.7 Thermal.....	25
4.3.8 Damage tolerance.....	26
4.3.9 Tolerances and alignments	26
4.3.10 Electrical conductivity.....	26

4.3.11	Lightning protection.....	26
4.3.12	Electromagnetic compatibility.....	26
4.3.13	Dimensional stability.....	27
4.4	Interface.....	27
4.5	Design.....	28
4.5.1	Inspectability.....	28
4.5.2	Interchangeability.....	28
4.5.3	Maintainability.....	28
4.5.4	Dismountability.....	29
4.5.5	Mass and inertia properties.....	29
4.5.6	Material selection.....	30
4.5.7	Mechanical parts selection.....	30
4.5.8	Material design allowables.....	30
4.5.9	Metals.....	31
4.5.10	Non-metallic materials.....	32
4.5.11	Composite materials.....	32
4.5.12	Adhesive materials in bonded joints.....	33
4.5.13	Ablation and pyrolysis.....	33
4.5.14	Micrometeoroid and debris collision.....	33
4.5.15	Venting.....	33
4.5.16	Margin of safety (MOS).....	34
4.5.17	Factors of safety (FOS).....	34
4.5.18	Scatter factors.....	35
4.6	Verification.....	35
4.6.1	Overview.....	35
4.6.2	Verification by analysis.....	36
4.6.3	Verification by test.....	41
4.6.4	Verification of composite structures.....	46
4.7	Production and manufacturing.....	47
4.7.1	General.....	47
4.7.2	Manufacturing process.....	47
4.7.3	Manufacturing drawings.....	47
4.7.4	Tooling.....	47
4.7.5	Assembly.....	48
4.7.6	Storage.....	48
4.7.7	Cleanliness.....	49
4.7.8	Health and safety.....	49

4.8	In-service	49
4.8.1	Ground inspection	49
4.8.2	In-orbit inspection	49
4.8.3	Evaluation of damage	50
4.8.4	Maintenance	50
4.8.5	Repair	51
4.9	Data exchange	52
4.9.1	General	52
4.9.2	System configuration data	53
4.9.3	Data exchange between design and structural analysis	53
4.9.4	Data exchange between structural design and manufacturing	53
4.9.5	Data exchange with other subsystems	53
4.9.6	Tests and structural analysis	54
4.9.7	Structural mathematical models	54
4.9.8	Data traceability	54
4.10	Deliverables	54
Annex A (normative) Computer aided design model description and delivery (CADMDD) - DRD		56
A.1	DRD identification	56
A.1.1	Requirement identification and source document	56
A.1.2	Purpose and objective	56
A.2	Expected response	56
A.2.1	Scope and content	56
A.2.2	Special remarks	61
Annex B (normative) Design loads (DL) - DRD		62
B.1	DRD identification	62
B.1.1	Requirement identification and source document	62
B.1.2	Purpose and objective	62
B.2	Expected response	62
B.2.1	Scope and content	62
B.2.2	Special remarks	65
Annex C (normative) Dimensional stability analysis (DSA) - DRD		66
C.1	DRD identification	66
C.1.1	Requirement identification and source document	66
C.1.2	Purpose and objective	66
C.2	Expected response	66

C.2.1	Scope and content	66
C.2.2	Special remarks	69
Annex D	(normative) Fatigue analysis (FA) - DRD	70
D.1	DRD identification	70
D.1.1	Requirement identification and source document	70
D.1.2	Purpose and objective	70
D.2	Expected response	70
D.2.1	Scope and content	70
D.2.2	Special remarks	72
Annex E	(normative) Fracture control analysis (FCA) - DRD	73
E.1	DRD identification	73
E.1.1	Requirement identification and source document	73
E.1.2	Purpose and objective	73
E.2	Expected response	73
E.2.1	Scope and content	73
E.2.2	Special remarks	76
Annex F	(normative) Fracture control plan - DRD	77
F.1	DRD identification	77
F.1.1	Requirement identification and source document	77
F.1.2	Purpose and objective	77
F.2	Expected response	77
F.2.1	Scope and content	77
F.2.2	Special remarks	79
Annex G	(normative) Fracture control items lists (PFCIL, FCIL and FLLIL) - DRD	80
G.1	DRD identification	80
G.1.1	Requirement identification and source document	80
G.1.2	Purpose and objective	80
G.2	Expected response	80
G.2.1	Scope and content	80
G.2.2	Special remarks	81
Annex H	(normative) Material and mechanical part allowables (MMPA) - DRD	82
H.1	DRD identification	82
H.1.1	Requirement identification and source document	82
H.1.2	Purpose and objective	82

H.2	Expected response	82
H.2.1	Scope and content	82
H.2.2	Special remarks	84
Annex I	(normative) Mathematical model description and delivery (MMDD) - DRD	85
I.1	DRD identification	85
I.1.1	Requirement identification and source document	85
I.1.2	Purpose and objective	85
I.2	Expected response	85
I.2.1	Scope and content	85
I.2.2	Special remarks	92
Annex J	(normative) Modal and dynamic response analysis (MDRA) - DRD	93
J.1	DRD identification	93
J.1.1	Requirement identification and source document	93
J.1.2	Purpose and objective	93
J.2	Expected response	94
J.2.1	Scope and content	94
J.2.2	Special remarks	96
Annex K	(normative) Stress and strength analysis (SSA) - DRD	97
K.1	DRD identification	97
K.1.1	Requirement identification and source document	97
K.1.2	Purpose and objective	97
K.2	Expected response	97
K.2.1	Scope and content	97
K.2.2	Special remarks	103
Annex L	(normative) Structure alignment budget (SAB) - DRD	105
L.1	DRD identification	105
L.1.1	Requirement identification and source document	105
L.1.2	Purpose and objective	105
L.2	Expected response	105
L.2.1	Scope and content	105
L.2.2	Special remarks	108
Annex M	(normative) Structure buckling (SB) - DRD	109
M.1	DRD identification	109
M.1.1	Requirement identification and source document	109
M.1.2	Purpose and objective	109

M.2	Expected response	109
M.2.1	Scope and content	109
M.2.2	Special remarks	111
Annex N	(normative) Structure mass summary (SMS) - DRD	112
N.1	DRD identification	112
N.1.1	Requirement identification and source document	112
N.1.2	Purpose and objective	112
N.2	Expected response	112
N.2.1	Scope and content	112
N.2.2	Special remarks	114
Annex O	(normative) Test-analysis correlation (TAC) - DRD	115
O.1	DRD identification	115
O.1.1	Requirement identification and source document	115
O.1.2	Purpose and objective	115
O.2	Expected response	115
O.2.1	Scope and content	115
O.2.2	Special remarks	117
Annex P	(normative) Test evaluation (TE) - DRD	118
P.1	DRD identification	118
P.1.1	Requirement identification and source document	118
P.1.2	Purpose and objective	118
P.2	Expected response	118
P.2.1	Scope and content	118
P.2.2	Special remarks	121
Annex Q	(normative) Test prediction (TP) - DRD	122
Q.1	DRD identification	122
Q.1.1	Requirement identification and source document	122
Q.1.2	Purpose and objective	122
Q.2	Expected response	122
Q.2.1	Scope and content	122
Q.2.2	Special remarks	125
Annex R	(informative) Document description list	126
R.1	Computer aided design model description and delivery	126
R.2	Configuration item data list (document controlled by ECSS-M-ST-40)	126
R.3	Design definition file (document controlled by ECSS-E-ST-10)	126

R.4	Design development plan (included in the System engineering plan controlled by ECSS-E-ST-10)	126
R.5	Design justification file (document controlled by ECSS-E-ST-10)	126
R.6	Drawings (document controlled by ISO 128)	127
R.7	Design loads	127
R.8	Dimensional stability analysis	127
R.9	Fatigue analysis	127
R.10	Fracture control analysis	127
R.11	Fracture control plan	127
R.12	Fracture control items lists	127
R.13	Material and mechanical part allowables	128
R.14	Mathematical model description and delivery	128
R.15	Modal and dynamic response analysis	128
R.16	Stress and strength analysis	128
R.17	Structure alignment budget	128
R.18	Structure buckling	128
R.19	Structure mass summary	128
R.20	Test-analysis correlation	128
R.21	Test evaluation	129
R.22	Test prediction	129
R.23	Test procedure (document controlled by ECSS-E-ST-10-03)	129
R.24	Test report (document controlled by ECSS-E-ST-10-03)	129
R.25	Test specification (document controlled by ECSS-E-ST-10-03)	129
R.26	Verification plan (document controlled by ECSS-E-ST-10-02)	129
Annex S (informative) Effective mass definition		130
Annex T (informative) E-32 discipline documents delivery per review		133
Bibliography		135