

ISO 10786:2025-09 (E)

Space systems - Structural components and assemblies

| Contents | | Page |
|--------------------|------------------------------------------------------------------------------------------------------------|-------------|
| Foreword | | vi |
| Introduction | | vii |
| 1 | Scope | 1 |
| 2 | Normative references | 1 |
| 3 | Terms and definitions | 1 |
| 4 | Symbols and abbreviated terms | 14 |
| 5 | Tailoring | 15 |
| 6 | Requirements | 15 |
| 6.1 | General | 15 |
| 6.2 | Design requirements | 16 |
| 6.2.1 | Static strength | 16 |
| 6.2.2 | Buckling strength | 16 |
| 6.2.3 | Margin of safety (MS) | 16 |
| 6.2.4 | Static stiffness | 16 |
| 6.2.5 | Dynamic behaviour | 17 |
| 6.2.6 | Dimensional stability | 17 |
| 6.2.7 | Tolerances and alignments | 17 |
| 6.2.8 | Thermal | 17 |
| 6.2.9 | Thermal distortion | 17 |
| 6.2.10 | Interface requirements | 18 |
| 6.2.11 | Electromagnetic compatibility | 18 |
| 6.2.12 | Lightning protection | 18 |
| 6.2.13 | Mass and inertia properties | 18 |
| 6.2.14 | Fatigue life | 18 |
| 6.2.15 | Fracture control | 18 |
| 6.2.16 | Impact damage | 19 |
| 6.2.17 | Stress-rupture life | 19 |
| 6.2.18 | Corrosion and stress corrosion control | 20 |
| 6.2.19 | Outgassing | 20 |
| 6.2.20 | Meteoroid and orbital debris protection | 20 |
| 6.3 | Material requirements | 20 |
| 6.3.1 | Mechanical properties | 20 |
| 6.3.2 | Metallic materials | 20 |
| 6.3.3 | Glass and ceramics materials | 21 |
| 6.3.4 | Composite materials | 22 |
| 6.3.5 | Polymeric materials | 23 |
| 6.3.6 | Adhesive materials in bonded joints | 24 |
| 6.4 | Manufacturing and interfaces requirements | 24 |
| 6.4.1 | Ensuring quality, reliability and reproducibility of manufacturing process by production engineering | 24 |
| 6.4.2 | Manufacturing requirements | 24 |
| 6.4.3 | Manufacturing process | 24 |
| 6.4.4 | Integration requirements and procedures | 25 |
| 6.5 | Quality assurance | 26 |
| 6.5.1 | General | 26 |

| | | |
|--------|-----------------------------------------------------------------------|----|
| 6.5.2 | Inspection | 26 |
| 6.5.3 | Acceptance proof test | 27 |
| 6.6 | Traceability | 27 |
| 6.7 | Deliverables | 27 |
| 6.7.1 | Identification of contractual deliverable products | 27 |
| 6.7.2 | Packing, handling, transportation | 27 |
| 6.7.3 | Storage | 28 |
| 6.8 | In-service requirements | 28 |
| 6.8.1 | Ground inspection | 28 |
| 6.8.2 | In-orbit inspection | 28 |
| 6.8.3 | Evaluation of damage | 28 |
| 6.9 | Maintenance requirements | 29 |
| 6.9.1 | General maintenance requirements | 29 |
| 6.9.2 | Preventive maintenance | 29 |
| 6.9.3 | Corrective maintenance | 29 |
| 6.10 | Repair and refurbishment | 30 |
| 7 | Verification of general requirements | 30 |
| 7.1 | General | 30 |
| 7.2 | Verification of design requirements | 31 |
| 7.2.1 | Introductory remarks for verification of design requirements | 31 |
| 7.2.2 | Verification of static strength | 31 |
| 7.2.3 | Buckling strength verification | 32 |
| 7.2.4 | Margin-of-safety (MS) verification | 33 |
| 7.2.5 | Stiffness verification | 33 |
| 7.2.6 | Verification of dynamic behaviour | 33 |
| 7.2.7 | Dimensional stability verification | 36 |
| 7.2.8 | Verification of tolerances and alignments and geometric control | 36 |
| 7.2.9 | Verification of thermal stress | 36 |
| 7.2.10 | Verification of thermal distortion | 37 |
| 7.2.11 | Verification of interface joints and connections | 37 |
| 7.2.12 | Verification of electromagnetic compatibility (EMC) | 38 |
| 7.2.13 | Verification of lightning protection | 38 |
| 7.2.14 | Verification of mass and inertia properties | 38 |
| 7.2.15 | Verification of fatigue life | 39 |
| 7.2.16 | Verification of fracture control | 40 |
| 7.2.17 | Verification of impact damage | 40 |
| 7.2.18 | Verification of stress-rupture life | 41 |
| 7.2.19 | Verification of corrosion and stress-corrosion cracking control | 41 |
| 7.2.20 | Outgassing verification | 41 |
| 7.2.21 | Verification of meteoroid and orbital debris shielding | 41 |
| 7.3 | Acceptance tests | 41 |
| 7.3.1 | Overview of acceptance tests | 41 |
| 7.3.2 | Non-destructive inspection (NDI) | 41 |
| 7.3.3 | Proof load and/or pressure test | 42 |
| 7.3.4 | Vibration and shock test | 42 |
| 7.4 | Qualification programme (qualification tests) | 42 |
| 7.4.1 | Overview of qualification tests | 42 |
| 7.4.2 | Inspection | 43 |
| 7.4.3 | Proof load and/or pressure tests | 43 |
| 7.4.4 | Vibration and shock tests | 43 |
| 7.4.5 | Qualification load and/or pressure tests | 43 |
| 8 | Special structural items | 44 |
| 8.1 | General | 44 |
| 8.2 | Special structural items with published standards | 44 |
| 8.3 | Special structural items without published standards | 44 |
| 8.3.1 | Overview of the requirements for special structural items | 44 |
| 8.3.2 | Beryllium structural items | 45 |
| 8.3.3 | Cryo structures and hot structures | 45 |
| 8.3.4 | Sandwich structures | 45 |

| | | |
|--------------|-------------------------------------------------------------------------------------|-----------|
| 9 | Documentation requirements | 45 |
| 9.1 | Interface control documents | 45 |
| 9.2 | Applicable (contractual) documents | 45 |
| 9.3 | Analysis reports | 46 |
| 9.3.1 | General | 46 |
| 9.3.2 | Stress analysis report | 46 |
| 9.3.3 | Fatigue or damage tolerance life analysis reports | 46 |
| 9.3.4 | Fracture/impact damage control plan/report | 47 |
| 9.3.5 | Inspection reports | 47 |
| 9.3.6 | Dynamic analysis | 47 |
| 10 | Data exchange | 47 |
| 10.1 | Data set requirements | 47 |
| 10.2 | System configuration data | 48 |
| 10.3 | Data exchange between design and structural analysis | 48 |
| 10.4 | Data exchange between structural design and manufacturing | 48 |
| 10.5 | Data exchange with other subsystems | 48 |
| 10.6 | Tests and structural analysis | 48 |
| 10.7 | Structural mathematical models | 48 |
| | Annex A (informative) Recommended best practices for structural design | 50 |
| | Annex B (informative) Design requirements verification methods | 60 |
| | Annex C (informative) Minimum design safety factors | 63 |
| | Annex D (informative) Margin of safety for combined loads | 67 |
| | Bibliography | 69 |