

Indian Space Standards: Design, Interface, Test, Operate, & EOL

Technical Directorate

Section 1 : Design Phase

- **IS 19265 : 2025 (ISO 17546)** — Lithium-Ion Batteries
- **IS 18896 : 2024 (ISO 22010)** — Mass Properties Control
- **IS 18913 : 2024 (ISO 16781)** — Simulation Requirements for Control Systems
- **IS 18893 : 2024 (ISO 10786)** — Structural Components and Assemblies

IS 19265:2025 ISO 17546 : 2016 Space systems - Lithium ion battery for space vehicles - Design and verification requirements

PRIMARY OBJECTIVE

To establish minimum design and verification requirements to ensure battery reliability and prevent hazardous incidents throughout the full lifecycle—from electrolyte filling to mission termination.

APPLICABILITY

- Systems: Secondary electrochemical systems (including Li-Po) used in space vehicles
- Scope: Covers both individual "component cells" and the final "battery assembly" across 10 lifecycle stages.

REQUIREMENTS

- State of Charge (SOC) Management, cell matching & Fault tolerance
- Acceptance Testing (Leak, internal resistance,) & Two-fault tolerant logic
- Environmental Control(Assembly), Transport safety tests & Traceability(logs)

OUTCOME

- Validated Life Estimation (Temp, Cycles, DOD)
- Flight Accreditation (Safety, Space Worthy)

IS 18896 : 2024 ISO 22010 : 2022 Space systems - Mass properties control

PRIMARY OBJECTIVE

To establish a documented and rigorous process for managing, controlling, and monitoring mass properties throughout the entire mission lifecycle to ensure all performance requirements are met.

APPLICABILITY

- Life Cycle: Spans from pre-proposal/conceptual design through launch, manoeuvres, and final end-of-life disposal
- Systems & Subsystems: Applies to the full launch vehicle down to individual wire harnesses, antennas, and propulsion units.

REQUIREMENTS

- Resource Allocation ("Not-to-Exceed" (NTE) mass limits)
- Governance: Mass Properties Control Board(MPCB)
- Subcontractor Control & Analytical Database

OUTCOME

- Launch Compatibility
- Operational Accuracy
- Auditability & Mass Margin Compliance

IS 18893 : 2024 ISO 10786 : 2011 Space systems - Structural components and assemblies

PRIMARY OBJECTIVE

To establish baseline requirements for design, material selection, fabrication, and testing to ensure high confidence in the structural integrity and reliable operation of space systems.

APPLICABILITY

- Scope: All structural items for expendable/reusable launch vehicles, satellites, and payloads.
- Exclusions: adaptive structures, engines, or thermal protection systems.

REQUIREMENTS

- Positive Margin of Safety (MS) & Fatigue Life
- Dynamic Coupling Prevention (avoid resonance)
- Non-Destructive Evaluation (NDE)

OUTCOME

- Fracture Control (validated "Safe-Life" or "Fail-Safe" architecture)
- Verified Build Quality (Inspection Master Plan: hardware matches to FEA Model)

IS 18913 : 2024 ISO 16781 : 2021 Space systems simulation requirements for control system

PRIMARY OBJECTIVE

To establish mandatory requirements for control system simulations, ensuring they accurately predict flight performance and reduce development time, cost, and risk.

APPLICABILITY

- From Design and prototyping to final integrated system verification.
- Subsystems: Applies to all "Closed-loop" systems

REQUIREMENTS

- Interface Mirroring
- Robustness Analysis
- Facility Standards & Configuration Management

OUTCOME

- Validated Performance (virtual test bench)
- Integrity Declaration (representative of the final flight hardware)

Section 2 : Form Factor & Interfacing

- **IS 18891 : 2024 (ISO 17770)** — Cube Satellite (CubeSat) Specifications
- **IS 19067 : 2024 (ISO/TS 20991)** — Requirements for Small Spacecraft
- **IS 18914 : 2024 (ISO 17401)** — Spacecraft-to-Rocket Interface Requirements (IRD)
- **IS 18897 : 2024 (ISO 17689)** — Ground-to-Rocket Interface Control (ICD)

IS 18914 : 2024 ISO 17401 : 2023 Space systems - Spacecraft interface requirements document for launch vehicle services

PRIMARY OBJECTIVE

Standardize the format for the Interface Requirement Document (IRD) to facilitate technical exchanges between spacecraft (SC) organizations and launch vehicle (LV) agencies (launch service application process)

APPLICABILITY

- Scope: All commercial launch vehicles (LV) and launch facilities worldwide.
- Content: Covers mission definitions, mechanical/electrical interfaces, environmental requirements, and ground range & support logistics.

REQUIREMENTS

- Mechanical Definition & fundamental natural frequencies
- Electrical Connectivity (umbilical, Cmds, Pyro)
- RF Signature for compatibility with LV

OUTCOME

- Technical Efficiency (Standard IRD)
- Logistical Readiness (facility, equipment, ground support)

IS 18897 : 2024 ISO 17689 : 2023 Space systems - Interface control documents between ground systems ground support equipment and launch vehicle with payload

PRIMARY OBJECTIVE

To establish essential Interface Control Documents (ICD) and coordination procedures that prevent design discrepancies across the "System-of-Systems" (Payload, Rocket, and Ground Site)

APPLICABILITY

- Life Cycle: Every stage from Preliminary Design Review (PDR) through Operations and Maintenance.
- Subsystems: Manages connections between the Payload, Launch Vehicle (LV), Ground Support Equipment (GSE), and Launch Site technical systems.

REQUIREMENTS

- Hierarchical Construction
- Unique Coding (digital ID for tracking)
- Parameter Ranges & Comprehensive Tables (all interfaces)

OUTCOME

- ICD must provide an explicit distribution of work and responsibility
- Verification of Design
- Risk Reduction (Fuel/gas)

IS 19067 : 2024 ISO/TS 20991 : 2018 Space systems requirements for small spacecraft

PRIMARY OBJECTIVE

To define the absolute minimum requirements for small spacecraft to assure safety, harmlessness to co-passengers/launchers, and mandatory debris mitigation.

APPLICABILITY

- Design, launch, deployment, operation, and disposal
- Small sat developers, dispenser providers, and launch operators.

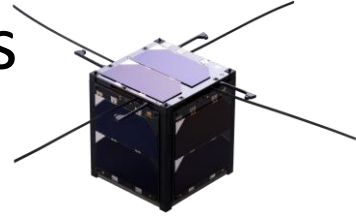
REQUIREMENTS

- Launcher ICD Adherence & Launch Readiness Contingency
- Multiple Power Inhibits & RF Compatibility
- Debris Mitigation (ISO 24113)

OUTCOME

- Risk-Based Assurance (Qualification of COTS)
- Harmlessness (Safe Co-Passenger)
- Absolute Safety Compliance (ISO 14620-1)

IS 18891 : 2024 ISO 17770 : 2017 Space Systems - Cube Satellites (Cubesats)



PRIMARY OBJECTIVE

To establish a standardized, low-cost cube-satellite platform that reduces development cycles and provides a reliable path for in-space hardware qualification.

APPLICABILITY

- Form Factor
- Mission Lifecycle: from mechanical design and material selection to launch integration and ejection

REQUIREMENTS

- Hazardous Inhibits & Energy Limits (100Wh)
- Surface Hardening (Cold welding)
- Activation Delays (Deployment and RF-TX)

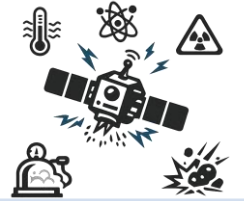
OUTCOME

- Structural Integrity
- Contamination Control (Outgassing)
- Verified Readiness (Vibration, TVAC, Shock)

Section 3: Testing Phase

- **IS 19217 : 2025 (ISO 19683)** — Small Spacecraft Design Qualification & Acceptance
- **IS 18912 : 2024 (ISO 15864)** — General Test Methods for Units/Subsystems
- **IS 19258 : 2025 (ISO 15865)** — Qualification Assessment

IS 19217:2025 ISO 19683 : 2017 Space Systems - Design Qualification And Acceptance Tests of Small Spacecraft And Units



PRIMARY OBJECTIVE

To establish minimum test requirements that guarantee reliability against "infant mortality" while maintaining the low-cost and fast-delivery nature of SmallSat projects.

APPLICABILITY

- Categories: Mini, Micro, Nano, Pico, Femto, and CubeSat.
- Scope: Focuses on hardware units and integrated systems. Does not cover standalone software or deployment PODs

REQUIREMENTS

- Environmental Tolerance (Vibration, Vacuum, Shock, Thermal, Radiation)
- COTS Risk Management & Full Traceability
- Functional & Mission Tests

OUTCOME

- Minimum environmental tests to prove that COTS-based products can survive
- Agreement-Based Tailoring
- Constellation Efficiency

IS 18912 : 2024 ISO 15864 : 2021 Space systems - General test methods for spacecraft , subsystems and units

PRIMARY OBJECTIVE

To establish a baseline for testing at the system, subsystem, and unit levels, ensuring that all unmanned spacecraft meet design, performance, and product assurance requirements.

APPLICABILITY

- Hardware Models: Applies to Qualification, Acceptance, and Proto-flight (PFT) hardware.
- Levels: Entire assembly hierarchy from single unit up to the full spacecraft

REQUIREMENTS

- Qualification test levels must exceed maximum predicted levels by a safety margin, and durations must be longer than the actual flight environment
- Baseline Functionality & Integrity Verification
- Trend Monitoring & Retest Discipline

OUTCOME

- Standardized Documentation & Global Acceptance
- Risk Reduction, Data Integrity & Traceability
- Verification of Design Maturity, Proven Flight Readiness and Manufacturing Assurance

IS 19258:2025 ISO 15865: 2022 Space systems - Qualification assessment

PRIMARY OBJECTIVE

To establish a standardized process for assessing the qualification of space products (hardware, software, and processes) against their technical specifications to determine readiness for any lifecycle stage.

APPLICABILITY

- Levels: Applies to the entire "Product Tree"—from small parts and materials up to full systems.
- Scope: Covers flight hardware, software, ground support equipment, and even the facilities and methods used to build them.

REQUIREMENTS

- Traceability
- Design Justification Data File(DJDF)
- Design Finalization & Operational Constraints

OUTCOME

- Reduced Uncertainty
- Insurability

Section 4 Mission Operations & Sustainability

- **IS 19279 (Part 1-3) : 2025 (ISO 10784-1-3):** Initialization, Commissioning, and Utilization.
- **IS 18890 : 2024 (ISO 14950)** — Unmanned Spacecraft Operability
- **IS 19069 : 2024 (ISO/TR 16158)** — Avoiding Collisions Among Orbiting Objects
- **IS 19292 : 2025 (ISO 16126)** — Debris Survivability & Post-Mission Disposal

IS 18890 : 2024 ISO 14950 : 2004 Space systems unmanned spacecraft operability



PRIMARY OBJECTIVE

To define the essential properties and requirements for on-board functions that enable a ground segment to operate the spacecraft efficiently in both nominal and contingency situations.

APPLICABILITY

- All unmanned missions
- Covers the entire mission lifetime
- Design is robust against human error and optimized for workload.

REQUIREMENTS

- Observability, Commandability and flexibility
- Single-Point Failure Protection & Autonomous Survival
- Critical Telecommand Validation

OUTCOME

- Efficiency & Reliability
- No single command shall lead to the loss of the space segment
- Risk Mitigation

IS 19279 (Part 1):2025 ISO 10784-1 : 2011 Space systems - Early operations Part 1 spacecraft initialization and commissioning



PRIMARY OBJECTIVE

To establish a common language and standardized format to verify and document the spacecraft (SC) initialization and commissioning for the transition of a spacecraft from its launch configuration (test article) to a certified mission asset.

APPLICABILITY

- Early Operations mission phase
- Applies to all major SC subsystems (Spacecraft configuration)
- Spacecraft commissioning report (All Stakeholder)

REQUIREMENTS

- Strategy Matrix
- Operational Sequence
- Abort Limits & Configuration Integrity

OUTCOME

- Formal Certification for mission commercialization/start
- Traceable Verification & Data-Driven Certification

IS 19075 (Part 2) : 2024 ISO 10784-2 : 2011 Space systems early operations part 2 initialization plan



PRIMARY OBJECTIVE

To establish a standardized form and format to document the spacecraft (SC) initialization plan, ensuring the configuration and verification of the SC as a "test article" during its transition to normal mission operations.

APPLICABILITY

- Early Operations mission phase with Ground-system requirements
- Applies to all major SC subsystems (Spacecraft configuration)
- Personnel & Stakeholders (Roles & Duties)

REQUIREMENTS

- Initialization Strategy Matrix
- Operational Constraints
- Tool Calibration & Traceability

OUTCOME

- Risk Mitigation
- Operational Readiness & Operational Traceability
- Verification Logic & checklists

IS 19075 (Part 3): 2025 ISO 10784-3 : 2011 Space Systems - Early Operations Part 3 Commissioning Report



PRIMARY OBJECTIVE

To establish a common language and standardized **reporting format** to verify and document spacecraft (SC) initialization and commissioning as the formal transition to normal mission operations.

APPLICABILITY

- From launch vehicle separation through to final certification for mission operations
- Applies to all major SC subsystems H/W & S/W

REQUIREMENTS

- "As-Run" Documentation
- Deviation & Contingency Tracking
- Performance Evaluation & Instrumentation Log

OUTCOME

- **Certification Readiness:** Delivery of the final commissioning recommendation, providing the legal and technical "Green Light" for the mission to begin.

IS 19069 : 2024 ISO/TR 16158 : 2021 Space systems - Avoiding collisions among orbiting objects



PRIMARY OBJECTIVE

To guide collaborative enterprises in sustaining the space environment by mitigating collision risks through structured Conjunction Assessment (CA) and evasive manoeuvring.

APPLICABILITY

- All mission phases involving orbit determination, probability estimation, and manoeuvring.
- Defining roles and information flows between s/c operators and SSA providers.

REQUIREMENTS

- 6X6 covariance matrices (3D position/velocity) at the Time of Closest Approach
- Mandatory use of ISO 26900 for exchanging orbital metadata

OUTCOME

- Valid probability estimates and justifiable manoeuvre decisions.
- Validated Safety
- Mitigation Strategy

IS 19292:2025 ISO 16126 : 2014 Space systems - Assessment of survivability of unmanned spacecraft against space debris and meteoroid impacts to ensure successful post -mission disposal



PRIMARY OBJECTIVE

Define procedures for assessing survivability of critical components against impacts to ensure successful post-mission disposal

APPLICABILITY

- **Systems:** All unmanned spacecraft subsystems required for the final de-orbit or disposal phase.
- **Focus:** Specifically targets "disposal-critical" items

REQUIREMENTS

- Quantitative Survivability (Probability of No Failure)
- Component Cataloguing
- Environmental Modelling & Reliability Linking(FMEA/FTA)

OUTCOME

- Regulatory Compliance & Global acceptance
- Robust design & Risk Mitigation
- Sustainable Space