

ISO 14620-1:2018 (E)

Space systems — Safety requirements — Part 1: System safety

Contents

| | |
|----------|---|
| | Foreword |
| | Introduction |
| 1 | Scope |
| 1.1 | General |
| 1.2 | Field of application |
| 1.3 | Tailoring |
| 2 | Normative references |
| 3 | Terms, definitions and abbreviated terms |
| 3.1 | Terms and definitions |
| 3.2 | Abbreviated terms |
| 4 | System safety programme |
| 4.1 | Scope |
| 4.2 | Safety organization |
| 4.2.1 | General |
| 4.2.2 | Safety representative |
| 4.2.3 | Reporting lines |
| 4.2.4 | Safety integration |
| 4.2.5 | Coordination with others |
| 4.3 | Safety representative access and authority |
| 4.3.1 | Access |
| 4.3.2 | Delegated authority to reject — stop work |
| 4.3.3 | Delegated authority to interrupt operations |
| 4.3.4 | Conformance |
| 4.3.5 | Approval of reports |
| 4.3.6 | Review |
| 4.3.7 | Representation on boards |
| 4.4 | Safety risk management |
| 4.4.1 | Safety risks |
| 4.4.2 | Hazard assessment |
| 4.4.3 | Preferred measures |
| 4.5 | Project phases and safety review cycle |
| 4.5.1 | Progress meetings |
| 4.5.2 | Project reviews |
| 4.5.2.1 | General |
| 4.5.2.2 | Mission definition review |
| 4.5.2.3 | Preliminary requirements review |
| 4.5.2.4 | System requirements review |
| 4.5.2.5 | Preliminary design review |
| 4.5.2.6 | Critical design review |
| 4.5.2.7 | Qualification review |
| 4.5.2.8 | Acceptance review |
| 4.5.2.9 | Flight readiness review |
| 4.5.2.10 | Operational readiness review |
| 4.5.2.11 | Launch commitment meeting |
| 4.5.2.12 | In orbit test review |
| 4.5.2.13 | End-of-life assessment |
| 4.5.3 | Safety programme review |
| 4.5.4 | Safety data package |
| 4.6 | Safety programme plan |
| 4.6.1 | Implementation |

- 4.6.2 Safety activities
- 4.6.3 Definition
- 4.6.4 Description
- 4.6.5 Safety and project engineering activities
- 4.6.6 Supplier and sub-supplier premises
- 4.6.7 Conformance
- 4.7 Safety certification
- 4.8 Safety training
 - 4.8.1 Overall training
 - 4.8.2 Participation
 - 4.8.3 Detailed technical training
 - 4.8.4 Product specific training
 - 4.8.5 Records
 - 4.8.6 Identification
- 4.9 Accident/incident reporting and investigation
- 4.10 Safety documentation
 - 4.10.1 General
 - 4.10.2 Customer access
 - 4.10.3 Supplier review
 - 4.10.4 Documentation
 - 4.10.5 Safety data package
 - 4.10.6 Safety deviations and waivers
 - 4.10.6.1 Request for deviation
 - 4.10.6.2 Description, analysis and rationale
 - 4.10.6.3 Identification and review
 - 4.10.6.4 Assessment of deviation
 - 4.10.6.5 Review and disposition
 - 4.10.6.6 Certification authority approval
 - 4.10.7 Verification tracking log
 - 4.10.8 Lessons-learned file
- 5 Safety engineering
 - 5.1 Safety engineering objectives
 - 5.1.1 General
 - 5.1.2 Elements
 - 5.1.3 Lessons learned
 - 5.2 Safety design principles
 - 5.2.1 Human life consideration
 - 5.2.2 Design selection
 - 5.2.3 System safety order of precedence
 - 5.2.4 Environmental compatibility
 - 5.2.5 Safe without services
 - 5.2.6 Fail safe design
 - 5.2.7 Hazard detection — Signalling and safing
 - 5.2.8 Access
 - 5.2.9 Safety risk reduction and control
 - 5.3 Failure tolerance requirements
 - 5.3.1 Basic requirements
 - 5.3.2 Software
 - 5.3.3 Payload interface
 - 5.3.4 Redundancy separation
 - 5.3.5 Failure propagation
 - 5.3.6 Design for minimum risk
 - 5.3.6.1 General
 - 5.3.6.2 Fracture control
 - 5.3.6.3 Safety factors
 - 5.3.6.4 Materials
 - 5.3.7 Probabilistic safety targets
 - 5.4 Identification and control of safety critical functions
 - 5.4.1 Identification
 - 5.4.2 Inadvertent operation
 - 5.4.3 Provisions
 - 5.4.4 Shutdown and failure tolerance requirements
 - 5.4.5 Electronic, electrical, electromechanical

- 6 Safety analysis requirements and techniques**
 - 6.1 General
 - 6.2 Assessment and allocation of requirements
 - 6.2.1 Safety requirements
 - 6.2.2 Additional safety requirements
 - 6.2.3 Define safety requirements — functions
 - 6.2.4 Define safety requirements — subsystems
 - 6.2.5 Justification
 - 6.2.6 Functional and subsystem specification
 - 6.3 Safety analysis
 - 6.3.1 General
 - 6.3.2 Mission analysis
 - 6.3.3 Feasibility
 - 6.3.4 Preliminary definition
 - 6.3.5 Detailed definition, production and qualification
 - 6.3.6 Utilization
 - 6.3.7 Disposal
 - 6.4 Specific safety analysis
 - 6.4.1 General
 - 6.4.2 Hazard analysis
 - 6.4.3 Safety risk assessment
 - 6.4.4 Safety analysis for hardware-software systems
 - 6.4.4.1 Safety critical function
 - 6.4.4.2 Requirements definition phase
 - 6.4.4.3 Architectural and detailed design phase
 - 6.4.4.4 Software code
 - 6.4.4.5 Space debris mitigation
 - 6.5 Supporting assessment and analysis
 - 6.5.1 General
 - 6.5.2 Warning time analysis
 - 6.5.3 Caution and warning analysis
 - 6.5.4 Common cause and common mode failure analysis
 - 6.5.4.1 Multiple failures
 - 6.5.4.2 Identification of requirements and scope
 - 6.5.4.3 Identification of common cause failures
 - 6.5.4.4 Analysis of common mode failures
 - 6.5.4.5 Integration of results
 - 6.5.5 Fault tree analysis
 - 6.5.6 Human dependability analysis
 - 6.5.7 Failure modes, effects and criticality analysis
 - 6.5.8 Sneak analysis
 - 6.5.8.1 Applicability
 - 6.5.8.2 Use of results
 - 6.5.9 Zonal analysis
 - 6.5.9.1 Definition
 - 6.5.9.2 Redundancy and objectives
 - 6.5.10 Energy trace analysis

- 7 Safety verification**
 - 7.1 General
 - 7.2 Tracking of hazards
 - 7.2.1 Hazard reporting system
 - 7.2.2 Status
 - 7.2.3 Safety progress meeting
 - 7.2.4 Review and disposition
 - 7.2.5 Documentation
 - 7.2.6 Mandatory inspection points
 - 7.3 Safety verification methods
 - 7.3.1 Verification engineering and planning
 - 7.3.2 Methods and reports
 - 7.3.3 Verification requirements
 - 7.3.4 Analysis
 - 7.3.5 Inspections

- 7.3.6 Tests
 - 7.3.7 Verification and approval
 - 7.4 Qualification of safety critical functions
 - 7.4.1 Verification
 - 7.4.2 Qualification
 - 7.4.3 Failure tests
 - 7.4.4 Verification of design or operational characteristics
 - 7.4.5 Safety verification testing
 - 7.5 Hazard close-out
 - 7.5.1 Safety assurance verification
 - 7.5.2 Safety approval authority
 - 7.6 Residual risk reduction
- 8 Operational safety
- 8.1 General
 - 8.2 Basic requirements
 - 8.3 Flight operations and mission control
 - 8.3.1 Launcher operations
 - 8.3.2 Contamination
 - 8.3.3 Flight rules
 - 8.3.4 Hazardous commanding control
 - 8.3.5 Mission operation change control
 - 8.3.6 Safety surveillance and anomaly control
 - 8.4 Ground operations
 - 8.4.1 Applicability
 - 8.4.2 Initiation
 - 8.4.3 Review and inspection
 - 8.4.4 Hazardous operations
 - 8.4.5 Launch and landing site requirements
 - 8.4.6 GSE requirements

Page count: 36