

# ISO 16615:2025-07 (E)

## Space systems - Stable operation requirements for spacecraft attitude and orbit control system

---

### Contents

Page

|  |          |
|--|----------|
| Foreword   | v        |
| Introduction   | vi       |
| <b>1 Scope</b>   | <b>1</b> |
| <b>2 Normative references</b>  | <b>1</b> |
| <b>3 Terms and definitions</b>   | <b>1</b> |
| <b>4 Stable operation general principles</b>                                     | <b>2</b> |
| 4.1 General  | 2        |
| 4.2 Classification of stable operation levels                                    | 2        |
| 4.2.1 General  | 2        |
| 4.2.2 Continuous operational service   | 2        |
| 4.2.3 Degraded performance operation   | 3        |
| 4.2.4 Emergency transitional operation   | 3        |
| 4.3 Factors affecting stable operation   | 3        |
| 4.3.1 General  | 3        |
| 4.3.2 Anomalies from known sources   | 3        |
| 4.3.3 Anomalies from unknown sources   | 3        |
| 4.4 Capability building for stable operation                                     | 3        |
| 4.5 Ground-based optimization and operational maintenance                        | 4        |
| <b>5 Data validity assessment requirements</b>                                   | <b>4</b> |
| 5.1 Basic principles of data validity judgement                                  | 4        |
| 5.2 Data validity assessment process   | 5        |
| 5.2.1 General  | 5        |
| 5.2.2 Status flag assessment   | 5        |
| 5.2.3 Data validity range assessment   | 5        |
| 5.2.4 Data continuity assessment   | 5        |
| 5.2.5 Data dynamism assessment   | 5        |
| 5.2.6 Data consistency assessment  | 6        |
| <b>6 Anomaly detection requirements</b>  | <b>6</b> |
| 6.1 Classification of anomaly levels   | 6        |
| 6.1.1 General  | 6        |
| 6.1.2 Component-level anomaly detection  | 6        |
| 6.1.3 System-level anomaly detection   | 6        |
| 6.2 Component-level anomaly detection  | 6        |
| 6.3 System-level anomaly detection   | 7        |
| <b>7 Software or hardware fault handling requirements</b>                        | <b>7</b> |
| 7.1 Fault classification   | 7        |
| 7.1.1 General  | 7        |
| 7.1.2 Software faults  | 7        |
| 7.1.3 Hardware faults  | 7        |
| 7.2 Software fault handling requirements   | 7        |
| 7.3 Hardware fault handling requirements   | 7        |
| <b>8 Safety boundary check requirements</b>                                      | <b>8</b> |
| 8.1 Principles of safety boundary checks   | 8        |
| 8.2 Requirements for safety boundary checks of spacecraft structure or mechanism | 8        |
| 8.3 Requirements for safety boundary checks of spacecraft energy                 | 8        |
| 8.4 Requirements for safety boundary checks of spacecraft propellant             | 8        |

|           |   |           |
|-----------|---|-----------|
| <b>9</b>  | <b>Requirements for emergency survival modes in the spacecraft's AOCS</b> ..... | <b>9</b>  |
| 9.1       | Classification of emergency survival modes .....                                | 9         |
| 9.1.1     | General .....   | 9         |
| 9.1.2     | Sun-oriented safety mode .....  | 9         |
| 9.1.3     | Stop-control safety mode .....  | 9         |
| 9.2       | Requirements for sun-oriented safety mode handling .....                        | 9         |
| 9.3       | Requirements for stop-control safety mode handling.....                         | 9         |
| <b>10</b> | <b>Cybersecurity requirements for AOCS</b> .....                                | <b>10</b> |
| 10.1      | General.....  | 10        |
| 10.2      | Encryption of telemetry data .....  | 10        |
| 10.3      | Access control for ground systems.....  | 10        |
| 10.4      | Anomaly detection for cybersecurity breaches.....                               | 10        |
| 10.5      | Fault handling in the event of a cyber-attack.....                              | 10        |
| 10.6      | Regular security updates and testing.....                                       | 10        |
|           | <b>Bibliography</b> .....   | <b>11</b> |