Feb 27th, 3:30 PM

International Organization for Standardization (ISO) activities for Long-Term Sustainability (LTS) of Space Activities

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https://commons.erau.edu/stm/2019/presentations/31
International Organization for Standardization (ISO) activities for Long-Term Sustainability (LTS) of space activities

Dan Oltrogge, Center for Space Standards and Innovation
About ISO

• ISO established in 1947 to promote standards in international trade, communications, and manufacturing
  • ISO general consultative status with UN ECOSOC since 1947

• ISO is an independent, non-governmental organization made up of members from national standards bodies of 163 countries

• “World's largest developer of international standards”

• “One country, one vote”
Globally, international standards …

… provide a reference framework and a common language to facilitate trade and technology transfer

… prioritize describing performance requirements and interfaces

… are verifiable and well-suited for contractual mechanisms

… ensure shared technical knowledge and compatibility

… provide scientific basis for health, safety and environmental legislation

Voluntary, consensus international standards can overcome political barriers, diplomatic objectives, and competitive rivalries.
ISO Governance Structure

- ISO General assembly and secretariat based in Geneva
- ISO has 245 technical committees
  - 100,000+ subject matter experts
  - 22,000 international standards
    - Languages: English, French, Russian
ISO air and space standards developed in TC20

• ISO/TC 20 develops and maintains standards for aircraft and space vehicles, including:
  • materials, components and equipment for construction and operation of aircraft and space vehicles
  • equipment used in the servicing and maintenance of these vehicles

• Over **600** published standards

• Over **200** in development

ISO TC 20/SC 1 Aerospace electrical requirements
ISO TC 20/SC 4 Aerospace fastener systems
ISO TC 20/SC 6 Standard atmosphere
ISO TC 20/SC 8 Aerospace terminology
ISO TC 20/SC 9 Air cargo and ground equipment
ISO TC 20/SC 10 Aerospace fluid systems and components
ISO TC 20/SC 13 Space data and information transfer systems
ISO TC 20/SC 14 Space systems and operations
ISO TC 20/SC 15 Airframe bearings
ISO TC 20/SC 16 Unmanned Aircraft Systems
ISO TC 20/SC 17 Airport Infrastructure
SC13 develops international space data standards

• SC13 is operated by the Consultative Committee for Space Data Systems (CCSDS)
  • Comprised of 11 space agencies
  • Standards available through ISO and also at: https://public.ccsds.org/default.aspx

• LTS-relevant CCSDS navigation data exchange messages:
  • Orbit Data Message (ODM)
  • Conjunction Data Message (CDM)
  • Tracking Data Message (TDM)
  • Attitude Data Message (ADM)
  • Events Data Message (EDM)
  • Reentry Data Message (RDM)

The ODM is the most popular SC13 standard today
SC14 develops best practices for space

• Space Systems & Operations
  • SC14/WG3: Space operations international standards.
  • SC14/WG7: Orbital debris mitigation international standards.

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SC14 core space debris mitigation standards

ISO TC20/SC14

WG1 Design
WG2 Integ. / test
WG3 Operations
WG4 Environment
WG5 Management
WG6 Materials
WG7 Debris

16158: Avoiding collisions
[16164: Disposal of satellites in LEO]
[16699: Disposal of orbital stages]
[23339: Propellant mass estimation]
[26872: Disposal of satellites at GEO]
27852: Determining orbit lifetime
27875: Re-entry risk management

14200: Meteoroid / debris models

11227: Test procedures for ejecta
16126: Survivability against impacts
[16127: Prevention of s/c break-ups]
18146: Space debris mitigation design and operations manual for S/C
20590: Space debris mitigation design and operations manual for LV
20893: Detailed debris mitigation requirements for LVOS
[21095: Procedure for limiting re-entry risk]
23312: Detailed debris mitigation requirements for S/C
26113: Space debris mitigation requirements

* [bracketed standards] will be merged/replaced
IADC guidelines have been codified as ISO standards through WG7’s Orbital Debris Mitigation Work Program since 2009.
Published ISO documents addressing LTS guidelines*

**LEGEND**
- SC13/SC14 already have a standard or work project to address LTS need
- No current standard or work project
- Need for international standard explicitly identified in LTS guideline
Compendium of space debris mitigation standards

- Appreciate UNOOSA assistance adding international standards to “Compendium document (5 Sep 18)"

**INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO) \(\text{STANDARDS AND TECHNICAL REPORTS}^*\)**

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<th>Measures</th>
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<tr>
<td>LDG</td>
<td>ISO 24119, 6.3.2 (Detailed in ISO 20939; 23312)</td>
<td>Recommendation 1</td>
<td>5.1</td>
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</table>
| GED      | ISO 24119, 6.1.1 | 5.3.1 | 235 km
| 1,000C+24A/m |
| Re-orbit at end of operation | ISO 24119, 6.1.2, 6.1.2.3 | -- | -- |
| 5.3.2.1: General Requirement | ISO 24119, 6.1.2.1 | -- | -- |
| Reduction of orbital lifetime | ISO 24119, 6.2.2 | Recommendation 2 | 5.2.2 (Monitoring) |
| Options for removal from the protected region | ISO 24119, 6.2.3 | Recommendation 5 | 5.2.1 |

Spacecraft operators

Academia

Commercial

Civil

Government

Operator best practices

IADC: Exchange, facilitate, review research; identify debris mitigation options

UN COPUOS consensus best practices (5 treaties + 21 LTS guidelines)

ITU best practices

Commercially viable international standards (ISO, CCSDS, etc.)

SDA: Self-formed STC

CONFERS: RPO/SSO

GVF: Global VSAT Forum

ESOA: EU S/C Ops

SIA: Satellite Industry

CSSMA: Smallsat Freq Mgmt

SIG: Satcom Innov Group

GSC: Global Sat. Coalition

Others…

National regulatory governance