



## MINUTES OF THE 30<sup>TH</sup> MEETING OF AIR AND SPACE VEHICLES SECTIONAL COMMITTEE

**DATE: 24.09.2024 (2 TO 3 PM)**

**CHAIRMAN: SHRI RAJEEV JYOTI (IN-SPACE)**

**MEMBER SECRETARY: RAVINDRA BENIWAL (BIS HQs)**

### **ITEM 0 WELCOME AND OPENING REMARKS**

*At the outset, Dr. APD Dwivedi, Scientist F & Head (TED) welcomed the Chairman and Members in the committee and requested everyone for active participation in standardization work*

*Thereafter, The Chairman of committee, Sh Rajiv Jyoti welcomed the members present in the meeting and directed member secretary to formally take up agenda of the day.*

### **ITEM 1 CONFIRMATION OF THE MINUTES OF LAST MEETING**

*There being no comments, the committee confirmed the minutes of last meeting.*

### **ITEM 2 SCOPE AND COMPOSITION OF THE COMMITTEE**

**2.1 & 2.2** *The committee deliberated on its existing scope and proposal from IN-SPACE to bifurcate the committee into Air and Space Vehicles as two separate committees. It was suggested that Air Vehicles may be merged with Unmanned Aerial Vehicles Committee and this committee can take up only space systems as its domain. Sh Manish Gupta from DGCA commented that there is division between manned and unmanned aircraft systems in DGCA also and merging both into single committee will pose difficulty in liaison.*

*After detailed deliberations, the committee dropped the proposal to bifurcate TED 14 and decided that a separate panel on 'Aerospace Requirements' to be created under TED 14 on similar lines with the existing panel on 'Space Systems' so that these two subjects can be dealt as sub-divisions and to put up recommendations before the sectional committee in order to increase work efficiency. The initial composition of the new panel will be finalized by BIS.*

### **ITEM 3 ISSUES ARISING OUT OF PREVIOUS MEETINGS**

*No issue was pending since last meeting.*

### **ITEM 4 DRAFT STANDARDS/AMENDMENTS UNDER FORMULATION/PUBLICATION**

**4.1** *The committee deliberated and decided to finalize the following documents for publication/printing-*

<b>Document Number</b>	<b>Document Title</b>
TED/14/22366(Identical To: ISO 21349: 2023)	Space Systems Project Reviews
TED/14/21434IS 13932: 1994(Identical To: ISO 2574:1994)	Aircraft Electrical Cables Identification Marking
TED/14/24558IS 12545: 1988(Identical To: ISO 10046: 1996)	Aircraft Methodology Of Calculating Cargo Compartment Volumes
TED/14/20706IS 7879 : Part 1: 1975	Glossary Of Aeronautical And Astronautical Terms Part 1 General
TED/14/22950(Identical To: ISO 17546 : 2016 )	Space Systems Lithium Ion Battery For Space Vehicles Design And Verification Requirements

TED/14/22938(Identical To: ISO 15863 : 2003)	Space Systems Spacecraft-To-Launch-Vehicle Interface Control Document
TED/14/22924(Identical To: ISO 14302 : 2022 )	Space Systems - Electromagnetic Compatibility Requirements
TED/14/22364(Identical To: ISO 16192: 2017)	Space Systems Experience Gained In Space Projects Lessons Learned Principles And Guidelines
TED/14/21356IS 12678: 1989(Identical To: ISO 11532:2018)	Aircraft Ground Equipment Graphical Symbols
TED/14/22936(Identical To: ISO 15388 : 2022)	Space Systems - Contamination And Cleanliness Control
TED/14/22922(Identical To: ISO 12208 : 2015 )	Space Systems - Space Environment (Natural And Artificial) - Observed Proton Fluences Over Long Duration At Geo And Guidelines For Selection Of Confidence Level In Statistical Model Of Solar Proton Fluences
TED/14/24556IS 8980: 1978(Identical To: ISO 1467:1973)	General Purpose Push-Pull Single-Pole Circuit-Breakers For Aircraft Performance Requirements
TED/14/22362(Identical To: ISO 15865: 2022)	Space Systems Qualification Assessment
TED/14/21135IS 7879 : Part 7: 1984	Glossary Of Aeronautical And Astronautical Terms Part 7 Air Traffic And Ground Services
TED/14/22977(Identical To: ISO/TS 18667 :2018 )	Space Systems - Capability-Based Safety Dependability And Quality Assurance Programme Management
TED/14/22946(Identical To: ISO 16694 : 2015 )	SPACE SYSTEMS The Measured Parameters At Firing Bench And Flight Tests Of Liquid Rocket Engines
TED/14/21448IS 6722: 1972(Identical To: ISO 43:2016)	Aircraft Jacking Pads
TED/14/20763IS 7879 : Part 6: 1978	Glossary Of Aeronautical And Astronautical Terms Part 6 Space Terms
TED/14/22934(Identical To: ISO 14952-6 : 2003)	Space Systems - Surface Cleanliness Of Fluid Systems - Part 6 : Precision-Cleaning Processes
TED/14/22975(Identical To: ISO/TR 17400 : 2021 )	Space Systems Space Launch Complexes, Integration Sites And Other Facilities General Testing Guidelines
TED/14/22943(Identical To: ISO 16457 : 2022)	Space Environment (Natural And Artificial) The Earth's Ionosphere Model International Reference Ionosphere Model And Extensions To The Plasmasphere
TED/14/22932(Identical To: ISO 14952-4 : 2003 )	Space Systems - Surface Cleanliness Of Fluid Systems - Part 4 : Rough-Cleaning Processes
TED/14/22916(Identical To: ISO 10784-2 : 2011)	Space Systems Early Operations Part 2 Initialization Plan
TED/14/21442IS 12043 : Part 1: 1987(Identical To: ISO 1949:1987)	Aircraft Electrical Connectors Design Requirement
TED/14/26250IS 14389: 1996	Aircraft-Pallet Dolley Functional Requirements
TED/14/20759IS 7879 : Part 4: 1980	Glossary Of Aeronautical And Astronautical Terms Part 4 Aerodynamics
TED/14/22941(Identical To: ISO/TR 16158 : 2021 )	Space Systems - Avoiding Collisions Among Orbiting Objects
TED/14/22930(Identical To: ISO 14952-2: 2003 )	Space Systems - Surface Cleanliness Of Fluid Systems - Part 2 : Cleanliness Levels
TED/14/22367(Identical To: ISO 23462: 2014)	Space Systems Guidelines To Define The Management Framework For A Space Project
TED/14/21437IS 11680: 1986(Identical To: ISO 4147:1997)	Aerospace Nuts, Hexagonal, Slotted (Castellated), Normal Height, Normal Across Flats, With MJ Threads
TED/14/24559IS 11437: 1985(Identical To: ISO 4116: 1986)	Air Cargo Equipment Ground Equipment Requirements For Compatibility With Aircraft Unit Load Devices
TED/14/20708IS 7879 : Part 2: 1975	Glossary Of Aeronautical And Astronautical Terms Part 2 Motion Of Aircraft
TED/14/22365(Identical To: ISO 17666: 2016)	Space Systems Risk Management
TED/14/22953(Identical To: ISO 17761 : 2015 )	Space Environment (Natural And Artificial) Model Of High Energy Radiation At Low Altitudes (300 Km To 600 Km)
TED/14/24557IS 12043 : Part 2: 1987(Identical To: ISO 2100:1987)	Aircraft Electrical Connectors Tests
TED/14/22949(Identical To: ISO 17540 : 2016 )	Space Systems Liquid Rocket Engines And Test Stands Terms And Definitions
TED/14/22937(Identical To: ISO 15862 : 2009 )	Space Systems Launch-Vehicle-To-Spacecraft Flight Environments Telemetry Data Processing
TED/14/22923(Identical To: ISO 14222 : 2022 )	Space Environment Natural And Artificial Earth's Atmosphere From Ground Level Upward
TED/14/22363(Identical To: ISO 16091: 2018)	Space Systems Integrated Logistic Support
TED/14/21157IS 8169: 1997(Identical To: ISO 6517:2013)	Air Cargo Certified Lower Deck Containers design And Testing
TED/14/22978(Identical To: ISO 14622 : 2000 )	Space Systems Structural Design Loads And Induced Environment

TED/14/22935(Identical To: ISO 14953 : 2000 )	Space Systems Structural Design Determination Of Loading Levels For Static Qualification Testing Of Launch Vehicles
TED/14/22921(Identical To: ISO 10785 : 2011 )	Space Systems Bellows Design And Operation
TED/14/20768IS 7879 : Part 8: 1987	Glossary Of Aeronautical And Astronautical Terms Part 8 Power Plant
TED/14/22976(Identical To: ISO/TR 11233 : 2014 )	Space Systems - Orbit Determination And Estimation - Process For Describing Techniques
TED/14/22945(Identical To: ISO 16679 : 2015)	Space Systems - Relative Motion Analysis Elements After LV/SC Separation
TED/14/22933(Identical To: ISO 14952-5 : 2003 )	Space Systems - Surface Cleanliness Of Fluid Systems - Part 5 : Drying Processes
TED/14/22917(Identical To: ISO 10784-3 : 2011 )	Space Systems Early Operations Part 3 Commissioning Report
TED/14/21443IS 11554: 1986(Identical To: ISO 4115:1997)	Methods Of Test For Air - Land Cargo Pallet Nets
TED/14/20760IS 7879 : Part 5: 1982	Glossary Of Aeronautical And Astronautical Terms Part 5 Aerodynes Heavier-Than-Air Aircraft
TED/14/22967(Identical To: ISO/TS 20991 : 2018 )	Space Systems Requirements For Small Spacecraft
TED/14/22931(Identical To: ISO 14952-3 : 2003 )	Space Systems - Surface Cleanliness Of Fluid Systems - Part 3 : Analytical Procedures For The Determination Of Non Volatile Residues And Particulate Contamination
TED/14/22915(Identical To: ISO 10784-1 : 2011)	Space Systems Early Operations Part 1 Spacecraft Initialization And Commissioning
TED/14/21439IS 12863: 1989(Identical To: ISO 9031:1987)	Air Cargo Equipment Handling Systems For Unit Load Devices (Ulds) Symbols For Pictorial Representation
TED/14/22942(Identical To: ISO 16159 : 2012 )	Space Systems Launch Pad And Integration Site Facility, System And Equipment Failure Analysis
TED/14/24656(Identical To: ISO 27026: 2023)	Space Systems Programme Management Breakdown Of Project Management Structures
TED/14/20757IS 7879 : Part 3: 1975	Glossary Of Aeronautical And Astronautical Terms Part 3 Structure
TED/14/22961(Identical To: ISO 19683 : 2017 )	Space Systems Design Qualification And Acceptance Tests Of Small Spacecraft And Units
TED/14/22940(Identical To: ISO 16126 : 2014 )	Space Systems - Assessment Of Survivability Of Unmanned Spacecraft Against Space Debris And Meteoroid Impacts To Ensure Successful Post-Mission Disposal
TED/14/22927(Identical To: ISO 14952-1 : 2003 )	Space Systems - Surface Cleanliness Of Fluid Systems - Part 1: Vocabulary

**4.2** The committee agreed on the changes proposed by P5 in draft standards as given in agenda.

## ITEM 5 REVIEW OF STANDARDS

**5.1** The committee noted the information given in the agenda.

**5.2** The committee deliberated and decided to Reaffirm the following standards for a further period of 5 years from its due date-

IS 10980 (Part 1) : 2014ISO 5855-1 : 1999Reviewed In : 2019	Aerospace - MJ threads: Part 1 general requirements (First Revision)
IS 10980 (Part 2) : 2014ISO 5855-2 : 1999Reviewed In : 2019	Aerospace - MJ threads: Part 2 limit dimensions for bolts and nuts (First Revision)
IS 10992 (Part 1) : 2003ISO 3324-1:1997Reviewed In : 2018	Aircraft tyres and: Part 1 specifications (First Revision)
IS 10992 (Part 2) : 2003ISO 3324-2:1998Reviewed In : 2018	Aircraft tyres and rims: Part 2 test methods for tyres (First Revision)
IS 7828 : 2008ISO 102:1990Reviewed In : 2018	Aircraft - Gravity filling orifices (First Revision)
IS 9086 : 2003Reviewed In : 2018	Aerospace - Universal head aluminium alloy rivets - Specification (First Revision)
IS 10980 (Part 3) : 2014ISO 5855-3 : 1999Reviewed In : 2019	Aerospace - MJ threads: Part 3 limit dimensions for fittings for fluid systems (First Revision)
IS 17095 : 2019ISO 16682:2015	Aerospace series - Terminology for clamping devices
IS 17096 : 2019ISO 10254 : 2016	Air Cargo and Ground Equipment " Vocabulary

**5.3** The committee deliberated and decided to Archive the following pre-2000 standards-

IS 10041 : 1981Reviewed In : 2021	Glossary of terms for airline technical operations
IS 10195 : 1982Reviewed In : 2019	General requirements for insulated air cargo containers
IS 10196 : 1982Reviewed In : 2018	Guidelines for transportation of dead body and cremated remains of human beings by air
IS 10240 : 1982Reviewed In : 2021	General requirements for electrical equipment for aircraft
IS 10241 (Part 3) : 1987Reviewed In : 2019	Specification for electric cables for aircraft: Part 3 nyvin type electric cables
IS 10515 : 1983Reviewed In : 2019	General requirements of main deck container/pallet loader for aircraft
IS 10610 : 1983Reviewed In : 2021	Aircraft pressure cabin ground test connections
IS 10628 : 1983Reviewed In : 2021	General requirements for aerospace bolts and nuts
IS 10682 : 1983Reviewed In : 2021	Specification for aircraft safety belts, lap type
IS 10869 (Part 1) : 1984Reviewed In : 2019	Specification for igloo: Part 1 non - Structural igloo
IS 10869 (Part 2) : 1984Reviewed In : 2019	Specification for igloo: Part 2 structural igloo assembly
IS 10965 : 1984Reviewed In : 2021	Specification for valves for aircraft tyre tubes
IS 11165 : 1985Reviewed In : 2021	Specification for aircraft seat rails and pins
IS 11436 : 1985Reviewed In : 2021	General requirements for ground handling and transport systems equipment for air cargo unit load devices
IS 11437 : 1985Reviewed In : 2021	Ground equipment requirement for compatibility with aircraft unit load devices
IS 11499 : 1996ISO 4117:1993Reviewed In : 2021	Air and air/land ,cargo pallets - Specification and testing (First Revision)
IS 11517 : 1985Reviewed In : 2022	Methods of test for air and air - Land cargo pallets
IS 11554 : 1986Reviewed In : 2021	Methods of test for air - Land cargo pallet nets
IS 12044 : 1987Reviewed In : 2019	Specification for mechanically operated switches for use in aircrafts
IS 12524 : 1988Reviewed In : 2019	General requirements for main deck baggage container loader
IS 12559 : 1989Reviewed In : 2019	General requirements for self - Propelled conveyor - Belt loader
IS 12559 : 1989Reviewed In : 2019	General requirements for self - Propelled conveyor - Belt loader
IS 12559 : 1989Reviewed In : 2019	General requirements for self - Propelled conveyor - Belt loader
IS 12842 : 1989Reviewed In : 2019	Tie - Down fittings - Aircraft net assemblies - Specification
IS 12842 : 1989Reviewed In : 2019	Tie - Down fittings - Aircraft net assemblies - Specification
IS 13153 : 1991Reviewed In : 2022	Aerospace plain hexagon nuts (MJ Series) strength classification 1100 mpa maximum operating temperature 235°C - Specification
IS 13259 : 1992ISO 7717:1985Reviewed In : 2018	Aircrafttow tractors - Performance requirements
IS 13283 : 1991ISO 7995:2002	Aerospace - Self - Locking, hexagon nuts (MJ Series) - Strength classification 1100 mpa
IS 13908 : 1993Reviewed In : 2019	Aircraft unit load devices - Loading and securing cargo - Guidelines
IS 14389 : 1996Reviewed In : 2022	Aircraft - Pallet dolley - Functional requirements
IS 14389 : 1996Reviewed In : 2022	Aircraft - Pallet dolley - Functional requirements
IS 14431 : 1997Reviewed In : 2019	Airport passenger bus - Functional requirements
IS 14432 : 1997Reviewed In : 2019	Air craft - Ambulift - Functional requirements

IS 14547 : 1998Reviewed In : 2018	Aircraft - Electrical cables and cable harnesses - Terminology
IS 14548 : 1998Reviewed In : 2018	Aircraft - Standby magnetic compass - Specification
IS 7073 (Part 2) : 1983Reviewed In : 2019	Glossary of terms relating to air cargo pallets and containers: Part 2 air cargo containers
IS 8396 : 1977Reviewed In : 2021	Specification for air cargo base sandwich panel
IS 8706 : 1978Reviewed In : 2021	Safety features for alternating current ground power units for aircraft - Servicing
IS 8762 : 1978Reviewed In : 2021	General requirements and testing of certified lower - Deck half - Size containers for high capacity aircraft
IS 8852 : 1978Reviewed In : 2021	Dimensions for general purpose push - Pull single - Pole circuitbreakers for aircraft
IS 8946 : 1978Reviewed In : 2021	General requirements for rotating electrical machinery for aircraft
IS 8981 : 1978Reviewed In : 2021	Specification for extra low voltage and low voltage spring return non - Latch switches for aircraft
IS 9088 : 1979Reviewed In : 2021	Specification for universal head nickel alloy rivets for aircraft
IS 9093 : 1979Reviewed In : 2021	Specification for 100 degree countersunk nickel alloy rivets for aircraft
IS 9156 : 1979Reviewed In : 2021	Specification for dc generators for aircraft
IS 9174 : 1979Reviewed In : 2021	Dimensions for single - Hole mounted lever - Operated switches for aircraft
IS 9290 : 1979Reviewed In : 2020	Specification for aircraft fuel servicing vehicles
IS 7879 (Part 5) : 1982Reviewed In : 2021	Glossary of aeronautical and astronautical terms: Part 4 aerodynes (Heavier - Than - Air - Aircraft)
IS 7879 (Part 6) : 1978Reviewed In : 2021	Glossary of aeronautical and astronautical terms: Part 6 space terms
IS 8252 (Part 1) : 1976Reviewed In : 2021	Environmental tests for aircraft equipment: Part 1 general
IS 6722:1972	Dimensions for Aircraft Jacking Pads (may be withdrawn as ISO 43 has been revised and IS 6742 formulated)
IS 7855/ISO TR 224	Aircraft - Declaration of design and performance for aircraft equipment - Standard form (ISO has withdrawn it)

#### **ITEM 6 INTERNATIONAL ACTIVITIES**

*The committee nominated the experts in various groups of ISO as finalized by the Panel on Space Systems (attached).*

#### **ITEM 7 FURTHER DISCUSSION ON PROPOSAL TO ORGANIZE MEETING OF ISO TC 20/ SC 14 IN INDIA**

*The committee agreed to host plenary meeting of ISO TC 20/SC 14 in 2026 in India and requested BIS to take further necessary actions. IN-SPACE proposed BIS to co-sponsor hosting the meeting in New Delhi as per suitable plan and venue decided by BIS.*

#### **ITEM 8 DATE AND PLACE OF NEXT MEETING**

*It was decided to host Next meeting of the committee in December in discussion with Chairman.*

#### **ITEM 9 ANY OTHER BUSINESS**

*There being no other business, the meeting ended with hearty vote of thanks to the Chair.*



भारत सरकार/ Government of India  
अंतरिक्ष विभाग/ Department of Space  
भारतीय राष्ट्रीय अंतरिक्ष संवर्धन एवं प्राधिकरण केंद्र  
Indian National Space Promotion and Authorization Centre  
अहमदाबाद – ३८० ०५८/Ahmedabad – 380 058

24<sup>th</sup> September 2024

Sub: Nominations for various Working Groups and Standard development at ISO

As part of the Panel BIS:TED14:P5 “Space Systems and Operations” a team was constituted comprising following members to review the nominations received for contributing in various working groups and development of ISO standards.

1. R.V. Kaushik
2. Rajeev Gambhir
3. Satyam Khushwaha &
4. Paragjyoti Garg

All the nominations received were deliberated based on the information provided regarding the expertise and experience on the relevant domain.

The following nominations have been recommended to the Sectional Committee BIS:TED14 “Air and Space Vehicle” for further processing.

**Working Group 2:** System requirements, verification and validation, interfaces, integration, and test

Sl. No.	Project Number	Name of Project	Personnel Identified	Designation, Organisation
1.	NWIP2022001	Requirements for Launch Vehicle Polarity Check	Mr Arun Devanathan	VP, Quality Assurance, Agnikul Cosmos
2.	NWIP2017005	Test Requirements for Liquid LV at Launch Site	Harish P	Manager/ Engineering/ Godrej Aerospace Division
3.	NWIP2017004	Test method for IMU navigation precision evaluation based on 6DOF vibration	Prof. Dipak Kumar Giri	Assistant professor, Department of Aerospace Engineering, IIT Kanpur
4.	NWIP2023001	Environmental control requirements for	Kuppuswamy D	Sr. Manager (Process & NPI), Sr. Manager (QA),

Sl. No.	Project Number	Name of Project	Personnel Identified	Designation, Organisation
		spacecraft assembly, integration and test		CENTUM ELECTRONICS LTD.
5.	NWIP2023002	Fiber optic components – Testing guideline	Prof Arup Lal Chakraborty	Professor, Electrical Engineering, IIT Gandhinagar
6.	NWIP2024001	Multi-axis Vibration Testing	Prof. Prof. Tanmay Dutt Mathur	Assistant professor, Department of Aerospace Engineering, IIT Kanpur

Additional Names for the working group to support in all the above standards are as follows:

- i. Rajat Kumar, Associate Scientist- Thruster, Manastu Space technologies
- ii. Santosh Joteppa, Director, Mechanical Design & Analysis, CENTUM ELECTRONICS LTD., BANGALORE
- iii. Sajo George, Associate Scientist- Thruster, Manastu Space technologies

#### Working Group 1: Design engineering and production

Sl. No.	Project Number	Name of Project	Personnel Identified	Designation, Organisation
1.	PWI	Magnetic design	Bhoopendrakumar Singh	Director, Power Electronics-Design, CENTUM ELECTRONICS LTD.
2.	PWI	Requirements for space science payloads re-flight	Priti Mehta	Chair Professor and Head, Department of Pharmaceutical Analysis, Institute of Pharmacy, Nirma University
3.	PWI	Lunar reference system for spatial coordinates	Prof. Balaji Devaraju	Assistant professor, Department of Civil Engineering, National Centre of



Sl. No.	Project Number	Name of Project	Personnel Identified	Designation, Organisation
				Geodesy, IIT Kanpur
4.	PWI	Lunar plain orthogonal mapping	Prof. Deepak Dhingra	Assistant professor, Department of Aerospace Engineering, IIT Kanpur

**Working Group 4: Space environment (natural and artificial)**

Sl. No.	Project Number	Name of Project	Personnel Identified	Designation, Organisation
1.	--	Radiation exposure from the atmosphere into space	Dr. K. Sankarasubramanian	Project Scientist, AdityaL1, Head, Science Application Group, URSC, ISRO
2.	--	Coronal mass ejections and solar wind	Dibyendu Nandi	Professor and Head, CESSI, IISER Kolkata

Additional Names for the working group to support in all the above standards are as follows:

- i. Prof. Gopal Hazra, Assistant professor, Department of Physics, IIT Kanpur

**Working Group 5: Space System Program Management and Quality**

Sl. No.	Project Number	Name of Project	Personnel Identified	Designation, Organisation
1.	NWIP	Space systems - COTS EEE components for space application - assurance requirements	Dr. Gopalsharma R. Joshi	Professor, Centre for Space Science & Technology, Dayananda Sagar University, Bangalore
2.	NWIP	Space system - Semiconductor integrated circuits for space application -	Dr Ashutosh Mishra	Assistant Professor Grade II, NIT Calicut

Sl. No.	Project Number	Name of Project	Personnel Identified	Designation, Organisation
		Verification and validation methods		
3.		Space system-Reliability Development / Growth testing	Dwivedi S	Consultant, CENTUM ELECTRONICS LTD.

**Working Group 8: Downstream space services and space-based applications**

1. Lt Col V S Velan, Founder, Elena Geo Systems

R. V. Kaushik  
 Convenor, BIS : TED 14 : P5,  
 Space Systems & Operations Panel