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Space systems — Flight-to-ground umbilicals

Systèmes spatiaux — Ombilicaux bord-sol

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 14, *Space systems and operations*.

This second edition cancels and replaces the first edition (ISO 15389:2001), which has been technically revised. It also incorporates the Amendment ISO 15389:2001/Amd 1:2005 and the Technical Corrigendum ISO 15389:2001/Cor 1:2006.

The main changes are as follows:

— addition of 4.9 on the prevention of accidental cross-connection.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

This document establishes the general requirements and criteria for flight-to-ground umbilical systems used by space systems. The purpose of this document is to establish uniform engineering practices and methods and to ensure the inclusion of essential requirements in the design of reusable flight-to-ground umbilical systems that support the launch of space systems. This document is not intended to define how to design umbilicals but to define the minimum requirements for umbilicals.

Prevention of accidental cross-connection of umbilical system connectors and couplings is extremely important. Launch vehicle and spacecraft assemblies and features are often unique, requiring many connectors and couplings to be in close proximity to each other. The accidental cross-connection of service lines can result in very serious and even tragic consequences. For example:

— supplying other gas or fluids;

— supplying gas or fluid under other pressure;

— supplying the electric power with other parameters;

— supplying an error signal (command).

Therefore, differences in design of connectors and couplings that are located close to each other should be significant. Such differences can be both in design and in marking for identification.

International cooperation in space engineering assumes international cooperation in design, manufacture, and operation. The application of uniform methods increases the reliability of space systems by minimizing the accidental cross-connection of connectors and couplings. The application of unified symbols promotes mutual understanding and personnel training.

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Space systems — Flight-to-ground umbilicals

1 Scope

This document defines the general criteria for the development of flight-to-ground umbilical systems used by a space system. These criteria apply to the service arms or equivalent mechanisms, umbilical carriers and plates, couplings, connectors, withdrawal and retract devices, handling mechanisms and control systems for mechanisms, as well as the prevention of accidental cross-connection.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 14625, *Space systems — Ground support equipment for use at launch, landing or retrieval sites — General requirements*

IEC 60364-5-54, *Electrical installations of buildings — Part 5: Selection and erection of electrical equipment — Chapter 54: Earthing arrangements and protective conductors*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
carrier
device that groups *coupling* (3.3) and *connector* (3.2) halves together to provide a common means for their positioning, retention, unlocking, and separation

Note 1 to entry: The term is commonly used in relation to the facility ground-side of umbilical *interfaces* (3.8).

3.2
connector
device, consisting of two halves, that permits engagement and disengagement of electrical circuits at an *interface* (3.8)

3.3
coupling
device, consisting of two halves, that permits transfer of fluid across and disconnection at an *interface* (3.8)

3.4
flanged connection
connection at which halves of *connectors* (3.2) or *couplings* (3.3) are mated by means of flanges

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