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Space systems — Safety requirements —

Part 2: Launch site operations

Systèmes spatiaux — Exigences de sécurité —

Partie 2: Opérations sur le site de lancement

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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 documents 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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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 third edition cancels and replaces the second edition (ISO 14620-2:2011), which has been technically revised.

The main changes compared to the previous edition are related to terms and definitions which have been aligned with ISO 10795.

A list of all parts in the ISO 14620 series can be found on the ISO website.

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.

Introduction

Space activities, carried out within the framework of outer space treaties adopted by the United Nations, may cause harm to people and create damage to public and private property and the environment. The variety of professional disciplines linked to space activities and the legal liabilities incumbent on countries require international regulations to protect Earth populations against the consequences of a possible mishap caused by these activities. The international treaties listed in Annex A define the liabilities for damage related to space activities.

This document pertains to exposed people (including populations and personnel), launch systems, manned or unmanned space vehicles, operations carried out on or from a launch site and associated procedures, natural environment, etc., during prelaunch (integration, test, checking, preparation, etc.) and launch activities.

This document is intended to be applied by any country, by any international organization, whether governmental or non-governmental, and by any operator undertaking space activities within the framework of outer space treaties adopted by the United Nations.

This document is intended to be applied by agencies, enterprises, manufacturers, customers, designers, operators, facility authorities, launch service providers, etc., participating in the activities carried out on or from a launch site, unless more restrictive requirements are imposed by the national regulations in effect on the launch site.

Space systems — Safety requirements —

Part 2: Launch site operations

1 Scope

This document specifies requirements for the safety liabilities of countries undertaking space activities or allowing operators to perform space activities on or from their territory under outer-space treaties adopted by the United Nations. It defines the safety responsibilities for the operators involved in commercial or non-commercial space launch activities. This document establishes the overall safety requirements to be observed on a launch site for prelaunch (integration, test, checking, preparation, etc.) and launch operations of a space object. It provides the basic principles to enable any operator to implement its own safety methods, tools and procedures to ensure the safety of people and personnel, public and private property, and the environment, in a consistent and uniform manner.

The safety requirements for system safety are defined in ISO 14620-1, and the requirements for the flight safety systems in ISO 14620-3.

2 Normative reference

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 10795, *Space systems — Programme management and quality — Vocabulary*

ISO 14620-1, *Space systems — Safety requirements — Part 1: System safety*

ISO 14620-3, *Space systems — Safety requirements — Part 3: Flight safety systems*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 10795 and the following apply.

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

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

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

3.1
authorization
permission granted to an *operator* (3.15) by a *responsible authority* (3.17) to perform specified space activities

Note 1 to entry: Space activities include conducting space operations, conducting *launch* (3.8) operations, operating one or more sites, and operating one or more space vehicles on or from one or more *launch sites* (3.11).

3.2
damage
loss of human life, personal injury or other health impairments, occupational illness, total or partial loss of public or private property, or degradations caused to the aforesaid property or to the environment

3.3
dangerous area
area associated with a mishap or a potential mishap, inside which the consequences are catastrophic or critical

3.4
flight plan
plan related to the in-flight *launch* (3.8) vehicle, including data directly or indirectly related to *launch site* (3.11) safety

3.5
flight safety
arrangements intended to control *safety risks* (3.19) from *launch* (3.8) through the flight of a *space object* (3.20), and to protect people, public and private property, and the environment, against any *damage* (3.2) that could be caused by in-flight manœuvres of this space object

3.6
ground safety
arrangements intended to reduce and control *safety risks* (3.19) identified in ground prelaunch and *launch* (3.8) activities of a manned or unmanned space vehicle

Note 1 to entry: Arrangements include protecting people, public and private property, and the environment, and completing and adjusting the *national regulatory laws* (3.14) related to occupational safety and health, workers, environment, space, etc.

3.7
inhibit
verifiable design feature intended to prevent a hazardous situation from occurring, that provides an interruption between an energy source and a function actuator

EXAMPLE An inhibit can be a function, a product, a hardware, a software, a physical property, or a technological device.

3.8
launch
initial action to place, or attempt to place, a launch vehicle and payload, if any, in a suborbital trajectory, in Earth orbit in outer space, or otherwise in outer space

3.9
launch complex
site assigned to or owned by a *launch* (3.8) vehicle *operator* (3.15) to operate a launch vehicle

3.10
launch phase
period which begins when the *launch* (3.8) vehicle is no longer in physical contact with the *launch complex* (3.9) or the carrier aircraft and continues up to the end of the mission assigned to it including disposal and passivation actions

Note 1 to entry: The launch phase ends when any planned and unplanned physical contact with the ground or destruction or breakdown of the vehicle takes place.

3.11
launch site
site necessary for the prelaunch and *launch* (3.8) operations of a space vehicle and for the in-flight operations during the *launch phase* (3.10)

3.12
launch site country
country that has jurisdiction over a specified *launch site* (3.11)

3.13
launch system
system made up of a *launch* (3.8) vehicle, the associated *launch complex* (3.9), *launch site* (3.11), payload, ground support equipment and associated airborne equipment (including software), control systems, navigation system, trajectories, procedures, necessary personnel, and any other associated items

3.14
national regulatory laws
set of official statutes of a country

Note 1 to entry: The official statutes include constitution, law, decree, administrative order, code, regulation, etc.

3.15
operator
governmental or non-governmental entities, international organization, or natural person carrying out a space operation independently and under its responsibility

3.16
residual safety risk
safety risk (3.19) associated with the hazards and/or hazardous situations remaining in a space system after eliminating hazards and hazardous situations as much as practical, and reducing the unacceptable safety risks

3.17
responsible authority
ministry, department, agency, subsection, or office of a government or international governmental organization, which is responsible for space activities including, but not limited to, *launch* (3.8) operations in a specified location or country

3.18
safe
property of an item and its environment that limits its potential for *damage* (3.2) to an acceptable risk

3.19
safety risk
measure of the potential consequences of a hazard considering the probability of the associated mishap, the harm caused to people and the *damage* (3.2) caused to public and private property and the environment

Note 1 to entry: The safety risk is defined to be differentiated from political, financial, industrial, project, and other risks.

Note 2 to entry: An example of a safety risk is the expected number of casualties.

3.20
space object
space vehicle of artificial earthly origin and any of its component parts, except space debris, if any

3.21
specific authorized operator
entity allowed or licensed to conduct a space operation in an independent way according to relevant applicable space law

4 Operator's safety responsibilities

4.1 General

The following subclauses define the general allocation of the safety responsibilities and requirements for the prelaunch (integration, test, checking, preparation, etc.) and launch operations related to a launch system. It is understood, in this document, that each operator is either duly authorized or

entered into an appropriate contract (specific agreement, commercial contract, etc.) with a responsible authority or an authorized operator. Several operators (e.g. launch site operator, site operator, launch vehicle operator, payload operator) can operate simultaneously on the same launch site. They can be concerned either with the same launch system or with different systems.

4.2 Occupational safety and health

It is presupposed that any operator carrying out operations on a launch site respects and applies the occupational safety and health requirements of the launch site country.

4.3 Ground and environment safety

4.3.1 Ground safety operator

Ground safety responsibilities and requirements vary among operators. Generally, the different operators should determine themselves how safety concerns should be met. However, on the same launch site, the following conditions or criteria may exist:

a) several operators can carry out hazardous operations simultaneously;

b) hazardous operations can cause harm to personnel or damage to private or public property (external to the launch site facilities) or the environment;

c) hazardous operations carried out by one operator can cause harm to personnel or property damage to another operator;

d) some hazardous operations are performed by several operators.

Therefore, ground safety responsibilities and requirements shall be allocated between a specific operator selected from all the authorized operators, the ground safety operator in this document, and other operators carrying out prelaunch (integration, test, checking, preparation, etc.) or launch operations on the launch site.

4.3.2 Ground safety operator responsibilities

Some ground safety responsibilities are general enough to be specified in this document.

The ground safety operator shall be approved by the national responsible authority of the launch site country to perform the activities related to its ground safety responsibilities.

The ground safety operator shall be responsible for:

a) identifying, supervising and coordinating the allocation of ground safety responsibilities and requirements among the operators;

b) specifying ground safety rules to be applied by the operators meeting one or more of the previous criteria (as described in 4.3.1) associated with the hazardous operations;

c) verifying the application of the specified rules;

e) reviewing and approving the procedures of hazardous operations meeting one or more of the previous criteria b), c) and d) and as described in 4.3.1;

f) supervising and coordinating hazardous operations meeting one or more of the previous criteria (as described in 4.3.1);

g) verifying that the emergency plans of the operators performing hazardous operations meeting one or more of the previous criteria (as described in 4.3.1) are consistent and in accordance with the approved emergency procedures;

h) defining the general safety training (as required in 6.6.2);

i) verifying and ensuring that the safety training of each operator is consistent and homogeneous with all the other training;

j) implementing resolutions for conflicts arising among the operators from hazardous operations;

k) coordinating with, and notifying, local government authorities, as appropriate, on all matters affecting public safety and environmental protection;

l) reporting any incident or accident to affected authorities (including local government authorities), and participating in mishap investigations and finding documentation;

m) communicating the safety lessons learned to the other operators;

n) setting up a ground safety organization capable of performing ground safety responsibilities;

o) developing and maintaining a consistent environmental safety policy that meets the regulatory requirements of the launch site country.

4.3.3 Operator responsibilities

Each operator (e.g. launch site operator, specific site operator, launch vehicle operator, payload operator) on a launch site shall be responsible for:

a) protecting personnel, property and the environment from any damage caused by its own hazardous items;

b) applying the ground safety rules issued from the ground safety operator;

c) developing, implementing, maintaining, taking into account, and abiding by its own ground safety rules, consistent with the other ground safety rules and the applicable requirements (occupational safety and health, workers, environment, space, etc.);

d) accepting the allocation of the appropriate ground safety responsibilities from the ground safety operator;

e) defining and implementing the associated ground safety arrangements that ensure the ground safety risks inherent in its operations are compatible with the stated safety objectives (as required in 5.3) and are safely controlled;

f) identifying the hazards and hazardous situations and assessing the associated ground safety risks by performing hazard analysis on its space vehicles, sites and operations, and eliminating the hazards and hazardous situations or reducing the unacceptable ground safety risks;

g) managing the residual ground safety risks inherent in its space vehicles, sites and operations (including procedures and personnel) to achieve safe operations;

h) performing the necessary functions to ensure safe operations;

i) developing, verifying, implementing and maintaining an emergency plan for the mishaps that can occur during its own hazardous operations;

j) participating in mishap investigations as required by the ground or flight safety operator;

k) defining and providing the specific safety training by site (as required in 6.6.3) related to its operations;

l) verifying that any worker has a valid safety accreditation (as required in 6.6.5) before beginning any hazardous operation;

m) setting up a ground safety organization capable of performing its ground safety responsibilities.

If the ground safety rules of a launch site and the occupational safety and health regulations of the country of a foreign operator performing space activities on this launch site are in conflict, then the