Order amending the Order of 31 March 2011 on the technical regulation pursuant to Decree No 2009-643 of 9 June 2009 concerning authorisations granted pursuant to Law No 2008-518 of 3 June 2008 on space operations

The Minister for the Economy, Finance and Industrial and Digital Sovereignty,

Having regard to Directive 98/34/EC of the European Parliament and of the Council of 22 June 1998 laying down a procedure for the provision of information in the field of technical standards and regulations and of rules on Information Society services, and in particular notification No 2010/0687/F;

Having regard to Law No 2008-518 of 3 June 2008 on space operations, in particular Articles 2 and 3 thereof;

Having regard to Decree No 2009-643 of 9 June 2009, as amended, on authorisations issued pursuant to the Law of 3 June 2008 on space operations, in particular Article 1 thereof;

Having regard to the Order of 31 March 2011, as amended, on the technical regulation pursuant to Decree No 2009-643 of 9 June 2009 concerning authorisations granted pursuant to Law No 2008-518 of 3 June 2008 on space operations

Having regard to the Order of 23 February 2022 on the composition of the three parts of the file referred to in Article 1 of Decree No 2009-643 of 9 June 2009 concerning authorisations granted pursuant to Law No 2008-518 of 3 June 2008, as amended, on space operations,

Hereby decrees:

PART 1: PRELIMINARY DEFINITIONS AND PROVISIONS

Article 1
(Definitions)

For the purposes of this Order, in addition to the terms defined in Article 1 of the aforementioned Law of 3 June 2008 on space operations, the following definitions apply:

‘Allocation’: the level of probability assigned to the occurrence of a dreaded or specified event when developing safety objectives;

‘Safety coefficient’: the ratio between the permissible limit of a parameter characterising a system or element and its maximum expected value under nominal operation. Its value incorporates the concept of dispersion specific to each domain concerned;

‘Constellation’: a group of space objects consisting of at least ten space objects working together for a common mission subject to a predefined orbital deployment plan. *See also ‘Megaconstellation’*.

‘Flight corridor’: the volume in which the launch or re-entry vehicle is likely to move, in light of normal dispersions;

‘Space debris’: any non-functional space object of human origin, including fragments and elements thereof, orbiting around Earth or re-entering the Earth’s atmosphere;

‘Deployer’: A device that carries a space object(s) as part of a multiple launch and releases it into orbit as requested by the client(s). Such a device, with or without propulsion, which releases one or more space objects after separation from the launcher, shall be subject to the orbital requirements specified in Part Three of this Order.
Note: A device without propulsion which releases space objects without separation or before separation of the launcher shall be subject to the requirements for launcher elements specified in Part Two of this Order.

‘On-board neutralisation device’: all on-board means involved in the neutralisation of the launch or re-entry vehicle;
Note: The on-board neutralisation device can be remotely controlled via external or autonomous means.

‘Catastrophic damage: loss of human life, immediate or delayed, or serious injury to people (irreversible damage to health, disability or permanent occupational disease).

‘Deck’: an element of a launcher, with or without propulsion, planned to detach itself at the end of its main mission.
Note 1: an orbital deck corresponds to a separate deck in orbit
Note 2: a hood constitutes a deck.

‘End of life’: end of the space object’s withdrawal from service or loss of control of the space object;

‘Irreversible moment’: for a launch operation, the moment the command is given that leads irreversibly to the take-off of the launch vehicle.

‘Launcher’: a self-propelled vehicle intended to put space objects into orbit;

‘Reusable launcher’: a launcher of which all or part of the elements undergo a recovery phase on Earth in order to be reused in a subsequent launch operation;

‘Safety margin’: the ratio between the permissible limit of a parameter characterising a system or element and its maximum expected value under normal operation multiplied by the safety coefficient;

‘Megaconstellation: a constellation containing at least one hundred space objects

‘Space object mission’: for each space object, this designates all the tasks or functions performed during the operational phase of the operation to control that object.

‘Neutralisation’: an intervention on the launcher or re-entry vehicle to minimise damage to people and property. In particular, it may be characterised by an action to cause the destruction, or to stop

the thrust, of a launch or re-entry vehicle in order to stop the flight of that vehicle or of a deck that is no longer functioning properly;

‘Nominal’: corresponding to the specifications or performance declared by the space object operator or designer;

‘Space object’: any object of human origin, whether functional or not during its launch, that stays in outer space or returns, including elements of an orbiting launcher;

‘Recovery phase’: During the launch phase, beginning with the separation of the reusable element from the main launcher and ending at the immobilisation of that element on Earth;

‘Withdrawal from service phase’: the final phase of the space operation during which actions to secure the space object are carried out in order to limit risks related to space debris;

‘Operational phase’: a period of time which, as part of a control operation in outer space, begins at the moment the operator takes control of the space object or group of coordinated space objects and ends at the beginning of the withdrawal from service phase;

‘Procedure’: the specified manner of carrying out an activity or process;

‘Process’: a set of correlated or interactive activities that transform input elements into output elements;

‘Protected regions’:

1. Protected Region A, Low Earth Orbit (LEO) – a spherical region extending from the Earth’s surface to an altitude ~~(Z)~~ of 2 000 km;

2. Protected region B, geosynchronous region – a segment of the spherical envelope defined as follows:

— lower limit = geostationary altitude minus 200 km;
— upper limit = geostationary altitude plus 200 km;
— latitude between -15 and +15 degrees;
— geostationary altitude (~~Z~~ GEO) = 35 786 km (gestationary Earth orbit altitude);

‘Controlled re-entry’: the re-entry into the atmosphere of a space object with a ~~predefined~~ predicted area of contact or impact ~~on the ground~~ on Earth of the object or its fragments. A controlled re-entry can be done either on site with precision, or by targeting a limited area with a certain level of confidence.
Note:

- *Examples of on-site re-entries with precision: reusable launcher decks, space objects, etc.*
- *Example of re-entries targeting a limited area with a certain level of confidence: controlled re-entry of orbital decks for one-use launchers, etc.*

‘Uncontrolled re-entry’: the re-entry into the atmosphere of a space object for which it is not possible to ~~predefine~~ predict the area of impact ~~on the ground~~ on Earth of the object or its fragments;

~~‘Return’: a period which begins with the re-entry of the space object into the Earth’s atmosphere and ends when it is immobilised on Earth, as part of a controlled or uncontrolled re-entry;~~

‘Technical risk’: a risk of technological, industrial, operational, human or natural origin. An expression used to differentiate a risk of a technical nature from any other type of risk, in particular of a financial nature or relating to the security of the installations;

‘Security’: all provisions to control risks with the aim of ensuring the protection of persons, property and the protection of public health and the environment;

‘Orbital service’: a service carried out by a *service vehicle* and which requires a meeting and/or approach and/or contact phase with a *target object* such as: inspection, capture, docking, orbital transfer, repair, assembly, fluid transfer, undocking. To that end, the following definitions shall apply:

- ‘Operator of a *service vehicle*’: An entity that conducts service activities in orbit.
- ‘Service vehicle’: A space object that performs service operations in orbit.
- ‘Target object’: Space object (including space debris) served by the *service vehicle*.
- ‘Composite’: A set composed of the *service vehicle* and the target object after a Capture.
- ‘Capture’: Action to establish a physical connection between two space objects.
- ‘Area of proximity’: Volume around the *target object* in which a series of orbital manoeuvres dictated by the relative positions, speeds and attitudes of the two objects, makes it possible to place and keep the *service vehicle* in the immediate vicinity of *target object*.
- ‘Meeting phase’: A phase during which two space objects are intentionally brought to the area of proximity through a series of orbital manoeuvres at a defined and planned time and place.
- ‘Approach phase’: A series of orbital manoeuvres carried out in the area of proximity to position and keep a vehicle in the environment close to the *target object* according to a planned and defined trajectory, for the duration necessary for the mission.
- ‘Contact phase’: A phase consisting of the following 3 steps:
    - The final translation of the *service vehicle* towards the *target object* beyond the point of no return until contact is made
    - Capture of the *target object*,
    - Stabilisation of the *composite*.
- ‘Attached phase’: A phase during which the two objects form the *composite*.
- ‘Separation and removal phase’: A series of manoeuvres to ensure the physical separation of the *target object* and the *service vehicle* and the distance from the *service vehicle* beyond the area of proximity.
- ‘Parking point’: A waiting area outside the area of proximity to maintain a constant relative distance to the target object during which the *service vehicle* is on hold before initiating manoeuvres taking him to a nearby area
- ‘Point of no return’: The point in the approach phase at which fallback manoeuvres are excluded.
- ‘Corridor’: the volume in which the service vehicle is likely to move, in light of normal dispersions;

‘Space system’: a set consisting of one or more space objects and associated equipment and facilities to fulfil a given mission.

As a launch operation, the space system is a set consisting of the launcher, from the launch base to the interface, including the tracking systems ~~stations~~ (networks of terrestrial stations and satellites)and the space object or objects intended to be launched;

In the case of a control operation, the space system is a set consisting of the space object(s) and the ground segment in an interface;

‘Launch vehicle’: a set consisting of the launcher and space objects intended to be put into orbit;

‘Re-entry vehicle’: A space object, not constituting the launch vehicle, designed to land in an integral manner on Earth after an orbital or sub-orbital flight phase.

Article 2

Introductory provisions

1. The purpose of this Order is to specify the technical regulations on the basis of which the Minister for Space issues, following a conformity check carried out by the National Centre for Space Studies, an authorisation for conducting a space operation, in accordance with the law of 3 June 2008 referred to above.

2. The provisions of this Order shall apply to the space operations referred to in Articles 2 and 3 of the above-mentioned Law of 3 June 2008, with the exception of those for which exemption from conformity monitoring is granted under the conditions of Article 4(4) of the aforementioned Law.

3. The provisions of this Order shall apply only to:

a) A launch operation of a launch vehicle which fulfils the following three cumulative criteria:

- it takes off from the ground;
- jet propulsion;
- unmanned flight;

b) A control operation in outer space of an unmanned space object or group of coordinated space objects;

c) A return operation to Earth of an unmanned space object;

The technical regulations applicable to space operations not mentioned above will be the subject of a specific order.

4. Compliance with the requirements of this Order shall not exempt the operator from liability for damages caused to third parties, as provided for in Article 13 of the above-mentioned Law of 3 June 2008.

5. Officials who, pursuant to Article 7 of the aforementioned Law of 3 June 2008, are authorised to monitor compliance with the technical requirements laid down by reference to these technical regulations and annexed to the authorisation order shall be placed under the authority of the President of the National Centre for Space Studies under the conditions laid down by the authorising order.

PART 2: LAUNCH OF A SPACE OBJECT AND RETURN TO EARTH OF THE ELEMENTS OF THE LAUNCHER

TITLE I: SCOPE

Article 3

The provisions of this Part shall apply to the launch operation, until the end of life of the decks and the elements of the launcher, or, where applicable, until their recovery.

TITLE II: TECHNICAL FILE

CHAPTER I: DOCUMENTATION TO BE PROVIDED [REPEALED]

Article 4
Repealed – see the Joint Order on the composition of the file

Article 5
Repealed – see the Joint Order on the composition of the file

Article 6
Repealed – see the Joint Order on the composition of the file

Article 7
Repealed – see the Joint Order on the composition of the file

Article 8
Repealed – see the Joint Order on the composition of the file

Article 9
Repealed – see the Joint Order on the composition of the file

Article 10
Repealed – see the Joint Order on the composition of the file

CHAPTER II: QUALITY SYSTEM REQUIREMENTS

Article 11
Quality assurance.

1. The launch operator must implement and manage, for the conducting of the space operation, a quality management system as well as internal standards and quality management provisions. This management system must deal with quality assurance, operational safety, configuration management and the carrying out of works.

2. The space system must be designed, produced, integrated and implemented in such a way as to control the risks posed by critical activities. An activity is considered critical if a human error or a failure in the means used increases the risk of harm to people during the launch operation.

3. A system for monitoring and controlling deviations in manufacturing and implementation must be introduced. This system must allow the traceability of technical and organisational facts affecting

engineering and production activities.

4. The quality management system must address, in particular, the following technical or organisational facts:

— deviations (anomalies, developments) from the configuration (definition, production process and implementation of the launch system) which were authorised or, where applicable, licensed;

— deviations (anomalies, developments) resulting from the operation of the parameters recorded in flight which may call into question the conditions under which the authorisation or, where applicable, the licence was acquired.

5. The description and justification of the behaviour of the launcher and the definition of the materials used must be retained until the end of the space operation concerned. At the end of this process, these elements are transmitted to the National Centre for Space Studies with a description of the state reached.

Article 12
Competence, means, organisation and facilities.

The launch operator must have the necessary skills, means and organisation to prepare and implement the planned launch operation:

— appropriate facilities and organisation;
— equipment, tools and equipment suitable for the proposed operation;
— documentation of tasks and procedures;
— access to data relevant for the preparation of the proposed operation;
— recording, operation and archiving of technical data;
— key positions and associated training processes.

Article 13
~~Technical visibility~~ Technical and organisational facts.

The launch operator must set up an organisation enabling it to inform, pursuant to Article 7 of the aforementioned Decree of 9 June 2009, the National Centre for Space Studies without delay of all the technical or organisational facts referred to in Article 11(4) of this Order, as well as the progression of their treatment until their closure.

Article 14
Technical reviews.

1. The launch operator must plan technical reviews intended to verify the implementation of the provisions of this Order. These reviews may also be carried out as part of reviews conducted by others, as part of development and operational activities.

2. The launch operator must inform the National Centre for Space Studies of the pre-launch reviews done. Officials authorised under Article 7 of the aforementioned Law of 3 June 2008 may assist.

Article 15
Co-contractors, subcontractors and clients.

1. The launch operator must ensure that its contractors, subcontractors and clients apply ~~the~~ any

provisions necessary to establish and maintain compliance with this technical regulation.

2. The launch operator is responsible for ensuring that the persons referred to above apply the provisions relating to the organisation, quality assurance and engineering in accordance with standards and practices recognised by the profession.

3. In the event that the launch operator is legal entity different from the launcher provider, the launch operator is responsible for ensuring the application of the provisions described in Articles 11 and 12 of this Order by the launcher provider.

4. The launch operator is responsible for ensuring that its clients apply the provisions ensuring compatibility (geometric, mechanical, dynamic, thermal, electromagnetic, radio) between space objects intended to be put into orbit and the launch system, and to verify that they are taken into account.

CHAPTER III: SPECIFIC TECHNICAL REQUIREMENTS FOR LAUNCH OPERATIONS

SECTION 1: GENERAL TECHNICAL REQUIREMENTS RELATING TO THE LAUNCH OPERATION

Article 16

Evidence required.

1. To ensure technical control of the system and procedures in relation to the dreaded events referred to in Article 7 of the aforementioned Order of 23 February 2022 ~~on the composition of the files referred to in Article 1 of Decree No 2009-643 of 9 June 2009 on permits issued pursuant to Law No 2008-518 of 3 June 2008, as amended, on space operations~~, the launch operator shall comply with the following provisions:

a) It shall use a technical reference standard;

b) It shall take into account the climate environment in which the system is operated;

c) It shall ensure the ability of the launch system and its subsystems to fulfil the mission, taking into account:

- the definition, the sizing;
- the trial runs and/or models, the recalibration and accuracy of associated models, which must highlight the interfaces and interactions between the different subsystems and between the different disciplines;
- the safety coefficients and safety margins;
- the configurations of the launching means on the ground interfacing with the launcher (monitoring thresholds);

d) It shall ensure the control and reproducibility, where appropriate, of industrial manufacturing, inspection and implementation processes.

e) It shall take into account, in the design, the operational safety analyses, including reliability assessments and identifications of criticalities;

f) It shall take into account, where appropriate, a post-flight revalidation plan for reusable launcher elements;

~~f~~ g) It shall take into account the measures resulting from risk analyses of the launch system and risk analyses in operations;

~~g~~ h) It shall take into account the feedback from the processing of technical facts relating to development, production, testing and flights;

~~h~~ i) It shall develop scenarios for the fragmentation and generation of space debris during th ere-entry or neutralisation of the launch vehicle.

2. Compliance with the provisions laid down in point 1 of this Article must be guaranteed in each of the following cases:

- the flight envelope, (in the nominal case, cases with uncertainties associated with dispersions and unknowns);
- the extreme envelope;
- non-nominal cases (faults).

Such evidence must cover:

- all phases of the system's lifetime, including where appropriate the recovery phase
- all the stabilised and transitional phases encountered.

3. For the implementation of the provisions described in point 1 of this Article, the operator shall:

a) Characterise the envelope of nominal and extreme developments of the launch vehicle (free movement with six degrees of freedom of the launch vehicle);

b) Assess the reliability of the launcher in this envelope, in particular with regard to:

- its mechanical strength (propulsion systems, main structures and subsystems);
- the performance of propulsion and pyrotechnic systems;
- the performance of flight drive transmissions (including electrical, hydraulic and software systems);
- if required, the reliability of the on-board neutralisation device and its effect on the fallout zones.

c) Determine:

- the minimum value in terms of impact and dynamic pressure ensuring the structural failure of the launcher;
- the fragmentation (amount of debris, geometry, mass, material characteristics) of all or part of the launch vehicle depending on the origin of the destruction, mechanical or thermal scenarios.

d) With regard to ~~the~~ implementation operations related to the preparation of the launch ~~on the ground~~:

- analyse the risks associated with the timing of the launch operation, to ensure that the expected state is reached at the irreversible moment;
- ensures that preparation operations have no impact on the reliability of the launch vehicle during the launch operation, by analysing all manufacturing, integration and control operations carried out directly by human intervention, or remotely via a control-command system.

4. For a reusable launcher element, provisions 1 to 3 of this Article shall cover its entire life cycle.

Article 17
Specific mission analysis.

For the planned specific launch operation, and in addition to the provisions laid down in Article 16 of this Order, linked to the generic definition of the launch system for a given family of missions, the operator shall:

1. Ensure that the scope of use of the launch vehicle is respected;

2. Ensure the compatibility of objects intended to be put into orbit with the ~~launch vehicle~~ launcher environments (geometric, mechanical, dynamic, thermal, electromagnetic, radio);

3. Determine the load levels of the launch vehicle, including space objects intended to be launched (dynamic and thermal loads);

4. Ensure that the load separation systems are compatible with the launch vehicle environments;

5. Where appropriate, ensure, for a reusable launcher element, compliance with the post-flight revalidation plan referred to in Article 16(1) of this Order, with a view to its re-use;

6. Ensure that the actual characteristics of the launcher specimen used for the mission comply with the theoretical definition presented in accordance with Article 16 of this Order;

7. Where appropriate, ensure that deviations (anomalies, developments) from the configuration that are qualified in accordance with the provisions of Article 16 of this Order (definition, production process, implementation and, where appropriate, post-flight revalidation) and those resulting from the operation of the parameters recorded in flight are analysed and made technically acceptable;

8. Ensure the acceptability of the mission-specific trajectory optimised in relation to the risks involved;

9. Ensure that there is no risk of collision between the launcher and its satellites and between different satellites until they start to manoeuvre or, at most, for five days after the end of the phase of withdrawal from service of the launch vehicle;

10. Define a flight corridor around the nominal trajectory, until launch into orbit, or until the end of the on-site recovery phase for reusable launcher elements;

11. Determine the sizing and position of the fallout tasks for non-orbiting elements, including air and maritime traffic information;

12. Define end-of-life choices for the elements put into orbit pursuant to the provisions of Articles 20 and to points 4, 5, 6 and 7 of Article 21 of this Order and, where appropriate, determine the fallout zones;

13. Ensure the validity of the flight control settings and the mission-specific flight software to ensure the proper functioning of the flight software;

14. Where applicable, for the on-board ~~automatic~~ neutralisation means of the launch vehicle and, where applicable, ro4 reusable decks:
— define the settings from the analysis of simulated trajectories, including non-nominal cases;
— determine the sizing and position of the debris fallout tasks following the neutralisation;

— ensure the validity of the thresholds of the specific algorithms of the ~~flight software for neutralising~~ software triggering the neutralisation of the launch vehicle and, where applicable, of the reusable decks, in order to demonstrate its proper functioning.

Article 18

On-board neutralisation means.

For the launch phase:

The launch operator shall identify faults causing abnormal situations leading to the launch vehicle becoming dangerous, in particular in the following cases:

- exit of the predefined flight corridor;
- dangerous fallout and recovery phase of the elements predicted to detach;
- non-nominal flight control behaviour;
- non-orbiting of the upper composite.

The operator must deduce qualitatively and quantitatively, whether or not there is a need for ~~on-board automatic~~ means enabling the launch vehicle to be neutralised before the moment when the site of impact is identified, in whole or in part, in a territory under the sovereignty of any State encountered along its nominal trajectory, including its ~~those tangential to the~~ territorial seas ~~of the first of any State encountered along the nominal trajectory~~. Where such means are necessary, the operator must have their definition and configuration made as required under Article ~~17-11~~17-14 of this Order.

The neutralisation of the launch vehicle can be triggered by a remote order or automatically by an autonomous safeguard system. In this second case, the definition elements and the results of validation tests, including the demonstration of the proper functioning of the autonomous safeguard system in all non-nominal flight cases, must be communicated to the National Centre for Space Studies.

In the case of an autonomous neutralisation system, a preliminary conformity file as provided for in the first paragraph of Article 11 of the aforementioned Decree of 9 June 2009 and in the Part 4 of this Order shall be submitted to the National Centre for Space Studies.

For controlled re-entry:

The launch operator shall identify faults causing abnormal situations leading the propulsive element of the launcher put into orbit to become dangerous, in particular in the case of non-control of the level or direction of the thrust.

The operator must define the automatic on-board means and the associated criteria for carrying out the controlled re-entry of the propulsive element put into orbit, respecting the aims of Articles 20 to 23 of this Order.

Article 19

~~Component monitoring~~ In-flight tracking, major flight anomaly and associated feedback.

1. The operating settings of the ~~launch vehicle~~ launcher, including the positions and speeds of the latter, having an impact on the control of risks resulting from the hazard assessment and the impact assessment referred to in Articles 7 and 8 of the aforementioned Order of 23 February 2022 ~~on the~~

~~composition of the files referred to in Article 1 of Decree No 2009-643 of 9 June 2009 on permits issued pursuant to Law No 2008-518 of 3 June 2008, as amended, on space operation~~ must be acquired, retransmitted on the ground, recorded and operated by the launch operator. Any deviation of these parameters from the expected baseline constitutes a technical fact, an analysis of which must be carried out ex post for any recurrent launch system.

2. In the event of a major flight anomaly calling into question the hazard assessment and associated risk reduction actions, the launch operator must organise a board of inquiry, to analyse the causes of the anomaly encountered and to identify the corrective measures to be implemented allowing return to flight, involving experts from the National Centre for Space Studies.
At the end of the inquiry and prior to the return to flight, the launch operator must present to the National Centre for Space Studies, in particular to the agents authorised under Article 7 of the Law of 3 June 2008 of the National Centre for Space Studies concerned:

- the results of the investigations carried out;
- the recommendations issued by the Board of Inquiry and the resulting action plan;
- and then provide the following documents:
- the Board of Inquiry's report;
- the evidence demonstrating that the recommendations issued by the Board of Inquiry have been taken into account;
- where appropriate, the updating of the documents in accordance with Articles 4 to 10 of the aforementioned Order of 23 February 2022.

SECTION 2: QUANTITATIVE TARGETS FOR HUMAN SAFETY

Article 20

Quantitative targets for human safety.

1. For the sum of risks of catastrophic damage, the launch operator must meet the following quantitative objectives, expressed as the maximum permissible probability of at least one victim (collective risk):

a) Risk at launch (excluding the recovery phase of reusable launcher elements):

$2*10^{-5}$ for the ~~launch~~ flight phase between take-off of the launch vehicle and the beginning of orbiting, including taking into account the degradations of the launch system and including the fallout of the elements predicted to detach from the launcher without being put into orbit;

10^{-7} by nominal element fallout for the elements predicted to detach from the launcher without being put into orbit, in accordance with Article 23(1) of this Order.

b) Risk at re-entry (excluding the recovery phase of reusable launcher elements):

$2*10^{-5}$ for the phase between the beginning of orbiting of the launch vehicle and the return to Earth of each element of the launcher put into orbit as part of a controlled re-entry into the atmosphere, including, in accordance with Article 23(1) of this Order, a specific allocation of 10^{-7} by nominal return of each element. The launch operator shall implement the controlled re-entry in accordance with Article 21(1) and (5) of this order.

In exceptional, duly justified cases where ~~it is impossible for~~ the operator is not in a position to carry out a controlled re-entry into the atmosphere as referred to in Article 21(5) ~~provided for above~~, the launch operator must do its best to meet a quantitative target of 10^{-4} for the return phase of each element of the launcher put into orbit. In this case, the architectural and material choices of the elements put into orbit that are subject to an uncontrolled re-entry must be dictated by the objective

of limiting the number and energy (kinetic and explosive) of the fragments likely to reach the ground.

b) Risk for the recovery phase of reusable launcher elements:

$2*10^{-5}$ for the recovery phase of each element of the launcher intended to be reused.

In the case of an reusable deck in orbit, the launch operator shall implement on-site controlled re-entry in accordance with Article 21(1) and (5) and Article 23(2) of this Order.

In the case of a reusable deck that is not in orbit, the launch operator shall implement the on-site recovery phase in accordance with Article 23(2) of this Order.

2. The requirements referred to in point 1 of this Article shall be assessed using a calculation method that takes into account:

- all the phenomena leading to a risk of catastrophic damage (ascent phase, fallout from stage after separation, re-entry into the atmosphere of a deck put into orbit, recovery phase of a reusable deck);
- pre-fragmentation trajectories (atmospheric or outer space), depending on the flight times and faults considered;
- the corresponding fragmentation and debris generation scenarios~~, at the re-entry or~~ at the neutralisation of the launch vehicle and the return to Earth of any element of the Launcher;
- the dispersion on the ground of the debris and the evaluation of its effects;
- the reliability of the launcher for the launch phase, including where applicable during the recovery phase;
- the reliability of the deorbiting manoeuvre of the launcher element put into orbit, in the case of controlled re-entry;

3. Specific quantitative allocations for a particular risk of catastrophic damage may be prescribed, in particular for the specific cases of sea and air routes, in compliance with the objectives referred to in point 1 of this Article, in accordance with Article 5 of the aforementioned Decree of 9 June 2009.

SECTION 3: SPACE DEBRIS LIMITATION AND RISK COLLISION PREVENTION

Article 21

Limitation of space debris.

The launch ~~system~~ vehicle put in place by the launch operator shall be designed, produced and implemented in such a way as to comply with the following provisions for elements evolving in outer space:

1. The launcher shall be designed, produced and implemented in such a way as to minimise the production of debris during nominal operations, including beyond the end of life of the launcher and its components. The launch operator shall, in particular, implement the following provisions:

- when launching a single space object, a single element (e.g. a stage) of the launcher may be placed into orbit;
- when launching several space objects, a maximum of two elements (e.g. a deck or the adaptation structure) of the launcher can be placed in orbit.

The above provisions shall not apply to:

- pyrotechnic systems. However, they must not generate products greater than or equal to 1 mm in their largest dimension;

- solid or hybrid rocket ~~powder~~ motors. These must not however generate combustion debris greater than or equal to 1 mm in size in the protected regions A and B. ~~With regard to the design and use of dry-propellant thrusters, the launch operator shall implement methods allowing it to avoid putting into orbit on a permanent basis solid combustion products that could contaminate the protected region A.~~

2. The launcher shall be designed, produced and implemented in such a way that the debris produced in compliance with the provisions of 1 above that reach the Earth's surface does not pose an excessive risk to persons, property, public health or the environment, in particular as a result of pollution of the environment by hazardous substances.

3. The probability of occurrence of accidental disintegration must be less than 10^{-3} until the end of life of the orbited launcher element(s); its calculation shall include the failed modes of propulsion and power systems, mechanisms and structures, and the passivation operations described in point 4 of this Article, but shall not take into account external impacts.

~~The voluntary fragmentation of launcher elements is prohibited.~~

If an orbited launcher deck cannot perform its controlled re-entry as intended, passivation must be carried out in a safe and controlled manner.

4. The launcher shall be designed, produced and implemented in such a way that, at the end of the withdrawal from service phase, passivation of all its components is carried out:
- all energy reserves on board are permanently depleted or in such a state that their depletion ~~energy reserves on board~~ is unavoidable, or in such a state that they do not present a risk of generating debris;
- all means of generating energy on board shall be permanently deactivated, or all equipment directly powered by such means of energy production is placed in such a state that it does not present a risk of generating debris.
- at the end of the withdrawal from service phase, the launcher must be in a stable state with minimal internal energy

5. Respect zone A

~~a)~~ The launcher shall be designed, produced and implemented in such a way that, after the end of the launch phase, its components placed in orbit passing through Protected Region A shall be removed from orbit as part of a controlled re-entry into the atmosphere.

~~b)~~ In exceptional, duly justified cases, ~~If it is not possible~~ of non-compliance ~~to comply~~ with this provision, ~~it~~ the launcher shall be designed, produced and implemented in such a way that its components are no longer present in Protected Area A 25 years after the end of the launch phase. This result is obtained ~~preferably~~ by an uncontrolled re-entry into the atmosphere, ~~or, failing that, by placing it in an orbit whose perigee remains, one hundred years after the end of the operation, above protected region A.~~ The launch operator must also demonstrate that it uses the necessary means to minimise the duration in orbit of the components of the launcher passing through protected region A, which must be less than or equal to 25 years after the withdrawal from service,

~~c) if the orbit targeted by the components of the launcher after the service withdrawal manoeuvres is in or passes through Zone A and has a eccentricity of less than 0.25, it shall enable compliance with the requirements laid down in (a) and (b) of point 5 of this Article with a probability of at least 0.5, taking into account the effect of natural orbital disturbances.~~

~~d) If the orbit employed by the constituent elements of the launcher following manoeuvres to remove it from service has an eccentricity greater than 0.25, it must permit compliance with the requirements set out in a) and b) of point 5 of this article with a probability of at least 0.9, taking into account the effect of natural orbital perturbations and the associated uncertainties.';~~

6. Respect zone B

~~a)~~ The launcher shall be designed, produced and implemented in such a way that, after the end of the launch phase, its components placed in an orbit included in or passing through Protected Region B are placed in an orbit that does not interfere with that region beyond one year. This orbit must be such that, as a result of natural disturbances, the launcher or its orbited components will not return to Protected Region B within one hundred years after the end of ~~the operation~~ the withdrawal from service phase.

~~b) If the orbit employed by the constituent elements of the launcher following manoeuvres to remove it from service has an eccentricity greater than 0.25, it must permit compliance with the requirements set out in a) of point 6 of this article with a probability of at least 0.9, taking into account the effect of natural orbital perturbations and the associated uncertainties.~~

7. The particular case of missions to Lagrange points or with release orbits

The launch operator shall use all necessary means to ensure that the components of the launcher do not return to either Protected Region B or Protected Region A within 100 years after the end of the withdrawal from service phase. For this purpose, the operator shall take the necessary means to implement a manoeuvre to release or generate a speed increment by the launcher. In addition, the non-crossing of protected regions will have to be demonstrated to the best of the state of the art of orbital calculation methods.

8~~7~~. The probability of being able to successfully carry out the ~~manoeuvres~~ operations of withdrawal from service mentioned in paragraphs 4, 5, 6 and 7 of this Article must be at least 0.9. This probability is assessed over the total duration of the operation; its calculation, carried out before the start of the space operation, must take into account all systems, subsystems and equipment usable for these operation. ~~manoeuvres~~, their potential redundancy levels and their reliability, taking into account the effects of ageing at the moment when it is expected that these ~~manoeuvres~~ operations will be carried out, as well as the availability of the necessary energy resources and resources for these ~~manoeuvres~~ operations.

9 ~~8~~. The ~~voluntary~~ deliberate fragmentation of launcher elements is prohibited.

Article 22

Prevention of collision risks.

The systems shall be designed, produced and implemented and their mission defined in such a way as to limit, during the space operation and within three days after the end of the phase of withdrawal of service, the risk of accidental collision between launcher elements, including injected satellites, and ~~with~~ inhabited objects whose orbital parameters are known accurately and available.

SECTION 4: REQUIREMENTS RELATING TO FALLOUT TO LAND AND TO THE RECOVERY OF REUSABLE LAUNCHER ELEMENTS

Article 23

Prevention of the risks induced by the fallout of the launcher or its fragments.

1. In the event that the launcher has elements that are predicted to detach in the launch phase or in relation to the ~~propulsive~~ element(s) of the launcher put into orbit and subject to ~~within the context of~~ a controlled re-entry into the atmosphere, the fallout area on Earth must be controlled by the launch operator. The fallout zone, associated with a probability of 99.999 %, shall not overlap with the territory, including the territorial seas ~~waters~~ of any State, unless agreed to by the latter.

To this end, the launch operator shall implement the following provisions:

- taking into account the pre-fragmentation trajectories (atmospheric or outer space), depending on the moment of separation of the stages and taking into account the operating dispersions of the subsystems of the launch vehicle;
- modelling the corresponding fragmentation and debris generation scenarios;
- analysing the dispersion of debris landing in the sea.

2. In the event that the launcher contains elements which are subject to a return on site, the launch operator shall comply with the applicable regulations specific to the said site.
In the case of a return operation to a site other than the Guyanese Space Centre, the operator must provide the information requested under the second paragraph of Article 27 of this Order.

In the specific case of the return of launcher elements to a remote landing site at sea (e.g. barge or ship), the fallout zone associated with a probability of 99.999% must not overlap with the territory of any State. In case of overlap with the territorial seas of a State, the latter's agreement must be obtained.

3. In the event that a fallout zone is located in a region characterised by heavy maritime or air traffic ~~(mainly sea rail)~~, or by the presence of ~~stationary and occupied~~ oil rigs, a particular analysis must be carried out in the context of the hazard assessment provided for in Article 7 of the aforementioned Order of 23 February 2022. ~~on the composition of the files referred to in Article 1 of Decree No 2009-643 of 9 June 2009 on authorisations issued pursuant to Law No 2008-518 of 3 June 2008, as amended, on space operations~~.

4. The organisation and means put in place by the launch operator must enable the Chair of the National Centre for Space Studies to:

- inform the competent authorities responsible for air and maritime control of the fallout zones in nominal cases, specifying the tasks to 99% of these fallouts;
- in a non-nominal situation, to transmit, without delay, to the competent authorities information relating to the fallout zone enabling the authorities of the States concerned to be notified as soon as possible;
- provide all relevant information for the preparation and implementation of the necessary contingency plans by the competent authorities.

Article 24

Floating objects, wrecks and recovery of launcher elements.

1. Any launcher must be designed, produced and implemented in such a way that its propulsive decks predicted to fall back to Earth do not pose a ~~technical~~ risk following the creation of a floating object or a maritime wreck.
Wrecks and floating objects shall not constitute~~, nor risk constituting,~~ an obstacle or danger to navigation, fishing or the environment, or a pitfall or obstacle in a port, access pathway or harbour, or a lasting hazard on the seashore.

2. When decks are to be recovered from an area, their neutralisation device must be disabled ~~in the event of~~ after nominal separation~~, but must work in the event of untimely separation or deck breakage~~. It shall be possible to restore this device to safety prior to any handling of recovery.

3. When decks are recovered on site, their neutralisation device must be disabled at a moment during the recovery phase which minimises the risk of a victim on the ground. The operator must define this moment and justify this choice.

It shall be possible to restore the neutralisation device to safety prior to any handling on Earth.

SECTION 5: PARTICULAR RISKS

Article 24-1
Cybersecurity

The launch operator must implement a cybersecurity approach and the resulting security measures, in order to protect against cyber-based malicious attack that may pose a risk to compliance with these rules.

The elements justifying this approach and a summary of the security measures put in place shall be transmitted to the National Centre for Space Studies.

Article 25
Nuclear safety.

Any launch operator intending to transport radioactive ~~materials~~ substances on the launch vehicle must comply with the applicable regulations in force and prove their application in the nuclear safety plan provided for in Article 9 of the aforementioned Order of 23 February 2022.

Article 26
Planetary protection.

Any launch operator launching to another celestial body, whether or not there is a return of extraterrestrial matter, shall comply with the International Standard 'Planetary Protection Policy' published by the Committee on Space Research (COSPAR) for the implementation of Article IX of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies.

CHAPTER IV: TECHNICAL REQUIREMENTS RELATING TO THE LAUNCH SITE

Article 27

1. In the case of an operation conducted from the Guyanese Space Centre, the launcher must be designed and produced in such a way as to be compatible with the systems and procedures resulting from the Order regulating the operation of the facilities of the Guyanese Space Centre issued by the Chair of the National Centre for Space Studies.

2. In the case of an operation carried out from another launch site, and subject to the exemptions granted under Article 4(4) of the aforementioned Law of 3 June 2008, the launch system must be

operated via ~~ground~~ systems and procedures, making it possible to locate, neutralise and remotely measure in the course of the operation for the protection of persons, property, public health and the environment;

- the ~~ground~~ systems and procedures referred to above must be compatible with the provisions of this Order;
- the launcher must be designed and produced in such a way as to be compatible with the aforementioned systems and procedures;
- cybersecurity measures must be put in place to ensure that no unauthorised or unauthenticated remote controls that are likely to pose a risk to compliance with these regulations can be received and executed on-board.

3. The launch site used must have the means to ensure the safety of people, property, public health and the environment during the implementation of the launcher or in the event of an accident.

PART 3: CONTROL AND RETURN TO EARTH OF A SPACE OBJECT OR A GROUP OF COORDINATED SPACE OBJECTS

TITLE I: SCOPE

Article 28

The provisions of this Part shall apply to the control and return of any space object, including those forming part of a group of coordinated space objects.

The provisions of this Part shall not apply to the control and return of decks and launcher elements to which the provisions of Part 2 of this Order apply.

TITLE II: TECHNICAL FILE

~~CHAPTER I: DOCUMENTATION TO BE PROVIDED~~ [REPEALED]

Article 29

Repealed – see the Joint Order on the composition of the file

Article 30

Repealed – see the Joint Order on the composition of the file

Article 31

Repealed – see the Joint Order on the composition of the file

Article 32

Repealed – see the Joint Order on the composition of the file

Article 33

Repealed – see the Joint Order on the composition of the file

Article 34

Repealed – see the Joint Order on the composition of the file

CHAPTER II: QUALITY SYSTEM REQUIREMENTS

Article 35

Competence, means, organisation and facilities.

1. The operator must implement and manage, for the conducting of the space operation, a quality management system as well as internal standards and quality management provisions~~, in accordance with II (2°, b) of Article 1 of the aforementioned Decree of 9 June 2009~~. This management system must deal with quality assurance, operational safety, configuration management and the carrying out of works.

2. The operator ~~It~~ must have the necessary skills, means and organisation to prepare and implement the planned operation:

- appropriate facilities and organisation;
- equipment, tools and materials suitable for the proposed operation;
- documentation of tasks and procedures;
- access to data relevant for the preparation of the proposed operation;
- recording, operation and archiving of technical data;
- key positions and associated training processes.

3. The operator shall keep until the end of the space operation:

- The definition of the materials used.
- The description and justification of the components of the space object or group of coordinated space objects critical to the protection of persons, property, public health and the environment, in particular as regards the production of space debris

At the end of the space operation, after the withdrawal from service manoeuvres or in case of transfer of responsibility to another operator, these elements shall be transmitted to the National Centre for Space Studies with a description of the state reached.

Article 36

Technical and organisational facts.

The operator must set up an organisation enabling it to:

- to know and process, during the preparation and conducting of the space operation, all technical and organisational facts likely to affect the conditions of the space operation as authorised, including the withdrawal from service strategy;
- to inform, without delay, pursuant to II of Article 7 of the aforementioned Decree of 9 June 2009, the National Centre for Space Studies of all such technical and organisational facts.

Article 37

Technical reviews.

The ~~key points~~ technical reviews aimed at verifying the implementation of the provisions of this Order must be planned by the operator before launch.

The operator must inform the National Centre for Space Studies of the ~~key points~~ reviews prior to launch and to the engagement of withdrawal from service manoeuvres of the space object.

Article 38

Co-contractors and subcontractors.

1. The operator must ensure that its contractors and subcontractors apply any provisions necessary to establish and maintain compliance with this technical regulation.

2. The operator must ensure that the persons referred to above apply the provisions relating to the organisation, quality assurance and engineering in accordance with standards and practices recognised by the profession.

Article 38-1

Inspection plan during in-orbit control

The operator shall draw up a plan for monitoring the implementation of the provisions of this Order during the in-orbit control phase. This inspection plan shall provides for information briefings with the National Centre for Space Studies at least once a year, and in particular:

- After the initial *deployment* phase.
- At the end of the transfer of control of the space object or group of coordinated space objects to another operator
- Before the start of the withdrawal from service manoeuvres
- At the end of the withdrawal from service manoeuvres
- For *in-orbit service* operations, at the end of the completion of a service.

These information briefings must present, depending on the phase in question, the outcome of the operations carried out or the availability of the vehicle to initiate future operations, with, in particular:

- The status of anomalies, and on-board and orbital configuration
- A declaration justifying the ability of the space object to perform withdrawal from service operations (manoeuvres and passivation)
- The availability of the necessary energy resources (in particular management of propellant fuels) for withdrawal from service manoeuvres
- An assessment of the manoeuvres implemented to avoid other space objects and coordination with other operators
- The status of the means on ground

Article 38-2

Validation of procedures

The procedures for controlling the space object shall be tested and validated by the operator prior to launch, with the exception of degraded cases not requiring an immediate response from the operator and end-of-life procedures if it is demonstrated that there is no risk of having to carry out an emergency withdrawal from service.

The operational sequences following the inspection procedures of the object must be tested and validated by the operator before launch for the critical phases of the mission (deployment operations, withdrawal from service, critical operations in orbit, etc.).

CHAPTER III: ~~SPECIFIC~~ TECHNICAL REQUIREMENTS COMMON TO IN-ORBIT CONTROL OPERATIONS ~~COMMON TO THE CONTROL IN ORBIT AND RETURN TO EARTH OF A SPACE OBJECT~~

SECTION 1: REQUIREMENTS RELATING TO THE CONDUCT OF OPERATIONS

Article 39
Ability to control the space object.

The space ~~object~~ system shall be designed, produced and implemented in such a way as to enable the operator to receive, throughout the operation, information on ~~its~~ the state of the space object and send it commands ~~necessary in particular for the application of Articles 47 and 48 of this Order,~~ with the following aims:

- To ensure the prevention of collisions in orbit;
- To ensure the ability to perform a withdrawal from service or any other operation intended to preserve the integrity of the object.

Article 39-1
Identification of space objects

Space systems shall be designed, produced and implemented, and their task defined, in such a way that any space object is unambiguously identifiable as soon as possible and by no later than 3 days after launch by space surveillance systems.

Article 39-2
Management of propellant fuels

The probability, calculated prior to launch, of having the propellant fuels required for to perform end-of-life manoeuvres successfully shall be at least 0.99 at each moment during the mission.

Article 39-3
Cybersecurity

The operator must put in place a cybersecurity plan whose aim is to ensure that no unauthorised or unauthenticated remote controls that are likely to pose a risk to compliance with these regulations can be received and executed on-board.

Article 39-4
In-orbit service for a vehicle whose control has already been authorised

An operator wishing to benefit from an *In-Orbit Service* operation must ensure and demonstrate that the *service vehicle* complies with the specific requirements detailed in Chapter V.

SECTION 2: PREVENTION OF FRAGMENTATION

Article 40
Protection of the space environment.

~~The systems implemented by the operator must be designed, produced and implemented so as to respect the following provisions:~~

1 - Intentional release of debris
Space systems implemented by the operator shall be designed, produced and implemented in such a way as not to generate debris during the operation~~s~~ when ~~the space object~~ it is conducted nominally.

The above provision shall not apply to:
- pyrotechnic systems. However, they must not generate products greater than or equal to 1 mm in their largest dimension;
- solid or hybrid rocket ~~powder~~ motors. These must not however generate combustion debris greater than or equal to 1 mm in size in the protected regions A and B. ~~With regard to the design and use of dry-propellant thrusters, the operator shall implement methods allowing it to avoid putting into orbit on a permanent basis solid combustion products that could contaminate the protected region A.~~

However, the release into orbit of a single module of ~~propulsion~~ additional service is allowed. This module, as a space object, must comply with all of the provisions of the third part of this order.

2. Accidental disintegration
The probability of occurrence of accidental disintegration of any space object must be less than 10^{-3} until the end of the withdrawal from service operations of that space object. Its calculation shall include the failed modes of propulsion and power systems, mechanisms and structures, but shall not take into account external impacts. ~~In the event of detection of a situation leading to such a failure, the operator shall be able to plan and implement corrective measures in order to avoid disintegration.~~

3. Passivation
Any space object ~~Systems~~ must be designed, produced and implemented in such a way that, at the end of the withdrawal from service phase:
– all energy reserves on board are permanently depleted or in such a state that they do not present a risk of generating debris
– all means of generating energy on board shall be permanently deactivated, or all equipment directly powered by such means of energy production is placed in such a state that it does not present a risk of generating debris;
– all cargo bay or payload radio broadcasting capacities must be permanently disabled.

The provisions of point 3 of this Article shall not apply to controlled receipts.

~~4. Respect zone A~~
~~a) Systems equipped with propulsive elements permitting modifications to be made to their orbit must be designed, produced and implemented so that the space object is no longer present in the protected region A, twenty-five years after completion of its operational phase in an orbit crossing the protected region A.~~
~~b) This result shall be obtained, preferably, by a re-entry into the atmosphere or, failing that, by placing in a stable orbit whose perigee remains, within one hundred years after the end of the operation, above protected region A.~~

~~c) Systems not equipped with a propulsive element permitting modifications to be made to their orbit must be designed, produced and implemented so that the space object is no longer present in the protected region A, twenty-five years after its injection into orbit.~~
~~d) If the orbit employed by the space object following manoeuvres to remove it from service is within or crosses zone A and has an eccentricity of less than 0.25, it must permit compliance with the requirements set out in a), b) and c) of point 4 of this article with a probability of at least 0.5, taking into account the effect of natural orbital perturbations.~~
~~e) If the orbit employed by the space object following manoeuvres to remove it from service has an eccentricity greater than 0.25, it must permit compliance with the requirements set out in a), b) and c) of point 4 of this article with a probability of at least 0.9, taking into account the effect of natural orbital perturbations and the associated uncertainties.~~

~~5. Respect zone B~~
~~a) The space object shall be designed, produced and implemented in such a way that, when it has completed its operational phase in an orbit included in or passing through Protected Region B, it is placed in an orbit that does not overlap with that region. This orbit must be such that, under the effect of natural disturbances, within one hundred years of the end of the operation, the object does not return to protected region B.~~
~~b) If the orbit employed by the space object following manoeuvres to remove it from service has an eccentricity greater than 0.25, it must permit compliance with the requirements set out in point 5 of this article with a probability of at least 0.9, taking into account the effect of natural orbital perturbations and the associated uncertainties.~~
~~c) If the orbit employed by the space object following manoeuvres to remove it from service has an eccentricity of less than 0.1, it must permit compliance with the requirements set out in point 5 of this article and be located above zone B.~~

~~6. The probability of being able to carry out successfully the manoeuvres of withdrawal from service mentioned in paragraphs 3, 4 and 5 of this article must be at least 0.85. This probability, which does not include the availability of consumable energy resources, shall be calculated before the launch by the operator over the duration of the control phase for which the system has been qualified and shall take into account all systems, subsystems and equipment usable for such manoeuvres, their possible redundancy levels and their reliability.~~

~~7. The probability, calculated before launch and at any moment during the mission, of having the consumable energy resources necessary to successfully perform the end-of-life manoeuvres, when undertaking the manoeuvres mentioned in points 3, 3.4 and 5 of this article to remove it from service, must be at least 0.99.~~

Article 40-1
Intentional destruction.

1. The operator must avoid the intentional destruction of any space object in orbit.

2. When the operator intends to carry out an intentional destruction, it shall report its necessity to the Minister for Space. These destructions can only take place at altitudes low enough to limit the length of life in orbit of the fragments produced.

Article 40-2
Devices for the active removal of debris

Any space object must be designed, produced or implemented in such a way as to facilitate, after its withdrawal from service, a possible seizure, or *Capture* by an RAD (Retrait Actif de Débris - Active Debris Removal) *service vehicle*.

SECTION 3: PREVENTION OF COLLISIONS

Article 41
Prevention of the risk of collision with manned objects.

The space systems shall be designed, produced and implemented and their mission defined in such a way as to limit, during the space operation and within three days after the end of the operation, the risk of collision with manned objects ~~and geostationary orbiting satellites~~ whose orbital parameters are known with precision and are available.

Article 41-1
Anti-collision capacity

The space systems of manoeuvring objects shall have an operational capability to detect and manage a collision risk either by carrying out a remote-controlled or autonomous avoidance manoeuvre with the secondary object themselves, or by coordinating with the secondary object's control centre, when the secondary object is controlled, in order to decide which of the objects will perform such a manoeuvre. The post-manoeuvre trajectory must substantially reduce the risk of initial collision.

Article 41-2
Availability of anti-collision manoeuvres

The space systems of manoeuvring objects shall be designed and implemented in such a way that they will be available for the implementation of a anti-collision manoeuvre within a maximum of 5 days after launch, or in the case of a multiple launch of several satellites from the same operator, as soon as possible after their launch, by presenting a strategy minimising the period of unavailability of the anti-collision capacity.

Article 41-3
Probability of collision with a space object

The probability of occurrence, calculated before launch, for the entire life of the space operation, of an accidental collision with a space object larger than 1 cm shall be assessed and mitigated as much as possible. Additionally, this estimate must include the return to Earth phase for a space object operating in Zone A.

Article 41-4
Prevention of collisions at separation from a launcher or deployer

During separation of the launcher or deployer from the space object that launches it:

- The operator controlling of the launched space object must ensure that the launcher or deployer operator guarantees:
    - that each object it launches is on a trajectory that will not lead to a collision neither with the launcher or the deployer, nor with the other launched objects, for a minimum of 5 days after injection, or until the space object is able to perform anti-collision manoeuvres.

- that each of the launched objects is on a trajectory that will not lead to a collision with manned objects for a minimum of 3 days after injection, or until the space object is able to perform anti-collision manoeuvres.

- The operator controlling the deployer which launches one or more other space objects must ensure:
  - that each of these objects is on a trajectory that will not lead to a collision neither with themselves, nor with the other launched objects, for a minimum of 5 days after injection, or until the space object is able to perform anti-collision manoeuvres.
  - that each of the launched objects is on a trajectory that will not lead to a collision with manned objects for a minimum of 3 days after injection, or until the space object is able to perform anti-collision manoeuvres.

Article 41-5
Coordination in the event of a collision alert between two operators controlling manoeuvring space objects

In the event of a known collision alert between two manoeuvring space objects, the operator subject to this Regulation shall coordinate with the other operator to decide on a manoeuvring strategy leading to the manoeuvre of at least one of the two objects.

Article 41-6
Threshold for triggering anti-collision manoeuvres

In the case of an alert collision with a catalogued space object, collision avoidance measures take priority over the mission. The collision probability threshold above which the operator is to implement collision avoidance measures must be defined, and its relevance justified, in the operational design.

Article 41-7
Data sharing

The operator must share, at the earliest after launch by the launcher and within a maximum of 3 days, with any relevant actor or entity the necessary up-to-date information to monitor the risks of collision with the catalogued space objects it may encounter. This information shall include, at least, the following:

- Ephemeris, from the operator's own orbit restitution means, or from space monitoring systems
- Manoeuvring plan,
- Covariances

SECTION 4: PREVENTION OF ORBITAL SATURATION

Article 41-8
Obligation to withdraw from service

a) The space systems must be designed, produced and implemented in such a way that, at the end of their operational phase, they shall be withdrawn from service by:

- Release from Earth's gravitational pull;

- Re-entry into the atmosphere, whether controlled or not;
- A graveyard orbit between protected region A and protected region B;
- A graveyard orbit over protected region B.

b) In the case of space objects located, during their operational phase, in an orbit included in or passing through protected region A, only a release from the operational orbit by a re-entry into the atmosphere shall be permitted.

c) In the case of space objects located, during their operational phase, in an orbit included in or passing through protected region B: if the graveyard orbit targeted by the space object after the withdrawal from service manoeuvres has an eccentricity of less than 0.1, it shall be located above protected region B.

Article 41-9
Maximum orbital lifetime before re-entry into the atmosphere

In the event that the withdrawal from service of the space object leads to re-entry into the atmosphere, the residual duration in orbit may not exceed:

- three years for systems with an operational phase of less than 1 year, or
- three times the duration of the operational phase, and in any case may not exceed 25 years.

This residual duration in orbit is considered as soon as there is no manoeuvring capacity.

Article 41-10
Characteristics of a graveyard orbit between protected region A and protected region B

A graveyard orbit between protected region A and protected region B shall be such that, as a result of natural disturbances and associated uncertainties, within one hundred years of the end of the withdrawal from service phase, the space object shall not return to protected region A, protected region B, or interfere with the operational orbits of the constellations already present between these two regions.

Article 41-11
Characteristics of a graveyard orbit above protected region B

A graveyard orbit above protected region B must be such that, under the effect of natural disturbances, within one hundred years of the end of the operation, the space object does not return to protected region B.

Article 41-12
Reliability of withdrawal from service operations

The probability of being able to successfully perform withdrawal from service operations (including passivation operations as well as withdrawal from service manoeuvres) shall be equal to or greater than 0.9.

Article 41-13
Limiting the orbit of non-manoeuvring space objects

Systems not equipped with a propulsion element for orbit modification shall be designed, produced and operated for orbits with an apogee of less than 600 km.

Article 41-14
Radio emissions

The operator must comply with the applicable radio frequency regulations from its operational orbit and must coordinate with other operators in flight to avoid radio interference.

SECTION 5: PARTICULAR RISKS

Article 42
Nuclear safety

Any operator intending to put radioactive ~~materials~~ substances on board the space object must comply with the applicable regulations in force and justify its application in the nuclear safety plan provided for in Article 17 of the aforementioned Order of 23 February 2022 ~~1 of the aforementioned Decree of 9 June 2009~~.

Article 43
Planetary protection.

Any operator intending to conduct a mission to another celestial body, whether or not there is a return of extraterrestrial matter, shall comply with the International Standard 'Planetary Protection Policy' published by the Committee on Space Research (COSPAR) for the implementation of Article IX of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies. The operator shall justify its application in the planetary protection plan provided for in Article 17 of the aforementioned Order of 23 February 2022.

CHAPTER IV: SPECIFIC TECHNICAL REQUIREMENTS FOR THE RETURN OF A SPACE OBJECT

Article 44

1. Regarding the return of a space object, the quantitative objective for protection, expressed in maximum probability admissible of having at least one victim (collective risk), shall be 10-4.

2. The provisions mentioned in point 1 of this article must be evaluated taking into account:
- the re-entry into the atmosphere strategy (controlled or uncontrolled);
- the population on the envisaged re-entry date;
- all the phenomena leading to the generation of a risk of catastrophic damage;
- the trajectories before fragmentation;
- the modelling of scenarios of fragmentation and of generation of the corresponding debris, on re-entry;
- the dispersion on the ground of the debris and the evaluation of its effects;
- the reliability of the space object.

3. These objectives include the risk associated with the nominal return of the object or its fragments as well as the risk associated with non-nominal cases. These objectives are without prejudice to the provisions of Articles 42 and 45 of this Order.

Article 45
Requirements relating to the uncontrolled re-entry of the space object predicted at the end of life.

~~1. The architectural and material choices of space objects subject to uncontrolled re-entry must be justified by the objective of limiting the number and energy (kinetic and explosive) of fragments likely to reach the ground~~.

~~2.~~ Systems must be designed, produced and implemented so that elements that reach the Earth's surface do not pose an unacceptable risk to ~~people,~~ goods, public health or the environment, in particular as a result of pollution of the environment by dangerous substances.

Article 46
Prevention of risks induced by the deorbitation and fallout of the space object or its fragments during a controlled re-entry.

1. The operator shall demonstrate that there is no risk of collision in orbit with manned stations as a result of deorbiting and return to Earth manoeuvres.

~~1~~ 2. The operator shall determine the fallout zones of the space object and its fragments for any ground-controlled re-entry into the atmosphere, associated with a probability of 99% and 99.999% respectively. These fallout zones must take into account the uncertainties associated with the re-entry parameters.

~~2~~.3. The fallout zone associated with a probability of 99.999 % shall not overlap with the territory, including the territorial waters, of any State, unless agreed to by the latter.
In the event that a fallout zone is located in a region characterised by heavy maritime or air traffic ~~(mainly sea rail)~~, or by the presence of stationary and occupied oil rigs, a particular analysis must be carried out, in the context of the hazard assessment referred to in Article 32 of this Order.

~~3~~.4. The organisation and means put in place by the operator must enable the Chair of the National Centre for Space Studies to:

- inform the competent authorities responsible for air and maritime control of the fallout zones in nominal cases, specifying the tasks to 99% of these fallouts;
- to transmit to the competent authorities information relating to the fallout zone enabling the authorities of the States concerned to be notified as soon as possible;
- provide all relevant information for the preparation and implementation of the necessary contingency plans by the competent authorities.

Article 46-1
Controlled re-entry on site

In the case of an operation of a space object carrying out a controlled re-entry on a French or foreign site, for which this is the purpose, that object must be designed, produced and implemented in such a way as to be compatible with the systems and procedures of the landing site in question. Landing at this site may only be done after authorisation has been obtained by the authorities responsible for the landing site.
If the object returning to the site has previously been separated from a service module, the risk of a victim caused by the fallout of the latter's fragments must be less than 1^{E}-04, including for the orbital composite in case of non-separation.

For the object returning to the site, the operator shall demonstrate that the risk of victims on the ground is less than 2^{E}-05.
Finally, the operator shall make the necessary arrangements vis-à-vis the air and maritime authorities as required by Article 46(4).

For the return and landing phase, the operator shall identify the faults leadung to abnormal situations causing the orbital vehicle to become dangerous, in particular in the following cases:

- exit of the predefined re-entry corridor;
- dangerous fallout and recovery phase of the elements predicted to detach;
- non-nominal flight control landing behaviour;

The operator must deduce qualitatively and quantitatively, whether or not there is a need for on-board means enabling the vehicle in orbit to be neutralised before the moment when the site of impact is identified, in whole or in part, in a territory under the sovereignty of any State encountered along its nominal trajectory, including its territorial seas.

~~TITLE III: OBLIGATIONS RELATING TO THE CONDUCT OF THE SPACE OPERATION~~

Article 47
Non-nominal re-entries

In the case of premature or accidental re-entry, the operator shall, as a matter of priority, implement all measures to reduce the risk to the ground.

CHAPTER V: SPECIFIC TECHNICAL REQUIREMENTS FOR IN-ORBIT SERVICE

SECTION 1: REQUIREMENTS FOR ALL PHASES

Article 47-1
Collection of debris created

In the event that the in-orbit service operation would require the integrity of the Target Object to be undermined, the service vehicle operator shall collect intentionally created debris of a size greater than or equal to 1 mm in its largest dimension, in accordance with the other provisions of this Chapter, so that it is not released into outer space.

Article 47-2
Survival and collision

The on-board systems of the service vehicle shall be designed and implemented in such a way that the survivability of the service vehicle does not give rise to a risk of collision with the Target Object.

Article 47-3
Compatibility of the target object

The service vehicle must demonstrate that its design and operational concept are compatible with the systems of the Target Object, or where the Target Object is space debris, with the condition of the Target Object.

Article 47-4

Impact of the mission on a third party

The in-orbit service operation shall be conducted without prejudice to or interference with the operations of third parties that are not involved in the operation.

SECTION 2: REQUIREMENTS IN THE AREA OF PROXIMITY

Article 47-5
Volumes and corridors in the area of proximity

The service vehicle operator must define, in the area of proximity, the volumes around the Target Object in which the service vehicle can operate and the volumes in which it is prohibited to enter.

In particular, approach corridors must be defined by the service vehicle operator.

The service vehicle's systems shall be designed, produced and implemented in such a way that any flight exits from these corridors are continuously monitored and result in a fallback solution allowing the service vehicle to be placed in a condition or dynamic that does not affect the safety and integrity of both objects.

Article 47-6
GO/NOGO criteria

The service vehicle operator shall define, in the operational concept, for the purposes of the approach phase and to initiate the separation, the standby or transit points for which the minimum expected on-board and ground configurations (states) and the absolute and relative orbital configuration (position, velocity, attitude, angular velocity) are defined in advance for each object, enabling operations to be continued or withdrawn. These verification points are mandatory to enter the different volumes of the area of proximity.

Article 47-7
Coordination of control centres

Service vehicle and target object control centres must be fully coordinated with the following principles:

- sharing all data and telemetry necessary for the safety of operations,
- identifying, for each phase, the control centre (for the service vehicle or Target Object) with decision-making authority for joint operations in the area of proximity, including in the attached phase, and the control centre that controls the Composite in the attached phase.

The above provision shall not apply in the event that the target object is space debris.

Article 47-8
On-board-to-ground communication

Continuous on-board-to-ground communication and monitoring shall be implemented in such a way that the critical phases of In-Orbit Service operations are as safe as possible.

The contact phase, up to the capture, operations deemed critical in the attached phase, and separation must be carried out under continuous telemetry/remote control visibility.

In the area of proximity and during the approach and distancing phases, continuous telemetry/remote control visibility is not required if an operational concept with sufficient autonomy is demonstrated in terms of operational safety.

Article 47-9
Securing in-orbit service communications

The on-board and ground systems of the service vehicle must be designed, produced and implemented in such a way as to secure on-board/ground and on-board/on-board connections and thus be resilient to any corruption that could jeopardise the safety of operations.

Article 47-10
Inspection of surroundings

The operator of the service vehicle must ensure, for all operations carried out in the area of proximity, that only the objects participating in the current operation are in its vicinity in order to avoid any possible collision. The operational concept shall thus define the safe zone in which the presence of a third party will lead to non-engagement or withdrawal of the current operation.

Article 47-11
Emergency avoidance capacity

In the area of proximity, during the approach phase and after separation, the on-board systems of the service vehicle shall be able to assess the risk of collision between the service vehicle and the Target Object in real time.
These systems shall be capable of triggering, autonomously, an avoidance manoeuvre which must place the vehicles on relative paths which do not cross each other over a time horizon compatible with the total recovery of the combined mission, ensuring the required safety.

Article 47-12
Tests for the proper functioning of the *service vehicle*

The *service vehicle* operator shall carry out tests for the proper functioning of the equipment necessary for In-Orbit Service operations and their safety, except for non-reversible operations, at least before engaging in the first service and under conditions that do not pose a danger to any other space object.

Article 47-13
Prevention of jet effect
In the *area of proximity*, the *service vehicle* must be designed, produced and implemented so as not to cause degradation by contamination of the *Target Object* via the jet effects of its thrusters.
The above provision shall not apply in the event that the target object is space debris.

SECTION 3: REQUIREMENTS OF THE APPROACH AND CONTACT PHASES

Article 47-14
Qualification of the concepts of approach and docking

Any new concept or technology of approach, docking or undocking of the *service vehicle* must be qualified. The qualification must include:

- in every case, a ground demonstration, and

- in the event that the representativeness of the ground demonstration vis-à-vis the inherent hazards of the operation is not justified, an in-flight demonstration by successfully docking with a Target Object in an orbit with an apogee of less than 600 km above zone B, or between zones A and B

Article 47-15
Inspection before docking

All docking on a *Target Object* shall be subject to a pre-flight inspection of the said target object and, if possible, of the *service vehicle* in order to verify that no particular mechanical interference could cause the docking to fail or corrupt the relative navigation. The *service vehicle* must remain on a standby or *parking point* until the inspection assessment can allow the operation to continue.

Article 47-16
Safety performance in the approach phase

The systems of the *service vehicle* must be designed, produced and implemented in such a way as to guarantee, in the *approach phase*, a probability of violation of flight corridors defined in the approach and docking operational concepts and therefore of the risk of collision between the two vehicles of less than 1% per approach, and less than 5% over the entire orbital life of the *service vehicle*.

Article 47-17
Electrostatic and electromagnetic compatibility during contact

The *service vehicle* must be designed and produced with the necessary protections, so that during the *Contact phase*, it cannot generate damage induced by ESD (electrostatic discharges) and EMC (electromagnetic compatibility).

SECTION 4: REQUIREMENTS OF THE ATTACHED PHASE

Article 47-18
Inspection of the composite in the attached phase

The *Composite* must be capable of being inspected in attitude and orbit in particular to ensure its anti-collision capacity.
In the context of a joint operation between two separate entities, the entity responsible for the control of the *Composite* must be identified.
This entity shall be in charge of anti-collision manoeuvres, where appropriate. It shall take all necessary steps to ensure compliance with the provisions required in Section 3 of Chapter III of Title II of Part € of this Order.

SECTION 5 REQUIREMENTS OF THE SEPARATION AND REMOVAL PHASE

Article 47-19
Reliability relating to the separation

The calculated probability of success of the nominal separation and removal of the *service vehicle* outside the *area of proximity* must be evaluated and maximised

Article 47-20

The integrity of the target object at the moment of separation

The systems of the *service vehicle* must be designed, produced and implemented in such a way that, during separation of the *Composite*, the *service vehicle* does not permanently degrade the vital functional abilities of the *Target object*, in particular its ability to control the attitude and withdraw from service.
The above provision shall not apply in the event that the *Target Object* is space debris.

Article 47-21
Separation dynamics

The systems of the *service vehicle* and the target object must be designed, produced and implemented in such a way that the separation allows the two objects to move away on a trajectory whose drift does not create a risk of collision between them over a time horizon compatible with the implementation of an anti-collision manoeuvre.

~~**Article 48 [repealed]**~~

~~1. The operator shall keep up to date a declaration justifying the ability of the space object to perform the withdrawal manoeuvres referred to in points 3, 4 and 5 of Article 40 of this Order and in particular the availability of the energy resources necessary for this manoeuvre. This declaration shall be transmitted to the National Centre for Space Studies whenever an event affecting that ability occurs.~~
~~2. The status of the space object obtained at the end of the withdrawal from service operations shall be transmitted to the National Centre for Space Studies.~~

CHAPTER VI: SPECIFIC TECHNICAL REQUIREMENTS FOR CONSTELLATIONS

Article 48-1
Probability of withdrawal from service of satellites in a constellation

Each satellite in a constellation must have a success probability for withdrawal from service operations (including passivation operations as well as withdrawal from service manoeuvres) complying with the following rule:

- A constellation whose number (N) of satellites is less than 50: $P > 0.9 + N \times 0.001$
- A constellation whose number (N) of satellites is equal to or greater than 50: $P > 0.95$

N being the number of satellites in the constellation, and N being greater than or equal to 10.

Article 48-2
Probability of victims on the ground

The quantitative safeguard objective including all returns to Earth of megaconstellation satellites, expressed as the maximum permissible probability of at least one victim (collective risk), is 1E-02.

Article 48-3
Incorporation of feedback

Any feedback from the in-flight failure of a satellite belonging to a constellation during deployment, and more generally from any incident or technical fact affecting the conditions of the space operation as authorised, shall be taken into account for the launch of the following satellites.

Article 48-4
Intraconstellation collisions after withdrawal from service

The withdrawal from service of satellites from the same constellation shall be carried out in such a way as to ensure an intra-constellation collision risk of less than 10-3 until their re-entry into the atmosphere or for 100 years in the graveyard zone approved for constellations located outside Region A.

Article 48-5
Anti-collision capacity for megaconstellations

Each satellite in a mega constellation must have an on-board propulsion system in order to be able to implement anti-collision manoeuvres efficiently and in a timely manner until the end of its withdrawal from service.

Article 48-6
Vital system testing before reaching operational orbit for megaconstellations

Before a megaconstellation satellite reaches its operational orbit, tests showing a good state of health must be conducted, from an intermediate orbit, on the subsystems of its platform necessary for withdrawal from service.

For satellites operating in Region A, this intermediate orbit must allow a natural re-entry within less than 5 years and have its apogee lower than the perigee of the operational orbit.

Article 48-7
Maximum time for the withdrawal from service of megaconstellation satellites

For each satellite in a megaconstellation operating in Region A, the maximum presence in orbit after the withdrawal from service shall be limited to:

- 5 years for megaconstellations whose total number of satellites is less than 1000
- 2 years for megaconstellations whose total number of satellites is greater than or equal to 1000.

Article 48-8
Separation of intraconstellation planes

The geometry of a constellation must be defined in order to ensure sufficient separation between the satellites of that constellation in order to ensure robustness against the risk of collision.

Article 48-9
Separation between megaconstellations

The geometry of a megaconstellation must not overlap with the geometry of another megaconstellation already in orbit by ensuring adequate radial separation, until the start of the megaconstellation’s withdrawal from service.

If it is not possible, in a duly justified manner, to ensure adequate radial separation, the operator must demonstrate robustness with regard to the risk of collision between its satellites and those of the other megaconstellation.

Article 48-10
Limitation of the optical disturbances of megaconstellation satellites

Each megaconstellation satellite must be designed, produced and implemented with the objective of achieving an apparent magnitude greater than or equal to 7 in order to limit optical disturbances for astronomical observations from the ground or space.

~~**Article 49 [repealed]**~~
~~Intentional destruction.~~

~~1. The operator must avoid the intentional destruction of any space object in orbit.~~

~~2. When the operator intends to carry out an intentional destruction, it shall report its necessity to the Chair of the National Centre for Space Studies. These destructions can only take place at altitudes low enough to limit the length of life in orbit of the fragments produced.~~

CHAPTER VII: MISSION EXTENSION

Article 49-1
Conditions for mission extension

In the event of a desire to extend the mission beyond the initially authorised duration, the operator shall demonstrate that this mission extension does put in doubt the compliance with the operational provisions of Part 3 of this Order.

In addition, within the context of the hazard assessment, the dreaded events specific to the mission extension must be identified and controlled.

The contribution of a service vehicle during this mission extension must be assessed against the provisions of this Order.

PART 4: PRELIMINARY COMPLIANCE WITH TECHNICAL REGULATIONS

TITLE I: SCOPE

Article 50

Under Article 11 of the aforementioned Decree of 9 June 2009, the following critical systems and subsystems may be submitted to the National Centre for Space Studies:

- the space system;
- the space object or group of coordinated space objects;
- the platform of a space object, where applicable associated with a control and inspection system;
- ~~the propulsive subsystem of a space object~~
- the propulsive subsystem of a launcher;
- the autonomous neutralisation system of a launcher
- ~~the launch facilities of a space object~~.

Article 51

The file provided for in the first paragraph of Article 11 of the aforementioned Decree of 9 June 2009 shall be compiled in accordance with the provisions of Article 50 of this Order. It shall be submitted to the National Centre for Space Studies during the development of the system or subsystem concerned, at the earliest at the end of the preliminary design phase.

The document certifying preliminary compliance with this technical regulation may be issued by the National Centre for Space Studies at the end of the following stages of the design and development of the system or subsystem:

- preliminary design;
- detailed design;
- production and ground tests to verify compliance with the provisions of this Order for the system or subsystem in question;
- qualification.

TITLE II: PROCEDURE FOR THE DELIVERY OF THE DOCUMENT ATTESTING COMPLIANCE

Article 52

Documents to be provided.

1. For a launch system, the submitter shall provide all or part, depending on the system concerned, of the documents provided for in Chapter 1 of Ttitle II of the aforementioned Order of 23 February 2022.

~~For a propulsive subsystem of a launch system, the National Centre for Space Studies shall draw up the list of documents to be provided and the associated schedule after the development plan provided for in the first paragraph of Article 11 of the aforementioned Decree of 9 June 2009 is presented.~~

2. For a space system other than a launch system, the submitter shall provide all or part, depending on the system concerned, of the documents ~~provided for in Articles 29 to 34 of this Order.~~ in Chapter II of Title II of the aforementioned Order of 23 February 2022.

Article 53

Inspections, tests and analyses.

On the basis of the documents provided under Article 52 of this Decree, the National Centre for Space Studies prescribes all checks, tests and analyses as provided for in the second paragraph of Article 11 of the Decree of 9 June 2009 referred to above.

In the case of a launch system, these requests may also relate to the compatibility with the systems and procedures of the site from which the space operation is conducted.

PART FIVE: BEST PRACTICE GUIDE

SINGULAR TITLE

Article 54

1. ~~One~~ Two best practice guides, one for launchers and one for satellites, shall be drawn up by the National Centre for Space Studies, in consultation with the profession within the context of a working

group representing the operators and industrialists concerned in order to characterise certain practices in force which make it possible to contribute to demonstrating compliance with these technical regulations.

These guides shall be based on practices validated by experience gained in the development, operation and control of space systems. They are based in particular on norms, technical specifications for normative purposes and standards recognised by the profession, relating to the safety of property, persons, public health and the environment in the conduct of space operations. The content of these guides shall comply with the applicable provisions on the protection of intellectual property and industrial and scientific heritage.

2. Compliance with all or part of the provisions of this technical regulation shall be presumed if the operator demonstrates compliance with the relevant recommendations of these guides.

The use of a best practice guide should not be mandatory or exclusive in nature.

PART SIX: TRANSITIONAL AND FINAL PROVISIONS

Article 55
Transitional provisions

~~1. In the case of space object launch operations, the following transitional provisions shall apply:~~
~~a) Applications for authorisation for launch operations using a launch system whose first operation in French territory took place before 4 June 2008 may refer to technical files already examined by the National Centre for Space Studies, in particular in the framework of existing international agreements, in particular those concluded with or within the context of the European Space Agency. In this case~~**, the provisions of Article 21(6) of this Order** ~~are not applicable.~~

~~In the event of a duly justified impossibility to apply the provisions o~~**f Article 21(5) of this Order**~~, the launch operator will make its best effort to approach the thresholds mentioned.~~

~~b) for systems whose first launch from French territory took place between 4 June 2008 and 31 December 2011, the provisions~~ **of Article 21(6) of this Order** ~~are not applicable;~~

~~c) for systems whose first launch from French territory took place after 31 December 2011, the provisions of this Order shall be fully applicable.~~

~~2.~~ In the case of control and return operations of a space object or group of coordinated space objects, the following transitional provisions shall apply:

~~a) For space objects launched before 10 December 2010:~~
-
~~— as regards the provisions of Articles 32 and 33, the studies will address only the hazards and impacts associated with the procedures implemented after 10 December 2010;~~
-
~~— the provisions of Article 38, those of points 1, 2, 6 and 7 of Article 40 and those of Article 45 shall not apply;~~
-
~~— as regards the provisions of points 3, 4 and 5 of Article 40 and those of Article 41, the operator must implement the best possible strategy taking into account the definition of the space object;~~
-

~~— as regards the provisions of Article 44, the operator must implement the best possible strategy taking into account the definition of the space object, and must estimate the risk.~~

~~b) For space objects launched between 10 December 2010 and 31 December 2020:~~

~~— the provisions of points 1 to 2 of Article 40 and those of Article 45 are not applicable;~~

~~— as regards the provisions of points 3 to 7 of Article 40 and those of Article 41, the operator must implement the best possible strategy taking into account the definition of the space object;~~

~~— as regards the provisions of Article 44, the operator must implement the best possible strategy taking into account the definition of the space object, and must estimate the risk.~~

a) For space objects or groups of space objects whose application for authorisation provided for in Article 2 of the aforementioned Law of 3 June 2008 is made between 1 April 2024 and 31 December 2026:

- with regard to the provisions of Articles 41-12 (Reliability of withdrawal from service operations) and 48-1 (Probability of withdrawal from service of satellites in a constellation), a probability of being able to successfully perform withdrawal from service operations of 0.85 is required for individual satellites, and the following rule is applied for each satellite in a constellation (N being the number of satellites in the constellation):
    - A constellation whose number (N) of satellites is less than 50: $P > 0.85 + N \times 0.001$
    - A constellation whose number (N) of satellites is equal to or greater than 50: $P > 0.90$

- as regards the provisions of Article 41(2) (Availability of anti-collision manoeuvres), the operator is required to present a strategy that minimises the period of unavailability of the anti-collision capacity;

- as regards the provisions of Article 41-7 (Data sharing), the operator of a non-manoeuvring object or group of objects must implement the best possible strategy taking into account the definition of the space object or group of coordinated space objects;

- as regards the provisions of Article 41-9 (Maximum orbital lifetime before re-entry into the atmosphere), the operator must implement the best possible strategy to achieve the objective of the article, within the limit of 25 years for re-entry into the atmosphere;

b) For space objects or groups of space objects whose application for authorisation provided for in Article 2 of the aforementioned Law of 3 June 2008 is made between 1 April 2024 and 31 December 2028:

- with regard to the provisions of Article 39-1 (Identification of space objects), identification within one week is acceptable for manoeuvring objects launched in clusters, and detectability of non-manoeuvring objects within 3 days is considered acceptable;

- as regards the provisions of Article 48-4 (Intraconstellation collisions after withdrawal from service), the operator must present an analysis detailing the withdrawal from service strategy implemented in order to limit the risk of intraconstellation collision after withdrawal from service;

- as regards the provisions of Article 48-10 (Limitation of the optical disturbances of

megaconstellation satellites), the operator must minimise the optical disturbances of megaconstellation satellites in order to limit interference for astronomical observations;

- the provisions of Article 40-2 (Devices for active removal of debris) shall not apply.

Article 56

The Chaire of the National Centre for Space Studies shall be responsible for the implementation of this Order, which shall be published in the Official Journal of the French Republic.