FRANCE

National mechanism:

Decree on Technical Regulation issued pursuant to Act n°2008-518 of 3rd June 2008, 31 March 2011

Legal framework:

– *French Space Operations Act* n°2008-518 of 3rd June 2008

Description:

1. French Space Operations Act n°2008-518 of 3rd June 2008

The French Space Operations Act (FSOA) was adopted in 2008. It has established a national regime of authorization and supervision of national space activities.

Systems and procedures implemented by the operator in the frame of the operation shall be compliant with the national technical regulation. Authorizations are issued by the Minister in charge of space affairs, on the basis of a technical assessment carried out by the French space agency, CNES.

It is foreseen by the FSOA that the authorizations granted may include specific requirements set forth for the safety of persons and property, protection of public health and the environment, in particular in order to limit risks related to space debris (art. 5 FSOA).

2. Decree on Technical Regulation issued pursuant to Act n°2008-518 of 3rd June 2008, 31 March 2011

The Technical Regulation issued in 2011 pursuant to the FSOA contains the technical requirements that any operator shall comply with. The Technical Regulation is composed of a first part dedicated to launch systems and of a second part dedicated to orbital systems. Both parts contain provisions related to the mitigation of space debris.

- For launch systems, article 21 ('Space Debris limitation'):

The launch system implemented by the launch operator must be designed, produced and implemented such as to comply with the following requirements for the elements operating in outer space:

1. The launcher must be designed, produced and implemented in such a way as to minimise the production of debris during nominal operations, including after the end-of-life of the launcher and its component parts. The launch operator in particular takes the following measures in this respect:

for launch of a single space object, a single launcher element (for example a stage) may be placed in orbit;

for launch of several space objects, a maximum of two launcher elements (for example a stage or the adapter structure) may be placed in orbit.

The above requirements do not apply:

to pyrotechnic systems. The largest dimension of any products generated must be less than 1 mm;

to solid propellant boosters. The size of any combustion debris generated in protected region B must be less than 1 mm. With regard to the design and operation of solid propellant boosters, the launch operator takes steps to avoid placing solid combustion products in long term orbit which could contaminate protected region A.

2. The launcher must be designed, produced and implemented so that the debris produced in compliance with the requirements of the first paragraph above and which do manage to reach the surface of the Earth, constitute no excessive risk for individuals, property, public health or the environment, in particular as a result of environmental pollution by hazardous substances.

3. The probability of occurrence of accidental break-up must be less than 10-3 until the end-of-life of the space object. This calculation must include failure modes of propulsion and power systems, mechanisms and structures but does not take account of any external impacts.

Intentional fragmentations of launcher elements are prohibited.

4. The launcher must be designed, produced and implemented so that, following the disposal phase:

all the on-board energy reserves are permanently depleted or placed in a state such that depletion of the on-board energy reserves is inevitable, or in such a condition that they entail no risk of generating debris;

all the means for producing energy production means are permanently deactivated.

5. The launcher must be designed, produced and implemented so that, after the end of the launch phase, its components placed in orbits passing through protected region A are de-orbited by controlled atmospheric re-entry.

If the impossibility of meeting this requirement can be duly proven, the launcher must be designed, produced and implemented so that its components are no longer present in protected region A twenty-five years after the end of the launch phase. This result is preferably achieved by uncontrolled atmospheric re-entry or, failing that by placing them to an orbit for which the perigee remains above protected region A for one hundred years following the end of the operation.

6. The launcher must be designed, produced and implemented so that, after the end of the launch phase, its components stationed in an orbit in or passing through protected region B, are placed in an orbit which does not interfere with this region for more than one year. This orbit must be such that, under the effect of natural disturbances, the launcher or its components do not return to protected region B within one hundred years following the end of the operation.

7. The probability of successfully completing the disposal manoeuvres mentioned in paragraphs 4, 5 and 6 above must be at least 0.9. This probability is evaluated for the total duration of the operation. Its calculation, carried out before the beginning of the space operation, must take account of all the systems, subsystems and equipment usable for these manoeuvres, their redundancy levels as applicable and their reliability, taking account of the effects of the ageing reached at the time for which their use is scheduled, along with the availability of the means and energy resources necessary for these manoeuvres.

- For orbital systems, article 40:

The systems implemented by the operator must be designed, produced and implemented such as to comply with the following requirements:

1. The systems must be designed, produced and implemented so as to avoid generating debris during nominal operations of the space object.

The above requirement does not apply:

to pyrotechnic systems. The largest dimension of any products they generate must however be less than 1 mm;

to solid propellant boosters. The size of any combustion debris they generate in protected region B must however be less than 1 mm. With regard to the design and operation of solid propellant boosters, the operator implements measures allowing to avoid placing durably in orbit solid combustion products which could contaminate protected region A.

2. The probability of occurrence of accidental break-up must be less than 10-3 until the end of life of the space object. This calculation must include failure modes of propulsion and power systems, mechanisms and structures, but does not take into account external impacts.

If a situation leading to such a failure is detected, the operator must be able to schedule and implement corrective measures to prevent any break-up.

3. The systems must be designed, produced and implemented so that, following the disposal phase:

all the on-board energy reserves are permanently depleted or placed in such a condition that they entail no risk of generating debris,

all the means for producing energy on-board are permanently deactivated.

4. The systems must be designed, produced and implemented so that, once the space object has completed its operational phase in an orbit passing through protected region A, the space object is deorbited with controlled atmospheric re-entry.

If the impossibility of meeting this requirement can be duly proven, it must be designed, produced and implemented so that it is no longer present in protected region A twenty-five years after the end of the operational phase. This result is preferably achieved by uncontrolled atmospheric re-entry or, failing that, by placing in a stable orbit for which the perigee remains above protected region A for one hundred years following the end of the operation.

5. The space object must be designed, produced and implemented so that, once it has completed its operational phase in an orbit in or passing through protected region B, it is placed in an orbit which does not interfere with this region. This orbit must be such that, under the effect of natural disturbances, the object does not return to protected region B within one hundred years following the end of the operation.

6. The probability of having sufficient energy resources to successfully carry out the disposal manoeuvres mentioned in paragraphs 3, 4 and 5 above must be at least 0.9.

7. The operator must evaluate the probability of being able to successfully carry out the disposal manoeuvres mentioned in paragraphs 3, 4 and 5 above. This evaluation, which does not include the availability of energy resources, must be made by the operator for the total duration of the operation and take account of all systems, subsystems and equipment usable for these manoeuvres, their level of redundancy, if any, and their reliability, taking account of the effects of the ageing reached at the time they are scheduled to be carried out.

It has to be mentioned that interim provisions are foreseen by the Technical Regulation, in order to adapt the application of the provisions related to space debris for existing space systems (art. 55 of the Technical Regulation).

Applicability:

French Space Operations Act n°2008-518 of 3rd June 2008

The scope of the FSOA covers:

- Launch and return operations carried out from the French territory
- Launch and return operations carried out by a French operator from a foreign country
- Procurement of a launch by a French entity
- Control of space objects in outer space by a French operator

As a law, it is mandatory for concerned space operators.

Decree on Technical Regulation issued pursuant to Act n°2008-518 of 3 June 2008, 31 March 2011

As a decree, the Technical Regulation is mandatory for concerned space operators.

Relation to international mechanisms:

France has contributed to the development of Space Debris Mitigation Guidelines of the Committee, the European Code of Conduct for Space Debris Mitigation and, through CNES, to the IADC Space Debris Mitigation Guidelines. The French Technical Regulation is consistent with these guidelines, as well as with the ISO 24113 standard.

Link to other national mechanisms:

None.

References:

- French Space Operations Act n°2008-518 of 3rd June 2008
  http://legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000018931380&fastPos=9&fastReqId=1846263462&categorieLien=cid&oldAction=rechTexte

- Decree on Technical Regulation issued pursuant to Act n°2008-518 of 3rd June 2008, 31 March 2011
  http://legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000024095828&fastPos=5&fastReqId=289170871&categorieLien=cid&oldAction=rechTexte