STATUTORY INSTRUMENTS

2021 No. 792

The Space Industry Regulations 2021

PART 8

Safety of operator's spaceflight activities

CHAPTER 5

Additional safety requirements for launch vehicles with human occupants

SECTION 1

Interpretation

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105.—(1) In this Chapter any reference to a pilot in command, a pilot or a remote pilot "carrying out the flight safely" or to the flight being "carried out safely" has the meaning referred to in paragraph (2).

(2) A pilot in command, pilot or a remote pilot carries out the flight safely by carrying it out—

(a) in accordance with the current safety case by—

(i) preventing a major accident from occurring, or

(ii) mitigating the consequences of such an accident if it does occur, and

(b) in accordance with the current risk assessment, by securing the safety of a human occupant.

SECTION 2

The crew or remote pilots

The roles and duties of each member of the crew or a remote pilot

106.—(1) If the launch vehicle has a crew, before the operator's spaceflight activities commence a spaceflight operator must—

(a) define the respective roles and duties of every member of the crew,

(b) ensure that every member of the crew is aware of their role and their duties, and

(c) provide copies of checklists of the duties to every member of the crew.

(2) If the launch vehicle has a remote pilot, before the operator's spaceflight activities commence a spaceflight operator must—

(a) define the role and duties of the remote pilot,

(b) ensure that the remote pilot is aware of their role and their duties, and

(c) provide copies of checklists of the duties to the remote pilot.

Information about the flight

107.—(1) If the launch vehicle has a flight crew, a spaceflight operator must make available to each member of that crew all information necessary for the flight crew to carry out the flight safely.

(2) If the launch vehicle has a remote pilot, a spaceflight operator must make available to that pilot all information necessary for the remote pilot to carry out the flight safely.

Authority to pilot in command or remote pilot

108. If the launch vehicle has a pilot in command or a remote pilot, a spaceflight operator must give that pilot the authority to give the commands, make the decisions or take the actions referred to in regulation 115.

SECTION 3

The launch vehicle

Additional conditions if the launch vehicle has a human occupant

109.—(1) The systems referred to in regulation 91(3)(d) are that, if the launch vehicle has a human occupant, that vehicle must have—

(a) a system capable of providing on board power and atmospheric conditions for the inhabited areas of the launch vehicle which are adequate to sustain life and consciousness of a human occupant or equipment to provide such conditions to each human occupant,

(b) an adequate redundant system for supplying oxygen to a human occupant and preventing depressurisation, or the harmful effects of depressurisation, in inhabited areas of the launch vehicle,

(c) a system capable of warning the pilot in command or the remote pilot of any significant accumulation of ice on the exterior of the launch vehicle,

(d) a system which enables the spaceflight operator or any crew to detect smoke in the inhabited areas of the launch vehicle and to assist in preventing or suppressing a fire in that area,

(e) a system capable of displaying any information necessary to any flight crew to ensure that the flight is carried out safely, and

(f) a system capable of restraining any member of the crew or any spaceflight participant in their seat when necessary to ensure that the flight is carried out safely.

(2) Any system referred to in paragraph (1) includes any hardware or software relating to that system and must—

(a) be suited to the operator's spaceflight activities, and

(b) be capable of functioning during those activities.

(3) If a launch vehicle has a human occupant, that vehicle must have a flight recorder.

(4) In this regulation "a redundant system" means a system which provides the essential services of a primary system in the event of the failure of such a primary system.

Numbers of crew or spaceflight participants on board

110. Before an operator's spaceflight activities commence, the spaceflight operator must determine the number of flight crew, cabin crew, spaceflight participants or both crew and spaceflight participants to be carried on board the launch vehicle, taking into account—

(a) any conditions of the launch operator licence or return operator licence describing matters to be taken into account when determining these numbers,

(b) the limits of the launch vehicle during operations as established by the technical requirements of that vehicle,

(c) the configuration of the launch vehicle and loading,

(d) the duration of the mission,

(e) any medical needs of a human occupant,

(f) the equipment including seating available to a human occupant, and

(g) any other matter which may affect the carrying out of the operator's spaceflight activities safely, in so far as these numbers are concerned.

Accessibility of instruments and equipment

111. If the launch vehicle has a flight crew, a spaceflight operator must ensure that instruments, systems and equipment within the launch vehicle are readily operable and accessible from the station where—

(a) any pilot in command who needs to use them is seated, and

(b) another member of the flight crew who needs to use them is seated.

Emergency equipment

112.—(1) A spaceflight operator must ensure that the launch vehicle is equipped with emergency equipment and a means of emergency evacuation of any human occupants in so far as is reasonable for and suited to the operator's spaceflight activities.

(2) The spaceflight operator must ensure that—

(a) each human occupant is aware of the location of the emergency equipment within the launch vehicle and the means of emergency evacuation from that vehicle,

(b) immediately before the flight, each human occupant is provided with information about how to use the emergency equipment and means of emergency evacuation and that such information is available on board the launch vehicle, and

(c) the emergency equipment and means of emergency evacuation are identifiable and accessible on the launch vehicle for immediate use.

(3) In this regulation "emergency equipment" means first aid supplies, fire extinguishers, radio beacons, clothing and other emergency and survival equipment relevant to the operator's spaceflight activities.

Atmospheric conditions on board

113.—(1) A spaceflight operator must maintain adequate atmospheric conditions in the inhabited areas of the launch vehicle, or provide equipment to provide such conditions to each human occupant, by monitoring and controlling—

(a) the composition of the atmosphere including oxygen, carbon dioxide and the need for revitalisation of the internal atmosphere,

(b) pressure, temperature and humidity,

(c) contaminants that include particles and any harmful or hazardous concentrations of gases or vapours, and

(d) ventilation and circulation.

(2) In this regulation "revitalisation" means a process by which the internal atmosphere of the inhabited parts of the launch vehicle is sustained at a healthy level, by introducing oxygen to replace the oxygen which has been consumed and by removing carbon dioxide.

SECTION 4

Specific obligations of pilot in command, flight crew or remote pilot

Obligations of pilot in command or remote pilot immediately before the flight

114. Immediately before a flight, the pilot in command or the remote pilot must—

(a) perform an inspection of the launch vehicle and its systems and equipment to the extent that it is practicable to do so, and

(b) consult any of the spaceflight operator's written records relating to the fitness, condition and preparation of the launch vehicle, in so far as necessary to ensure the flight is carried out safely.

Obligations of pilot in command or remote pilot to carry out flight safely

115.—(1) If a launch vehicle has a pilot in command or a remote pilot, that pilot must give commands, make appropriate decisions and take appropriate actions during the flight of that vehicle which are necessary to ensure that the flight is carried out safely.

(2) A pilot in command or a remote pilot must inform the spaceflight operator and the regulator at the earliest practicable opportunity if any of the commands, decisions or actions referred to in paragraph (1) did not comply with provisions contained in or made under the Act and the conditions of the launch operator licence or return operator licence.

Pilot in command, flight crew or remote pilot to remain at stations

116.—(1) If a launch vehicle has a flight crew, that crew must during the flight remain at their stations secured in their seat by a safety belt or other restraint device unless there is more than one member of the flight crew and the pilot in command permits a member to leave the member's station temporarily—

(a) to provide urgent assistance to another human occupant, or

(b) for an urgent physiological or operational need.

(2) If a launch vehicle has a pilot in command that pilot may during the flight only leave the pilot in command's station temporarily where—

(a) there is more than one member of the flight crew,

(b) the flight can be carried out safely by another member of the flight crew, and

(c) there is an urgent physiological reason or operational need to do so.

(3) If a launch vehicle has a remote pilot that remote pilot may during the flight only leave the remote pilot's station temporarily where—

(a) there is more than one remote pilot,

(b) the flight can be carried out safely by that other pilot, and

(c) there is an urgent physiological reason or operational need to do so.

Pilot in command's obligations to a spaceflight participant about stations

117. If a launch vehicle has a pilot in command, that pilot must ensure that each spaceflight participant is seated at the spaceflight participant's assigned station and secured in that participant's seat by a safety belt or other restraint device—

(a) before launch and landing and during any taxiing operation necessary for the operator's spaceflight activities,

(b) during periods of flight when the effects on the human body of the forces due to acceleration and their duration are most acute, and

(c) at any other time when necessary for the flight to be carried out safely.

Remote pilot's obligations to a spaceflight participant about stations

118. If a launch vehicle has a remote pilot, that pilot must ensure that each spaceflight participant is seated at the spaceflight participant's assigned station and secured in that participant's seat by a safety belt or other restraint device—

(a) before launch and landing and during any taxiing operation necessary for the operator's spaceflight activities,

(b) during periods of flight when the effects on the human body of the forces due to acceleration and their duration are most acute, or

(c) at any other time when necessary for the flight to be carried out safely.

Launch director's or safety manager's obligations to a spaceflight participant about stations

119.—(1) If a launch vehicle has no pilot in command or remote pilot—

(a) where the operator's spaceflight activities are authorised by a launch operator licence, the launch director, or

(b) where those activities are authorised by a return operator licence, the safety manager,

must ensure that each spaceflight participant is seated at the spaceflight participant's assigned station and secured in that participant's seat by a safety belt or other restraint device at the times or during the periods referred to in paragraph (2).

(2) The times or periods are—

(a) before launch and landing and during any taxiing operation necessary for the operator's spaceflight activities,

(b) during periods of flight when the effects on the human body of the forces due to acceleration and their duration are most acute, and

(c) at any other time when necessary for the flight to be carried out safely.

SECTION 5

Spaceflight participants

Prohibiting the launch vehicle carrying a spaceflight participant

120. A spaceflight operator must not carry a spaceflight participant in a launch vehicle unless that vehicle is fit for the operator's spaceflight activities in accordance with regulation 91.

A spaceflight participant to remain at station

121.—(1) A spaceflight participant must remain seated at the spaceflight participant's assigned station and secured in that participant's seat by a safety belt or other restraint device at all times and during all the periods referred to in regulations 117 to 119 unless one of the individuals in paragraph (2) permits such a participant to leave that station.

(2) The individuals are—

(a) the pilot in command,

(b) a member of the flight crew,

(c) a remote pilot,

(d) the launch director, where the operator's spaceflight activities are authorised by a launch operator licence, or

(e) the safety manager, where the operator's spaceflight activities are authorised by a return operator licence.

Availability of seating requirement to a spaceflight participant

122. A spaceflight operator must make a copy of the requirement relating to seating in regulation 121 available to each spaceflight participant.

SECTION 6

Human occupant: information to be given after consent form is signed

Information about the operator's spaceflight activities

123. Before an operator's spaceflight activities commence, the spaceflight operator must give each human occupant the information referred to in regulations 209 and 210 which has become available since that occupant signed the consent form referred to in section 17.