

SCHEDULE 1

Regulations 26, 27, 29

Information the safety case must contain

General information

1. A description of the proposed spaceflight activities including the proposed flight trajectory, any planned orbital parameters for the launch vehicle, any planned orbital parameters for any payload and details of any planned re-entry from orbit by the launch vehicle.
2. General descriptions of—
 - (a) the applicant's organisation and management structure;
 - (b) the launch vehicle to be used including descriptions and, where appropriate, diagrams of—
 - (i) its concept of operations,
 - (ii) any payload or class of payload, and
 - (iii) the layout of systems that are part of it;
 - (c) any carrier aircraft to be used including descriptions and, where appropriate, diagrams of—
 - (i) its concept of operations,
 - (ii) any payload or class of payload, and
 - (iii) the layout of systems that are part of it;
 - (d) the facilities and major items of equipment that the applicant will need to carry out the proposed spaceflight activities, and which, if any, of these will be provided by a proposed spaceport licensee or by a proposed range control service provider;
 - (e) the areas which could be affected by a major accident during the proposed spaceflight activities, including—
 - (i) their geography,
 - (ii) any structures in them built by humans or built for human use or benefit, and
 - (iii) the existing and expected locations of humans and areas of habitation within those areas.
3. For launch operator licence applicants, identification of the spaceport or other place from which the launch is to take place and the proposed spaceport licensee.
4. Identification of—
 - (a) any range control services needed;
 - (b) any proposed range control service providers;
 - (c) any site or facility other than a spaceport that has been or is to be used by the applicant in the design, manufacture, testing or operation of the applicant's launch vehicle or any carrier aircraft.
- 5.—(1) For launch operator licence applicants—
 - (a) a schedule of the preparatory events mentioned in the ground safety analysis required by regulation 27 setting out how long before the launch each preparatory event is intended to take place;
 - (b) the review processes the applicant will use to check—
 - (i) that launch preparations are progressing safely, and

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- (ii) whether the applicant and any other licensees involved in the launch are ready to commence the launch;
 - (c) a schedule of any safety-critical actions the proposed range control service provider and the proposed spaceport licensee will carry out in preparation for the launch from the time when the launch vehicle or its components arrive at the spaceport or other place from which the launch is to take place.
- (2) In this paragraph, “safety-critical action” means any action which is essential to preventing the proposed spaceflight activities from causing a major accident.
6. Evidence that the applicant will, if granted the licence, be able to meet the requirements of regulations 84 to 104 of Part 8 (safety of operator’s spaceflight activities).
7. Details of the applicant’s safety management system for the proposed spaceflight activities.
8. Particulars of any licence, permit or approval that any country other than the United Kingdom has granted to the applicant in relation to the proposed spaceflight activities or a launch vehicle that the applicant plans to use for those activities.
9. Information about what applications, if any, the applicant has previously made for a licence or approval to carry out spaceflight activities similar to the proposed spaceflight activities, and what the outcome was of each of those applications.
10. Information about the applicant’s experience, if any, in the design, development or operation of launch vehicles, payloads or any other space-related hardware or software.

Technical particulars

11. Descriptions of the technical requirements which apply to the launch vehicle, which must be either—
- (a) the requirements described under the headings of technical requirements types contained in Chapter 6 of the Space Engineering Technical Requirements Specification produced by the European Cooperation for Space Standardisation and dated 6th March 2009(1), or
 - (b) requirements of substantially like effect to the requirements referred to in subparagraph (a).
- 12.—(1) For each safety-critical system used in the proposed spaceflight activities—
- (a) a description, drawing and schematic diagram of the system;
 - (b) a statement of the system’s purpose;
 - (c) documentation justifying the choice of design for that system;
 - (d) a description of each way that system could fail;
 - (e) predicted probabilities of failure and, where known, failure frequencies;
 - (f) predicted consequences of failure;
 - (g) a description of any method used to check that the applicant has correctly identified the environment within which the system is expected to operate;
 - (h) a description of the methods used to—
 - (i) design, test and qualify the system;

(1) ECSS-E-ST-10-06C (<https://ecss.nl/standard/ecss-e-st-10-06c-technical-requirements-specification>). The specification is annexed to the guidance for launch operator and return operator applicants and licensees, available on the CAA’s website (www.caa.co.uk). A paper copy of that guidance may be requested by writing to the CAA at Aviation House, Beehive Ringroad, Crawley, West Sussex RH6 0YR.

- (ii) accept the system hardware and any software for use;
- (iii) determine the service life of the system and the major phases of its lifecycle;
- (i) the criteria and procedures for disposal or refurbishment of the system or its major components;
- (j) a description of any standards used in paragraphs (a) to (i).

(2) In this paragraph, “safety-critical system” means any system, including hardware and software, the performance of which is essential to preventing a major accident as a result of the proposed spaceflight activities.

13. A description of the engineering practices used in the design, manufacture, assembly and operation of the launch vehicle including of—

- (a) the design and analysis tools used;
- (b) any national or international design, engineering or safety standards followed;
- (c) test, validation and verification procedures undertaken or to be undertaken as required by regulation 94.

14. A description of the engineering practices and design and operational measures that will be used to prevent or mitigate the creation of space debris during the proposed spaceflight activities, including identification of methods for verifying and validating those practices and measures.

15. Descriptions of any hazardous material that is part of the launch vehicle or payload or is to be carried on board the launch vehicle during the proposed spaceflight activities.

16. For any payload that the launch vehicle will carry, technical particulars relevant to the risk of a major accident, including—

- (a) descriptions of any systems on board the payload that are required for the basic operation of the payload or necessary to carry out its intended mission;
- (b) information about any hazardous material or any equipment or device carried on board the payload that could give rise to a major accident hazard;
- (c) a description of any ground support equipment needed for the payload or its integration with the launch vehicle;
- (d) information about any essential interface between the payload and specific equipment at the place of launch.

17. Technical particulars of and performance data for any carrier aircraft intended to be used, including any existing aircraft certification or permit.

Flight safety analysis

18.—(1) The hazards mentioned in regulation 26(2) which the applicant must consider in carrying out the flight safety analysis are—

- (a) blast overpressure;
- (b) fragmentation debris;
- (c) thermal radiation;
- (d) toxic release;
- (e) major accident hazards arising from—
 - (i) any discarded part of the launch vehicle and any object, including any payload, released or separated from the launch vehicle;
 - (ii) collision with a space object;

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- (iii) meteorological or environmental conditions;
 - (iv) the use of a carrier aircraft, if applicable;
 - (v) re-entry of the launch vehicle, or any part of it, from orbit, if applicable.
- (2) The matters mentioned in regulation 26(3) which the applicant must take into account in carrying out the flight safety analysis are—
- (a) the locations of individuals who could be harmed by any of the identified hazards;
 - (b) the applicant’s own and each proposed range control service provider’s capabilities in—
 - (i) tracking;
 - (ii) telemetry;
 - (iii) communications;
 - (c) how any flight safety system will be activated if its activation is necessary;
 - (d) how the applicant will coordinate and communicate with air traffic control service providers, meteorological information providers and emergency services;
 - (e) any legal requirements relevant to the applicant’s proposed use of airspace;
 - (f) information available about any known space object with which there is a risk of the launch vehicle colliding.

Ground safety analysis

19. The hazards mentioned in regulation 27(5) which the applicant must consider in carrying out the ground safety analysis are—
- (a) blast overpressure;
 - (b) fragmentation debris;
 - (c) thermal radiation;
 - (d) toxic release;
 - (e) major accident hazards arising from—
 - (i) hazardous material;
 - (ii) contamination of hazardous material intended for use in the launch vehicle;
 - (iii) impact damage and mechanical damage;
 - (iv) meteorological or environmental conditions;
 - (v) sources of electrical discharge.

SCHEDULE 2

Regulation 32

Matters applicant must take into account for the risk assessment

The applicant must consider all hazards that could cause a human occupant to experience or undergo any of the following—

- (a) disorientation;
- (b) acceleration;
- (c) free-falling in circumstances equivalent to reduced gravity;
- (d) excessive noise or vibration;

- (e) anxiety, claustrophobia or other conditions caused by restrictions on individual mobility or reduced ability to use the senses during spaceflight activities;
- (f) loss of, or a reduction in the level of, launch vehicle pressurisation;
- (g) depleted levels of oxygen and decompression sickness;
- (h) fire, smoke or other emergency on board the launch vehicle which contaminates the supply of oxygen;
- (i) evacuation of the launch vehicle;
- (j) activation of a flight safety system.

SCHEDULE 3

Regulations 56, 66, 69

Training and qualification

PART 1

Specified criteria

Launch directors

1. A launch director (“LD”) must have a detailed knowledge and understanding of—
 - (a) the operator’s spaceflight activities, including the operation of the launch vehicle and any carrier aircraft and all matters which may affect the safety of the launch;
 - (b) the responsibilities of the LD in relation to the licence of the spaceflight operator and any conditions imposed on that licence;
 - (c) all launch procedures and spaceflight procedures throughout all phases of the flight, including under both normal conditions and abnormal conditions, including emergency situations;
 - (d) in cases where the operator’s spaceflight activities require a flight safety system, the flight safety system, including autonomous flight safety systems and manual systems, and the circumstances and conditions for use of the flight safety system.
2. The LD must be able to demonstrate an ability to deal with both planned and unplanned events during—
 - (a) a launch, or a series of simulated launches, and
 - (b) flights,

in accordance with the procedures established by the spaceflight operator.

3. The LD must have the ability to organise and lead personnel of the spaceflight operator working on the launch, and any other staff involved with monitoring in real time the launch vehicle’s trajectory, performance or safe condition for continued flight.

4. The LD must have a comprehensive knowledge of pre-flight, flight and post-flight activities, including safety-critical ground operations and the role and functions of any sub-contractors and other agencies involved during the operator’s spaceflight activities.

5. The LD must have a clear understanding of—
 - (a) the role of the safety manager,

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- (b) the regulatory matters pertaining to the operator's spaceflight activities,
 - (c) the role of regulatory officials during launch and spaceflight activities, and
 - (d) the processes involved in gaining final approval for launch.
6. The LD must have participated in practical training, which must include mission rehearsals, and either—
- (a) participating in actual launch activities under the supervision of a qualified LD, or
 - (b) simulations of any circumstances where the trainee LD was forbidden from participating in actual launch activities under paragraph 7.
7. A trainee LD may not be given any role in relation to an actual launch if this could adversely affect flight safety.

Flight termination personnel

8. Every member of the flight termination personnel ("MFTP") must have the knowledge, skill and ability to operate a manual flight safety system in accordance with the safety regulations in Part 8.
9. The MFTP must be familiar with—
- (a) the spaceport or other place from which the launch is to take place or takes place, the launch vehicle and equipment used in the operator's spaceflight activities, and
 - (b) the flight-safety functions and procedures which relate to the operator's spaceflight activities.
10. The MFTP must have completed—
- (a) training designed for each mission in which the MFTP is to participate, and
 - (b) launch and spaceflight simulation exercises and rehearsals designed to test the flight termination criteria, the flight safety data display integrity and the performance of the MFTPs for the flight in both normal and abnormal conditions, including emergency situations.
11. All MFTPs who monitor launch vehicle performance and perform flight termination, or oversee an automated flight safety system which performs these functions, must have detailed knowledge of—
- (a) the application of safety support systems such as position-tracking sources, communications, telemetry and system redundancy,
 - (b) the technology and scientific principles associated with the flight safety systems used by the spaceflight operator, including hardware and software and any command destruct function,
 - (c) the principles of radio frequency transmission, propagation, reception and attenuation,
 - (d) the behaviour of ballistic and aerodynamic vehicles in flight under the influence of aerodynamic forces, and
 - (e) the application of safety regulations in Part 8 and the procedures set out in the safety operations manual so far as they apply to flight termination.
12. The MFTP must also be capable of resolving, where possible, malfunctions in the flight safety systems used by the spaceflight operator, and be aware of the procedures to be followed if malfunctions cannot be resolved.

Flight crew and remote pilots

13. Every member of the flight crew (“MFC”) and remote pilot must be able to demonstrate their ability to operate the launch vehicle and to perform their assigned functions competently and safely throughout all phases of the flight in both normal and abnormal conditions, including emergency situations.

14.—(1) An MFC of a sub-orbital aircraft must, subject to paragraph (3), hold—

- (a) a commercial pilot’s licence with an instrument rating, issued by the CAA, or
- (b) an ICAO compliant commercial pilot’s licence with instrument rating,

which, subject to paragraph (2), has a valid type-rating for at least one type of turbo-jet aircraft.

(2) The MFC may hold a licence within paragraph (1)(a) or (b) which does not have a valid type-rating for a type of turbo-jet aircraft if the MFC can provide evidence that the MFC is, or has been, qualified to fly a military turbo-jet aircraft.

(3) An MFC who is a pilot of a launch vehicle which is a balloon must hold—

- (a) a commercial pilot’s licence for balloons issued by the CAA, or
- (b) an ICAO compliant commercial pilot’s licence for balloons.

(4) A remote pilot must have any qualifications required by the regulator by conditions included in the spaceflight operator’s licence.

15.—(1) Pilots and remote pilots must possess the aeronautical knowledge, experience and skills necessary to pilot and control the launch vehicle within airspace having the same classification as the airspace in which the launch vehicle will be operating, including in the vicinity of spaceports and airports.

(2) For the purposes of sub-paragraph (1), aeronautical experience may include hours in flight and hours under instruction.

16.—(1) An MFC expecting to act as a pilot in command of a flight in which a spaceflight participant is to be carried (a “participant spaceflight”), must have undertaken one actual or simulated spaceflight in a launch vehicle of the same type as the spaceflight operator’s launch vehicle as a member of the flight crew within the period of 14 days ending on the day before the participant spaceflight (the “relevant period”).

(2) A remote pilot who intends to act as a remote pilot in command of a participant spaceflight must have undertaken one actual or simulated spaceflight in a launch vehicle of the same type as the spaceflight operator’s launch vehicle as a remote pilot within the relevant period.

17. An MFC must be able to demonstrate the MFC’s ability to withstand the mental and physical stresses of spaceflight including disorientation, illusory effects, rapid acceleration, microgravity, noise and vibration, in sufficient condition to be able to operate the launch vehicle throughout all phases of flight safely and competently.

18.—(1) An MFC of a launch vehicle other than a balloon must be able to demonstrate an ability to perform tasks, equivalent in complexity to those which would be performed in flight, while exposed to the mental and physical stresses of rapid acceleration.

(2) Whether the MFC satisfies the criteria in sub-paragraph (1) must be tested in a centrifuge device or an aircraft, or in a combination of the two, that is able to replicate the effects on the human body of the forces of acceleration, the rate of change of those forces and their duration, in conditions equivalent to the periods of the flight when those forces are most acute.

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19. An MFC and a remote pilot must hold a flight radiotelephony operator's licence for the area of operation of the licensee's spaceflight activities, which certifies that they have language proficiency in English to level 6, in accordance with Appendix 2 to the Aircrew Regulation.

20. An MFC must have previous experience as a member of the flight crew or as a remote pilot in a launch vehicle or aircraft that exposed the MFC—

- (a) to a workload which is equivalent to that expected of an MFC or a remote pilot undertaking the spaceflight activities, and
- (b) to effects on the body of rapid onset and diminution of acceleration at least equivalent to those which would be experienced during a typical flight of the spaceflight operator's launch vehicle.

Sub-orbital aircraft engineers

21.—(1) A sub-orbital aircraft engineer for a sub-orbital aircraft intended to carry humans must hold—

- (a) an aircraft engineer's licence issued by the CAA which is relevant to turbo-jet powered aircraft, or
- (b) an equivalent ICAO compliant aircraft maintenance engineer's licence.

(2) The sub-orbital aircraft engineer referred to in sub-paragraph (1) must be able to demonstrate an ability to carry out any inspections and functional checks and to review any information, which are necessary to confirm that the launch vehicle complies with conditions referred to in regulation 99 in so far as readiness of the launch vehicle to launch is concerned.

Range operations manager

22. A range operations manager ("ROM") must be able to demonstrate competence in—

- (a) coordinating arrangements for the activation and operation of the range, and
- (b) ensuring—
 - (i) that range functions of a mission are carried out in accordance with the terms and conditions of the range control licence, and
 - (ii) effective functioning of range operation and personnel in support of the spaceflight activities.

23. The ROM must ensure that the ROM's team has completed mission-specific training so that the team is ready to support the spaceflight activities involved in a mission.

24. The ROM must have experience in a similar or related role in another organisation.

Range safety manager

25. A range safety manager ("RSM") must have completed—

- (a) mission-specific training to ensure that the team is ready for a mission, and
- (b) launch and spaceflight simulation exercises and rehearsals covering both normal and abnormal conditions, including emergency situations, designed to test—
 - (i) range safety personnel performance,
 - (ii) flight termination criteria, and
 - (iii) flight safety data-display integrity.

26. The RSM must be able to demonstrate familiarity with the range, spaceport or other place from which the launch is to take place or takes place, launch vehicle and the flight safety system functions, equipment and procedures related to the operator's spaceflight activities.

27. Where the RSM is to be responsible for operating, or for overseeing the operation of, the flight safety system, the RSM must be able to demonstrate the knowledge, skill and ability necessary to operate that system, or, in the case of an autonomous flight safety system, to oversee the operation of that system.

28. The RSM must be able to demonstrate detailed knowledge of—

- (a) the application of safety support systems such as position-tracking sources, communications, telemetry and system redundancy,
- (b) the technology and scientific principles associated with the flight safety system to be used by the spaceflight operator, including hardware and software and any command destruct function,
- (c) the principles of radio frequency transmission, propagation, reception and attenuation,
- (d) the behaviour of ballistic and aerodynamic vehicles in flight under the influence of aerodynamic forces, and
- (e) the application of safety regulations in Part 8 and the procedures set out in the safety operations manual so far as they apply to flight termination.

29. The RSM must also be capable of resolving malfunctions in flight safety systems used by the spaceflight operator and be aware of the procedures to be followed if malfunctions cannot be resolved.

PART 2

Training manual

30. The training manual must contain the matters set out in paragraphs 31 to 47.

31. The training policy of the licensee, including guidance on objective assessment, the need for impartiality, and what provision is made for independent confirmation that an individual meets the required standard of competency.

32. The responsibilities of the training manager.

33. The responsibilities of instructors carrying out any part of the training programme.

34. Information for instructors on the training programme, including—

- (a) the syllabus and content for each course on the training programme,
- (b) what assessments are to be carried out on the training programme, and
- (c) the facilities, equipment and instructional material to be used on each course on the training programme.

35. The locations where any training is to be carried out.

36. The procedures established by the licensee to satisfy its obligations under regulation 72(1), and, where the licensee will be undertaking spaceflight activities with individuals on board a launch vehicle, to enable crew members and spaceflight participants to satisfy their obligations under Chapter 5 of Part 8.

37. The entry requirements for applicants for each role.

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38. The procedures to be adopted for determining that an individual has met the required standard of competency to undertake a role, and for recording that fact.

39. A full description of the training programme, including—

- (a) a schedule of all the training provided, indicating—
 - (i) the priority and sequence of courses of training,
 - (ii) the intervals at which recurrent training will be provided, and
 - (iii) when assessments will be carried out;
- (b) a statement of the standards, objectives and training goals for each course of training included in the training programme, setting out—
 - (i) what training is provided, at each level referred to in regulation 69(3)(a),
 - (ii) who will be providing the training,
 - (iii) when practical instruction, in the form of group training, exercises and simulations, will be used,
 - (iv) what theoretical instruction will be given, and
 - (v) what criteria a participant has to satisfy to pass a course, and
- (c) a description of—
 - (i) any aircraft referred to in regulation 70(3), and
 - (ii) any simulated training devices or other equipment referred to in regulation 71, which is used in any of the training given on the training programme, and how it is intended to be used in the training programme.

40. A full description of the arrangements made for undertaking mission rehearsals in compliance with regulation 70(5), including the time at which mission simulations are held, and who participates in them.

41. A statement describing any arrangements which have been made with a third party for the provision of any services or equipment by the third party, setting out precisely what services or equipment are to be provided by that third party.

42. A statement of how the licensee, other than a spaceport licensee, will ensure that relevant individuals, before undertaking any role in relation to licensed activities, have undertaken the required training, and have reached the required level of competence and medical fitness for their roles, including—

- (a) a description of the procedures for testing the competency of relevant individuals, and the standards to be applied in relation to each role;
- (b) the procedures for medical assessments and medical examinations.

43. A statement of the policy in relation to individuals who do not fully complete training, fail a competency test, or withdraw or are withdrawn from training.

44. Where the licensee will be undertaking spaceflight activities with individuals on board a launch vehicle, the informed consent procedures applying to the crew and any spaceflight participants.

45. The procedures of the licensee, other than a spaceport licensee, for recording results of training undertaken by relevant individuals, and keeping the records of those results, including the measures being taken to ensure the confidentiality of personal information.

46. The measures being taken to assess the performance of training instructors and to review the adequacy and suitability of the training being provided.

47. A section setting out the measures the licensee is taking to satisfy the medical requirements in these Regulations which apply to the licensee's activities, which must, where appropriate to those activities, contain—

- (a) the licensee's policy in relation to medical fitness;
- (b) information on the responsibilities of the licensee, and the training manager in relation to medical fitness under regulations [58\(6\)\(c\)](#) and [58\(7\)\(b\)](#), [63\(1\)\(a\)](#), and [72 to 77](#);
- (c) information on the responsibilities of the aeromedical examiner and medical staff taking part in the licensee's medical programme;
- (d) the medical requirements for any flight crew, remote pilots and spaceflight participants under this Part;
- (e) the obligations of any flight crew, remote pilots and spaceflight participants under regulations [72 to 77](#);
- (f) information for approved medical examiners, any flight crew and spaceflight participants and their medical advisers on—
 - (i) when medical examinations and assessments will be held, and how they will be conducted;
 - (ii) where medical examinations will be conducted, and what equipment and facilities are available for them;
 - (iii) what medical reports will be required for the purpose of medical assessments;
 - (iv) what conditions may be imposed on a certificate or confirmation of medical fitness under regulation [73\(6\)](#);
- (g) a list of the medical records kept by the licensee under regulation [77](#).

PART 3

Training for specified roles and capacities

48. Every member of the crew and remote pilot must have received the training described in paragraphs [49](#) and [50](#) before they are assigned duties on board a launch vehicle or, in the case of a remote pilot, permitted to pilot a launch vehicle remotely.

49. Every member of the crew and remote pilot must receive theoretical and practical training on—

- (a) all matters where coordination between members of the crew, remote piloting staff and spaceflight participants is critical to dealing effectively with normal and abnormal situations, including emergency situations, and
- (b) the location and use of the launch vehicle's emergency equipment including the procedures for evacuating the launch vehicle, and for these purposes, "emergency equipment" has the same meaning as in regulation [112\(3\)](#).

50. Every member of the crew and spaceflight participant must receive training in withstanding the stresses of spaceflight activities, including training on—

- (a) the causes of disorientation, and what effects of disorientation may be experienced by crew and spaceflight participants during the various phases of flight,
- (b) what physical effects may be experienced as a result of—
 - (i) gradual or instantaneous acceleration, and
 - (ii) free-falling in circumstances equivalent to reduced gravity, and

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- how those effects may be mitigated,
- (c) how to reduce the effects of excessive noise and vibration, including the methods and equipment available for this purpose,
 - (d) techniques available for countering anxiety, claustrophobia and other conditions which may be caused by restrictions on individual mobility or reduced ability to use the senses during spaceflight,
 - (e) procedures for a loss of launch vehicle pressurisation, or a reduction in the level of launch vehicle pressurisation, including how to deal with depleted levels of oxygen and decompression sickness,
 - (f) procedures for dealing with fires, smoke or other emergencies on board the launch vehicle when the supply of oxygen becomes contaminated, and
 - (g) survival techniques following an evacuation, including basic first aid, so far as relevant to the operator's intended spaceflight activities.
- 51.** Every member of the crew and remote pilot must receive training in—
- (a) co-ordination of the crew,
 - (b) the extent to which human error may affect the safety and efficiency of spaceflight activities, and how this may be mitigated, and
 - (c) the identification and carriage of hazardous material or dangerous goods.
- 52.** Every spaceflight participant must receive training in—
- (a) what functions, if any, they are directly responsible for,
 - (b) how these functions relate to the functions of others on board the launch vehicle, particularly during abnormal or emergency conditions,
 - (c) entering and leaving the launch vehicle and the actions to be taken on board the launch vehicle during all phases of the flight,
 - (d) the instructions to be complied with in relation to any direction from the crew,
 - (e) what hazardous forms of activity are forbidden during training and during the spaceflight activities,
 - (f) the use of any personal protective equipment,
 - (g) the location and use of the launch vehicle's emergency equipment, and
 - (h) the procedures for evacuating the launch vehicle.

SCHEDULE 4

Regulations 85 and 163

Requirements and matters to be addressed by safety management systems

1. In this Schedule—

“emergency response plan” means the plan referred to in regulation 104 (in the case of a spaceflight operator) and in regulation 165 (in the case of a spaceport licensee);

“licensed activities” means the activities which a person is authorised to carry out by virtue of a launch operator licence, a return operator licence or a spaceport licence;

“licensee” means a person who holds a launch operator licence, a return operator licence or a spaceport licence under the Act;

“safety-critical information” means any information which is essential to the licensee satisfying its safety duty;

“safety duty” is to be construed in accordance with—

- (a) regulation 79, in the case of a spaceflight operator,
- (b) regulation 152, in the case of a spaceport licensee;

“security risk assessment” means the assessment required under—

- (a) regulation 170(5)(f), in the case of a spaceport licensee,
- (b) regulation 171(5)(f), in the case of a spaceflight operator, and
- (c) regulation 185(2)(f), in the case of either a spaceport licensee or a spaceflight operator.

2. A safety management system must—

- (a) be proportionate to the hazards, licensed activities and complexity of the licensee’s organisation,
- (b) be based on an assessment of the risks,
- (c) include within its scope the general management system, including the organisational structure, responsibilities, practices, procedures, processes and resources for determining and implementing the licensee’s spaceflight safety policy, and
- (d) be coordinated with the safety management system of any other licensee or other organisation with whom the licensee must interact during the provision of its licensed activities.

3. A safety management system must include a written spaceflight safety policy which—

- (a) is proportionate to the licensee’s safety duty,
- (b) sets out the licensee’s overall aims and principles of action,
- (c) sets out the role and responsibility of management, and its commitment towards continuously improving the licensee’s safety performance,
- (d) sets out a direct accountability for safety on the part of senior management, and
- (e) is signed by the accountable manager.

4. The following matters must be addressed by the safety management system—

- (a) in relation to the organisation and personnel—
 - (i) the safety roles and responsibilities of personnel involved in the management of major accident hazards at all levels in the organisation,
 - (ii) where relevant, the safety roles and responsibilities of personnel involved in the management of risks to human occupants at all levels in the organisation,
 - (iii) the identification of the training needs of personnel in paragraphs (i) and (ii), and the provision of the training with reference to the training management system the licensee has in place under regulation 58(8),
 - (iv) the measures taken to raise awareness of the purpose and content of the licensee’s spaceflight safety policy amongst such personnel,
 - (v) the communication of safety-critical information, and
 - (vi) the involvement of employees and agents involved in the licensed activities, who are important from the point of view of safety;
- (b) the identification and evaluation of major accident hazards by the adoption and implementation of procedures which—
 - (i) systematically identify those hazards,

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- (ii) assess their likelihood and severity,
 - (iii) take into account human factors in the initiation, prevention, control and mitigation of the consequences of those hazards, and
 - (iv) take into account the security risk assessment;
 - (c) where relevant, the identification and evaluation of risks to human occupants by the adoption and implementation of procedures which—
 - (i) systematically identify the risks to those occupants,
 - (ii) assess their likelihood and severity,
 - (iii) take into account human factors in the initiation, prevention, control and mitigation of the consequences of those risks, and
 - (iv) take into account the security risk assessment;
 - (d) in relation to operational control—
 - (i) the adoption and implementation of procedures which take account of human factors and instructions for—
 - (aa) safe operation including condition monitoring and maintenance of facilities or infrastructure and equipment;
 - (bb) where relevant, safe assembly and integration, including condition monitoring and maintenance of launch vehicles;
 - (ii) the taking into account of available information on best practices for monitoring and control, with a view to reducing the risk of system failure;
 - (e) in relation to the management of change, the adoption and implementation of procedures which take account of human factors, for planning changes to licensed activities or organisational change;
 - (f) in relation to planning for emergencies—
 - (i) the adoption and implementation of procedures to identify foreseeable emergencies by systematic analysis,
 - (ii) the preparation, testing and review of the emergency response plan, and
 - (iii) the provision of specific training for all personnel working in the licensee's organisation, including relevant subcontracted personnel;
 - (g) in relation to monitoring performance, the adoption and implementation of procedures, which must include the matters referred to in paragraph 5, for—
 - (i) the ongoing assessment of compliance with the objectives set by the licensee's spaceflight safety policy and safety management system, and
 - (ii) the mechanisms for investigation and taking corrective action in case of non-compliance or sub-standard safety performance of the safety management system;
 - (h) in relation to audit and review—
 - (i) the adoption and implementation of procedures for periodic systematic assessment of the licensee's spaceflight safety policy and the effectiveness and suitability of the safety management system;
 - (ii) the documented review of performance of the safety policy and safety management system and its updating by senior management, including consideration and incorporation of necessary changes indicated by the audit and review.
5. The procedures referred to in paragraph 4(g)—

- (a) must cover the licensee's system for internal reporting of occurrences, particularly those involving failure of protective measures, and their investigation and follow-up on the basis of lessons learned, and
- (b) may include performance indicators such as safety performance indicators or other relevant indicators.

SCHEDULE 5

Regulation 90

Safety operations manual

1. Where the operator's spaceflight activities are authorised by—
 - (a) a launch operator licence, the safety operations manual must contain the matters set out in paragraphs 2 to 27;
 - (b) a return operator licence, the safety operations manual must contain the matters set out in paragraphs 3 to 6, 7(1)(l), 8, 9, 14, 15, 17 and 20 to 27,

in so far as relevant to the operator's spaceflight activities which are authorised by the launch operator licence or the return operator licence.

2. The manual must—
 - (a) where necessary, include or refer to information relating to the instructions and procedures referred to in this Schedule, and
 - (b) take into account any human factors relevant to the performance of those procedures and instructions by members of the operating staff and, if the launch vehicle has a spaceflight participant on board, that participant.

Fatigue and other human factors

3. Instructions and procedures that take account of the effects of fatigue and other human factors related to the ability of any member of the operating staff to carry out their spaceflight duties safely.

4. If the launch vehicle has a crew, information about the limitations on flight time, flight duty periods and rest periods for members of the crew and any other matter intended to manage the effects of spaceflight on the human body and to ensure that the crew comply with the requirement in regulation 74.

5. If the launch vehicle has a remote pilot, information about the limitations on flight time, flight duty periods and rest periods for remote pilots and to ensure that the remote pilot complies with the requirement in regulation 74.

6. Details of the safety management system which the spaceflight operator has put in place and which satisfies the requirements in regulation 85 and Schedule 4.

Preparations for launch, return and other operations

- 7.—(1) Instructions and procedures about—
 - (a) the arrival of the launch vehicle at the spaceport or other place from which the launch is to take place;
 - (b) storing the launch vehicle at the spaceport or other place from which the launch is to take place;

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- (c) the assembly and integration of any component parts of the launch vehicle including any instructions from the design authority or a person who manufactured the launch vehicle or any of its component parts;
 - (d) if a launch vehicle is to be reused, satisfying the requirements in regulations 91 to 93;
 - (e) the verification and validation of the launch vehicle to satisfy the requirement in regulation 94;
 - (f) the integration of any payload with the launch vehicle;
 - (g) the loading of any hazardous material onto the launch vehicle;
 - (h) the meteorological and environmental conditions needed to safely load such material;
 - (i) the preparations for the use of any carrier aircraft;
 - (j) moving the launch vehicle to the place of launch at the spaceport or other place from which the launch is to take place and finally preparing the launch vehicle;
 - (k) carrying out safety, technical and organisational reviews, including joint procedures for carrying out such reviews, to check—
 - (i) the progress of launch preparations,
 - (ii) the fitness of the launch vehicle for the operator’s spaceflight activities,
 - (iii) the fitness of the ground support equipment for supporting those activities, and
 - (iv) the readiness for use of any flight safety system or any necessary equipment for providing range control services;
 - (l) to ensure the requirements in regulation 96 are satisfied, coordinating and communicating, including joint procedures for coordinating and communicating, with—
 - (i) the range control service provider and any site or other place used in connection with the provision of range control services,
 - (ii) the spaceport licensee,
 - (iii) the relevant meteorological service providers,
 - (iv) the relevant air navigation service providers, and
 - (v) the relevant emergency services.
- (2) In this paragraph “design authority” means the person with responsibility for the design of the launch vehicle.

8. Instructions and procedures for complying with the operator security programme.

9. Instructions about the functions and procedures of a mission management facility or ground control at a spaceport or other place and how such functions and procedures affect the duties of a member of the operating staff.

10. Instructions and procedures for ground operating staff about the types of dangerous conditions or events necessitating such staff to cease work on the launch vehicle or its ground support equipment and withdraw to a safe location.

11. Instructions and procedures for monitoring the progress of the preparations for readiness to launch.

12. Procedures for notifying the regulator about planned operator’s spaceflight activities and for arranging and cooperating with any inspections by the regulator of the launch vehicle, carrier aircraft, any ground support equipment or other equipment.

13. Instructions as to the order of the activities and safety procedures to be followed by ground operating staff on the day of the launch.

14. Instructions and procedures about recording in writing the environmental and meteorological information referred to in regulation 97, including the source of that information.

Launch and other operations

15. Instructions and procedures about the conditions referred to in regulation 99 and how to satisfy them.

16. Instructions and procedures about the steps to be taken if a launch cannot safely commence.

17. Instructions and procedures about the steps to be followed during each phase of the flight of the launch vehicle and other operator's spaceflight activities, including any phase when that vehicle is in orbit, to ensure that the spaceflight operator satisfies the requirements in regulations 100 and 101.

18. Instructions about the process to be followed before a flight termination decision is made in accordance with regulation 100(2).

19. If there is a flight safety system—

- (a) instructions and procedures to ensure that the system is capable of operating correctly and of being activated at any time in accordance with sub-paragraphs (c) to (e);
- (b) instructions and procedures about how to separate flight termination decisions and the actions of flight termination personnel relating to those decisions from the decisions and actions of other operating staff during launch and flight;
- (c) instructions to flight termination personnel relating to any time that a launch vehicle malfunctions and that malfunction prevents the operator's spaceflight activities being carried out safely;
- (d) instructions relating to any time that a system—
 - (i) used to monitor whether or not the launch vehicle remains fit for the operator's spaceflight activities, or
 - (ii) used to detect a malfunction,fails and that failure threatens the carrying out of the operator's spaceflight activities safely;
- (e) instructions relating to any time that it is necessary to make a flight termination decision for any reason other than one referred to in sub-paragraph (c) or (d) which threatens or prevents the carrying out of the operator's spaceflight activities safely;
- (f) instructions to the flight termination personnel on making a flight termination decision and the actions that such personnel must perform to terminate the flight.

20. If part of the mission, instructions and procedures about returning the launch vehicle to earth including a re-entry from orbit.

21. If the launch vehicle is reusable, instructions and procedures about recovering the launch vehicle to the earth's surface, rendering it safe from major accident hazards and enabling the planned landing.

22. Instructions and procedures about the steps to be followed on successful completion of the flight of the launch vehicle or other operator's spaceflight activities.

Launch vehicles with crew or a remote pilot

23. Instructions and procedures for members of the crew and any remote pilot to satisfy any requirements in these Regulations which apply to such members or pilot.

Emergency response

24. The emergency response plan satisfying the requirements in regulation 104 and instructions and procedures to implement that plan.

25. Procedures to ensure that the emergency response plan is tested, reviewed and revised as required by regulation 104(3) and that the results of a test of that plan and details of any revisions to that plan are supplied to the regulator as required by regulation 104(4).

Ground support equipment

26. Instructions and procedures for using, maintaining, verifying and validating, repairing and servicing any ground support equipment.

Making, collecting and retaining information

27. Instructions and procedures about—

- (a) making recordings referred to in regulation 103(1), and
- (b) collecting and retaining the information referred to in regulation 103(2).

SCHEDULE 6

Regulation 145

Information to be included in a health record

The information that must be included in a health record is—

- (a) the crew member's—
 - (i) full name;
 - (ii) gender;
 - (iii) date of birth;
 - (iv) address;
 - (v) national insurance number, if the crew member has one,
- (b) the date the crew member began work as a classified crew member for the operator required to create the health record,
- (c) if the crew member has received an overexposure—
 - (i) the date on which the overexposure occurred, and
 - (ii) the results of any medical examination undertaken by an approved doctor pursuant to regulation 141(2)(b), and the name and signature, which may be an electronic signature, of the approved doctor who undertook that examination,
- (d) the results of all medical examinations and health reviews of the crew member performed in accordance with regulation 144 under the instruction of the spaceflight operator which are signed by the approved doctor and include a legible record of that doctor's signature,
- (e) a statement made by the approved doctor who performed the crew member's most recent examination or, as the case may be, health review, setting out the determination made in respect of the crew member under regulation 144(3) at that examination or review, including any conditions specified as mentioned in regulation 144(3)(b), and
- (f) a copy of the record of all monitoring undertaken in relation to the crew member under regulation 146.

SCHEDULE 7

Regulation 150

Amendments to the Air Navigation (Cosmic Radiation: Protection of Air Crew and Space Crew and Consequential Amendments) Order 2019

1. The Air Navigation (Cosmic Radiation: Protection of Air Crew and Space Crew and Consequential Amendments) Order 2019(2) is amended as follows.

2. In article 2 (interpretation)—
 - (a) in the definition of “crew”, omit paragraph (b) including the word “and” immediately following it,
 - (b) in the definition of “doctor” omit the words “or space crew”,
 - (c) in the definition of “relevant crew member” omit the words “or spacecraft”,
 - (d) omit the definitions of “space cabin crew”, “space flight crew”, “spacecraft” and “spaceport”,
 - (e) in the definition of “task specialist” omit the words “or spacecraft”, and
 - (f) in paragraph (2) omit the words “or spacecraft”.
3. In article 3 (application of this Order)—
 - (a) omit paragraph (1)(b),
 - (b) in paragraph (2) omit the words “or spacecraft”, and
 - (c) in paragraph (3) omit the words “or spacecraft” in each place in which they occur.
4. In article 4 (meaning of “operator”)—
 - (a) in paragraph (1) omit the words “or spacecraft” in both places in which they occur,
 - (b) in paragraph (2) omit the words “or spacecraft” in each place in which they occur, and
 - (c) in paragraph (3) omit the words “or spacecraft”.
5. In article 5 (authorisation and prohibition on exposure)—
 - (a) in paragraph (1) omit the words “or spacecraft”,
 - (b) in paragraph (2)(a) omit—
 - (i) “, a Space Industry Act licence,”, and
 - (ii) “, licence”,
 - (c) in paragraph (3) omit the words “or spacecraft”,
 - (d) in paragraph (4) omit the words “or spacecraft”, and
 - (e) in paragraph (5) omit the definition of “Space Industry Act licence”.
6. In article 6 (risk assessments)—
 - (a) in paragraph (1) omit the words “or spacecraft” in both places in which they occur,
 - (b) in paragraph (2), both in the opening words and in sub-paragraph (c), omit the words “or spacecraft”, and
 - (c) in paragraph (3) omit the words “or spacecraft” in both places in which they occur.
7. In article 10 (provision of information and training to crew)—
 - (a) in paragraph (1)(a) omit “or, as the case may be, spacecraft”,
 - (b) in paragraph (2)(a) omit the words “or spacecraft”, and

(2) [S.I. 2019/1115](#).

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- (c) in paragraph (2)(b) omit “or, as the case may be, spacecraft”.
- 8. In article 11 (overexposure), in paragraph (1) omit the words “or spacecraft”.
- 9. In article 12 (continued working of overexposed crew)—
 - (a) in paragraph (1) omit the words “or spacecraft”, and
 - (b) in paragraph (3) omit the words “or spacecraft”.
- 10. In article 15 (health records), in paragraph (3)(b)(ii) omit the words “or spacecraft”.
- 11. In article 17 (records of exposure to cosmic radiation of classified crew), in paragraph (3)(b) omit the words “or spacecraft”.
- 12. In article 18 (access to records of individual exposure to cosmic radiation), in paragraph (2)(b) omit the words “or spacecraft”.
- 13. In article 19 (instruction of experts), in paragraph (5) omit the words “or spacecraft”.
- 14. In article 21 (right of access to aerodromes and other places)—
 - (a) omit paragraphs (2)(d) and (e), and
 - (b) in paragraph (4) (the definition of “relevant area”), for “, aerodrome or spaceport” substitute “, or an aerodrome,”.

SCHEDULE 8

Regulation 164

Information and instructions which must be included in a spaceport manual

1. The name and status of the accountable manager for the spaceport.
2. The names and status of other senior operating staff at the spaceport and instructions as to the order and circumstances in which they may be required to act.
3. Details of the safety management system.
4. Procedures for promulgating information concerning the spaceport’s state.
5. Procedures for control of access, vehicles and work in relation to the operational areas.
6. Procedures for the removal of disabled carrier aircraft, launch vehicles or payloads.
7. Process to ensure the emergency response plan is tested, reviewed and revised and the procedures for complying with regulation 165.
8. Process to ensure that the part of the site plan required under regulation 36(4)(d), which identifies the location of any areas at the spaceport designated as hazardous material storage facilities under regulation 158(1), is maintained and complied with.
9. Procedures to ensure that an appropriate safety clear zone, where required, is in place and is monitored.
10. Procedures for using a designated static engine test area.
11. Process and procedures to ensure the safe integration of licensed activities with—
 - (a) spaceflight activities undertaken at the spaceport, and
 - (b) aerodrome and aviation activities undertaken at the aerodrome with which the spaceport is co-located, if applicable.

12. In the case of a spaceport which has any hazardous material storage facility, procedures for complying with regulation 158.

13. Procedures for complying with fit for purpose requirements in regulation 160 for hazardous material.

14. Operational procedures for the routine and special inspection of the spaceport operational areas.

15. Process for using, maintaining, testing, repairing and servicing of any safety equipment.

16. If spaceflight activities are permitted during periods of low visibility, procedures for the protection of the runways, if applicable, during such periods.

17. Details of, or reference to, the bird control management plan, if any, related to spaceflight activities.

18. The scale of rescue, first aid and fire service facilities, the spaceport emergency procedures and procedures to be adopted in the event of temporary depletion of the rescue and fire service facilities.

19. Procedures for complying with the space site security programme required under regulation 170.