

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,
 - (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.

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.

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, andhow 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.

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- 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.