

---

---

First published in the Government Gazette, Electronic Edition, on 30 June 2018 at 9 am.

**No. S 442**

AIR NAVIGATION ACT  
(CHAPTER 6)

AIR NAVIGATION  
(98 — SPECIAL OPERATIONS)  
REGULATIONS 2018

ARRANGEMENT OF REGULATIONS

PART 1

PRELIMINARY

Regulation

1. Citation and commencement
2. Definitions
3. Application of Regulations

PART 2

*Division 1 — General requirements*

4. Application for special operations approval
5. Grant of special operations approval
6. Validity of special operations approval
7. Variation of special operations approval
8. General requirements of Singapore operator with special operations approval
9. Consequences of non-compliance

*Division 2 — Specified navigation performance operations*

10. Additional details for application
11. General requirements for specified navigation performance operations
12. Flight crew requirements
13. Continuous monitoring

*Division 3 — Operations in RVSM airspace*

14. Additional details for application
15. General requirements for RVSM operations

---

---

**Regulation**

16. Equipment requirements for RVSM operations
17. RVSM maintenance and inspection programme
18. Height-keeping performance monitoring
19. Flight crew requirements for operations in RVSM airspace

*Division 4 — Low visibility operations*

20. Additional details for application
21. General requirements for low visibility operations
22. Other required approvals
23. Operational demonstration
24. Aerodrome considerations
25. Training
26. Operating procedures
27. Minimum equipment requirements
28. Continuing Airworthiness Maintenance Procedures
29. Continuous monitoring
30. Aircraft and crew recency
31. Operations Manual

*Division 5 — Operations using automatic landing system,  
combined vision system, enhanced vision system,  
synthetic vision system or head-up display*

32. Additional details for application
33. General requirements for operations using automatic landing system, combined vision system, enhanced vision system, synthetic vision system, head-up display or hybrid display

*Division 6 — Data link system*

34. Additional details for application
35. General requirements for use of data link
36. Equipment

*Division 7 — Electronic flight bag*

37. Additional details for application
38. General requirements for use of electronic flight bag
39. Electronic flight bag equipment
40. Electronic flight bag function

*Division 8 — Extended diversion time operations (EDTO)*

41. Additional details for application
42. General requirements for EDTO

---



---

Regulation

- 43. Extension of maximum diversion time
- 44. Alternate aerodromes
- 45. Additional fuel

*Division 9 — Polar operations*

- 46. Additional details for application
- 47. General requirements for polar operations
- 48. Equipment requirements for polar operations
- 49. Operational plan for polar operations
- 50. Flight validation
- 51. Training requirements

*Division 10 — Mixed fleet flying*

- 52. Additional details for application
- 53. General requirements for mixed fleet flying operations
- 54. Assignment of duty for mixed fleet flying operations
- 55. Singapore operator's obligations for pilot licence endorsement
- 56. Pre-requisite experience for MFF Programme
- 57. MFF Programme
- 58. MFF Consolidation Period
- 59. MFF Indoctrination Training
- 60. Operator Proficiency Check
- 61. Operator Line Checks
- 62. MFF Pilot recency requirements
- 63. Rostering of MFF pilots
- 64. Cessation of deployment as MFF pilot

*Division 11 — Operations of single-engine turbine-powered  
aeroplane at night or in instrument  
meteorological conditions*

- 65. Additional details for application
- 66. General requirements for operations at night or in instrument meteorological conditions
- 67. Turbine engine reliability
- 68. Systems and equipment
- 69. Manuals and documentation
- 70. Route planning and limitations
- 71. Flight crew experience, training and checking

---

---

*Division 12 — Operations with performance-based  
communications or surveillance*

Regulation

- 72. Additional details for application
- 73. General requirements for operations with performance-based communications or surveillance
- 74. Equipment and maintenance
- 75. Operating procedures
- 76. Qualification and training requirements
- 77. Monitoring of performance

PART 3

MISCELLANEOUS

- 78. Financial penalties

PART 4

SAVING AND TRANSITIONAL PROVISIONS

- 79. Saving and transitional provisions  
The Schedules

---

In exercise of the powers conferred by section 3A of the Air Navigation Act, the Civil Aviation Authority of Singapore, with the approval of the Minister for Transport, makes the following Regulations:

PART 1

PRELIMINARY

**Citation and commencement**

1. These Regulations are the Air Navigation (98 — Special Operations) Regulations 2018 and come into operation on 1 October 2018.

---

---

## Definitions

2.—(1) Any term in these Regulations that is defined in the First Schedule to the Air Navigation (91 — General Operating Rules) Regulations 2018 (G.N. No. S 441/2018) has the meaning given to that term in that Schedule unless the term is otherwise defined in the First Schedule to these Regulations.

(2) Every standard in these Regulations for which a value is prescribed in the International System of Units (SI) and an alternative value is prescribed in a non-SI alternative unit of measurement in parentheses, the relevant standard is to be regarded as reached when either value is obtained.

## Application of Regulations

3. These Regulations apply to any Singapore operator who intends to conduct, or who is conducting, any of the following special operations:

- (a) a specified navigation performance operation;
- (b) an operation in RVSM airspace;
- (c) a low visibility operation;
- (d) an operation using an automatic landing system, a combined vision system, an enhanced vision system, a synthetic vision system, a head-up display, or a hybrid system comprising any combination of these systems and display;
- (e) any operation while using a data link system;
- (f) any operation while using an electronic flight bag;
- (g) an extended diversion time operation;
- (h) a polar operation;
- (i) a mixed fleet flying operation;
- (j) an operation at night or under instrument meteorological conditions using a single-engine turbine-powered aeroplane;

- (k) an operation with performance-based communications or performance-based surveillance.

## PART 2

### *Division 1 — General requirements*

#### **Application for special operations approval**

4.—(1) A Singapore operator may apply to the Director-General of Civil Aviation for an approval (called in these Regulations a special operations approval) to conduct any operation listed in regulation 3(a) to (k).

(2) An application made under paragraph (1) —

- (a) must be made at such time and in such form or manner as the Director-General of Civil Aviation may require;
- (b) must comply with the requirements prescribed in these Regulations for an application for the particular special operations approval; and
- (c) must include the Singapore operator's proposed amendments to its Operations Manual or equivalent and all other relevant documentation that are necessary for the special operation to be conducted safely.

(3) The Director-General of Civil Aviation may refuse to consider an application for a special operations approval that is incomplete or not made in the form or manner required by the Director-General of Civil Aviation.

#### **Grant of special operations approval**

5.—(1) After considering any application made under regulation 4, the Director-General of Civil Aviation may —

- (a) refuse the application; or
- (b) grant the special operations approval sought, subject to such conditions, restrictions and limitations as the Director-General of Civil Aviation thinks fit.

---

---

(2) Before granting a special operations approval, the Director-General of Civil Aviation must be satisfied that —

- (a) the Singapore operator seeking the special operations approval —
  - (i) meets the requirements specified in these Regulations that are applicable to the special operation for which approval is sought, including those that are applicable to a Singapore operator granted such an approval; and
  - (ii) has completed a safety risk assessment and has established appropriate measures to ensure an acceptable level of safety; and
- (b) it is not contrary to the interests of aviation safety to grant the special operations approval.

### **Validity of special operations approval**

6. A special operations approval is valid for the special operation and period specified in the approval.

### **Variation of special operations approval**

7.—(1) A Singapore operator with any special operations approval must obtain the Director-General of Civil Aviation's approval before varying —

- (a) the special operation that is the subject of the special operations approval; or
- (b) a document or procedure approved for the special operation.

(2) An application to vary a special operations approval or the period for which a special operations approval is valid —

- (a) must be made to the Director-General of Civil Aviation in the form and manner required by the Director-General of Civil Aviation; and

(b) must contain —

- (i) the details of the proposed variation, including the necessary changes to the Singapore operator's Operations Manual and all other relevant documentation if the proposed variation is approved; and
- (ii) the results of a safety risk assessment conducted by the Singapore operator to assess the level of safety of the special operation if the proposed variation is approved.

(3) After considering the application made under paragraph (2), the Director-General of Civil Aviation may —

- (a) approve the variation subject to conditions, restrictions and limitations;
- (b) refuse to approve the variation sought; or
- (c) withdraw the relevant special operations approval.

### **General requirements of Singapore operator with special operations approval**

**8.—(1)** A Singapore operator with a special operations approval must comply with —

- (a) the requirements prescribed in these Regulations for that operation;
- (b) the documents approved for that operation; and
- (c) the conditions, restrictions and limitations of the special operations approval.

(2) A Singapore operator with a special operations approval must maintain —

- (a) the training programme established for every person who is to be involved in the special operation that is the subject of the special operations approval as a flight crew member or a member of the operations personnel; and



- 
- 
- (b) the procedures, programmes or systems established to ensure compliance with —
- (i) the conditions, restrictions and limitations of the special operations approval; and
  - (ii) the requirements prescribed in these Regulations for the operation.

(3) A Singapore operator with a special operations approval must specify in —

- (a) the Singapore operator's Operations Manual if the Singapore operator is a commercial air transport operator; or
- (b) a document that is acceptable to the Director-General of Civil Aviation, if the Singapore operator is a person not mentioned in sub-paragraph (a),

the details of the special operation that is the subject of the special operations approval, including any training programme, procedure or system established for the special operation.

(4) Where a Singapore operator's special operations approval is varied under regulation 7(3)(a), the Singapore operator must update the relevant document mentioned in paragraph (2)(a) or (b) with —

- (a) the details of the approved variation; and
- (b) the conditions, restrictions or limitations that the approved variation is subject to.

### **Consequences of non-compliance**

**9.** The Director-General of Civil Aviation may vary, suspend or revoke a special operations approval if the Director-General of Civil Aviation is satisfied that the Singapore operator granted that special operations approval has failed to comply with —

- (a) a condition, restriction or limitation of the special operations approval; or
- (b) a provision of these Regulations.

---

---

*Division 2 — Specified navigation performance operations*

**Additional details for application**

**10.** A Singapore operator seeking a special operations approval to conduct a specified navigation performance operation must, as part of the application under regulation 4(1) —

- (a) identify the particular aircraft to be used for the specified navigation performance operation;
- (b) specify the equipment to be carried on the identified aircraft such that the aircraft is equipped to perform in accordance with the relevant navigation specification;
- (c) specify the composition and experience requirements of the flight crew for a flight involving the specified navigation performance operation; and
- (d) provide details of —
  - (i) the operating procedures required under regulation 11(a);
  - (ii) the training programme required under regulation 11(b);
  - (iii) the procedures required under regulation 11(d); and
  - (iv) the programme required under regulation 13.

**General requirements for specified navigation performance operations**

**11.** A Singapore operator with a special operations approval to conduct a specified navigation performance operation must —

- (a) have the following operating procedures for the specified navigation performance operation:
  - (i) procedures for normal and contingency situations;
  - (ii) incident reporting procedures;
- (b) have a training programme for every person to be involved in the specified navigation performance operation as a

---

---

flight crew member or a member of the operations personnel;

- (c) ensure that every aircraft identified for such operations is appropriately equipped to perform in accordance with the navigation specification; and
- (d) have procedures to ensure that the requirements of this Division and the conditions of the special operations approval are met.

### **Flight crew requirements**

**12.**—(1) A Singapore operator with a special operations approval to conduct a specified navigation performance operation must ensure that the aircraft used to conduct the specified navigation performance operation has a flight crew comprising members —

- (a) that are of the composition and experience required for such operations; and
- (b) that have completed the training programme established under regulation 11(b) for every flight crew member involved in such operations.

(2) A commercial air transport operator with a special operations approval to conduct a specified navigation performance operation must ensure that, when its aircraft is used to conduct a specified navigation performance operation, the flight crew comprises at least 2 pilots.

### **Continuous monitoring**

**13.** A Singapore operator with a special operations approval to conduct a specified navigation performance operation must have a programme to monitor the aircraft to be used for specified navigation performance operations to ensure the required level of navigation performance is maintained.

---

---

*Division 3 — Operations in RVSM airspace*

**Additional details for application**

**14.** A Singapore operator seeking a special operations approval to operate an aeroplane in RVSM airspace (called in these Regulations RVSM operations) must, as part of the application under regulation 4(1) —

- (a) identify the particular aeroplane to be so operated;
- (b) provide evidence that the identified aeroplane has a vertical navigation performance in accordance with the Second Schedule;
- (c) specify the equipment to be carried on the identified aircraft for compliance with regulation 16; and
- (d) provide details of —
  - (i) the training programme required under regulation 15(b);
  - (ii) the procedures required under regulation 15(c);
  - (iii) the RVSM maintenance and inspection programme required under regulation 17(1); and
  - (iv) the programme required under regulation 18(1).

**General requirements for RVSM operations**

**15.** A Singapore operator with a special operations approval to conduct RVSM operations must —

- (a) equip every aeroplane intended to be used for RVSM operations in accordance with regulation 16;
- (b) have a training programme for every person to be involved in such operations as a flight crew member or a member of the operations personnel; and
- (c) have procedures for ensuring that the requirements of this Division and conditions of the special operations approval will be met, including matters relating to —

- 
- 
- (i) the equipment to be carried on every aeroplane to be used, including the aeroplane's operating limitations and appropriate entries in the minimum equipment list;
  - (ii) flight crew composition and experience requirements;
  - (iii) flight planning;
  - (iv) pre-flight procedures;
  - (v) procedures prior to entry into RVSM airspace;
  - (vi) in-flight procedures;
  - (vii) post-flight procedures;
  - (viii) maintenance programmes;
  - (ix) incident reporting; and
  - (x) specific regional operating procedures.

### **Equipment requirements for RVSM operations**

**16.** A Singapore operator with a special operations approval to conduct RVSM operations must equip every aeroplane used for such operations with navigation equipment capable of —

- (a) indicating to the flight crew the flight level being flown;
- (b) automatically maintaining a selected flight level;
- (c) providing an alert to the flight crew when the aeroplane deviates from the selected flight level with a deviation exceeding the threshold of 90 m (300 ft) above or below the selected flight level; and
- (d) automatically reporting to the flight crew the pressure-altitude if the pressure-altitude is not automatically reported by the pressure altimeters required for the aeroplane.

---

---

**RVSM maintenance and inspection programme**

17.—(1) A Singapore operator with a special operations approval to conduct RVSM operations must have a maintenance and inspection programme for the altimeter system and altitude reporting equipment on every aeroplane that is used for such operations.

(2) The Singapore operator must incorporate the maintenance and inspection programme described in paragraph (1) into the aeroplane's approved airworthiness maintenance programme.

**Height-keeping performance monitoring**

18.—(1) A Singapore operator with a special operations approval to conduct RVSM operations must have a programme to monitor the height-keeping performance of the aeroplanes used for such operations.

(2) For the programme required in paragraph (1), the aeroplanes used for such operations must be grouped by the Singapore operator into 2 groups based on aeroplane type.

(3) For each group mentioned in paragraph (2), the Singapore operator must monitor the height-keeping performance of —

- (a) where the group consists of only one aeroplane — that aeroplane; or
- (b) where the group consists of 2 or more aeroplanes — at least 2 aeroplanes,

at least once every 2 years or every 1,000 flight hours, whichever period is longer.

**Flight crew requirements for operations in RVSM airspace**

19. A commercial air transport operator with a special operations approval to conduct RVSM operations must ensure that, when its aeroplane is used to conduct such an operation, the flight crew comprises at least 2 pilots.

---

---

*Division 4 — Low visibility operations*

**Additional details for application**

**20.** A Singapore operator seeking a special operations approval to conduct low visibility operations must, as part of the application under regulation 4(1) —

- (a) identify the aircraft types to be used for such operations;
- (b) conduct the operational demonstration specified in regulation 23(1) using an aircraft of the type to be used for the operations;
- (c) specify the equipment to be carried on the identified aircraft types for compliance with regulation 27(1);
- (d) specify the composition of, and experience requirements for, the flight crew assigned to such operations; and
- (e) provide details of —
  - (i) the system required under regulation 21(c);
  - (ii) the training programme required under regulation 21(d);
  - (iii) the syllabus required under regulation 21(e);
  - (iv) the procedures required under regulation 21(f);
  - (v) the operating procedures and instructions required under regulation 26(1); and
  - (vi) the flight crew recency requirements required under regulation 30.

**General requirements for low visibility operations**

**21.** A Singapore operator with a special operations approval to conduct a low visibility operation must —

- (a) ensure that every aircraft to be used for such an operation is certified under its type certificate for low visibility operations with a decision height not exceeding 200 ft;
- (b) ensure that each person assigned as a flight crew member to such an operation is appropriately qualified;

- (c) have a suitable system for recording the success and failure of automatic approach and automatic landing to monitor the overall safety of the operation;
- (d) have a training programme for every person to be involved in such an operation as a flight crew member or a member of the operations personnel;
- (e) have a detailed syllabus in its Operations Manual for the matters specified in regulation 25; and
- (f) have procedures for ensuring that the requirements of this Division and the conditions of the special operations approval are met.

### **Other required approvals**

**22.**—(1) A Singapore operator with a special operations approval to conduct a low visibility operation must not use a runway for a Category II or III operation unless the State of the Aerodrome for the aerodrome in which the runway is located has approved the use of the runway for such an operation.

(2) Where a Singapore operator with a special operations approval to conduct a low visibility operation intends to use —

- (a) a head-up display or equivalent;
- (b) an automatic landing system;
- (c) an enhanced vision system;
- (d) a synthetic vision system;
- (e) a combined vision system; or
- (f) a hybrid system comprising any combination of the display or systems mentioned in sub-paragraphs (a) to (e),

in the low visibility operation, the Singapore operator must obtain a separate special operations approval for that purpose.

### **Operational demonstration**

**23.**—(1) A Singapore operator must conduct, to the satisfaction of the Director-General of Civil Aviation, an operational demonstration



---

---

using an aircraft of the aircraft type to be used for a low visibility operation —

- (a) as required under regulation 20(b); and
- (b) as part of its application under regulation 7(2) to include an additional aircraft type in its special operations approval.

(2) The operational demonstration required under paragraph (1) must allow the Director-General of Civil Aviation to determine and validate the effectiveness of —

- (a) the aircraft system of the aircraft type to be used for the low visibility operation;
- (b) the Singapore operator's operating procedures and policies;
- (c) the Singapore operator's training and maintenance programmes; and
- (d) any relevant operational control mechanism of the Singapore operator.

### **Aerodrome considerations**

**24.**—(1) Before a Singapore operator with a special operations approval to conduct a low visibility operation commences the operation at a runway, the Singapore operator must verify that low visibility procedures have been established at the runway and are in use.

(2) Before a Singapore operator with a special operations approval to conduct a Category III operation commences the operations at a runway, the Singapore operator must verify that an aircraft, of the aircraft type intended to be used for Category III operations, has successfully completed at least one approach and landing at the runway in conditions that are Category II or better.

(3) Before a Singapore operator with a special operations approval to conduct a low visibility operation commences the operation at a runway with irregular pre-threshold terrain, or with other perceived or known deficiencies for low visibility operations, the Singapore operator must verify that the runway is suitable for such use by using

---

---

an aircraft, of the aircraft type intended to be used for such operations to complete, in the following order, at least one landing at the runway:

- (a) in conditions that are Category I or better;
- (b) in Category II conditions;
- (c) in Category III conditions.

### **Training**

**25.**—(1) A Singapore operator with a special operations approval to conduct a low visibility operation must ensure that every person assigned flight crew member duty as a pilot the operation —

- (a) has completed the training programme provided in accordance with regulation 21(d), which includes training in an approved flight simulation training device in operating the aircraft to the limiting values of RVR and decision height appropriate to the Singapore operator’s approval; and

*[S 678/2018 wef 09/10/2018]*

- (b) has undergone the relevant competency and proficiency checks to conduct the operation.

(2) The Singapore operator must conduct the training and checks mentioned in paragraph (1)(a) and (b) in accordance with a detailed syllabus specified in its Operations Manual.

(3) In this regulation, “approved flight simulation training device” means a flight simulation training device that —

- (a) is representative of the type of aircraft that is to be used to conduct the low visibility operation; and
- (b) is specifically approved, in accordance with paragraph 23A of the Air Navigation Order (O 2), to be used by the Singapore operator for this purpose.

*[S 678/2018 wef 09/10/2018]*

### **Operating procedures**

**26.**—(1) A Singapore operator with a special operations approval to conduct a low visibility operation must ensure that the operating procedures and instructions for the operation are designed such that

---

---

any aircraft used to conduct a 3D instrument approach operation crosses the threshold by a safe margin with the aircraft in the landing configuration and attitude.

*[S 678/2018 wef 09/10/2018]*

(2) The Singapore operator must ensure that the pilot-in-command of an aircraft approved for a low visibility operation does not commence the operation unless the pilot-in-command is satisfied that —

- (a) the visual and non-visual facilities at the aerodrome of take-off or approach is sufficient;
- (b) the appropriate low visibility procedures are in force according to information received from the relevant air traffic services authority; and
- (c) every flight crew member assigned to the operation has completed the necessary training, and meets the recency requirements prescribed in regulation 30(2).

### **Minimum equipment requirements**

**27.**—(1) A Singapore operator with a special operations approval to conduct a low visibility operation must ensure that, for every aircraft type that is to be used for the operation, the minimum equipment that has to be serviceable at the commencement of the low visibility operation is in accordance with the aircraft flight manual, minimum equipment list, or equivalent document acceptable to the Director-General of Civil Aviation.

(2) The pilot-in-command of an aircraft that has been approved for a low visibility operation must not commence the operation unless the pilot-in-command is satisfied that the status of the aircraft, and the status of the relevant airborne systems, are appropriate for the specific operation to be conducted.

### **Continuing Airworthiness Maintenance Procedures**

**28.**—(1) A Singapore operator with a special operations approval to conduct a low visibility operation must maintain every aircraft approved for such an operation in accordance with the Continuing Airworthiness Maintenance Procedures established by the

---

---

manufacturer of the aircraft with specific programmes for lower landing minima or low visibility operations, as applicable.

(2) A Singapore operator with a special operations approval to conduct a low visibility operation must —

- (a) continuously monitor every aircraft approved for low visibility operations to determine the aircraft's current category for such an operation (called in these Regulations the status of the aircraft); and
- (b) ensure that the flight crew of an approved aircraft is accordingly updated of the status of the aircraft before any flight involving the aircraft is commenced.

(3) A Singapore operator with a special operations approval to conduct a low visibility operation must ensure that every member of its maintenance personnel is trained in accordance with a training programme provided in accordance with regulation 21(d).

### **Continuous monitoring**

**29.**—(1) A Singapore operator with a special operations approval to conduct a low visibility operation must monitor every flight with such an operation to ensure that any undesirable trends are promptly detected and responded to.

(2) The Singapore operator's obligations under paragraph (1) include —

- (a) monitoring the performance of the automatic landing system or Head-Up Display Landing System or both (as appropriate) to touchdown of an aircraft;
- (b) ensuring every unsatisfactory report is investigated; and
- (c) taking positive steps following an unsatisfactory report to ensure safety of operations, such as the suspension of all low visibility operations until remedial action has been taken.

(3) A Singapore operator with a special operations approval to conduct a low visibility operation must retain, for a period of

---

---

12 months starting on the date immediately after any such operation is completed, information and reports on the following matters:

- (a) the aircraft type used for the operation;
- (b) the aircraft registration;
- (c) the aerodrome used for the operation;
- (d) the type of approach (Category II or III) and whether the approach was satisfactory;
- (e) if the approach or automatic landing was unsatisfactory, the reason for the unsatisfactory approach or landing, such as —
  - (i) an airborne equipment fault;
  - (ii) any difficulties with the ground facility;
  - (iii) any missed approach due to air traffic control instruction; or
  - (iv) any other reason.

### **Aircraft and crew recency**

**30.**—(1) A Singapore operator with a special operations approval to conduct a low visibility operation must not use an aircraft for a flight with a Category III approach and automatic landing unless a pilot has successfully completed at least one automatic landing with the aircraft in the 28 days immediately preceding the flight.

(2) A Singapore operator with a special operations approval to conduct a low visibility operation must not assign a person to flight crew member duty as a pilot-in-command or co-pilot for a flight with low visibility operations unless the person meets the recency requirements approved by the Director-General of Civil Aviation.

### **Operations Manual**

**31.** For the purposes of regulation 8(3)(a), a Singapore operator with a special operations approval to conduct a low visibility operation must specify in its Operations Manual —

- (a) the syllabus mentioned in regulation 21(e);

- (b) the operating procedures established in accordance with regulation 26(1), which include the duties of each flight crew member during taxiing, take-off, approach, flare, landing, roll-out and missed approach, as appropriate; and
- (c) the minimum equipment that has to be serviceable at the commencement of any low visibility operation.

*Division 5 — Operations using automatic landing system, combined vision system, enhanced vision system, synthetic vision system or head-up display*

### **Additional details for application**

**32.—**(1) A Singapore operator seeking a special operations approval to conduct operations using —

- (a) a head-up display or equivalent;
- (b) an automatic landing system;
- (c) an enhanced vision system;
- (d) a synthetic vision system;
- (e) a combined vision system; or
- (f) a hybrid system comprising any combination of a display or system mentioned in sub-paragraphs (a) to (e),

must comply with paragraph (2).

(2) A Singapore operator must, as part of the application under regulation 4(1) to use a display or system mentioned in paragraph (1)(a) to (f) —

- (a) identify the display or system for which a special operations approval is sought, and the operations on which the display or system is to be used;
- (b) carry out a safety risk assessment of the operations using that display or system; and
- (c) provide details of —
  - (i) the training programme required under regulation 33(1)(b); and

- 
- 
- (ii) the procedures required under regulation 33(1)(c) and (d).

**General requirements for operations using automatic landing system, combined vision system, enhanced vision system, synthetic vision system, head-up display or hybrid display**

**33.—(1)** A Singapore operator with a special operations approval to use a system or display mentioned in regulation 32(1)(a) to (f) in its operations must —

- (a) ensure that the aircraft and every equipment on board to be used in the special operations meets the appropriate airworthiness certification requirements;  
*[S 822/2022 wef 03/11/2022]*
- (b) have a training programme for every person to be involved in such operations as a flight crew member or a member of the operations personnel;
- (c) have procedures for the use of the system or display that is the subject of the special operations approval;  
*[S 822/2022 wef 03/11/2022]*
- (d) have procedures for ensuring that the requirements of this Division and the special operations approval are met, including procedures with respect to continuing airworthiness (maintenance and repair) practices and programmes;  
*[S 822/2022 wef 03/11/2022]*
- (e) maintain and make available to both pilots all information that is necessary to support effective crew tasks for the special operations, where the number of flight crew members specified in the operations manual (or other documents associated with the certificate of airworthiness for the aircraft) is more than one;  
*[S 822/2022 wef 03/11/2022]*
- (f) establish a system for data collection, evaluation and trend monitoring for low visibility operations for which there is an operational credit; and  
*[S 822/2022 wef 03/11/2022]*

- 
- 
- (g) establish and maintain —
- (i) an accurate record of all normal and abnormal procedures connected with the special operations; and
  - (ii) an accurate minimum equipment list required by any other provision of these Regulations with respect to the special operations.

[S 822/2022 wef 03/11/2022]

- (2) To avoid doubt —
- (a) when a Singapore operator has a special operations approval to use a system or display mentioned in regulation 32(1)(a) to (f) during low visibility operations, the Singapore operator must establish procedures under paragraph (1)(d) and regulation 21(f); and
  - (b) the classification of an instrument approach procedure is not affected by a special operations approval to use a system or display mentioned in regulation 32(1)(a) to (f).

#### *Division 6 — Data link system*

#### **Additional details for application**

**34.** A Singapore operator seeking a special operations approval to use a data link system for communications, navigation or surveillance during its operations must, as part of the application under regulation 4(1) —

- (a) identify the aircraft for which the special operations approval is sought;
- (b) specify the equipment to be carried on the aircraft so identified such that the aircraft is in compliance with regulation 36; and
- (c) provide details of —
  - (i) the training programme required under regulation 35(b); and
  - (ii) the procedures required under regulation 35(c).



---

---

**General requirements for use of data link**

**35.** A Singapore operator with a special operations approval to use a data link system for communications, navigation or surveillance during its operations must —

- (a) ensure that the equipment mentioned in regulation 36 meets the appropriate airworthiness certification requirements;
- (b) have a training programme for every person to be involved in such operations as a flight crew member or a member of the operations personnel; and
- (c) have procedures for ensuring that the requirements in this Division and the conditions of the special operations approval are met.

**Equipment**

**36.** A Singapore operator with a special operations approval to use a data link system for its operations must ensure every aircraft to be operated in accordance with the approval is appropriately equipped according to the standards and requirements specified by the Director-General of Civil Aviation.

*Division 7 — Electronic flight bag***Additional details for application**

**37.—(1)** A Singapore operator seeking a special operations approval to use an electronic flight bag during its operations must, as part of the application under regulation 4(1) —

- (a) identify the aircraft, and every operation, for which approval to use the electronic flight bag during a phase of flight is sought;
- (b) assess the safety risks associated with using the electronic flight bag during such operations;
- (c) specify the requirements for redundancy of information contained in or displayed by the electronic flight bag; and

- 
- 
- (d) provide details of —
- (i) the training programme required under regulation 38(1)(e); and
  - (ii) the procedures required under regulation 38(1)(c), (d) and (f).
- (2) The safety risk assessment required under paragraph (1)(b) must take into account —
- (a) human factors;
  - (b) human machine interface; and
  - (c) pilot workload.

### **General requirements for use of electronic flight bag**

**38.—**(1) A Singapore operator with a special operations approval to use an electronic flight bag during its operations must —

- (a) ensure that the electronic flight bag and its associated installation hardware, including the interaction of the equipment with aircraft systems (if applicable), meet the appropriate airworthiness certification requirements;
- (b) have requirements for redundancy of the information (if appropriate) contained in and displayed by an electronic flight bag;
- (c) have procedures for the administration and management of the electronic flight bag, including any database that the equipment may use;
- (d) have procedures for the use of the electronic flight bag and each function of the equipment;
- (e) have a training programme for every person to be involved in such operations as a flight crew member or a member of the operations personnel; and
- (f) have procedures for ensuring that the requirements in this Division and the conditions of the special operations approval are met.

---

---

(2) To avoid doubt, a Singapore operator with a special operations approval to use an electronic flight bag during its operations must not, in any of its operations —

- (a) use a new electronic flight bag or a new function in such equipment; or
- (b) use an amended electronic flight bag or an amended function in such equipment,

until the Singapore operator has obtained Director-General of Civil Aviation's approval for such variation to the special operations approval.

### **Electronic flight bag equipment**

**39.** A Singapore operator with a special operations approval to use an electronic flight bag during its operations must ensure that the use of an electronic flight bag on board the aircraft approved for such use will not affect —

- (a) the performance of the aircraft systems or equipment; or
- (b) the pilot's ability to operate the aircraft.

### **Electronic flight bag function**

**40.** A Singapore operator with a special operations approval to use an electronic flight bag during its operations must, before using any function of an electronic flight bag —

- (a) assess the safety risk associated with that function; and
- (b) ensure that, in the event of failure of the electronic flight bag function, sufficient information is readily available to the flight crew for the flight to be conducted safely.

### *Division 8 — Extended diversion time operations (EDTO)*

#### **Additional details for application**

**41.—(1)** A Singapore operator seeking a special operations approval to conduct EDTO must, as part of the application under regulation 4(1) —

- 
- 
- (a) identify every aeroplane type to be used for such operations;
  - (b) demonstrate, to the satisfaction of the Director-General of Civil Aviation, that the overall level of safety of its intended operations is adequate;
  - (c) if the aeroplane type to be used for such operations is a twin-engined aeroplane, comply with the requirements in paragraph 1 of the Third Schedule; and
  - (d) provide details of —
    - (i) the training programme required under regulation 42(1)(b); and
    - (ii) the procedures required under regulation 42(1)(c) and (e).
- (2) The Singapore operator mentioned in paragraph (1) may fulfil the requirements in paragraph (1)(b) by providing supporting documents and data on the following matters:
- (a) the airworthiness certification of every aeroplane type to be used for such operations;
  - (b) the reliability of the aeroplane's propulsion system (operator and world fleet);
  - (c) the Singapore operator's maintenance programme for an aeroplane used for such operations;
  - (d) the training programme mentioned in regulation 42(1)(b);
  - (e) the procedures mentioned in regulation 42(1)(c) and (e).
- (3) The application mentioned in paragraph (1) must be made at least 3 months before the intended date of commencement of such operations.

### **General requirements for EDTO**

**42.—**(1) A Singapore operator with a special operations approval to conduct EDTO must —

- (a) ensure that the overall level of safety of any such operation is adequate;

- 
- 
- (b) have a training programme for every person to be involved in such operations as a flight crew member or a member of the operations personnel;
  - (c) have operating procedures, and flight dispatch procedures, for such operations;
  - (d) if the aeroplane type to be used for such operations is a twin-engined aeroplane, comply with the additional requirements in the Third Schedule; and
  - (e) have procedures for ensuring that the requirements in this Division, and the Third Schedule where relevant, and the conditions of the special operations approval are met.

(2) A Singapore operator with a special operations approval to conduct EDTO must not, during any such operation, operate the aeroplane beyond the maximum diversion time for that aeroplane type that has been approved by the Director-General of Civil Aviation for the Singapore operator.

### **Extension of maximum diversion time**

**43.**—(1) If a Singapore operator with a special operations approval to conduct EDTO intends to increase the approved maximum diversion time for an aeroplane, of a specific airframe-engine combination, used for any such operation, the Singapore operator must make an application under regulation 7(2) to vary the special operations approval.

- (2) The application mentioned in paragraph (1) —
- (a) must be made at least 3 months before the intended date of commencement of any EDTO operation with the increased maximum diversion time using an aeroplane of that specific airframe-engine combination; and
  - (b) must include supporting documents and other supporting data that demonstrate the Singapore operator's ability to maintain an overall level of safety for the operations that is adequate.

---

---

(3) Subject to paragraph (4), the maximum diversion time that may be approved for an aeroplane, of any specific airframe-engine combination, that is used for EDTO must not exceed —

- (a) for any aeroplane, the most limiting EDTO-significant system time limitation (if any) indicated in the aircraft's flight manual (directly or by reference) that is relevant to that particular operation; and
- (b) for any aeroplane with 2 turbine engines, the maximum diversion time for which the aeroplane has been certified.

(4) The Director-General of Civil Aviation may approve, in respect of an aeroplane type used for EDTO with a specific airframe-engine combination, a maximum diversion time that is beyond the time limits of the most time-limiting EDTO-significant system if the Singapore operator applying to increase the maximum diversion time for its operations demonstrates to the Director-General of Civil Aviation, through a safety risk assessment, that an equivalent level of safety will be maintained.

(5) The safety risk assessment mentioned in paragraph (4) —

- (a) must demonstrate —
  - (i) the overall reliability of an aeroplane with that specific airframe-engine combination;
  - (ii) the reliability of each time-limited system of the aeroplane; and
  - (iii) the specific mitigation measures proposed by the Singapore operator; and
- (b) must provide any information from the aeroplane manufacturer that may be relevant to the assessment.

### **Alternate aerodromes**

**44.—**(1) For every aeroplane operated for EDTO by a Singapore operator with a special operations approval to conduct EDTO, the Singapore operator may select, as the take-off alternate aerodrome, the first available alternate aerodrome located within the maximum

---

---

diversion time that is calculated using the actual take-off mass of the aeroplane —

- (a) where the aeroplane is a twin-engined aeroplane, if there is no available alternate aerodrome within one hour of flight time of the departure aerodrome at a one-engine operative cruise speed; or
- (b) where the aeroplane is an aeroplane with 3 or more engines, if there is no available alternate aerodrome within 2 hours of flight time of the departure aerodrome at an all-engine operating cruise speed.

(2) For every twin turbine-engined aeroplane operated for EDTO, the Singapore operator must select, and specify in the operational and ATS flight plans, every aerodrome required as an en-route alternate aerodrome for EDTO using such an aeroplane.

(3) The Singapore operator must ensure that, for every operation in accordance with the special operations to conduct EDTO, no flight proceeds beyond the applicable threshold time unless —

- (a) the Singapore operator is satisfied that every en-route alternate aerodrome identified for the operation is available at the estimated time of use; and
- (b) the most up-to-date information indicates that, at the estimated time of use of such an aerodrome, the meteorological conditions at the aerodrome will be at or above the Singapore operator's established aerodrome operating minima for the operation.

(4) The Singapore operator must determine an alternative course of action if a safe approach or landing at the identified en-route alternate aerodrome during the estimated time of use is precluded for any reason.

### **Additional fuel**

**45.** A Singapore operator with a special operations approval to conduct EDTO must ensure that, for every aeroplane operated for EDTO, the additional fuel required under —

- 
- 
- (a) regulation 45(3)(g) of the Air Navigation (121 — Commercial Air Transport by Large Aeroplanes) Regulations 2018 (G.N. No. S 444/2018); or
- (b) regulation 46(3)(g) of the Air Navigation (135 — Commercial Air Transport by Helicopters and Small Aeroplanes) Regulations 2018 (G.N. No. S 445/2018),
- as applicable, includes the fuel necessary to comply with any EDTO-critical scenario that the Director-General of Civil Aviation may establish.

*Division 9 — Polar operations*

**Additional details for application**

**46.** A Singapore operator seeking a special operations approval to conduct a polar operation must, as part of the application under regulation 4(1) —

- (a) identify every aircraft to be used for the operation;
- (b) specify the equipment to be carried on board the aircraft so identified;
- (c) complete the flight validation required under regulation 50 using the aircraft so identified; and
- (d) provide details of —
- (i) the training programme required under regulation 47(b);
  - (ii) the operational plan for the operation required under regulation 47(c); and
  - (iii) the procedures required under regulation 47(d).

**General requirements for polar operations**

**47.** A Singapore operator with a special operations approval to conduct a polar operation must —

- (a) equip the aircraft to be used for the operation in accordance with regulation 48;



- (b) have the training programme for every person to be involved in the operation as a flight crew member or a member of the operations personnel;
- (c) have an operational plan for the operation; and
- (d) have procedures for ensuring that the requirements in this Division and the conditions of the special operations approval are met.

### **Equipment requirements for polar operations**

**48.**—(1) A Singapore operator with a special operations approval to conduct a polar operation must ensure that the following items are carried on board every aircraft to be used for such operations and are serviceable:

- (a) the items in the minimum equipment list specified in paragraph (2);
- (b) all other items that have been assessed as necessary for the operation pursuant to the safety risk assessment under regulation 5(2)(a)(ii).

(2) The minimum equipment list for an aircraft used for polar operations comprises the following items:

- (a) a fuel quantity indicating system;
- (b) a fuel tank temperature indicating system;
- (c) an auxiliary power unit that includes pneumatic and electrical power;
- (d) an auto-thrust system;
- (e) any communication system that the flight crew relies on to satisfy the requirement for effective communication capability;
- (f) a medical kit that includes an automated external defibrillator.

---

---

### **Operational plan for polar operations**

49. A Singapore operator with a special operations approval to conduct a polar operation must ensure that the operational plan for such operations is designed to —

- (a) ensure the safety of the passengers and crew on board an aircraft used for the operation;
- (b) cater to the physiological needs and expeditious evacuation of the passengers and crew on board an aircraft used for the operation; and
- (c) address concerns associated with polar operations including —
  - (i) fuel freeze and cold fuel management;
  - (ii) anomalies associated with Magnetic and True heading references due to the area of magnetic unreliability and converging meridians when nearing the Pole;
  - (iii) limitations on use of HF, VHF and satellite communication;
  - (iv) space weather activity affecting air navigation, human health and HF communication;
  - (v) in-flight diversion and evacuation of passengers and crew from a diversion aerodrome, including one in the Polar Regions;
  - (vi) the en-route alternate aerodrome;
  - (vii) recovery from a diversion to one of its designated en-route alternate aerodrome; and
  - (viii) fatigue risk management, as required under the Air Navigation (121 — Commercial Air Transport by Large Aeroplanes) Regulations 2018 or the Air Navigation (135 — Commercial Air Transport by Helicopters and Small Aeroplanes) Regulations 2018, where applicable.

---

---

**Flight validation**

**50.** A Singapore operator seeking a special operations approval to conduct a polar operation must, using the aircraft to be used for the operation —

(a) demonstrate its reaction and recovery plan in the event of a diversion to one of its designated en-route alternate aerodromes; and

(b) complete a successful validation flight,

under the observation of, and to the satisfaction of, the Director-General of Civil Aviation.

**Training requirements**

**51.** A Singapore operator with a special operations approval to conduct a polar operation must ensure that the training programme provided in accordance with regulation 47(b) ensures that every person involved in the operation as a flight crew member, or a member of the operations personnel, is trained and competent in the operational plans, procedures and use of equipment related to such operations.

*Division 10 — Mixed fleet flying***Additional details for application**

**52.** A Singapore operator seeking a special operations approval to conduct mixed fleet flying operations must, as part of the application under regulation 4(1), provide details of the following:

(a) for each aeroplane type that the Singapore operator intends to designate as the Primary MFF Aeroplane or the Secondary MFF Aeroplane, the aeroplane manufacturer's assessment of the aeroplane's suitability to be engaged in such operations;

(b) the Singapore operator's intended MFF policy and supporting procedures;

(c) the Singapore operator's intended MFF Programme which includes —

- 
- 
- (i) the details of each aeroplane type to be designated as the Primary MFF Aeroplane or as the Secondary MFF Aeroplane in the mixed fleet flying operations;
  - (ii) the minimum operating experience to be obtained during the MFF Consolidation Period by a person in the role as a pilot on the aeroplane type designated as the Secondary MFF Aeroplane; and
  - (iii) the details of the operator's MFF Indoctrination Training including the method used for the selection of instructors.

### **General requirements for mixed fleet flying operations**

**53.** A Singapore operator with a special operations approval to conduct mixed fleet flying operations must —

- (a) have an MFF policy and an MFF programme;
- (b) not designate a type of aeroplane as a Secondary MFF Aeroplane unless the aeroplane type is so approved by the Director-General of Civil Aviation;
- (c) not assign a person to be a flight crew member for a mixed fleet flying operation unless the person meets the criteria specified in regulation 54; and
- (d) document the MFF policy and MFF programme in its Operations Manual.

### **Assignment of duty for mixed fleet flying operations**

**54.** Before a person is assigned to be a flight crew member for any mixed fleet flying operation, the Singapore operator with a special operations approval to conduct mixed fleet operations must ensure that the person —

- (a) has a valid pilot licence that is endorsed for mixed fleet flying operations by the Director-General of Civil Aviation;

- 
- 
- (b) has a valid rating for the aeroplane type designated as the Primary MFF aeroplane and the aeroplane type designated as the Secondary MFF aeroplane;  
*[S 210/2020 wef 01/04/2020]*
  - (c) has, within a period of 12 consecutive months starting on the date after the person's last Operator Proficiency Check on the Primary MFF Aeroplane, completed the Singapore operator's MFF Programme;
  - (d) has, during the person's MFF Consolidation Period, acquired the minimum operating experience on the Secondary MFF Aeroplane;
  - (e) has completed the Singapore operator's MFF Indoctrination Training;
  - (f) has fulfilled the Operator Proficiency Check requirements in regulation 60;
  - (g) has fulfilled the Operator Line Check requirements in regulation 61; and
  - (h) has fulfilled the flight crew recency requirements in regulation 62.

### **Singapore operator's obligations for pilot licence endorsement**

**55.** A Singapore operator with a special operations approval to conduct mixed fleet flying operations must provide the following evidence to the Director-General of Civil Aviation if a person, who is employed by the Singapore operator as a pilot, is applying for the person's pilot licence to be endorsed for mixed fleet flying operations:

- (a) the person is employed by the Singapore operator as a pilot;
- (b) the person has completed the Singapore operator's MFF Programme after acquiring the pre-requisite experience specified in regulation 56.

---

---

**Pre-requisite experience for MFF Programme**

**56.**—(1) Before a Singapore operator with a special operations approval to conduct mixed fleet flying operations inducts a person into its MFF Programme as a pilot, the Singapore operator must ensure that the person —

- (a) has a valid OPC pass for the aeroplane type that is designated as the Primary MFF Aeroplane;
- (b) has a valid OLC pass for the aeroplane type designated as the Primary MFF Aeroplane;
- (c) has completed at least 500 total flying hours in the relevant crew role in any aeroplane; and
- (d) has at least 3 months of experience (comprising at least 150 flying hours) on the Primary MFF Aeroplane.

(2) In paragraph (1), “relevant crew role” means the flight crew member role that the person is to be assigned for mixed fleet flying operations.

**MFF Programme**

**57.** The MFF Programme provided by a Singapore operator in accordance with regulation 53(a) must describe the process for a person to qualify as an MFF pilot, which includes the following details:

- (a) each type of aeroplane designated as the Primary MFF Aeroplane or as the Secondary MFF Aeroplane;
- (b) the training required to obtain an aeroplane type rating on Secondary MFF Aeroplane;
- (c) the minimum operating experience to be acquired in the role as a pilot during the MFF Consolidation Period;
- (d) the MFF Indoctrination Training required under regulation 59.

---

---

### **MFF Consolidation Period**

**58.** A Singapore operator seeking a special operations approval to conduct mixed fleet flying operations must take the following factors into consideration when designing the MFF Consolidation Period:

- (a) the extent of the differences between aeroplane types designated as the Primary MFF aeroplane and Secondary MFF aeroplane;
- (b) the aircraft manufacturer's recommendations for every aeroplane type designated by the operator as a Primary MFF Aeroplane or as a Secondary MFF Aeroplane for the Singapore operator's mixed fleet flying operations;
- (c) the differences (if any) in the types of operations that each aeroplane type mentioned in paragraph (a) is deployed for.

### **MFF Indoctrination Training**

**59.—(1)** A Singapore operator with a special operations approval to conduct mixed fleet flying operations must provide MFF Indoctrination Training to every person that is to be an MFF pilot.

(2) For every person that is to be an MFF pilot, the Singapore operator must ensure that its MFF Indoctrination Training —

- (a) is designed to equip the person with the knowledge necessary for mixed fleet flying operations; and
- (b) is conducted by personnel who are qualified or selected by a process that is acceptable to the Director-General of Civil Aviation.

### **Operator Proficiency Check**

**60.—(1)** A Singapore operator with a special operations approval to conduct mixed fleet flying operations must ensure that every MFF pilot to be assigned to such an operation as a pilot has a valid OPC pass for both the aeroplane types designated as the Primary MFF Aeroplane and the Secondary MFF Aeroplane.

---

---

(2) For every MFF pilot that may be assigned to such an operation as a pilot, the Singapore operator must ensure that, after the person completes its MFF Programme —

- (a) the person's first Operator Proficiency Check is for the aeroplane type (whether designated as the Primary MFF Aeroplane or as the Secondary MFF Aeroplane) which the person's OPC pass is due to lapse first; and
- (b) the person's subsequent Operator Proficiency Checks alternate between the 2 aeroplane types designated as the Primary MFF Aeroplane and the Secondary MFF Aeroplane, starting with the aeroplane type (whether designated as the Primary MFF Aeroplane or as the Secondary MFF Aeroplane) that is not the subject of the Operator Proficiency Check mentioned in sub-paragraph (a).

### **Operator Line Checks**

**61.**—(1) A Singapore operator with a special operations approval to conduct mixed fleet flying operations must ensure that every MFF pilot that may be assigned to such an operation as a pilot has a valid OLC pass for both the aeroplane types designated as the Primary MFF Aeroplane and the Secondary MFF Aeroplane.

(2) For every MFF pilot that may be assigned to such an operation as a pilot by a Singapore operator, the Singapore operator must ensure that, after the person completes its MFF Programme —

- (a) the person's first Operator Line Check is on the aeroplane type (whether designated as the Primary MFF Aeroplane or as the Secondary MFF Aeroplane) which the person's OLC pass is due to lapse first; and
- (b) the person's subsequent Operator Line Checks alternate between the 2 aeroplane types designated as the Primary MFF Aeroplane and the Secondary MFF Aeroplane, starting with the aeroplane type (whether designated as the Primary MFF Aeroplane or as the Secondary MFF Aeroplane) that is not the subject of the Operator Line Check mentioned in sub-paragraph (a).



---

---

**MFF Pilot recency requirements**

**62.**—(1) A Singapore operator with a special operations approval to conduct mixed fleet flying operations must ensure that every MFF pilot assigned to such an operation as a pilot satisfies the recency requirements prescribed in regulation 133(1) of the Air Navigation (121 — Commercial Air Transport by Large Aeroplanes) Regulations 2018 for both the aeroplane types designated as the Primary MFF Aeroplane and the Secondary MFF Aeroplane.

(2) If an MFF pilot is to be designated as the pilot-in-command for a mixed fleet flying operation, the Singapore operator must ensure that, in addition to the requirement in paragraph (1), the person —

(a) satisfies the recency requirements prescribed in regulation 133(2) of the Air Navigation (121 — Commercial Air Transport by Large Aeroplanes) Regulations 2018 for the aeroplane type to be used for the operation; or

(b) has completed at least one take-off and one landing in the aeroplane type designated as the Primary MFF Aeroplane, or in the aeroplane type designated as the Secondary MFF Aeroplane, in the 35 days immediately preceding the operation.

(3) The take-off and landing requirements in paragraphs (1) and (2) may be fulfilled in a flight simulation training device that —

(a) is representative of an aeroplane of the same type or same class of aeroplane as the Primary MFF Aeroplane or the Secondary MFF Aeroplane; and

(b) is specifically approved, in accordance with paragraph 23A of the Air Navigation Order, to be used by the Singapore operator for any of its pilots to accrue flight-time in an aeroplane of that type or class.

*[S 678/2018 wef 09/10/2018]*

**Rostering of MFF pilots**

**63.** A Singapore operator with a special operations approval to conduct mixed fleet flying operations must not assign an MFF pilot to

---

---

operate both the Primary MFF Aeroplane and the Secondary MFF Aeroplane within a single day or a single flight duty period.

### **Cessation of deployment as MFF pilot**

**64.** A Singapore operator with a special operations approval to conduct mixed fleet flying operations must notify the Director-General of Civil Aviation if the Singapore operator intends to cease deploying any person in the Singapore operator's MFF Programme as an MFF pilot.

*Division 11 — Operations of single-engine turbine-powered  
aeroplane at night or in instrument  
meteorological conditions*

### **Additional details for application**

**65.—(1)** A commercial air transport operator seeking a special operations approval to conduct commercial air transport operations at night or in instrument meteorological conditions (as the case may be) using a single-engine turbine-powered aeroplane must comply with the requirements of paragraph (2) when making an application under regulation 4(1) for such an approval.

(2) As part of an application for the special operations approval mentioned in paragraph (1), the commercial air transport operator —

- (a) must demonstrate, to the satisfaction of the Director-General of Civil Aviation, that —
  - (i) the commercial air transport operator is able to safely conduct operations using a single-engine turbine-powered aeroplane at night or in instrument meteorological conditions, as the case may be; and
  - (ii) the airworthiness certification of the aeroplane that is to be used for such operations is appropriate;
- (b) must prove to the Director-General of Civil Aviation that the type of turbine engine in the single-engine turbine-powered aeroplane that is intended to be used for such operations has a world fleet power loss rate of less than one per 100,000 engine hours; and

- 
- 
- (c) must provide details of —
    - (i) the operating equipment to be carried on an aeroplane used for such operations; and
    - (ii) the training programme required under regulation 71.

### **General requirements for operations at night or in instrument meteorological conditions**

**66.**—(1) A commercial air transport operator with a special operations approval to conduct commercial air transport operations at night or in instrument meteorological conditions (as the case may be) using a single-engine turbine-powered aeroplane —

- (a) must equip the aeroplane approved for such operations in accordance with regulations 67(1) and 68;
- (b) must continuously monitor the engine of the approved aeroplane to detect any deterioration of the engine;
- (c) must have the training programme specified in regulation 71; and
- (d) must ensure that every person assigned duty as a flight crew member for such operations —
  - (i) meets the recency requirements specified in regulation 71(1); and
  - (ii) has completed the training programme specified in regulation 71(2).

(2) To avoid doubt, the special operations approval mentioned in paragraph (1) may be limited to —

- (a) a specific airframe or engine combination, including the current type design standard for such operations;
- (b) a specific aeroplane; or
- (c) a specific area or route where such operations may be conducted.

---

---

### **Turbine engine reliability**

**67.**—(1) A commercial air transport operator, with a special operations approval to conduct commercial air transport operations at night or in instrument meteorological conditions (as the case may be) using a single-engine turbine-powered aeroplane, must equip the engine of the approved aeroplane with —

- (a) an ignition system that activates automatically, or is capable of being operated manually —
  - (i) for take-off and landing; and
  - (ii) for flight when there is visible moisture;
- (b) a magnetic particle detection system (or equivalent) —
  - (i) that monitors the engine, the accessories gearbox and reduction gearbox; and
  - (ii) that includes a flight deck caution indication; and
- (c) an emergency engine power control device that permits the engine to continue operating throughout a sufficient power range to safely complete the flight in the event of any reasonably probable failure of the fuel control unit.

(2) If a commercial air transport operator mentioned in paragraph (1) detects any trend in the performance of the aeroplane's engine that indicates a deterioration in engine performance which may affect the safety of operations, the commercial air transport operator must take measures to address such a trend.

### **Systems and equipment**

**68.**—(1) A commercial air transport operator, with a special operations approval to conduct commercial air transport operations at night or in instrument meteorological conditions (as the case may be) using a single-engine turbine-powered aeroplane, must equip the aeroplane approved for such operations with systems and equipment in accordance with paragraph (2) —

- (a) to ensure continued safe flight; and

- 
- 
- (b) to assist in achieving a safe forced landing after an engine failure, under all allowable operating conditions.
- (2) An approved aeroplane mentioned in paragraph (1) must be equipped with —
- (a) 2 independent electrical generating systems, that are each capable of supplying all probable combinations of continuous in-flight electrical loads for the instruments, equipment and systems required for the operation that is the subject of the approval mentioned in paragraph (1);
  - (b) a radio altimeter;
  - (c) an emergency electrical supply system that, following the loss of all generated power, has the capacity and endurance to generate enough electrical supply to do all of the following:
    - (i) to maintain the operation of all essential flight instruments, communication and navigation systems during a descent from the maximum certificated altitude in a glide configuration to the completion of a landing;
    - (ii) to lower the flaps and landing gear, if applicable;
    - (iii) to provide power to one pitot heater, which must serve an air speed indicator clearly visible to the pilot;
    - (iv) to operate the landing light specified in sub-paragraph (i);
    - (v) to restart the engine, if applicable;
    - (vi) to operate the radio altimeter;
  - (d) 2 attitude indicators that are each powered by an independent power source;
  - (e) a means to make at least one attempt at engine restart;
  - (f) an airborne weather radar;

- 
- 
- (g) a certified area navigation system that is capable of —
    - (i) being programmed with the position of an aerodrome or a safe forced landing area; and
    - (ii) providing instantly available track and distance information to those locations;
  - (h) if the aeroplane is a pressurised aeroplane, an amount of supplemental oxygen sufficient for all occupants during the period of the descent, following engine failure, at the maximum glide performance from the maximum certificated altitude to an altitude at which supplemental oxygen is no longer required;
  - (i) a landing light that is independent of the landing gear and is capable of adequately illuminating the touchdown area in a night forced landing; and
  - (j) an engine fire warning system.

### **Manuals and documentation**

**69.**—(1) A commercial air transport operator with a special operations approval to conduct commercial air transport operations at night or in instrument meteorological conditions (as the case may be) using a single-engine turbine-powered aeroplane —

- (a) must specify in its Operations Manual all the information that is relevant to the operation;
  - (b) must ensure that the aircraft flight manual for the approved aeroplane contains the limitations, procedures and other information relevant to the operation; and
  - (c) must specify in its Maintenance Control Manual the maintenance and reliability programmes for the approved aeroplane (including the engine and any additional equipment mentioned in paragraph (2)(b)).
- (2) The information to be specified in a commercial air transport operator's Operations Manual in accordance with paragraph (1)(a) includes —

- 
- 
- (a) the operating equipment required for the operation, which is to be specified in the minimum equipment list for the approved aeroplane;
  - (b) the additional equipment, procedures and training required for such operations;
  - (c) the route or the area of operation, or both; and
  - (d) the aerodrome information (including planning and operating minima).

### **Route planning and limitations**

**70.**—(1) A commercial air transport operator with a special operations approval to conduct commercial air transport operations at night or in instrument meteorological conditions (as the case may be) using a single-engine turbine-powered aeroplane, must, in the assessment of intended routes or areas of operations in route planning for such operations, take into account all information relevant to the assessment including —

- (a) the nature of the terrain to be flown, including the potential for carrying out a safe forced landing in the event of an engine failure or major malfunction;
- (b) weather information, including seasonal and other adverse meteorological influences that may affect the flight; and
- (c) such other criteria and limitations as specified by the Director-General of Civil Aviation.

(2) As part of route planning, a commercial air transport operator mentioned in paragraph (1) —

- (a) must identify the aerodromes or safe forced landing areas that are available for use in the event of engine failure;
- (b) must programme into the area navigation system the position of the aerodromes and safe forced landing areas identified under sub-paragraph (a); and
- (c) must identify the limitations of the approved aeroplane in respect of over-water operations.

(3) Paragraphs (1) and (2)(a) and (b) do not apply where the single-engine turbine-operated aeroplane is to be operated over routes and in weather conditions that permit a safe forced landing to be executed in the event of an engine failure.

### **Flight crew experience, training and checking**

**71.**—(1) A commercial air transport operator, with a special operations approval to conduct a commercial air transport operation at night or in instrument meteorological conditions (as the case may be) using a single-engine turbine-powered aeroplane, must not assign a person to duty as a flight crew member for any such operation unless —

(a) where the duty being assigned is that as a pilot, the person has, in the 90 days immediately preceding the start of the operation, completed on the specific type or class of aeroplane to be used for the operation —

(i) at least 5 IFR flights (including 3 instrument approaches); or

(ii) an instrument approach check; or

(b) where the duty being assigned is that as the pilot-in-command, the person has completed at least 50 hours flight time under IFR (including at least 10 hours as the pilot-in-command) on the specific type or class of aeroplane to be used for the operation, in addition to the requirements in sub-paragraph (a).

(2) A commercial air transport operator must ensure that, before a person is assigned duty as a flight crew member for any operation mentioned in paragraph (1) that is the subject of a special operations approval, the person has completed the training programme and checks specified by the commercial air transport operator for the person to develop and demonstrate competency as a flight crew member for such an operation.

(3) The training programme and checks mentioned in paragraph (2) must encompass training and checks in the procedures for normal,



---

---

abnormal and emergency situations and, in particular, the procedures in the event of engine failure.

*Division 12 — Operations with performance-based communications or surveillance*

**Additional details for application**

**72.—**(1) A Singapore operator seeking a special operations approval to conduct any operations in an airspace or along a route where the appropriate air traffic services authority has specified —

- (a) a required communication performance for performance-based communications;
- (b) a required surveillance performance for performance-based surveillance; or
- (c) a combination of the requirements in sub-paragraphs (a) and (b),

for any aircraft operating in that airspace or along that route (called in these Regulations a PBCS operation), must comply with the requirements of paragraph (2) when making an application under regulation 4(1) for such an approval.

(2) As part of an application for the special operations approval mentioned in paragraph (1), the Singapore operator —

- (a) must identify the specific aircraft to be used for the operations for which approval is sought;
- (b) must demonstrate that any aircraft so identified is appropriately equipped to perform in accordance with the required communication performance or required surveillance performance or both (as applicable) specified by the appropriate air traffic services authority for the airspace or along the route for which the approval is sought;
- (c) must specify the airspace or routes for which the approval is sought; and

- 
- 
- (d) must provide details of —
- (i) the equipment mentioned in regulation 74(1);
  - (ii) the maintenance procedures required under regulation 74(2);
  - (iii) the information mentioned in regulation 75(1) and (2);
  - (iv) the operating procedures required under regulation 75(3);
  - (v) the qualification of the flight crew to be involved in such operations, as required in regulation 76(1); and
  - (vi) the training programme required under regulation 76(2).

### **General requirements for operations with performance-based communications or surveillance**

**73.** A Singapore operator with a special operations approval to conduct any PBCS operation must not conduct the operation unless —

- (a) the aircraft to be used for that operation —
  - (i) is approved to be used for that operation; and
  - (ii) is equipped and maintained in accordance with regulation 74; and
- (b) every person to be assigned duty as a flight crew member for the operation —
  - (i) is qualified to operate the aircraft for such operations in accordance with regulation 76(1); and
  - (ii) has completed the training programme provided in accordance with regulation 76(2).

### **Equipment and maintenance**

**74.—(1)** A Singapore operator with a special operations approval to conduct any PBCS operation must equip the approved aircraft with the capability of performing in accordance with the required

---

---

communications performance or required surveillance performance or both, as applicable.

(2) A Singapore operator with a special operations approval to conduct any PBCS operation must have appropriate maintenance procedures for the approved aircraft to ensure —

- (a) continued airworthiness of the aircraft; and
- (b) continued performance of the aircraft in accordance with the required communications performance or required surveillance performance, as applicable.

### **Operating procedures**

**75.**—(1) A Singapore operator with a special operations approval to conduct any PBCS operation must ensure that the aircraft's flight manual or equivalent for the approved aircraft contains information relevant to the aircraft's capability to comply with —

- (a) the required communications performance;
- (b) the required surveillance performance; or
- (c) a combination of the requirements in sub-paragraphs (a) and (b),

as applicable, that is specified for the approved operation.

(2) A Singapore operator with a special operations approval to conduct any PBCS operation must ensure that, where the approved aircraft —

- (a) is a Singapore registered aircraft; and
- (b) is subject to regulation 69 of the Air Navigation (91 — General Operating Rules) Regulations 2018,

the minimum equipment list for that aircraft includes information that is relevant to the aircraft's capability to comply with the required communications performance or the required surveillance performance or both (as applicable) specified for the approved operation.

(3) A Singapore operator with a special operations approval to conduct any PBCS operation must have procedures to be followed by

---

---

the flight crew in normal and abnormal situations during the operation, including contingency procedures for those situations.

### **Qualification and training requirements**

**76.**—(1) A Singapore operator with a special operations approval to conduct any PBCS operation must establish and maintain qualification and proficiency requirements for every person to be assigned duty as a flight crew member for such an operation.

(2) A Singapore operator with a special operations approval to conduct any PBCS operation must have a training programme for every person to be assigned duty as a flight crew member, or a member of the operations personnel, for such an operation.

### **Monitoring of performance**

**77.**—(1) A Singapore operator with a special operations approval to conduct any PBCS operation must, in respect of every aircraft approved for such an operation, monitor the actual performance of the aircraft against the required communications performance or required surveillance performance or both (as applicable) for the operation.

(2) If the Singapore operator mentioned in paragraph (1) observes that an approved aircraft is not performing in accordance with the required communications performance or required surveillance performance or both (as applicable), the Singapore operator must not dispatch the affected aircraft on the approved operation until the required performance is restored.

## **PART 3**

### **MISCELLANEOUS**

#### **Financial penalties**

**78.**—(1) Subject to paragraphs (2) and (3), where the Authority is of the opinion that a Singapore operator is contravening, has contravened or has failed to comply with any provision of these Regulations, the Authority may impose on the Singapore operator a financial penalty not exceeding the higher of the following:

- (a) \$500,000;

---

---

(b) 5% of the Singapore operator’s annual revenue derived from the regulated activity.

(2) Before exercising any power under paragraph (1), the Authority must give written notice to the Singapore operator concerned —

(a) stating that the Authority intends to impose on the Singapore operator a financial penalty under this regulation;

(b) specifying each instance of non-compliance that is the subject of the financial penalty; and

(c) specifying the time (being not less than 14 days after the service of the notice on the Singapore operator) within which written representations may be made to the Authority with respect to the non-compliance that is the subject of the financial penalty.

(3) The Authority may, after considering any written representations under paragraph (2)(c), decide to impose such financial penalty under paragraph (1) as the Authority considers appropriate.

(4) Where the Authority has made any decision under paragraph (3) against any Singapore operator, the Authority must serve on the Singapore operator concerned a notice of its decision.

(5) To avoid doubt, this regulation does not affect the operation of section 4C, 4D or 4E of the Act.

(6) In this regulation —

“annual revenue” means the amount of money received by a Singapore operator in the calendar year during which the Singapore operator contravened or failed to comply with a provision of these Regulations;

“regulated activity” means the flights or operations conducted by the Singapore operator under these Regulations.

## PART 4

## SAVING AND TRANSITIONAL PROVISIONS

**Saving and transitional provisions**

79.—(1) Every approval of a Singapore operator to fly a Singapore registered aircraft in an airspace specified in the Sixteenth Schedule to the Air Navigation Order (O 2) in accordance with paragraph 36 of the Air Navigation Order as in force immediately before 1 October 2018, is, so far as it is not inconsistent with the provisions of these Regulations, to continue as if the approval is a special operations approval granted under regulation 5 of these Regulations to conduct specified navigation performance operations in the North Atlantic High Level Airspace.

(2) Every approval of a Singapore operator to operate a Singapore registered aircraft in accordance with paragraph 36A of the Air Navigation Order as in force immediately before 1 October 2018, is, so far as it is not inconsistent with the provisions of these Regulations, to continue as if the approval is a special operations approval granted under regulation 5 of these Regulations to conduct specified navigation performance operations involving performance-based navigation.

(3) Every written permission granted by the Chief Executive to operate a Singapore registered aircraft in accordance with paragraph 29(5) of the Air Navigation Order as in force immediately before 1 October 2018 is, so far as it is not inconsistent with the provisions of these Regulations, to continue as if the permission is a special operations approval granted under regulation 5 of these Regulations to conduct EDTO.

(4) Every approval of a Singapore operator granted under the Air Operator Certificate Requirements as in force immediately before 1 October 2018 —

- (a) to conduct operations in RVSM airspace;
- (b) to conduct any low visibility operation;
- (c) to conduct any operations with —
  - (i) a head-up display or equivalent;

- 
- 
- (ii) an automatic landing system;
  - (iii) an enhanced vision system;
  - (iv) a synthetic vision system;
  - (v) a combined vision system; or
  - (vi) a hybrid system comprising any combination of the displays or systems mentioned in sub-paragraphs (i) to (v);
- (d) to use an electronic flight bag during its operations;
  - (e) to conduct any polar operations;
  - (f) to conduct mixed fleet flying operations; or
  - (g) to conduct commercial air transport operations at night or under instrument meteorological conditions with a single-engine turbine-powered aeroplane,

is, so far as it is not inconsistent with the provisions of these Regulations, to continue as if the approval is a special operations approval granted under regulation 5 of these Regulations to conduct that operation.

(5) Every approval of a Singapore operator to operate a Singapore registered aircraft in accordance with paragraph 36B of the Air Navigation Order as in force immediately before 1 October 2018, is, so far as it is not inconsistent with the provisions of these Regulations, to continue as if the approval is a special operations approval granted under regulation 5 of these Regulations to conduct operations in an airspace or along a route where the appropriate air traffic services authority has specified a required communications performance for performance-based communications.

(6) Every approval of a Singapore operator to operate a Singapore registered aircraft in accordance with paragraph 36C of the Air Navigation Order as in force immediately before 1 October 2018, is, so far as it is not inconsistent with the provisions of these Regulations, to continue as if the approval is a special operations approval granted under regulation 5 of these Regulations to conduct operations in an airspace or along a route where the appropriate air traffic services

---

---

authority has specified a required surveillance performance for performance-based surveillance.

(7) Where —

(a) an application is made for approval under the Air Navigation Order, or the Air Operator Certificate Requirements (AOCR), as in force before 1 October 2018; and

(b) the application was not approved by the Chief Executive before that date,

the application is (where applicable) deemed to be an application made to the Director-General of Civil Aviation under regulation 4(1) of these Regulations for a special operations approval for a special operation listed in regulation 3(a) to (k), as applicable.

## FIRST SCHEDULE

Regulation 2

### DEFINITIONS

“Aerial work operator” means a person who holds a valid aerial work certificate granted under the Air Navigation (137 — Aerial Work) Regulations 2018 (G.N. No. S 502/2018).

*[S 678/2018 wef 09/10/2018]*

“Commercial air transport operator” means a person who holds a valid air operator certificate granted under the Air Navigation (119 — Air Operator Certification) Regulations 2018 (G.N. No. S 443/2018).

“Complex general aviation operator” means a person who holds a valid complex general aviation certificate granted under the Air Navigation (125 — Complex General Aviation) Regulations 2018 (G.N. No. S 501/2018).

*[S 678/2018 wef 09/10/2018]*

“EDTO critical fuel” means the fuel quantity necessary to fly to an en-route alternate aerodrome considering, at the most critical point on the route, the most limiting system failure.

“EDTO-significant system” means an aeroplane system whose failure or degradation could adversely affect the safety particular to an EDTO flight, or whose continued functioning is specifically important to the safe flight and landing of an aeroplane during an EDTO diversion.



FIRST SCHEDULE — *continued*

“Electronic flight bag” or “EFB” means an electronic information system, comprising equipment and applications, for flight crew which allows for storing, updating, displaying and processing of EFB functions to support flight operations or duties.

“Low visibility operation” means —

- (a) a Category II or III approach and landing; or
- (b) a take-off with RVR of less than 400 m, or a higher value specified by the competent authority of the State of the Aerodrome.

“Mixed fleet flying” or “MFF” means the operation of both the Primary MFF Aeroplane and the Secondary MFF Aeroplane by a commercial air transport operator that is subject to the Air Navigation (121 — Commercial Air Transport by Large Aeroplanes) Regulations 2018.

“MFF pilot” means a person that is qualified under an approved MFF Programme to fly more than one aeroplane type as a pilot.

“OLC pass” has the same meaning as in regulation 167 of the Air Navigation (121 — Commercial Air Transport by Large Aeroplanes) Regulations 2018.

“OPC pass” has the same meaning as in regulation 166 of the Air Navigation (121 — Commercial Air Transport by Large Aeroplanes) Regulations 2018.

“Operator Line Check” means the competency assessment described in regulation 167 of the Air Navigation (121 — Commercial Air Transport by Large Aeroplanes) Regulations 2018.

“Operator Proficiency Check” means the competency assessment described in regulation 166 of the Air Navigation (121 — Commercial Air Transport by Large Aeroplanes) Regulations 2018.

“Polar operations” means any flight in or near the polar regions, or with a possibility of in-flight diversion to an airfield in the polar regions.

“Polar regions” means —

- (a) the North Polar Region, comprising the entire area that lies north of latitude 78°00′ North; and
- (b) the South Polar Region, comprising the entire area that lies south of latitude 60°00′ South.

“Primary MFF Aeroplane”, for the purposes of mixed fleet flying, means an aeroplane, or group of aeroplanes, that is designated, by a commercial air

FIRST SCHEDULE — *continued*

transport operator that is subject to the Air Navigation (121 — Commercial Air Transport Operations by Large Aeroplanes) Regulations 2018, to be used as a reference to identify differences with the Secondary MFF Aeroplane within the operator's fleet.

“Required navigation performance” or “RNP” means a statement of the navigation performance necessary for operation within a defined airspace.

“RVSM airspace” means an airspace where a reduced vertical separation minimum of 300 m (1,000 ft) applies above flight level 290.

“Safe forced landing” means a landing in which it can reasonably be expected that there will not be serious injury or loss of life, even though the aeroplane may incur extensive damage.

“Secondary MFF Aeroplane”, for the purposes of mixed fleet flying, means an aeroplane, or a group of aeroplanes, of a type or variant that is different from the Primary MFF Aeroplane.

“Singapore operator” means, as applicable —

- (a) an aerial work operator;
- (b) a commercial air transport operator;
- (c) a complex general aviation operator; or
- (d) any person, other than a person mentioned in paragraph (a), (b) or (c), who operates a Singapore registered aircraft for general aviation.

[S 678/2018 wef 09/10/2018]

“Special operation” means —

- (a) a specified navigation performance operation;
- (b) an operation in airspace with reduced vertical separation minima;
- (c) a low visibility operation;
- (d) an operation while using an automatic landing system, a combined vision system, an enhanced vision system, a synthetic vision system, a head-up display or a hybrid system containing any combination of these systems and display;
- (e) an operation while using a data link system;
- (f) an operation while using an electronic flight bag;
- (g) an extended diversion time operation;

---



---

FIRST SCHEDULE — *continued*

- (h) a polar operation;
- (i) a mixed fleet flying operation;
- (j) an operation at night or under instrument meteorological conditions involving a single-engine turbine-powered aeroplane; or
- (k) an operation with performance-based communications or performance-based surveillance.

“Specified navigation performance operation” means an operation on a route or in an airspace where navigation performance capability has been established and includes —

- (a) an operation in the North Atlantic High Level Airspace; and
- (b) an operation involving performance-based navigation (PBN) such as the following:
  - (i) area navigation (RNAV);
  - (ii) required navigation performance (RNP).

“Variant”, for the purposes of mixed fleet flying, means an aeroplane, or a group of aeroplanes, that has characteristics that are mostly identical to the Primary MFF Aeroplane with some differences from the Primary MFF Aeroplane that require the flight crew members to obtain additional knowledge, skills or abilities to operate the aeroplane, or any aeroplane in the group of aeroplanes.

SECOND SCHEDULE

Regulation 14(b)

MINIMUM AIRCRAFT SYSTEMS PERFORMANCE SPECIFICATIONS  
(MASPS)

**Definitions**

1. In this Schedule —

“Altimetry system error” or “ASE” means the difference between the altitude indicated by the altimeter display (assuming the altimeter barometric setting is correct) and the pressure altitude corresponding to the undisturbed ambient pressure;

“Total vertical error” or “TVE” means the vertical geometric difference between the actual pressure altitude flown by an aircraft and its assigned pressure altitude (flight level).

SECOND SCHEDULE — *continued***Minimum Aircraft Systems Performance Specifications (MASPS)**

2. In respect of a group of aeroplanes that are nominally of identical design and build with respect to all details that could influence the accuracy of an aeroplane's height-keeping performance capability, the performance of the altimeter system for operation by the group of aeroplanes in RVSM airspace is such that the total vertical error for the group of aeroplanes —

- (a) has a mean no greater than 25 m (80 ft) in magnitude; and
- (b) has a standard deviation ( $z$ ) with a magnitude no greater than —
  - (i) if the mean TVE is measured in metres, the value of  $28 - 0.013z^2$  for  $0 \leq z \leq 25$ ; or
  - (ii) if the mean TVE is measured in feet, the value of  $92 - 0.004z^2$  for  $0 \leq z \leq 80$ .

3. The components of total vertical error mentioned in paragraph 2 must have the following characteristics:

- (a) the mean ASE of the group must not exceed 25 m (80 ft) in magnitude;
- (b) the sum of the absolute value of the mean ASE and 3 standard deviations of altimetry system error must not exceed 75 m (245 ft);
- (c) the differences between cleared flight level and the indicated pressure altitude actually flown must be symmetric about a mean of 0 m (0 ft), with a standard deviation no greater than 13.3 m (43.7 ft);
- (d) the frequency of the differences occurring must decrease exponentially with the increase in the magnitude of the differences.

4. In respect of any aeroplane that cannot be classified as belonging to a group of aeroplanes as the characteristics of the aeroplane's airframe and altimetry system fit are unique, the height-keeping performance capability of the aeroplane must be such that the components of the total vertical error for the aeroplane have the following characteristics:

- (a) the magnitude of the aeroplane's altimetry system error must not exceed 60 m (200 ft) under any flight condition;
- (b) the difference between the cleared flight level and the indicated pressure altitude actually flown must be symmetric about a mean of 0 m (0 ft), with a standard deviation no greater than 13.3 m (43.7 ft);
- (c) the frequency of the differences occurring must decrease exponentially with the increase in the magnitude of the differences.

---

---

## THIRD SCHEDULE

Regulations 41(1)(c) and 42(1)(d)  
and (e)

### EDTO BY TWIN-ENGINED AEROPLANES

#### **Additional information to be submitted for approval of EDTO by twin-engined aeroplanes**

1.—(1) A Singapore operator seeking a special operations approval to conduct EDTO using a twin-engined aeroplane must, as part of the application under regulation 4(1), provide the necessary documents and information to demonstrate the Singapore operator's ability to comply with the requirements in this Schedule.

(2) The documents and information to be provided in accordance with sub-paragraph (1) include —

- (a) the Type Design Approval for the aeroplane to be used;
- (b) the in-service experience;
- (c) the reliability of significant airframe system;
- (d) the Singapore operator's reliability programmes;
- (e) the EDTO manual;
- (f) the Singapore operator's conformance to the latest Airworthiness Directives and Configuration, Maintenance and Procedures standards, as required under paragraph 4;
- (g) the Auxiliary Power Unit (APU) in-flight start programme as required under paragraph 6, if applicable;
- (h) the procedures established by the Singapore operator to comply with the requirements of this Schedule; and
- (i) any other data requested by the Director-General of Civil Aviation.

#### **Maintenance programme and procedures**

2.—(1) A Singapore operator with a special operations approval to conduct EDTO using a twin-engined aeroplane must include, in the maintenance programme for the fleet of aeroplanes to be used for such operations (called in this Schedule its EDTO fleet), the standards, procedures, guidance and direction necessary to support the approved operations.

(2) The Singapore operator must incorporate human factors principles into its maintenance programme.

THIRD SCHEDULE — *continued*

(3) The Singapore operator must take measures to ensure that every member of its maintenance personnel, and every member of its other operational personnel, involved in the maintenance of the EDTO fleet —

- (a) is aware of the nature of EDTO; and
- (b) has the knowledge, skills and ability to accomplish the requirements of the maintenance programme.

(4) The Singapore operator must have procedures in its maintenance programme to prevent identical action being applied to multiple similar elements in any EDTO significant system.

(5) The Singapore operator must, as part of the procedures in its maintenance programme —

- (a) identify the EDTO-related tasks on the operator's routine work forms and related instructions;
- (b) clearly define the EDTO-related procedures;
- (c) develop an EDTO service check to verify that the aircraft and certain critical items are fit for EDTO operations;
- (d) ensure that, immediately before an EDTO flight, the EDTO service check is completed and signed off by a person authorised by the operator for this purpose; and
- (e) review or document (as appropriate) log books to ensure the proper performance of minimum equipment list procedures, deferred items, maintenance checks and system verification procedures.

(6) When the Singapore operator contracts, or otherwise engages, an external organisation to carry out the maintenance on its EDTO fleet, the Singapore operator —

- (a) must ensure that the external organisation adheres to the maintenance programme; and
- (b) must be satisfied that the external organisation has established control procedures to ensure that —
  - (i) every member of its maintenance personnel involved in the maintenance of the EDTO fleet is appropriately qualified; and
  - (ii) all flight dispatch procedures and additional maintenance requirements, as specified in the Singapore operator's Maintenance Control Manual, are complied with.

---

---

THIRD SCHEDULE — *continued*

**EDTO Manual**

3.—(1) A Singapore operator with a special operations approval to conduct EDTO using a twin-engined aeroplane must develop a manual (called in this Schedule the EDTO Manual) for use by every member of its personnel involved in such operations.

(2) The EDTO Manual must —

- (a) make reference to the Singapore operator's maintenance programme and the other maintenance requirements set out in this Schedule; and
- (b) contain all EDTO requirements, including supportive programmes, procedures, duties and responsibilities and the primary systems or conditions that require verification actions under paragraph 10.

(3) The Singapore operator mentioned in sub-paragraph (1) must ensure that its EDTO Manual is kept up-to-date.

**Configurations, maintenance and procedures**

4.—(1) A Singapore operator with a special operations approval to conduct EDTO operations using a twin-engined aeroplane must ensure that every aeroplane in its EDTO fleet is in compliance with the current Configuration, Maintenance and Procedures (CMP) standards, as issued by the aeroplane manufacturer and the State of Design.

(2) Where a revision to the CMP standards results in any action being required by the Singapore operator mentioned in sub-paragraph (1), the Singapore operator must implement that action —

- (a) before the next EDTO flight; or
- (b) in accordance with a schedule accepted by the Director-General of Civil Aviation.

**Minimum equipment list**

5.—(1) A Singapore operator with a special operations approval to conduct EDTO using a twin-engined aeroplane must clearly indicate, in the minimum equipment list for every aeroplane in the Singapore operator's EDTO fleet, the items that have different dispatch requirements for EDTO flights.

(2) For the purposes of sub-paragraph (1), the following systems and equipment are considered to have a fundamental influence on flight safety:

- (a) electrical power system;
- (b) hydraulic system;

THIRD SCHEDULE — *continued*

- (c) pneumatic system;
- (d) flight instrumentation;
- (e) fuel system;
- (f) flight control system;
- (g) ice protection system;
- (h) engine start and ignition system;
- (i) propulsion system instruments;
- (j) navigation and communications systems;
- (k) auxiliary power units;
- (l) air conditioning and pressurisation systems;
- (m) cargo fire suppression system;
- (n) emergency equipment;
- (o) engine fire detection and extinguishing systems;
- (p) any other equipment required for EDTO.

**APU in-flight start programme**

6.—(1) A Singapore operator with a special operations approval to conduct EDTO using a twin-engined aeroplane must have procedures to verify the in-flight start reliability of any auxiliary power unit, installed in the aeroplane, following any maintenance of an auxiliary power unit (or a component of it) that has identified, by the aircraft manufacturer or the APU manufacturer, as potentially affecting the auxiliary power unit's start reliability at altitude.

(2) Where required by the aircraft manufacturer or by the State of Design, the Singapore operator mentioned in sub-paragraph (1) must have a programme (called in this Schedule an APU in-flight start programme) to ensure that —

- (a) the auxiliary power unit installed in any aeroplane of the operator's fleet maintains its in-flight start capabilities; and
- (b) the result of any auxiliary power unit's in-flight start is annotated in the technical log of the aeroplane.

**Maintenance training programme**

7.—(1) A Singapore operator with a special operations approval to conduct EDTO using a twin-engined aeroplane must have a maintenance training programme to ensure that —



---



---

THIRD SCHEDULE — *continued*

- (a) every member of its operations personnel that is involved in the maintenance of the operator's EDTO fleet is provided with the necessary training to competently complete EDTO-related maintenance tasks assigned to the member; and
  - (b) the nature of EDTO-related maintenance requirements is emphasised.
- (2) The maintenance training programme mentioned in sub-paragraph (1) must include human factors principles.
- (3) The Singapore operator mentioned in sub-paragraph (1) must ensure that, before any person is assigned to perform any EDTO-related maintenance task, that person —
- (a) has completed the operator's EDTO maintenance training programme; and
  - (b) has satisfactorily performed that task under supervision.

**EDTO parts control programme**

- 8.—(1) A Singapore operator with a special operations approval to conduct EDTO using a twin-engined aeroplane must have a programme that ensures proper parts and configurations are maintained for every aeroplane in the EDTO fleet.
- (2) The programme mentioned in sub-paragraph (1) must include a procedure to verify that, for every aeroplane in the EDTO fleet, the necessary EDTO configuration for the aeroplane is maintained for any part that is —
- (a) placed in the aeroplane during parts borrowing or pooling arrangements; or
  - (b) used in the aeroplane after repair or overhaul.

**Dispatch for EDTO**

- 9.—(1) Subject to sub-paragraph (2), a Singapore operator with a special operations approval to conduct EDTO using a twin-engined aeroplane must not dispatch an aeroplane for an EDTO flight after —
- (a) the aeroplane has, on a previous flight, experienced —
    - (i) an engine in-flight shut-down (IFSD);
    - (ii) a primary airframe system failure; or
    - (iii) a failure of an engine power control system; or

THIRD SCHEDULE — *continued*

- (b) the Singapore operator —
- (i) observes significant adverse trends in engine performance;
  - (ii) replaces one of the aeroplane's engine; or
  - (iii) has major maintenance work done on the aeroplane.
- (2) After the occurrence of any of the events listed under sub-paragraph (1) in respect of an aeroplane, the Singapore operator may dispatch the aeroplane for an EDTO flight if the Singapore operator has —
- (a) taken remedial action on the aeroplane in accordance with a verification programme required under paragraph 10; and
  - (b) conducted an in-flight verification on the aeroplane after the remedial action was taken.
- (3) The Singapore operator must record, in the aircraft technical log or equivalent, any conduct of the in-flight verification required under sub-paragraph (2)(b).
- (4) The record of the in-flight verification mentioned in sub-paragraph (3) must include the following details:
- (a) identification of the affected engine (such as the position, make and serial number), and the history of its use (such as the total time or cycles since manufactured, the total time since its last maintenance in a workshop);
  - (b) identification of any affected systems or defective unit, and the history of its use;
  - (c) the circumstances of the flight when the event listed under sub-paragraph (1) occurred (such as the phase of flight);
  - (d) any remedial action taken in accordance with the verification programme required under paragraph 10.

**Verification programme**

10.—(1) A Singapore operator with a special operations approval to conduct EDTO using a twin-engined aeroplane must have a verification programme to ensure that remedial action is taken following any event listed under paragraph 9(1).

- (2) The programme required in sub-paragraph (1) —
- (a) must clearly specify —
    - (i) the person who initiates the verification actions; and

---



---

THIRD SCHEDULE — *continued*

(ii) the section or group of persons responsible for the determination of the necessary action to be taken; and

(b) must establish the means to assure the completion of the verification programme or the remedial action procedures.

**Oil consumption monitoring**

11.—(1) A Singapore operator with a special operations approval to conduct EDTO using a twin-engined aeroplane must monitor the oil consumption of each engine and each auxiliary power unit installed in an aeroplane from its EDTO fleet.

(2) The monitoring programme or mechanism implemented pursuant to sub-paragraph (1) must take into consideration the aeroplane manufacturer's recommendations, oil consumption trends and other information relevant to the aeroplane's make and model.

**Reliability monitoring**

12.—(1) A Singapore operator with a special operations approval to conduct EDTO using a twin-engined aeroplane must have a reliability monitoring programme that includes a programme or mechanism (called in this Schedule a reliability monitoring programme) to monitor the systems identified in paragraph 5(2) for the early identification and prevention of EDTO-related problems.

(2) The reliability monitoring programme required under sub-paragraph (1) must focus on events that are detrimental to EDTO flights and incorporate reporting procedures for significant events.

(3) The Director-General of Civil Aviation may require a Singapore operator mentioned in sub-paragraph (1) to provide information on EDTO-related events that the Director-General of Civil Aviation considers relevant for the following purposes:

(a) to establish if the reliability level of the operator is adequate;

(b) to assess the Singapore operator's competence and capability to safely continue EDTO flights.

**Engine condition monitoring**

13.—(1) A Singapore operator with a special operations approval to conduct EDTO using a twin-engined aeroplane must, as part of the reliability monitoring programme mentioned in paragraph 12(1) —

THIRD SCHEDULE — *continued*

- (a) monitor the condition of each engine of every aeroplane in the Singapore operator's EDTO fleet such that the Singapore operator is able to detect deterioration of such engines at an early stage and do remedial action before safe operation is affected; and
  - (b) have procedures to ensure that engine limit margins of every aeroplane in the Singapore operator's EDTO fleet are maintained such that a prolonged single-engine diversion may be conducted without exceeding approved engine limits (such as rotor speeds, exhaust gas temperature) at all approved power levels and expected environmental conditions.
- (2) For the purpose of sub-paragraph (1)(a), the Singapore operator must have procedures —
- (a) that describe the parameters to be monitored, the method of data collection and assessment, including those for monitoring and assessing in-flight shut-down rate of the aeroplanes in the operator's EDTO fleet;
  - (b) that take into account manufacturer's instructions and industry practice;
  - (c) that specify remedial actions; and
  - (d) for reporting to the Director-General of Civil Aviation any undesirable trends observed on the parameters monitored and assessed in sub-paragraph (a).

**Reporting**

14.—(1) A Singapore operator with a special operations approval to conduct EDTO using a twin-engined aeroplane must report to the Authority the occurrence of any of the following reportable safety matters on an aeroplane that is part of the operator's EDTO fleet, within 72 hours after the completion of the affected flight:

- (a) any in-flight shut-downs;
  - (b) any uncommanded power changes or surges;
  - (c) any inability of the pilot to control the engine or obtain desired power;
  - (d) any unscheduled removal of an engine;
  - (e) any problem with systems critical to EDTO;
  - (f) any other events detrimental to EDTO.
- (2) The report required under sub-paragraph (1) must include the following information:

---

---

THIRD SCHEDULE — *continued*

- (a) identification of the aircraft (such as the registration);
- (b) identification of the affected engine (such as the position, make and serial number) and the history of its use (such as the total time or cycles since manufacture, and the total time since its last maintenance in a workshop);
- (c) identification of any affected systems or defective units, and the history of its use;
- (d) the circumstances of the flight during which the reportable safety matter occurred (such as the phase of flight);
- (e) any remedial action taken.

*[S 678/2018 wef 09/10/2018]*

Made on 21 June 2018.

LEE HSIEN YANG  
*Chairman,  
Civil Aviation Authority of  
Singapore.*

[LE/LGN/A1.8; AG/LLRD/SL/6/2010/15 Vol. 2]

(To be presented to Parliament under section 3A(8) of the Air Navigation Act).