

AERONAUTICAL CIRCULAR CIVIL AVIATION AUTHORITY – MACAO, CHINA

SUBJECT:

Minimum Equipment List (MEL) Requirements

EFFECTIVE DATE:

01 February 2021

CANCELLATION:

AC/OPS/024R00

GENERAL:

The President of Civil Aviation Authority – Macao, China, in exercise of his power under Paragraph 89 of the Air Navigation Regulation of Macao (ANRM) and Article 35 of the Statutes of Civil Aviation Authority, approved by the Decree-Law 10/91/M, established this Aeronautical Circular (AC).

1. Introduction

- 1.1. In accordance with paragraph 14 (2) of the ANRM, an aircraft registered in Macao shall not commence a flight if any of the equipment (including communication, navigation and surveillance equipment) required by or under the ANRM to be carried in the circumstances of the intended flight is not carried or is not in a fit condition for use. ANRM subparagraph 14 (2) (b) further states that this restriction can be alleviated in the case of an aircraft, for which an operations manual is required, contains the particulars as specified in Part F of the Ninth Schedule to the ANRM.
- 1.2. The document specified in Part F of the Ninth Schedule to the ANRM is the Minimum Equipment List (MEL), approved by the AACM, which will enable the commander to determine whether a flight may be commenced or continued from any intermediate stop should any instrument, equipment or system become inoperative.
- 1.3. Requirements of an MEL in the context of operations manual are set out in Aeronautical Circular AC/OPS/002. This AC is established to delineate the specification of an MEL in detail and specify the requirements on the preparation of an MEL to comply with the required approval process.

2. Applicability

- 2.1. This AC is applicable to all operators of Macao registered aircraft of which the operations manuals include Minimum Equipment List approved, or to be approved by the AACM.

3. Definition

Terms and abbreviation in the context of this AC have the following meaning:

- ***As required by operating requirements*** means that the listed item of equipment is subject to certain provisions (restrictive or permissive) expressed in the applicable operational requirements.
- ***Calendar Day*** means a 24 hour period from midnight to midnight based on either UTC or local time, as selected by the operator.
- ***Commencement of flight*** means the point when an aircraft begins to move under its own power for the purpose of preparing for take-off.
- ***Day of discovery*** means the calendar day that a malfunction was recorded in the aircraft maintenance record/log book.
- ***Equipment*** means item, function, component or system.
- ***Flight Day*** means a 24 hour period (from midnight to midnight) either UTC or local time, as established by the operator, during which at least one flight is initiated for the affected aircraft.
- ***If installed*** means that the equipment is either optional or is not required to be installed on all aircraft covered by the MMEL.
- ***Inoperative*** means that the equipment does not accomplish its intended purpose or is not consistently functioning within its design operating limits or tolerances. Some equipment have been designed to be fault tolerant and are monitored by computers which transmit fault messages to a centralized computer for the purpose of maintenance. The presence of this category of message does not necessarily mean that the equipment is inoperative.
- ***Master minimum equipment list (MMEL)*** means a list established for a particular aircraft type by the organization responsible for the type design with the approval of the State of Design containing items, one or more of which is permitted to be unserviceable at the commencement of a flight. The MMEL may be associated with special operating conditions, limitations or procedures.

- **Minimum equipment list (MEL)** means a list which provides for the operation of aircraft, subject to specified conditions, with particular equipment inoperative, prepared by an operator in conformity with, or more restrictive than, the MMEL established for the aircraft type.

Note - All items related to the airworthiness of the aircraft and not included in the list are automatically required to be operative.

- **Rectification Interval** means a limitation on the duration of operations with inoperative equipment.
- **RIE** means an abbreviation for Rectification Interval Extension.

4. General Requirements

- 4.1. The operator's MEL and any amendment thereto shall be approved by the AACM.

Note: The operator may apply Temporary Revisions (TR) to amend MEL for impending changes for the interest of safety and the changes shall be no less restrictive than the MMEL on which it is based. However, method to control and incorporate TRs into normal revision of MEL is subject to the AACM acceptance and the procedures shall be specified in the preamble section.

- 4.2. The operator's MEL shall be no less restrictive than the MMEL on which it is based.

- 4.3. The operator shall develop its MEL and all subsequent amendments, as a joint operations and maintenance project, based on the current MMEL revision and the applicable requirement of AACM which might be more stringent than MMEL, and take system reliability data and other airworthiness indicators, such as MORs, quality system records, defect deferral and rectification performance and spares provisioning into account.

- 4.4. The operator shall amend the MEL after any applicable change to the MMEL within the acceptable timescales. The operator shall define applicable changes to the MMEL that require amendment of its MEL in the preamble section. The applicable changes shall include, but not limited to, the following changes:

- (a) a reduction of the rectification interval;
- (b) change of an item, only when the change is applicable to the aircraft or type of operations and is more restrictive;
- (c) the modified procedure is applicable to the operator's MEL;

- (d) the purpose of this change is to improve compliance with the intent of the associated MMEL dispatch condition.

4.5. In addition to the list of items, the MEL shall contain:

- (a) a preamble, including guidance and definitions for flight crews and maintenance personnel using the MEL;
- (b) the revision status of the MMEL upon which the MEL is based and the revision status of the MEL;
- (c) the scope, extent and purpose of the MEL.

4.6. The operator shall:

- (a) establish rectification intervals for each inoperative instrument, item of equipment or function listed in the MEL. The rectification interval in the MEL shall not be less restrictive than the corresponding rectification interval in the MMEL;
- (b) establish an effective rectification programme;
- (c) only operate the aircraft after expiry of the rectification interval specified in the MEL when:
 - (1) the defect has been rectified; or
 - (2) the rectification interval is extended in accordance with paragraph 18 below.

4.7. The operator shall establish the operational and maintenance procedures referenced in the MEL taking into account the operational and maintenance procedures referenced in the MMEL, reflecting manufacturers' requirements and be within the technical competence and resource availability of the operator. These procedures shall be part of the operator's manual(s) or the MEL.

4.8. The operator shall amend the operational and maintenance procedures referenced in the MEL after any applicable change to the operational and maintenance procedures referenced in the MMEL, reflecting manufacturers' requirements and be within the technical competence and resource availability of the operator.

4.9. Unless otherwise specified in the MEL, the operator shall complete:

- (a) the operational procedures referenced in the MEL when planning for and/or operating with the listed item inoperative; and

(b) the maintenance procedures referenced in the MEL prior to operating with the listed item inoperative.

4.10. All items related to the airworthiness or operations of the aircraft and not included in the MEL are automatically required to be operative.

4.11. Non-safety related equipment, such as galley equipment and passenger convenience items, need not be included in the MEL. The operator shall ensure that failures of these equipment will not affect the airworthiness and safe operation of the aircraft.

5. MEL Review

5.1. The operator shall establish procedures to review its MEL to ensure that the latest MMEL revision with any applicable change has been incorporated in the MEL within the acceptable timescales and the MEL conforms to the current operational requirements of the AACM.

5.2. The AACM will audit the operator's conformance to MEL requirements on an ongoing basis. Significant non-conformances to the MEL requirements cited in this AC may result in the MEL approval being withdrawn.

6. MMEL Revision

6.1. The operator shall monitor the revision status of the MMEL and submit any MMEL revision together with a brief description of the MMEL changes and a statement to specify whether any applicable change is included for amendment of its MEL to the AACM within 30 days from the date of publication of the MMEL revision.

Note: For the brief description of the MMEL changes, highlight of changes from Original Equipment Manufacturer (OEM) is generally acceptable to the AACM.

7. Amendments to the MEL

7.1. Voluntary amendment of the MEL may be carried out as required by the operator, provided the proposed change is no less restrictive than the MMEL.

7.2. When an MMEL revision with any applicable change is issued, unless otherwise specified by the AACM for reduced timescales for the implementation of safety-related amendments, the operator shall submit the revised MEL together with form DFSL/APP/001 to the AACM for approval within 90 days from the date of publication of the MMEL revision.

7.3. The operator shall make amendments to its MEL to incorporate any material as the AACM may require for the purpose of ensuring the safety of the aircraft or of any persons or property carried therein or the safety, efficiency or regularity of air navigation.

- 7.4. Once the MEL revision is approved by the AACM, the operator shall notify the AACM of the effective date of the approved MEL revision and publish the approved MEL revision within 30 days from the AACM approval date. The previous revision will become invalid as soon as the MEL revision becomes effective or 30 days after the MEL revision is approved by the AACM, whichever comes first.

8. MEL Format

- 8.1. The MEL format and the presentation of items and dispatch conditions shall be clear and unambiguous to reflect those of the MMEL. The numbering system for MEL items shall be in accordance with the ATA 100/2200 Specification numbering system.

9. MEL Preamble

- 9.1. The MEL preamble shall:

- (a) reflect the content of the MMEL preamble as applicable to the MEL scope and extent;
- (b) contain terms and definitions used in the MEL;
- (c) contain any other relevant specific information for the MEL scope and use that is not originally provided in the MMEL;
- (d) provide guidance on how to identify the origin of a failure or malfunction to the extent necessary for appropriate application of the MEL;
- (e) contain guidance on the management of multiple unserviceabilities, based on the guidance given in the MMEL; and
- (f) contain guidance on placarding of inoperative items to inform crew members of equipment condition, as appropriate. In particular, when such items are accessible to the crew during flight, the control(s) and indicator(s) related to inoperative unit(s) shall be clearly placarded.

10. Scope of the MEL

- 10.1. The MEL shall include:

- (a) the dispatch conditions associated with flights conducted in accordance with specific approvals, such as Reduced Vertical Separation Minimum (RVSM), Performance-based Navigation (PBN), All Weather Operations (AWO), etc., held by the operator;
- (b) specific provision for particular types of operations carried out by the operator.

11. Extent of the MEL

- 11.1. The operator shall include guidance in the MEL on how to deal with any failures that occur between the commencement of the flight and the start of the take-off. If a failure occurs between the commencement of the flight and the start of the take-off, any decision to continue the flight shall be subject to pilot judgement and good airmanship. The pilot-in-command may refer to the MEL before any decision to continue the flight is taken.

12. Purpose of the MEL

- 12.1. The MEL shall be an alleviating document prepared by an operator having the purpose to:
- (a) identify the minimum equipment and conditions for an aircraft to maintain the Certificate of Airworthiness in force and to meet the operating rules of the type of operation;
 - (b) define operational procedures necessary to maintain an acceptable level of safety and to deal with inoperative equipment; and
 - (c) define maintenance procedures necessary to maintain an acceptable level of safety and procedures necessary to secure any inoperative equipment.

13. Multiple Unserviceabilities

- 13.1. The operator shall ensure that the MEL, including the Preamble, reflects the guidance given in the MMEL on the effects of multiple unserviceabilities.
- 13.2. In most cases, multiple unserviceabilities of unrelated aircraft systems cannot be addressed by the MMEL nor consequently by the MEL. The decision as to whether or not to dispatch with multiple unserviceabilities, which individually would be allowed by the MEL, will ultimately rest with the pilot-in-command, taking into consideration advice from the operator's specialists where available.

14. Operational and Maintenance Procedures

- 14.1. The operational and maintenance procedures referenced in the MEL shall be based on the operational and maintenance procedures referenced in the MMEL. Modified procedures may, however, be developed by the operator when they provide the same level of safety, as required by the MMEL. Providing appropriate operational and maintenance procedures referenced in the MEL, regardless of who developed them, is the responsibility of the operator.
- 14.2. Any item in the MEL requiring an operational or maintenance procedure to ensure an acceptable level of safety shall be so identified in the 'remarks' or 'exceptions'

column/part/section of the MEL. This will normally be '(O)' for an operational procedure, or '(M)' for a maintenance procedure. '(O)(M)' means both operational and maintenance procedures are required.

- 14.3. Operational Procedures shall be accomplished in planning for and/or operating with the listed item inoperative. Maintenance Procedures shall be accomplished prior to operating with the listed item inoperative. The satisfactory accomplishment of all procedures, regardless of who performs them, is the responsibility of the operator.
- 14.4. Appropriate operational and maintenance procedures are required to be published as a part of the operator's manual(s) or MEL.
- 14.5. Operational and maintenance procedures, regardless of the document where they are contained, shall be readily available for use when needed for the application of the MEL.

15. Rectification Intervals

- 15.1. The operator shall take account of the rectification interval given in the MMEL when preparing an MEL. The rectification interval in the MEL shall not be less restrictive than the corresponding rectification interval in the MMEL.
- 15.2. The operator is responsible for establishing an effective rectification programme that includes tracking of the inoperative items and coordinating parts, personnel, facilities, and procedures necessary to ensure timely rectification.
- 15.3. Inoperative items or components, deferred in accordance with the MEL, must be rectified at or prior to the rectification intervals established by the following letter designators given in the "Rectification Interval Category" column of the MEL.

Category A

No standard interval is specified, however, items in this category shall be rectified in accordance with the conditions stated in the MEL.

- (a) where a time period is specified in calendar days or flight days, the interval excludes the day of discovery.
- (b) where a time period is specified other than in calendar days or flight days, it shall start at the point when the defect is deferred in accordance with the operator's approved MEL.

Category B

Items in this category shall be rectified within three (3) consecutive calendar days, excluding the day of discovery.

Category C

Items in this category shall be rectified within ten (10) consecutive calendar days, excluding the day of discovery.

Category D

Items in this category shall be rectified within one hundred and twenty (120) consecutive calendar days, excluding the day of discovery. Items in this category meet the following criteria:

- (a) the absence of the item does not adversely affect crew workload;
- (b) the crew do not rely on the function of that item on a routine or continuous basis; and
- (c) the crew's training, subsequent habit patterns and procedures do not rely on the use of that item.

15.4. Operation of the aircraft is not allowed after expiry of the rectification interval specified in the MEL, unless:

- (a) the defect has been rectified; or
- (b) the rectification interval is extended in accordance with paragraph 18 below.

16. MMEL Items as Required by Regulation/the Authority

16.1. Certain items at the MMEL, especially for those navigation systems, the Remarks or Exceptions column may show "As required by Regulations / Operating Requirements / Air Navigation Legislation / FARs / etc.)". Operators when compiling their MEL shall specify clearly any limitations as required by the ANRM and/or relevant ACs on those items such that dispatch of the aircraft could be allowed.

16.2. The list of AACM MEL policy items in Appendix 1 to this AC specifies differences in dispatch conditions including rectification intervals as required by the ANRM and/or relevant ACs. The listed rectification intervals and/or applicable limitations/conditions shall be used when compiling the operator's MEL. Rectification intervals for the equipment as stipulated by the ANRM and/or relevant ACs shall be classified as Category A with applicable time limitations specified at the Remarks or Exceptions areas. No deviation from those intervals is allowed without prior approval from the AACM.

16.3. If there are differences in rectification intervals and/or applicable limitations/conditions for dispatch between those as listed in Appendix 1 to this AC and those specified in the respective MMEL or MMEL Supplement, the more restrictive rectification intervals and/or applicable limitations/conditions shall be used.

17. Deferral of Items

17.1. Procedures for the deferral of MEL items shall be included as part of the operator's Maintenance Management Exposition (MME). The operator shall ensure that the aforementioned procedures in the MME are referenced or copied in the MEL and/or Operations Manual.

17.2. These procedures comprise a method for:

- (a) deferral and/or rectification of inoperative equipment;
- (b) placarding requirements as per the MEL;
- (c) dispatching of aircraft with deferred MEL items(s);
- (d) using a remote deferral system;
- (e) controlling categorized times; and
- (f) training of company personnel who are responsible for MEL compliance procedures.

17.3. The operator shall establish procedures whereby the Maintenance and Flight Departments periodically review the deferred items, in order to ensure that any accumulation of deferred items neither conflict with each other nor present an unacceptable increase in flight or cabin crew workload. Notwithstanding the categorization of item rectification intervals, it shall be the aim of each MEL document holder to ensure that inoperative items are repaired as quickly as possible.

18. Rectification Interval Extension (RIE)

18.1. Principles of RIE

18.1.1. Subject to the approval of the AACM, the operator may use a procedure for the one time extension of the applicable intervals B, C and D, as specified in the MEL, provided that:

- (a) the extension of the rectification interval is within the scope of the MMEL for the aircraft type;
- (b) the extension of the rectification interval is, as a maximum, of the same duration as the rectification interval specified in the MEL;

- (c) the extension of the rectification interval is not used as a normal means of conducting MEL item rectification and is used only when events beyond the control of the operator have precluded rectification;
- (d) a description of specific duties and responsibilities for controlling extension is established by the operator and accepted by the AACM;
- (e) the AACM is notified of the application of any extension of the applicable rectification interval within 10 days; and
- (f) a plan to accomplish the rectification at the earliest opportunity within the period of the extension is established.

18.1.2. The operator shall ensure that rectifications are accomplished at the earliest opportunity. RIE is introduced to allow operators to continue to operate an aircraft after the Rectification Interval has expired if rectification has not been possible due to circumstances beyond the operator's control (e.g. unavailability of spare). The operator who utilizes RIE is required to report all such uses, together with the appropriate justification to the AACM. The operator remains responsible for the control of RIE.

18.2. Application for the use of RIE

18.2.1. The operator shall make an application to the AACM for approval to use RIE. The operator shall provide details of the name and position of the "Authorizing Person" responsible for the control of the company RIE procedure and details of the specific duties and responsibilities established by the operator to control the use of RIE. Authorizing Persons who must be senior with experience in technical and/or operations management are to be listed by appointment and name. The AACM will consider the engineering competence of the operator and the acceptability of the Authorizing Persons. Where an operator uses contracted-out maintenance facilities, the AACM will judge whether the relationship between an operator and an independent maintenance contractor is adequate for the purposes of RIE.

18.3. RIE Procedure

- 18.3.1. An RIE procedure must be defined by the operator in the Operations Manual, and shall consist of:
- (a) Consultation – between the operational and technical staff of the operator as to the requirement for the RIE and the recommendation of the proposal;
 - (b) Decision – made by the Authorizing Person to accept or reject the proposal based on consultation;

(c) Authorisation – formal authorisation to inform the aircraft commander of the use of the RIE; and

(d) RIE report – made to the AACM within 10 days of the extension being authorised.

18.3.2. A chain or system of consultation must be listed. Authorizing Persons who must be senior with experience in technical and/or operations management are to be listed by appointment and name.

18.4. Authorisation and Reporting Form

18.4.1. A specific Authorisation and Reporting form shall be developed and used by an operator approved for RIE. The Form should be in the format as specified in Appendix 2 to this AC. Minor modification are acceptable except that all necessary information as specified must not be omitted.

18.4.2. Part I of the form is to be completed (all boxes filled in) when the RIE is authorised and must contain the Authorizing Person's name and signature. A copy of the form shall be sent to the AACM within 10 days of a RIE being authorised. The Form will be used to check that the RIE was properly authorised and that the extension was granted for appropriate reasons.

18.4.3. Part II of the Form shall be completed once the defect has been rectified and confirmed by the Authorizing Persons as specified in the operator's RIE procedure. The completed form shall be sent to the AACM within 5 days after the defect has been rectified. The Form will be used to check that the rectification is accomplished at the earliest opportunity within the period of the extension.

18.5. Use of RIEs

18.5.1. The operator must ensure that rectification is accomplished at the earliest opportunity. This is applicable for both the standard rectification interval and for the RIE.

18.5.2. The RIE permits the operator to continue to dispatch an aircraft with particular equipment unserviceable after the standard rectification interval has expired if, in the opinion of the Authorizing Person, it is not reasonably practicable for the repair to be made within that rectification interval due to circumstances beyond the operator's control. It is not intended that RIE could be used purely to double the standard rectification interval.

18.5.3. It is most important that the agreed procedures for the use of RIE are followed. In the event that operators do not comply with the laid down conditions, the AACM will take action by removal of the approval to utilize RIE on a temporary or permanent basis.

19. Maintenance Action

- 19.1. Every effort shall be made by maintenance to correct all technical defects as early as practicable and that the aircraft be released from a maintenance station in fully operational condition. The pilot-in-command must be informed by maintenance as soon as practicable, should it be impossible to rectify the inoperative item prior to departure.
- 19.2. Whenever an aircraft is released by maintenance for dispatch with item inoperative, the following is required:
- (a) the technical log book aboard the aircraft must contain a detailed description of the inoperative item(s), special advice to the flight crew, if necessary, and information about corrective action taken.
 - (b) when they are accessible to the crew in flight, the control(s), and/or indicator(s) related to inoperative unit(s) or component(s) must be clearly placarded.
 - (c) if inadvertent operation could produce a hazard, such equipment must be rendered inoperative (physically) as given in the appropriate maintenance procedure.
 - (d) the relevant operational and maintenance procedures are contained in (identify the particular Manual, Section, Chapter or Part etc. authorised by the AACM).

20. Dispatch

- 20.1. “Dispatch” for the purpose of this AC refers to the commencement of flight. The MEL is approved on the basis that equipment will be operative for flight unless the appropriate MEL procedures have been carried out.
- 20.2. The operator’s MEL shall include procedures to deal with any failures which occur between the commencement of the flight and the start of the take-off. Any failure which occurs after the start of the take-off shall be dealt with as an in-flight failure, by reference to the appropriate section of the Aircraft Flight Manual, if necessary.
- 20.3. Any item of equipment in the MEL which, when inoperative would require an operational or maintenance to ensure an acceptable level of safety, shall be so identified in the “remarks” or “exceptions” column of the MEL. This shall be “(O)” for an operational procedure, or “(M)” for a maintenance procedure. (O) (M) means both operational and maintenance procedures are required. (see paragraph 14 of this AC).

21. Training

- 21.1. The operator shall develop a training programme for maintenance personnel and flight dispatchers dealing with the use of the MEL and detail such training in the Maintenance

Management Exposition (MME) and Operations Manual as appropriate. Such training programme shall include:

- (a) the scope, extent and use of the MEL;
- (b) placarding of inoperative equipment;
- (c) deferral procedures;
- (d) dispatching; and
- (e) any other operator's MEL related procedures.

21.2. The operator shall develop a training programme for crew members and detail such training in the Operations Manual. Such training programme shall include:

- (a) the scope, extent and use of the MEL;
- (b) the operator's MEL procedures;
- (c) elementary maintenance procedures; and
- (d) pilot-in-command responsibilities.

– END –

Appendix 1 List of AACM MEL Policy Items

<i>ATA Chapter</i>	<i>Item</i>	<i>Rectification Interval</i>	<i>Remarks or Exceptions</i>
25	Universal Precaution Kit	A	One required kit may be incomplete or missing for two calendar days.
34	Radio Navigation Equipment <ul style="list-style-type: none"> • Duplicated VHF navigation system (VOR/ILS) • 75 MHz Marker Beacon Receiver • DME • Radio compass system (ADF) 	A	Not more than one for each of the listed items may be inoperative provided: <ul style="list-style-type: none"> (a) It is not reasonably practicable to repair or replace the item, before the commencement of the flight; and (b) The aircraft has not made more than <u>ONE</u> flight since the item was last serviceable; and (c) The commander of the aircraft has satisfied himself that, taking into account the latest information available as to the route and aerodrome to be used (including any planned diversion) and the weather conditions likely to be encountered, the flight can be made safely and in accordance with any relevant requirements of the appropriate air traffic unit.
34	SSR Transponder with function <ul style="list-style-type: none"> • Mode A/C • Mode S 	A	(a) One SSR transponder with each of these functions must be operative; and (b) Repair of the inoperative transponder(s) is carried out as soon as aircraft returns to home base.

AC

No: AC/OPS/024R01

Date: 18 January 2021

Appendix 2 RIE Authorisation and Reporting Form**Part I Rectification Interval Extension (RIE) Authorisation**

Name of Operator:		Aircraft Registration:		RIE No:	
Aircraft Type:		Engine Type:		MEL Ref.:	
Defect No.:		Date of Defect:		RI Expiry Date:	
RI Category:					
Details of Defect/MEL item:					
Reason for not rectifying:					
Justification for Extension:					
History of previous RIE use for this item:					
Extension Expiry Date:			RIE Applicant (Name & Title) & Date:		
Approved by Authorizing Person:					
Name:			Signature:		
Title:			Date:		

Part II Rectification Interval Extension (RIE) Rectification

Details of Terminating Action:	
Defect cleared date:	
Technical logbook reference:	
Confirmed by Authorizing Person:	
Name:	
Signature:	
Title:	
Date:	