

# Singapore Airworthiness Requirements Part 145 Approved Maintenance Organisations

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Civil Aviation Authority of Singapore  
Singapore Changi Airport  
P.O.Box 1, Singapore 918141

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## SINGAPORE AIRWORTHINESS REQUIREMENTS

## PART 145

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Amendment No	Issue Date	Inserted By	Insertion Date
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**SINGAPORE AIRWORTHINESS  
REQUIREMENTS**

**PART 145**

**SECTION 1 – REQUIREMENTS**

**SAR-145.1 General**

(a) Pursuant to paragraph 17A of the Air Navigation Order, the Director General of Civil Aviation (DGCA) has issued this SAR-145 that prescribes the requirements for the approval of a maintenance organisation. The issue of a maintenance organisation approval shall be dependent upon the organisation demonstrating compliance with the requirements of the SAR-145 and all other applicable requirements published by the DGCA.

(b) No aircraft may fly unless a certificate of release to service has been issued by an organisation for maintenance carried out on the aircraft or an aircraft component intended for fitment to such an aircraft.

(c) No organisation may certify for release to service an aircraft unless approved in accordance with SAR-145 or accepted in accordance with SAR-145.10(d).

Except where stated otherwise in sub-paragraph (f), no organisation may maintain such an aircraft unless approved in accordance with this SAR-145 or working under the quality system of an appropriately approved SAR-145 approved maintenance organisation or accepted in accordance with SAR-145.10(d).

(d) No organisation may certify for release to service an aircraft component intended for fitment to an aircraft unless approved in accordance with this SAR-145 or accepted in accordance with SAR-145.10(d).

Except where stated otherwise in sub-paragraph (f), no organisation may maintain such an aircraft component unless approved in accordance with this SAR-145 or working under the quality system of an appropriately approved SAR-145 approved maintenance organisation or accepted in accordance with SAR-145.10(d).

(e) A maintenance organisation approval may be granted for maintenance activity varying from that for an aircraft component to that for a complete aircraft or any combination thereof.

(f) An organisation working under the quality

system of either

(1) an appropriately approved SAR-145 maintenance organization; or

(2) an organisation accepted in accordance with SAR-145.10(d)

is limited to the work scope permitted by the SAR-145.65(b) procedures and may not carry out the maintenance of an aircraft or maintenance of a complete engine, engine module or APU.

(g) Reserved

(h) Notwithstanding sub-paragraph (d), the DGCA may permit the use of aircraft components accompanied by an equivalent release document on a Singapore aircraft subject to conditions notified by the DGCA.

(i) Notwithstanding sub-paragraph (f), the Chief Executive may, subject to such conditions as the Chief Executive may impose, allow an overseas organisation that has applied for the grant of a certificate under paragraph 8A of the Air Navigation Order to carry out line maintenance work under the quality system and supervision of a Singapore AOC holder who is also a SAR-145 approved maintenance organisation or the AOC holder's principal contracted maintenance organisation.

**SAR-145.3 Effectivity**

(a) The SAR-145 was first issued in January 1996. Amendment 1 was issued in September 2000. Amendment 2 issued on 1 July 2003 became effective on 1 January 2004. Amendment 3 became effective on 1 April 2004. Amendment 4 became effective on 4 June 2004. Amendment 5 became effective on 15 August 2006. Amendment 6 became effective on 17 Jul 2008. Amendment 7 became effective on 1 January 2009. Amendment 8 became effective on 19 March 2010. Amendment 9 was issued on and became effective on 15 July 2010. Amendment 10 was issued on and became effective on 18 June 2011. Amendment 11 was issued on and became effective on 5 October 2012. Amendment 12 was issued on and became effective on 6 September 2013. Amendment 13 was issued on and became effective on 1 March 2017.

(b) Amendment 14 was issued on and became effective on 1 June 2018.

**SAR-145.5 Definitions**

- (a) For the purpose of this SAR-145, the following definitions shall apply:

*'Accountable manager'* means the manager who has corporate authority for ensuring that all maintenance required by the customer can be financed and carried out to the standard required by the DGCA.

*'Aircraft'* means any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface.

*'Aircraft component'* means any assembly, instrument, mechanism, equipment, part, item, or accessory, including an airframe, aircraft engine, or propeller, that is issued, or is intended to be used, in operating or controlling an aircraft in flight, or is installed in or attached to an aircraft.

*'Approved by the DGCA'* means approved by the DGCA directly or in accordance with a procedure approved by the DGCA.

*'Approved standard'* means a manufacturing/ design / maintenance / quality standard approved by the DGCA.

*'Authority'* means the Civil Aviation Authority of Singapore (CAAS) established under Section 4 of the Civil Aviation Authority of Singapore Act.

*'Certifying staff'* means those personnel who are authorised by the approved maintenance organisation in accordance with a procedure acceptable to the DGCA to certify aircraft or aircraft components for release to service.

*'Human factors principles'* means principles which apply to aeronautical design, certification, training, operations and maintenance and which seek safe interface between the human and other system components by proper consideration of human performance.

*'Human performance'* means human capabilities and limitations which have an impact on the safety and efficiency of aeronautical operations.

*'Inspection'* means the examination of an aircraft/aircraft component to establish conformity with an approved standard.

*'Life-limited part'* means a part for which a mandatory replacement limit (in hours, cycles

or calendar time) is specified in the type design, the mandatory continuing airworthiness information or instructions for continuing airworthiness. This part must be permanently removed from service on or before this limit is reached.

*'Location'* means a place from which an organisation carries out activities or wishes to carry out activities for which a SAR-145 approval is required.

*'Maintenance'* means the performance of tasks required to ensure the continued airworthiness of an aircraft, including any one, or combination of, the following:

- (1) overhaul;
- (2) inspection;
- (3) replacement'
- (4) defect rectification; and
- (5) the embodiment of a modification or repair.

*'Maintenance data'* means any information necessary to ensure that the aircraft or aircraft component can be maintained in a condition such that airworthiness of the aircraft or serviceability of aircraft components, operational and emergency equipment as appropriate, is assured.

*'Maintenance Organisation Exposition'* means the document or documents that contains the material specifying the scope of work deemed to constitute approval and showing how the organisation intends to comply with this Part.

*'Modification'* means the alteration of an aircraft / aircraft component in conformity with an approved standard.

*'Organisation'* means an organisation registered as a legal entity. Such an organisation may conduct business from more than one address and may hold more than one SAR-145 approval.

*'Overhaul'* means a process that ensures the aircraft component is in complete conformity with all the applicable service tolerances specified in the type certificate holder's, or equipment manufacturer's instructions for continued airworthiness, or in the data which is approved or accepted by the DGCA. The aircraft component will be at least disassembled, cleaned, inspected, repaired as necessary, reassembled and tested in accordance with the above specified data.

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'Quality policy' means the overall intentions and direction of an organisation with regard to quality, as approved by the accountable manager.

'Repair' means the restoration of an aeronautical product to an airworthy condition to ensure that the aircraft or component continues to comply with the design aspects of the appropriate airworthiness requirements used for the issuance of the type certificate for the respective aircraft type, after it has been damaged or subjected to wear.

'Safety management system' means a systematic approach to managing safety, including the necessary organisational structures, accountabilities, policies and procedures.

'Quality system' means the documented organizational procedures and policies; internal audit of those policies and procedures; management review and recommendation for quality improvement.

'SAR-145 certification authorisation' means the authorisation issued to certifying staff by the SAR-145 approved maintenance organisation and which specifies the fact that they may sign SAR-145.50 certificate of release to service within the limitation stated in such authorisation on behalf of the SAR-145 maintenance organisation.

### SAR-145.10 Applicability

- (a) This SAR-145 prescribes the requirements for issuing approvals to organisations for the maintenance of :
- (1) Singapore aircraft and aircraft components intended for fitment on a Singapore aircraft under paragraph 8A(1) of the ANO; or
  - (2) Foreign aircraft and aircraft components intended for fitment on a foreign aircraft under paragraph 8B(1) of the ANO or, if the maintenance is performed in accordance with an international maintenance agreement between the DGCA and another state's authority.
- (b) This SAR-145 prescribes the general operating rules for approved maintenance organisations. The approval, when granted, will apply to the whole organisation headed by the accountable manager.
- (c) Organisations regardless of their location may only be granted approval if the DGCA is

satisfied that there is a need for such approval to maintain aircraft/aircraft components and when in compliance with this SAR-145.

- (d) Notwithstanding sub-paragraph (c), organisations located outside Singapore will be accepted when working in accordance with the conditions detailed in an international maintenance agreement between the DGCA and another state's authority that ensures the equivalent safety standard to SAR-145.

### SAR-145.15 Application and Issue

- (a) An application for maintenance organisation approval or for the amendment of an existing maintenance organisation approval shall be made in a form and manner prescribed by the DGCA and submitted with the required number of copies of the maintenance organisation's exposition or amendment thereto.

### SAR-145.20 Extent of Approval

The grant of approval is indicated by the issue of a certificate of approval to the organisation by the Authority. The certificate of approval will specify the extent of approval. The SAR-145 approved maintenance organisation's exposition must specify the scope of work deemed to constitute approval.

### SAR-145.21 Display of Certificate

The SAR-145 approved maintenance organisation shall display the certificate in a prominent place within the organisation's premises and shall produce the certificate to the DGCA upon request.

### SAR-145.25 Facility Requirements

- (a) Facilities appropriate for all planned work, ensuring in particular, protection from the weather elements must be provided. Specialised workshops and bays must be segregated as appropriate, to ensure that environmental and work area contamination is unlikely to occur.
- (b) Office accommodation appropriate for the management of the sub-paragraph (a) planned work including in particular, the management of quality, planning and technical records must be provided.
- (c) The working environment must be appropriate for the task carried out and in particular special requirements observed. Unless otherwise dictated by the particular task

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- (d) environment, the working environment must be such that the effectiveness of personnel is not impaired.
- (e) Secure storage facilities must be provided for aircraft components, equipment, tools and material. Storage conditions must ensure segregation of serviceable aircraft components and material from unserviceable aircraft components, material, equipment and tools. The condition of storage must be in accordance with the manufacturer's instructions to prevent deterioration and damage of stored items. Access to storage facilities must be restricted to authorised personnel.

### SAR-145.30 Personnel Requirements

- (a) A senior person or group of persons acceptable to the DGCA, whose responsibilities include ensuring that the SAR-145 approved maintenance organisation is in compliance with SAR-145 requirements, must be nominated. Such person(s) must be directly responsible to the accountable manager who must be acceptable to the DGCA.
- (b) The accountable manager must nominate a sub-paragraph (a) senior person, with responsibility for monitoring the SAR-145.65(c) quality system including the associated feedback system. Such senior person must have right of direct access to the accountable manager to ensure that the accountable manager is kept properly informed on quality and compliance matters.
- (c) The SAR-145 approved maintenance organisation must have a maintenance man-hour plan showing that the organisation has sufficient staff to plan, perform, supervise, inspect and quality monitor the organisation in accordance with the approval. In addition the organisation must have a procedure to reassess work intended to be carried out when actual staff availability is less than the planned staffing level for any particular work shift or period.
- (d) The competence of personnel involved in maintenance and/or quality audits must be established and controlled in accordance with a procedure and to a standard acceptable to the DGCA. All maintenance personnel shall receive initial and continuation training appropriate to their assigned tasks and responsibilities. In addition to the necessary expertise related to the job function, competence must include an understanding of the application of human factors and human performance issues appropriate to that person's function in the organization.
- (e) The SAR-145 approved maintenance organisation shall ensure that personnel who carry out or control a continued airworthiness non-destructive test of aircraft structures or components are appropriately qualified for the particular non-destructive test in accordance with the European Standard EN4179, National Aerospace Standard NAS 410 or an equivalent standard recognised by the DGCA.
  - (ea) From 01 November 2018, where the personnel mentioned in paragraph (e) are qualified in accordance with EN4179 or NAS 410, the SAR-145 approved maintenance organisation shall nominate a Responsible Level 3 person acceptable to the DGCA.
  - (eb) From 01 November 2019, a SAR-145 approved maintenance organisation whose principal place of business is in Singapore shall ensure that its NDT personnel passes the appropriate examinations under the general control of a national aerospace non-destructive board (NANDTB) that is acceptable to the DGCA, as defined in the EN 4179 / NAS 410.
  - (ec) Any NDT personnel who before 01 November 2019 completed the examinations recognised by the DGCA shall not be required to pass the appropriate examinations under (eb) for the period which the relevant certification that is based on such examinations is in force.
  - (ed) Notwithstanding (eb), a certification that was granted based on examinations recognised by the DGCA to a NDT personnel before 01 November 2019 shall continue to be in force until the expiry date of this certification.
  - (ee) The SAR-145 approved maintenance organisation may authorise the holder of a SAR 66 license in Category B1 to carry out colour contrast dye penetrant test.
  - (f) A SAR-145 approved maintenance organisation maintaining aircraft must have:
    - (1) In the case of aircraft line maintenance, sufficient personnel and certifying staff qualified in accordance with SAR-145.35, licensed in accordance SAR-66 and meeting any other requirements notified by the DGCA. In addition, such SAR-145 approved maintenance organisation may also use appropriate task trained certifying staff qualified in accordance with SAR-145.35 plus SAR-66 Category A to carry out minor scheduled line maintenance and

simple defect rectification. The availability of such Category A certifying staff shall not replace the need for SAR-66 Category B1 and B2 licensed certifying staff to support the Category A certifying staff. However, such SAR Section 7 or SAR-66 Category B1 and B2 licensed certifying staff need not always be present at the line during minor scheduled line maintenance or simple defect rectification.

- (2) In the case of aircraft base maintenance,
  - i) staff appropriately licensed and type rated in accordance with SAR-66 Category C and authorised to certify the aircraft for release to service.
- (3) In addition to sub-paragraph (2),
  - i) sufficient aircraft type rated licence holders qualified in accordance with SAR-145.35 to support the release to service by the Category C certifying staff. Such support staff shall ensure that all relevant tasks or inspections have been carried out to the required standard.
- (4) The Category C certifying staff shall ensure that compliance with sub-paragraph (2)(ii) above has been met and that all work required by the customer has been accomplished during the particular base maintenance check or work package, and shall also assess the impact of any work not carried out with a view to either requiring its accomplishment or agreeing with the customer to defer such work to another specified check or time limit. Certifying staff shall be qualified in accordance with SAR-145.35 and licensed in accordance with SAR-66 and meeting any other requirements notified by the DGCA.
- (5) A SAR-145 approved maintenance organization maintaining aircraft components must have certifying staff qualified in accordance with SAR-145.35 plus any other requirements notified by the DGCA.
- (g) Notwithstanding sub-paragraphs (f), the SAR-145 approved maintenance organisation may in the following circumstances use certifying staff qualified as specified in this sub-paragraph subject to compliance with the conditions stated for each circumstance:
  - (1) For a SAR-145 approved maintenance organisation located outside Singapore, the organisation may use certifying staff

qualified in accordance with aviation regulations of a state acceptable to the DGCA plus any other requirements notified by the DGCA.

- (2) For foreign organisations accepted under an international maintenance agreement in accordance with SAR-145.10(d), the organisation may use certifying staff qualified under the regulations of the other authority, except that any additional requirements agreed upon between the DGCA and the other authority shall also be applicable.
- (3) For the unforeseen case of an aircraft grounded at a location not having an appropriately approved or accepted SAR-145 maintenance organisation, the principal SAR-145 approved or accepted maintenance organisation contracted to provide maintenance support and nominated by the operator for this purpose may issue a one-off SAR-145 certification authorisation to a person with not less than 5 years' experience and holding a valid and appropriate aircraft maintenance licence rated for the aircraft type requiring certification subject to the SAR-145 maintenance organisation obtaining and holding on file evidence of the experience and the licence.

All such cases must be reported to the DGCA within 2 days of the issuance of such certification authorisation. Any such maintenance that could affect flight safety shall be rechecked by the nominated SAR-145 approved or accepted maintenance organisation.

For the purposes of this sub-paragraph, unforeseen means that the aircraft grounding could not reasonably have been predicted by the operator because the defect was unexpected due to being part of a hitherto reliable system.

#### **SAR-145.35 Certifying Staff**

- (a) In addition to the appropriate SAR-145.30(f) and (g) sub-paragraph(s), the SAR-145 approved maintenance organisation must ensure that certifying staff receive Human Factors training and have an adequate understanding of the relevant aircraft and/or aircraft component(s) to be maintained, together with the associated organisation procedures before the issue or re-issue of the SAR-145 certification authorisation. Relevant aircraft and/or aircraft component(s) means

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those aircraft and/or aircraft component(s) specified in the particular SAR-145 certification authorisation.

- (b) The SAR-145 approved maintenance organisation must ensure that all aircraft release certifying staff are involved in at least 6 months of aircraft maintenance experience in the preceding 2-year period. For the purpose of this sub-paragraph, 'involved in actual aircraft maintenance' means the person has worked in an aircraft maintenance environment and has either exercised the privileges of the SAR-145 certification authorisation and/or has actually carried out maintenance on at least some of the aircraft type systems specified in the particular SAR-145 certification authorisation.
- (c) The SAR-145 maintenance organisation must ensure that all certifying staff receive sufficient continuation training in each 2-year period to ensure that such certifying staff have up-to-date knowledge of relevant technology, organisation procedures and human factors issues.
- (d) The SAR-145 approved maintenance organisation must establish a programme for the continuation training and a procedure to ensure compliance with the relevant sub-paragraph(s) of SAR-145.35 as the basis for issue of SAR-145 certification authorisations to certifying staff.
- (e) All prospective certifying staff must be assessed by the SAR-145 approved maintenance organisation for their competence, qualification and capability to carry out their intended certifying duties in accordance with a procedure acceptable to the DGCA before the issue or re-issue of a SAR-145 certification authorisation.
- (f) The SAR-145 approved maintenance organisation must issue a SAR-145 certification authorisation that clearly specifies the scope and limits of such authorisation to those staff that it nominates as certifying staff when satisfied that such staff are in compliance with sub-paragraph (a), (c) and (e), plus (b) as applicable. Continued validity of the SAR-145 certification authorisation is dependent upon compliance with sub-paragraphs (a) and (c), plus (b) as applicable.
- (g) The manager or person responsible for the quality system must also remain responsible on behalf of the SAR-145 approved maintenance organisation for issuing SAR-145 certification authorisations to certifying staff. Such manager or person may nominate other persons to actually issue the SAR-145

certification authorisations in accordance with a procedure acceptable to the DGCA.

- (h) The SAR-145 approved maintenance organisation must maintain a record of all certifying staff which must include details of any aircraft maintenance licence held, all training completed and the scope of their SAR-145 certification authorisation. The record must include those with limited or one-off SAR-145 certification authorisation.
- (i) Certifying staff must be provided with a copy of their SAR-145 certification authorisation. The copy may be in either a documented or electronic format.
- (j) Certifying staff must be able to produce their SAR-145 certification authorisation to any authorised person within a reasonable time.

### SAR-145.40 Equipment, Tools and Material

- (a) The SAR-145 approved maintenance organisation must have the necessary equipment, tools and material to perform the approved scope of work.
- (b) Where necessary, tools, equipment and particularly test equipment must be controlled and calibrated to standards acceptable to the DGCA at a frequency to ensure serviceability and accuracy. Records of such calibrations and the standards used must be kept by the SAR-145 approved maintenance organisation.

### SAR-145.45 Maintenance data

- (a) The SAR-145 approved maintenance organisation must hold and use applicable current maintenance data in the performance of maintenance including modifications and repairs. Applicable means relevant to any aircraft, aircraft component or process specified in the SAR-145 approved maintenance organisation's approval class rating schedule and any associated capability list.
- (b) For the purposes of SAR-145, applicable maintenance data is:
  - (1) Any applicable requirement, procedure, airworthiness directive, airworthiness notice or information issued by the DGCA.
  - (2) Any applicable airworthiness directive issued by the original type certificate authority.
  - (3) Any applicable data, such as but not

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- limited to, maintenance and repair manuals, issued by an organisation under the approval of the DGCA including type certificate and supplementary type certificate holders and any other organisation approved to publish such data by the DGCA.
- (4) Unless specified otherwise by the DGCA, any applicable data, such as but not limited to, maintenance and repair manuals, issued by an organisation under the approval or authority of the original type certificate authority.
- (5) Any applicable standard, such as but not limited to, maintenance standard practices issued by any authority, institute or organisation and recognised by the DGCA as a good standard for maintenance.
- (6) Any applicable data issued in accordance with sub-paragraph (c).
- (c) The SAR-145 approved maintenance organisation may only modify maintenance instructions in accordance with a procedure in the maintenance organisation's exposition where it can be shown that such modified maintenance instruction results in equivalent or improved maintenance standards and subject to the type certificate holder being informed. Maintenance instructions for the purpose of this sub-paragraph means any instruction on how to carry out the particular maintenance task. The SAR-145 approved maintenance organisation may not carry out the engineering design of repairs and modifications under this sub-paragraph (c).
- (d) A SAR-145 approved maintenance organisation shall only carry out repairs in accordance with the approved type certificate holder's published repair data or any other repair data approved by the DGCA, unless otherwise approved by the DGCA. The SAR-145 approved maintenance organisation must establish a procedure to ensure that appropriate action is taken in the case of damage assessment and the need to use only approved repair data.
- (e) Except where stated otherwise in sub-paragraph (e)(1), the SAR-145 approved maintenance organisation must provide a common workcard or worksheet system for use throughout relevant parts of the organisation and must either transcribe accurately the maintenance data contained in sub-paragraph (b), (c) and (d) onto such workcards or worksheets or make precise reference to the particular maintenance task(s) contained in such maintenance data. Workcards and worksheets may be computer generated and held on an electronic database subject to both adequate safeguards against unauthorised alteration and a back-up electronic database which is updated within 24 hours of any entry made to the main electronic database.
- (1) Where the SAR-145 approved maintenance organisation provides a maintenance service to an aircraft operator who require its workcard or worksheet system to be used, then such workcard or worksheet system may be used. In this case the SAR-145 approved maintenance organisation must establish a procedure to ensure correct completion of the aircraft operator's workcards or worksheets.
- (f) The SAR-145 approved maintenance organisation must ensure that all applicable maintenance data is readily available for use when required by maintenance personnel.
- (g) The SAR-145 approved maintenance organisation must ensure that maintenance data controlled by the organisation is kept up to date. In the case of operator/customer controlled and provided maintenance data, the SAR-145 approved maintenance organisation must show that either it has written confirmation from the operator/customer that all such maintenance data is up to date or it has work orders specifying the amendment status of the maintenance data to be used or it can show that it is on the operator/customer maintenance data amendment list.

### SAR-145.50 Certification of maintenance

- (a) Except where stated otherwise in sub-paragraphs (d), (e) and (f) a certificate of release to service must be issued by appropriately authorised certifying staff on behalf of the SAR-145 approved maintenance organisation when satisfied that all maintenance required by the customer of the aircraft or aircraft component has been properly carried out by the SAR-145 approved maintenance organisation in accordance with the procedures specified in the SAR-145.70 maintenance organisation exposition taking into account the availability and use of the maintenance data specified in SAR-145.45.

Note: An aircraft component which has been maintained off the aircraft requires the issue of a certificate of release to service for such maintenance and another certificate of release to service in regard

## SAR-145

to being installed properly on the aircraft when such action occurs.

- (b) A certificate of release to service must contain basic details of the maintenance carried out, the date such maintenance was completed and the identity including approval reference of the SAR-145 approved maintenance organisation and certifying staff issuing such a certificate.
- (c) Reserved
- (d) Notwithstanding sub-paragraph (a) when a SAR-145 maintenance organisation approved to maintain the aircraft is unable to complete all maintenance required by the customer, being the aircraft operator, within the aircraft operator's limitations, then such fact must be entered in the aircraft certificate of release to service before issue of such certificate.
- (e) Notwithstanding sub-paragraph (a), when an aircraft is grounded at a location other than the main maintenance base due to the non-availability of an aircraft component with the appropriate release certificate, it is permissible to temporarily fit an aircraft component without the appropriate release certificate for a maximum of 60 flight hours or until the aircraft first returns to the main line station or main maintenance base, whichever is sooner, subject to the aircraft operator's agreement and said component having a suitable serviceable tag but otherwise in compliance with the Singapore Airworthiness Requirements. Such aircraft components must be removed by the specified time unless an appropriate release certificate has been obtained in the meantime.
- (f) Notwithstanding sub-paragraphs (a), (d) and (e), a certificate of release to service must not be issued in the case of any non-compliance known to the SAR-145 approved maintenance organisation which could hazard flight safety.

### SAR-145.55 Maintenance records

- (a) The SAR-145 approved maintenance organisation must record all details of work carried out in a form acceptable to the DGCA.
- (b) The SAR-145 approved maintenance organisation must provide a copy of each certificate of release to service to the aircraft operator, together with a copy of any specific approved repair/modification data used for repairs/modifications carried out.
- (c) The SAR-145 approved maintenance organisation must retain a copy of all detailed

maintenance records and any associated maintenance data for 2 years from the date the aircraft or aircraft component to which the work relates was released from the SAR-145 maintenance organisation. The records shall be retrievable within a time acceptable to the DGCA.

Note : Where an AOC Holder contracts a SAR-145 organisation to keep the aircraft operator's certificates of release to service and any associated data, the retention period will be that required upon the AOC holder and not that specified by in 145.55(c).

### SAR-145.60 Reporting of Unairworthy Conditions

- (a) The SAR-145 approved maintenance organisation must report to the DGCA and the aircraft type certificate holder any condition of the aircraft or aircraft component identified by the SAR-145 approved maintenance organisation that could seriously hazard the aircraft.
- (b) Reports must be made in a form and manner prescribed by the DGCA and contain all pertinent information about the condition known to the SAR-145 approved maintenance organisation.
- (c) Where the SAR-145 approved maintenance organisation is contracted by the aircraft operator to carry out maintenance, the SAR-145 approved maintenance organisation must also report to the aircraft operator any such condition affecting the aircraft operator's aircraft or aircraft component.
- (d) Reports must be made as soon as practicable but in any case within 3 days of the SAR-145 approved maintenance organisation identifying the condition to which the report relates.

### SAR-145.64 Safety Management System

- (a) The SAR-145 approved maintenance organization (except Sub-part D organisations) must establish a safety management system, acceptable to the DGCA, that commensurates with its size and the complexity of its aviation products or services.
- (b) The framework for the implementation and maintenance of a safety management system must include, as a minimum, the elements as listed in Appendix 6.



## SAR-145

### SAR-145.65 Maintenance Procedures and Quality System

- (a) The SAR-145 approved maintenance organisation must establish a quality policy for the organisation to be included in the SAR-145.70 maintenance organisation exposition.
- (b) The SAR-145 approved maintenance organisation must establish procedures acceptable to the DGCA to ensure good maintenance practices and compliance with all relevant requirements in this SAR-145 which must include a clear work order or contract such that aircraft and aircraft components may be released to service in accordance with SAR-145.50.
- (c) The SAR-145 approved maintenance organisation must establish a quality system that includes:

- (1) Independent audits in order to monitor compliance with required aircraft/aircraft component standards and adequacy of the procedures to ensure that such procedures invoke good maintenance practices and airworthy aircraft/aircraft components. In the smallest organisations, the independent audit part of the quality system may be contracted to another SAR-145 approved maintenance organisation or a person with appropriate technical knowledge and proven satisfactory audit experience acceptable to the DGCA; and
- (2) A quality feedback reporting system to the person or group of persons specified in SAR-145.30(a) and ultimately to the accountable manager that ensures proper and timely corrective action is taken in response to reports resulting from the independent audits established to meet SAR-145.65(c)(1).

### SAR-145.70 Maintenance organisation exposition

- (a) The SAR-145 approved maintenance organisation must provide a maintenance organisation exposition containing the following information:
- (1) A statement signed by the accountable manager confirming that the maintenance organisation exposition and any referenced associated manuals define the organisation's compliance with SAR-145 and will be complied with at all times. When the accountable

manager is not the chief executive officer of the SAR-145 approved maintenance organisation then such chief executive officer must countersign the statement.

- (2) The organisation's SAR-145.65(a) quality policy.
- (3) The title(s) and name(s) of the senior person(s) accepted by the DGCA in accordance with SAR-145.30(a).
- (4) The duties and responsibilities of the senior person(s) specified in subparagraph (3) including matters on which they may deal directly with the DGCA on behalf of the SAR-145 approved maintenance organisation.
- (5) An organisation chart showing associated chains of responsibility of the senior person(s) specified in subparagraph (3).
- (6) A list of certifying staff.
- (7) A general description of manpower resources.
- (8) A general description of the facilities located at each address specified in the SAR-145 approved maintenance organisation's certificate of approval.
- (9) A specification of the SAR-145 approved maintenance organisation's scope of work relevant to the extent of approval.
- (10) The notification procedure of SAR-145.85 for SAR-145 approved maintenance organisation changes.
- (11) The maintenance organisation exposition amendment procedure.

Note: Sub-paragraphs (1) to (11) inclusive constitutes the management part of the maintenance organisation exposition.

- (12) The SAR-145 approved maintenance organisation's procedures and quality system as required by SAR-145.25 to SAR-145.95 inclusive.
- (13) A list of aircraft operators, if appropriate, to which the SAR-145 approved maintenance organisation provides a maintenance service.
- (14) A list of sub-contractors, if appropriate, as specified in SAR-145.75 (b),

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including a description of the maintenance function contracted to each sub-contractor.

- (15) A list of line stations, if appropriate, as specified in SAR-145.75(d).
- (16) A list of contracted SAR-145 approved maintenance organisations, if appropriate.
- (b) The information specified in sub-paragraphs (6) and (12) to (16) inclusive, whilst a part of the maintenance organisation exposition, may be kept as separate documents or on separate electronic data files subject to the management part of said exposition containing a clear cross-reference to such documents or electronic data files.
- (c) The maintenance organisation exposition shall be amended as necessary to keep the information contained therein up to date. The maintenance organisation exposition and any subsequent amendments must be approved by the DGCA.
- (d) Copies of all amendments to the maintenance organisation exposition shall be furnished promptly to all organisations and persons to whom the manual has been issued.

### **SAR-145.75 Privileges of the approved maintenance organisation**

The SAR-145 approved maintenance organisation may only carry out the following tasks as permitted by and in accordance with the SAR-145 approved maintenance organisation exposition:

- (a) Maintain any aircraft or aircraft component for which it is approved at the locations identified in the certificate of approval and/or in the SAR-145 approved maintenance organisation exposition.
- (b) Arrange for maintenance of any aircraft component within the limitations of SAR-145.1(f) for which it is approved at another organisation that is working under the quality system of the SAR-145 approved maintenance organisation.
- (c) Maintain any aircraft or aircraft component for which it is approved at any location subject to the need for such maintenance arising either from the unserviceability of the aircraft or from the necessity of supporting occasional line maintenance subject to conditions specified in the procedures acceptable to the DGCA and included in the SAR-145 approved maintenance organisation exposition.

- (d) Maintain any aircraft or aircraft component for which it is approved at a location identified as a line maintenance location capable of supporting minor maintenance and only if the SAR-145 approved maintenance organisation exposition both permits such activity and lists such locations.
- (e) Issue certificates of release to service in respect of paragraphs (a) to (d) on completion of maintenance in accordance with SAR-145.50.

### **SAR-145.80 Limitations on the approved maintenance organisation**

- (a) The SAR-145 approved maintenance organisation may only maintain an aircraft or aircraft component for which it is approved when all necessary facilities, equipment, tooling, material, maintenance data and certifying staff are available.
- (b) The SAR-145 approved maintenance organisation shall use only aircraft components/parts/materials acceptable to the DGCA.

### **SAR-145.85 Changes to the approved maintenance organisation**

- (a) The SAR-145 approved maintenance organisation must notify the DGCA of any proposal to carry out any of the following changes, at least 3 weeks before such changes take place, to enable the DGCA to determine continued compliance with this SAR-145 and to amend, if necessary, the certificate of approval, except that in the case of proposed changes in personnel not known to the management beforehand, these changes must be notified at the earliest opportunity.
  - (1) The name of the organisation.
  - (2) The location of the organisation.
  - (3) Additional locations of the organisation.
  - (4) The accountable manager.
  - (5) Any of the senior persons specified in SAR-145.30(a).
  - (6) The facilities, equipment, tools, material, procedures, work scope and certifying staff that could affect the approval.
- (b) The DGCA may prescribe the conditions under which the SAR-145 approved

## **SAR-145**

maintenance organisation may operate during such changes unless the DGCA determines that the approval should be suspended.

### **SAR-145.90 Continued validity of approval**

Unless the approval has previously been surrendered, superseded, suspended, revoked or expired by virtue of exceeding any expiry date that may be specified in the certificate of approval, the continued validity of approval is dependent upon -

- (a) The SAR-145 approved maintenance organisation remaining in compliance with this SAR-145;
- (b) The DGCA being granted access to the SAR-145 approved maintenance organisation to determine continued compliance with this SAR-145; and
- (c) The payment of any charges prescribed by the DGCA. Failure to pay entitles the DGCA to suspend, but does not automatically render the approval invalid.

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### **SAR-145.95 Equivalent safety case**

- (a) The DGCA may exempt a SAR-145 approved maintenance organisation from a requirement in this SAR-145 when satisfied that a situation exists not envisaged by a SAR-145 requirement and subject to compliance with any supplementary condition(s) that the DGCA considers necessary to ensure equivalent safety.
- (b) The DGCA may exempt an organisation from a requirement in SAR-145 on an individual case by case permission basis only subject to compliance with any supplementary condition(s) the DGCA considers necessary to ensure equivalent safety.

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**SINGAPORE AIRWORTHINESS REQUIREMENTS  
PART 145**

**SECTION 2 - ACCEPTABLE MEANS OF COMPLIANCE (AMC) AND  
INTERPRETATIVE/EXPLANATORY MATERIAL (IEM)**

**1 GENERAL**

- 1.1 This section contains Acceptable Means of Compliance (AMC) and Interpretative/Explanatory Material (IEM) that has been included in the SAR-145 to assist the SAR-145 approved maintenance organisation in meeting the necessary requirements.
- 1.2 Where a particular SAR paragraph does not have an Acceptable Means of Compliance or any Interpretative/Explanatory Material, it is considered that no supplementary material is required.
- 1.3 In addition, Advisory Circulars issued by the DGCA may contain further Acceptable Means of Compliance and/or Interpretative/Explanatory Material.

**2 PRESENTATION**

- 2.1 The Acceptable Means of Compliance and Interpretative/Explanatory Material are presented in full-page width on loose pages, each page being identified by the date of issue or the change number under which it is amended or re-issued.
- 2.2 A numbering system has been used in which the Acceptable Means of Compliance and Interpretative Material uses the same number as the paragraph in SAR to which it refers. The number is preceded by the letters AMC or IEM to distinguish the material from the SAR itself.
- 2.3 The acronyms AMC and IEM also indicate the nature of the material and for this purpose the two types of material are defined as follows:
  - (a) Acceptable Means of Compliance (AMC) illustrate a means, or several alternative means, but not necessarily the only possible means by which a requirement can be met. It should however, be noted that where a new AMC is developed, any such AMC (which may be additional to an existing AMC) may be amended into the document or issued as a separate Advisory Circular.
  - (b) Interpretative/Explanatory Material (IEM) helps to illustrate the meaning of a requirement.
- 2.4 Explanatory notes not forming part of the AMC text appear in a smaller typeface.

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**AMC 145.1 General**

- 1 Working under the quality system of an appropriately approved SAR-145 organisation refers to the case of one organisation, not itself appropriately approved to SAR-145 that carries out line maintenance, maintenance of aircraft components or a specialised service as a subcontractor for an appropriately approved SAR-145 maintenance organisation and referred to in Appendix 5 under the more common name as subcontracting.

To be appropriately approved to subcontract the SAR-145 organisation should have a procedure for the control of such subcontractors as stated in AMC-145.65(b) and described in Appendix 5.

Any SAR-145 approved maintenance organisation that carries out maintenance for another SAR-145 approved maintenance organisation where the maintenance comes within the approval scope of the SAR-145 approved maintenance organisation that carries out the maintenance is not considered to be subcontracting for the purpose of this paragraph.

- 2 As a guide, line maintenance is any maintenance that must be carried out before flight to ensure that the aircraft is fit for the intended flight. Taking into account the wide range of aircraft, and considering their different maintenance programmes, it is not appropriate to use hours, letter checks, or calendar time as a divider between line and base maintenance. Line maintenance may generally include :
- (a) Troubleshooting
  - (b) Defect rectification
  - (c) Component replacement with use of external test equipment if required. Component replacement may include components such as engines and propellers
  - (d) Scheduled maintenance and/or checks including visual inspections which will detect obvious unsatisfactory conditions/discrepancies but do not require extensive in depth inspection. It may also include internal structure, systems and powerplant items which are visible through quick opening access panels/doors
  - (e) Minor repairs and modifications which do not require extensive disassembly and can be accomplished by simple means. For temporary or occasional cases (ADs, SBs) the quality manager may accept base maintenance tasks to be performed by a line maintenance organisation provided all requirements are fulfilled. The DGCA will prescribe the conditions under which these tasks may be performed.

Maintenance tasks falling outside these criteria are considered to be base maintenance.

Aircraft maintained in accordance with “progressive” type programmes need to be individually assessed in relation to this paragraph. In principle, the decision to allow some “progressive” checks to be carried out is determined by the assessment that all tasks within the particular check can be carried out safely to the required standards at the designated line maintenance station.

**IEM 145.1 General**

Reserved

**IEM 145.5 Definitions**

- 1 With regard to the accountable manager definition, it is normally intended to mean the chief executive officer of the SAR-145 approved maintenance organisation, who by virtue of position has overall (including in particular financial) responsibility for running the organisation. The accountable manager may be the accountable manager for more than one organisation and is not required to be necessarily knowledgeable on technical matters as the maintenance organisation exposition defines the maintenance standards.

- 2 When the accountable manager is not the chief executive officer, the DGCA will need to be assured that such an accountable manager has direct access to the CEO and has a sufficiency of “maintenance funding” allocation.
- 3 ‘Restoration’ should be understood to mean the work necessary to return the aircraft/aircraft component to an approved standard.
- 4 The smallest SAR-145 approved maintenance organisations are those that employ full time between 1 and 20 staff actively engaged in maintenance or the control of maintenance. Full time means not less than 35 hours per week except during vacation periods.

**IEM 145.10          Applicability**

- 1 Where the organisation uses facilities both inside and outside Singapore such as satellite facilities, line stations, sub-contractors etc., such facilities may be included in the approval without being identified on the approval certificate subject to the maintenance organisation exposition identifying the facilities and containing procedures to control such facilities and the DGCA being satisfied that they form an integral part of the SAR-145 approved maintenance organisation.
- 2 CAAS publishes a list of all SAR-145 approved maintenance organisations approved under SAR-145.10 (b) and (c), and all organisations accepted under SAR-145.10(d) on the CAAS website at <http://www.caas.gov.sg>.

**AMC 145.10          Applicability**

- 1 Applicants should show the DGCA that there is a need to hold the SAR-145 maintenance organisation approval for the maintenance of a Singapore or foreign aircraft or an aircraft component intended for fitment on a Singapore or foreign aircraft. This should be in the form of a letter(s) from the prospective customer indicating their intent to engage the applicant’s services. In addition, applicants of the SAR-145 maintenance organisation approval for the maintenance of foreign aircraft or aircraft component intended for fitment on a foreign aircraft must show the DGCA that such an approval is required, either in the form of the foreign state’s regulations or an official letter from the foreign state’s authority.
- 2 The requirement to show evidence of need for accepted organisations under an international maintenance agreement depends on the provisions of the specific agreement between the DGCA and another authority.
- 3 The DGCA may require the applicant to provide information regarding the aircraft type or component that may be necessary for the evaluation of the application. Such information may be provided in the form of training, such as type training especially for foreign aircraft and aircraft components that are not on the Singapore Aircraft Register. The cost of such information (including technical training), in addition to the other applicable fees indicated in the Twelfth Schedule of the Air Navigation Order, shall be borne by the applicant.
- 4 The grant of a SAR-145 maintenance organisation approval for the maintenance of foreign aircraft and aircraft components intended for fitment on a foreign aircraft shall be limited to organisations and facilities that are based in Singapore.
- 5 The scope of work for the grant of a SAR-145 maintenance organisation approval for the maintenance of foreign aircraft and aircraft components intended for fitment on a foreign aircraft shall be limited to aircraft and engine types from the State of Designs mentioned in AMC-145.20.

**AMC 145.15          Application and Issue**

“In a form and manner” means that form CAAS(AW)21 should be obtained from the CAAS Airworthiness & Flight Operations Division and completed by the accountable manager. Normally only one copy of the maintenance organisation exposition is required to be submitted except when additional copies are requested by the DGCA in a particular case.



**IEM 145.20      Extent of approval**

Appendix 1 contains a table listing all classes and ratings possible under SAR-145.

**AMC 145.20      Extent of approval**

- 1 A SAR-145 organisation may be granted a Category A class rating for aircraft types that are currently registered in Singapore.
- 2 A SAR-145 organisation located in Singapore may also be granted a Category A class rating for aircraft types that are not on the Singapore register. The grant of such Category A class rating is only applicable to aircraft types from the following States of Design:

- (a) United States
- (b) European Union Member States
- (c) Canada
- (d) New Zealand
- (e) Australia
- (f) Brazil

The SAR-145 organisation that requires a Category A class rating specified in Paragraph 2 must justify to the DGCA the need to hold such a rating.

**AMC 145.25(a)      Facility Requirements (General)**

- 1 For base maintenance of aircraft, this means that aircraft hangars should be both available and large enough to accommodate aircraft on planned base maintenance. Where the hangar is not owned by the SAR-145 organisation, it may be necessary to establish proof of tenancy. In addition, sufficiency of hangar space to carry out planned base maintenance will need to be demonstrated by the preparation of a projected aircraft hangar visit plan relative to the maintenance programme. The aircraft hangar visit plan should be updated on a regular basis.
- 2 For line maintenance of aircraft, hangars are not essential but it is recommended that access to hangar accommodation be demonstrated for usage during inclement weather for minor scheduled work and lengthy defect rectification.
- 3 For aircraft component maintenance, this means that aircraft component workshops should be large enough to accommodate the components on planned maintenance.
- 4 Protection from the weather elements relates to the normal prevailing local weather elements that are expected throughout any twelve month period. The structures of aircraft hangars and aircraft component workshops should be to a standard that prevents the ingress of rain, hail, ice, snow, wind and dust etc. Aircraft hangar and aircraft component workshop floors should be sealed to minimise dust generation.

**AMC 145.25(b)      Facility Requirements (Office Accommodation)**

- 1 Office accommodation in this case means, office accommodation such that the incumbents, whether they be management, planning, technical records, quality or certifying staff, can carry out their designated tasks in a manner that contributes to good aircraft maintenance standards. In addition, aircraft maintenance staff should be provided with an area where they may study maintenance instructions and complete maintenance records in a proper manner.
- 2 It is acceptable to combine any or all of the above requirements into one office subject to the staff having sufficient room to carry out assigned tasks.

**AMC 145.25(c) Facility Requirements (Working Environment)**

- 1 Hangars used to house aircraft together with office accommodation should be such as to ensure the working environment permits personnel to carry out work tasks in an effective manner.
- 2 Temperatures should be maintained such that personnel can carry out required tasks without undue discomfort.
- 3 Dust and any other airborne contamination should be kept to a minimum and not be permitted to reach a level in the work task area where visible aircraft / component surface contamination is evident.
- 4 Lighting should be such as to ensure each inspection and maintenance task can be carried out.
- 5 Noise levels should not be permitted to rise to the point of distracting personnel from carrying out inspection tasks. Where it is impractical to control the noise source, such personnel should be provided with the necessary personal equipment to stop excessive noise causing distraction during inspection tasks.
- 6 Where a particular maintenance task requires the application of specific environmental conditions different to the foregoing, then such conditions should be observed. Specific conditions are identified in the approved maintenance instructions.
- 7 The working environment for line maintenance should be such that the particular maintenance or inspection task can be carried out without undue distraction. It therefore follows that where the working environment deteriorates to an unacceptable level in respect of temperature, moisture, hail, ice, snow, wind, light dust / other airborne contamination, the particular maintenance or inspection tasks should be suspended until satisfactory conditions are re-established.
- 8 For both base and line maintenance where dust / other airborne contamination results in visible surface contamination, all susceptible systems should be sealed until acceptable conditions are re-established.

**AMC 145.25(d) Facility Requirements (Storage Facilities)**

- 1 Storage facilities for serviceable aircraft components, equipment, tools and materials should be clean, well-ventilated and maintained at an even dry temperature to minimise the effects of condensation. Manufacturers' storage recommendations should be followed for those aircraft components identified in such published recommendations. Storage limiting periods should be observed.
- 2 Storage racks should be strong enough to hold aircraft components and provide sufficient support for large aircraft components such that the component is not distorted during storage.
- 3 All aircraft components, wherever practicable, should remain packaged in protective material to minimise damage and corrosion during storage.
- 4 A secure quarantine store or facility should be provided to isolate those aircraft components, tools or material where the status of serviceability has not been or cannot be determined.

**AMC 145.30(a) Personnel requirements (Senior Persons)**

- 1 The person or persons nominated should represent the maintenance management structure of the organisation and be responsible for all functions specified in SAR-145. It therefore follows that, dependent upon the size of the SAR-145 organisation, the SAR-145 functions may be sub-divided under individual managers (and in fact may be further sub-divided) or combined in any number of ways.
- 2 In essence however, the SAR-145 organisation should have, dependent upon the extent of approval, a base maintenance manager, a line maintenance manager, a workshop manager and a quality manager, all of whom should report to the accountable manager except in the smallest SAR-145 organisations, where any one manager may assume more than one manager's functions apart from that of Quality Manager.

- 3 Procedures should make clear who deputises for any particular manager in the case of lengthy absence of said manager(s). The length of absence to justify deputising is the period beyond which the organisation cannot function properly due to such absence.
- 4 The accountable manager is responsible for ensuring that all necessary resources are available to accomplish maintenance in accordance with SAR-145.65(b) to support the organisation's SAR-145 approval.
- 5 The base maintenance manager is responsible for ensuring that all maintenance required to be carried out in the hangar, plus any defect rectification carried out during base maintenance, is carried out to the design and quality standards specified in SAR-145.65(b). The base maintenance manager is also responsible for any corrective action resulting from the quality compliance monitoring of SAR-145.65(c).
- 6 The line maintenance manager is responsible for ensuring that all maintenance required to be carried out on the line including defect rectification is carried out to the standards specified in SAR-145.65(b) and also responsible for any corrective action resulting from the quality compliance monitoring of SAR-145.65(c).
- 7 The workshop manager is responsible for ensuring that all work on aircraft components is carried out to the standards specified in SAR-145.65(b) and also responsible for any corrective action resulting from the quality compliance monitoring of SAR-145.65(c).
- 8 The quality manager's responsibility is specified in SAR-145.30(b).
- 9 The organisation may adopt any title for the foregoing managerial positions but should identify to the DGCA the titles and persons chosen to carry out these functions.
- 10 Where a SAR-145 organisation chooses to appoint managers for all or any combination of the identified SAR-145 functions because of the size of the undertaking, it is necessary that these managers report ultimately through either the base maintenance manager or line maintenance manager or workshop manager or quality manager, as appropriate, to the accountable manager.
- 11 The DGCA therefore requires the managers specified above to be identified and their credentials submitted on form CAAS(AW)22 to the DGCA. The accountable manager should have a basic understanding of SAR-145 and the responsibilities associated with being the accountable manager. To be accepted, the quality manager must meet all qualification and experience requirements prescribed by AMC 145.30(b). To be accepted, all other such managers should have relevant knowledge and satisfactory experience related to aircraft/aircraft component maintenance as appropriate in accordance with the relevant Requirements published by the DGCA.

Note: Certifying staff may report to any of the managers specified depending upon which type of control the SAR-145 approved maintenance organisation uses (for example - licensed personnel / independent inspection / dual function supervisors etc.) so long as the quality compliance monitoring staff specified in the SAR-145.65(c)(1) remain independent of all.

#### **AMC 145.30(b) Personnel requirements (Quality manager)**

- 1 Monitoring the quality system includes requesting remedial action as necessary by the AMC-145.30(a) accountable manager, base maintenance manager, line maintenance manager and workshop manager as appropriate.
- 2 A Quality Manager should possess at least the following qualifications :-
  - (a) For organisations holding an 'A' class rating, be the holder of an aircraft maintenance engineer's licence acceptable to the DGCA or an otherwise equivalent qualification acceptable to the DGCA.
  - (b) Preferably have a relevant degree or diploma in a relevant discipline.
  - (c) Have at least 2 years' experience in quality assurance in related aviation environment.
  - (d) Passed the CAAS Air Legislation examination paper L11 or L12, as appropriate.

**AMC 145.30(c) Personnel requirements (Man-hour planning)**

- 1 Having sufficient staff means that the SAR-145 approved maintenance organisation employs or contracts such staff of which at least half the staff that performs maintenance in each workshop, hangar or flight line should be employed to ensure organisation stability. Contract staff, being part-time or full-time should be made aware that when working for the SAR-145 approved maintenance organisation they are subjected to compliance with the organisation's procedures specified in the maintenance organisation exposition relevant to their duties. For the purpose of this sub-paragraph, employed means the person is directly employed as an individual by the SAR-145 approved maintenance organisation whereas contracted means the person is employed by another organisation and contracted by that organisation to the SAR-145 approved maintenance organisation.
- 2 The maintenance man-hour plan should take into account any maintenance carried out on aircraft/aircraft components from outside Singapore.
- 3 The proposed maintenance man-hour plan must be commensurate with the size and complexity of each maintenance task and should relate to the anticipated maintenance work load except that when the SAR-145 approved maintenance organisation cannot predict such workload, due to the short term nature of its contracts, when such plan should be based upon the minimum maintenance workload needed for commercial viability. Maintenance work load includes all necessary work such as, but not limited to, planning, maintenance record checks, production of worksheets/cards in paper or electronic form, accomplishment of maintenance, inspection and the completion of maintenance records.
- 4 In the case of aircraft base maintenance, the maintenance man-hour plan should relate to the AMC-145.25(a) aircraft hangar visit plan.
- 5 In the case of aircraft component maintenance, the maintenance man-hour plan should relate to the AMC-145.25(a) aircraft component planned maintenance.
- 6 The quality monitoring compliance function man-hours should be sufficient to meet the requirement of SAR-145.65(c) which means taking into account relevant AMC-145.65(c) sub-paragraphs. Where quality monitoring staff performs other functions, the time allocated to such functions needs to be taken into account in determining quality monitoring staff numbers.
- 7 The maintenance man-hour plan should be reviewed at least every 3 months and updated when necessary.
- 8 SAR-145 approved maintenance may be required to submit the maintenance man-hour plans to the DGCA at intervals as determined by the DGCA.
- 9 Significant deviation from the maintenance man-hour plan should be reported through the departmental manager to the quality manager and the accountable manager for review. Significant deviation means more than a 25% shortfall in available man-hours during a calendar month for any one of the functions specified in SAR-145.30(c).
- 10 The referenced maintenance man-hour plan and any associated procedure should be specified in the maintenance organisation exposition.

**AMC 145.30(d) Personnel requirements (Personnel competency)**

- 1 The referenced procedure requires amongst others, that planners, mechanics, specialised services staff, supervisors and certifying staff are assessed for competence by 'on the job' evaluation and/or by examination relevant to their particular job role within the organisation before unsupervised work is permitted.
- 2 To assist in the assessment of competence, job descriptions are recommended for each job role in the organisation. Basically, the assessment should establish that:
  - (a) Planners are able to interpret maintenance requirements into maintenance tasks, and have an appreciation that they have no authority to deviate from the maintenance data.

- (b) Mechanics are able to carry out maintenance tasks to any standard specified in the maintenance data and will notify supervisors of mistakes requiring rectification to re-establish required maintenance standards.
  - (c) Specialised services staff are able to carry out maintenance tasks to the standard specified in the maintenance data and will both inform and await instructions from their supervisor in any case where it is not possible to complete the specialised maintenance in accordance with the maintenance data.
  - (d) Supervisors are able to ensure that all required maintenance tasks are carried out and where not completed or where it is evident that a particular maintenance task cannot be carried out to the maintenance data, then such problems will be reported to the SAR-145.30(b) person for appropriate action. In addition, for those supervisors who also carry out maintenance tasks, that they understand such tasks should not be undertaken when incompatible with their management responsibilities.
  - (e) Certifying staff are able to determine when the aircraft or aircraft component is ready to release to service and when it should not be released to service.
- 3 Particularly, in the case of planners, specialised services staff, supervisors and certifying staff, a knowledge of organisation procedures relevant to their particular role in the organisation is important.
- 4 Quality audit staff are able to monitor compliance with SAR-145 identifying non compliance in an effective and timely manner in order that the SAR-145 approved maintenance organisation may remain in compliance SAR-145.
- 5 All personnel as specified in this procedure who are involved in the support of maintenance related work are given human factors training.

**AMC 145.30(f)(1) Personnel requirements (SAR-66 Category A certifying staff)**

- 1 Minor scheduled line maintenance for the purpose of Category A is described in SAR-66.
- 2 Tasks permitted after appropriate task training to be carried out by the Category A certifying staff for the purpose of issuing a SAR-145.50 aircraft certificate of release to service as part of minor scheduled line maintenance or as part of a base maintenance check, are contained in the following list:
- (a) Visual inspection and replacement of wheel assemblies.
  - (b) Visual inspection and replacement of wheel brake units.
  - (c) Visual inspection and replacement of emergency equipment but excluding replacement of emergency slides.
  - (d) Visual inspection, operation checks and replacement of ovens, boilers, chillers, beverage makers and other galley inserts.
  - (e) Operation checks and replacement of internal and external lights, filaments and flash tubes.
  - (f) Replacement of windscreen wiper blades.
  - (g) Visual inspection, operation checks and replacement of passenger and cabin crew seats, seat belts and other seat components.
  - (h) Operation of cowlings and refitment of quick access inspection panels.
  - (i) Visual inspection, operation checks and replacement of toilet system components but excluding gate valves.
  - (j) Visual inspection, simple repairs and replacement of internal compartment doors but excluding doors forming part of a pressure structure and flight compartment doors.

- (k) Visual inspection, operation checks, simple repairs and replacement of overhead storage compartment doors and cabin furnishing items.
  - (l) Visual inspection and replacement of static wicks.
  - (m) Visual inspection, operation checks and replacement of inflight entertainment system components and media content, but excluding public address.
  - (n) Lubrication and replenishment of all system fluids and gases.
  - (o) Cleaning.
  - (p) Recording of part numbers, serial numbers and dates of parts and components.
  - (q) Recording of measurements from direct reading indicators.
  - (r) Replacement of placards for internal compartments but excluding placards in the flight deck.
  - (s) Removal, installation and visual inspection of non-structural panels, both internal and external, which do not form part of the pressure structure.
- 3 A category A certifying staff is not permitted to certify work on systems which require duplicate inspection, as defined in Singapore Airworthiness Requirements.

**IEM 145.30(f)(1) Personnel requirements (SAR-66 Category A certifying staff)**

- 1 A SAR-145 approved organisation that has a very limited scope of work may only need to have its own SAR-66 B1 licensed certifying staff. However, such organizations will need to have a separate maintenance agreements with other SAR-145 approved organisations for the provision of Category B2 licensed certifying staff. An example of such organization is an AOC holder which holds a SAR-145 approval solely for providing transit certification of its aircraft.

**AMC 145.35(a) Certifying Staff (General)**

- 1 Adequate understanding of the relevant aircraft and/or aircraft component(s) to be maintained together with the associated organisation procedures means that the person has received training and passed an examination or has relevant maintenance experience and passed an examination on the product type and associated organisation procedures such that the person understands how the product functions, what are the more common defects with associated consequences.
- 2 Alternatively such training and examination may be reduced or eliminated when AMC 145.35(e) subparagraph 3 is taken into account.
- 3 Training of certifying staff may be performed by the SAR-145 approved maintenance organisation or by an institute selected by the organisation. In either case, the SAR-145 approved maintenance organisation should establish the curriculum and standards for training. Consideration should also be given to the establishment of pre-qualification standards for the personnel intended for training so as to ensure that the trainee has a reasonable chance of successfully completing any course.
- 4 Human factors training includes instruction in, but is not limited to, human performance, factors influencing human error (such as fatigue, stress, assertiveness, awareness, resources, knowledge, teamwork, norms, complacency, pressure, distraction, communication, etc.) and error management, including error prevention and error containment.

**AMC 145.35(c) Certifying Staff (Continuation training)**

- 1 Continuation training is a two way process to ensure that certifying staff remain current in terms of procedures, human factors and technical knowledge and that the SAR-145 approved maintenance organisation receives feedback on the adequacy of its procedures and maintenance instructions. Due to the interactive nature of this training, consideration should be given to the possibility that such

training has the involvement of the quality department to ensure that feedback is acted upon. Alternatively, there should be a procedure to ensure that feedback is formally passed from the training department to the quality department to initiate action.

- 2 Continuation training should cover changes in relevant requirements such as SAR-145, changes in organisation procedures and the modification standard of the products being maintained plus human factor issues identified from any internal or external analysis of incidents. It should also address instances where staff failed to follow procedures and the reasons why particular procedures are not always followed. In many cases the continuation training will reinforce the need to follow procedures and ensure that incomplete or incorrect procedures are identified to the company in order that they can be corrected. This does not preclude the possible need to carry out a quality audit of such procedures.
- 3 Continuation training should be of sufficient duration in each 2 year period to meet the intent of SAR-145.35(c) and may be split into a number of separate elements. SAR-145.35(c) relates such training to keeping certifying staff updated in terms of relevant technology, procedures and human factors issues which means it is one part of ensuring quality. Therefore sufficient duration should be related to relevant quality audit findings and other internal / external sources of information available to the organisation on human errors in maintenance.

This means that in the case of a SAR-145 approved maintenance organisation that maintains aircraft with few relevant quality audit findings, continuation training could be limited to days rather than weeks, whereas a similar organisation with a number of relevant quality audit findings, such training may take several weeks. For a SAR-145 approved maintenance organisation that maintains aircraft components, the duration of continuation training would follow the same philosophy but should be scaled down to reflect the more limited nature of the activity. For example certifying staff who release hydraulic pumps may only require a few hours of continuation training whereas those who release turbine engine may only require a few days of such training.

The content of continuation training should be related to relevant quality audit findings and it is recommended that such training is reviewed at least once in every 24 month period.

- 4 The method of training is intended to be a flexible process and could, for example, include internal short duration courses, seminars, etc. The elements, general content and length of such training should be specified in the SAR-145 maintenance organisation exposition.
- 5 Continuation training should also be provided for non-certifying maintenance staff.

#### **AMC 145.35(d) Certifying staff (Continuation training procedures)**

- 1 The programme for continuation training should list all certifying staff and when training will take place, the elements of such training and an indication that it was carried out reasonably on time as planned. Such information should subsequently be transferred to the certifying staff record as required by SAR-145.35(h).
- 2 The referenced procedure should be specified in the maintenance organisation exposition.

#### **AMC 145.35(e) Certifying staff (Determination of competency)**

- 1 All prospective certifying staff are required to be assessed for competence, qualification and capability related to intended certifying duties. There are a number of ways in which such assessment may be carried out but the following points need to be considered to establish an assessment procedure that fits the particular SAR-145 approved maintenance organisation.
- 2 Competence and capability can be assessed by working the person under the supervision of either another certifying person or a quality auditor for sufficient time to arrive at a conclusion. Sufficient time could be as little as a few weeks if the person is fully exposed to relevant work. It is not practical to assess against the complete spectrum of intended duties and this should not be done. When the person has been recruited from another SAR-145 approved maintenance organisation and was a certifying person in that organisation for a similar product then it is reasonable to accept a written confirmation from the person responsible for running the quality system about the person.

- 3 Qualification assessment means collecting copies of all documents that attest to qualification, such as the licence and/or any authorisation held. This should be followed by a confirmation check with the organisation(s) that issued such document(s) and finally a comparison check for differences between the product type ratings on the qualification documents and the relevant product types maintained by the SAR-145 approved maintenance organisation. This latter point may reveal a need for product type differences training.
- 4 Unless otherwise agreed with the DGCA, the SAR-145 approved maintenance organisation must seek the DGCA's acceptance of a potential certifying staff prior to the initial issue or extension of the SAR-145 certification authorisation. The DGCA would require proof that all specified requirements for a certifying staff have been met. Forms CAAS(AW)22 and CAAS(AW)102 should be used. The SAR-145 certification authorisation may only be issued after the DGCA has indicated its acceptance.
- 5 The relevant procedures should be specified in the maintenance organisation exposition.

**AMC 145.35(f) Certifying staff (Scope of certification authorisation)**

The SAR-145 certification authorisation should be in a style that makes its scope clear to certifying staff and any authorised person that may require to examine the authorisation. Where codes are used to define scope, a code translation should be readily available.

**AMC 145.35(h) Certifying staff (Records)**

- 1 The following minimum information should be kept on record in respect of each certifying person:
  - (a) Name
  - (b) Date of birth
  - (c) Basic training
  - (d) Type training
  - (e) Continuation training
  - (f) Experience
  - (g) Qualifications relevant to the authorisation and licence
  - (h) Scope of authorisation and licence
  - (i) Date of first issue of the authorisation and licence
  - (j) If appropriate - expiry date of the authorisation and licence
  - (k) Identification number of the authorisation and licence
- 2 The record may be kept in any format but should be controlled by the organisation's quality department. This does not mean that the quality department should run the record system.
- 3 Persons authorised to access the system should be maintained at a minimum to ensure that records cannot be altered in an unauthorised manner or that such confidential records become accessible to unauthorised persons.
- 4 The certifying person should be given reasonable access on request to his/her own records.
- 5 The Authority is an authorised person when investigating the records system for initial and continued approval or when the Authority has cause to doubt the competence of a particular certifying person.
- 6 The organisation should keep the record for at least two years after the certifying person has ceased employment with the organisation or withdrawal of the authorisation, whichever is the sooner. In addition, the certifying staff should be furnished on request with a copy of their record on leaving the organisation.

**IEM 145.35(j) Certifying staff**

Certifying staff are not required to carry the SAR-145 certification authorisation. Authorised person means any official or business person or organisation with a valid reason for seeing the SAR-145 certification authorisation. Valid reasons include the need to check such authorisations for validity, scope and authenticity.



**AMC 145.40(a) Equipment, Tools and Material (General)**

- 1 Once the applicant for SAR-145 approval has determined the intended scope of approval for consideration by the CAAS, it will be necessary to show that all tools and equipment as specified in the approved data can be made available when needed. All such tools and equipment that are required to be controlled in terms of servicing or calibration by virtue of being necessary to measure specified dimensions and torque figures etc, should be clearly identified and listed in a control register including any personal tools and equipment that the organisation agrees can be used. Where the manufacturer specifies a particular tool or equipment, then that tool or equipment should be used unless otherwise agreed by the DGCA in a particular case via a procedure specified in the maintenance organisation exposition to use alternative tooling/equipment.
- 2 The availability of equipment and tools means permanent availability except in the case of any tool or equipment that is so rarely needed that its permanent availability is not necessary.
- 3 The SAR-145 organisation approved for base maintenance should have sufficient aircraft access equipment and inspection platforms/docking such that the aircraft may be properly inspected.
- 4 The necessary material to perform the scope of work means readily available raw material and aircraft components in accordance with the manufacturer's recommendation unless the organisation has an established spares provisioning procedure.

**AMC 145.40(b) Equipment, Tools and Material (Calibration)**

- 1 The control of these tools and equipment requires that the organisation has a procedure to inspect/service and, where appropriate, calibrate such items on a regular basis and indicate to users that the item is within any inspection or service or calibration time-limit. A clear system labeling all tooling, equipment and test equipment is therefore necessary giving information on when the next inspection of service or calibration is due and if the item is unserviceable for any other reason where it may not be obvious. A register should be maintained for all precision tooling and equipment together with a record of calibrations and standards used.
- 2 Inspection, service or calibration on a regular basis should be in accordance with the equipment manufacturer's instructions except where the SAR-145 organisation can show by results that a different time period is appropriate in a particular case.
- 3 Standards acceptable to the DGCA include acceptable national or international standards and approved original equipment manufacturer's standards.
- 4 The SAR-145 approved maintenance organisation may send its tools and equipment for inspection/calibration/servicing only to original equipment manufacturers and organisations accredited by the local national standards board. Organisations accredited by SAC-SINGLAS would be acceptable to CAAS.
- 5 Where in-house calibration is practised, the SAR-145 approved maintenance organisation must have such capability listed in the exposition together with the associated control procedures. Such procedures should include a laboratory management system containing all the control elements identifiable to international standards such as ISO 17025. The management system shall include:
  - (a) A system of issuing and keeping test reports/results;
  - (b) The monitoring of environmental conditions adequately for the intended purpose;
  - (c) The management personnel competence, training and qualification;
  - (d) The capability list specifying the type, range and traceability of the standards used; and
  - (e) A list of master equipment, and the control for the master equipment.

**AMC 145.45(b) Maintenance Data**

- 1 Except as specified in sub-paragraph 5, each SAR-145 approved maintenance organisation should hold and use the following minimum maintenance data relevant to the organisation's approval class rating:

All maintenance related SARs and associated AMCs and IEMs, all CAAS maintenance related Airworthiness Notices and Advisory Circulars and all applicable airworthiness directives.

- 2 In addition to sub-paragraph 1, a SAR-145 approved maintenance organisation with an approval class rating in category A - Aircraft, should hold and use the following maintenance data where published:

The appropriate sections of the operator's aircraft maintenance programme, aircraft maintenance manual, repair manual, supplementary structural inspection document, corrosion control document, service bulletins, service letters, service instructions, modification leaflets, NDI manual, parts catalogue, type certificate data sheet and any other specific document issued by the type certificate or supplementary type certificate holder as maintenance data, except that in the case of operator or customer provided maintenance data it is not necessary to hold such provided data when the work order is completed other than the need to comply with SAR-145.55(c).

- 3 In addition to sub-paragraph 1, a SAR-145 approved maintenance organisation with an approval class rating in category B - Engines/APUs, should hold and use the following maintenance data where published:

The appropriate sections of the engine/APU maintenance and repair manual, service bulletins, service letters, modification leaflets, NDI manual, parts catalogue, type certificate data sheet and any other specific document issued by the type certificate holder as maintenance data, except that in the case of operator or customer provided maintenance data it is not necessary to hold such provided data when the work order is completed other than the need to comply with SAR-145.55(c).

- 4 In addition to sub-paragraph 1, a SAR-145 approved maintenance organisation with an approval class rating in category C - Components other than complete engines/APUs, should hold and use the following maintenance data where published:

The appropriate sections of the vendor maintenance and repair manual, service bulletins and service letters plus any document issued by the type certificate holder as maintenance data on whose product the component may be fitted when applicable, except that in the case of operator or customer provided maintenance data it is not necessary to hold such provided data when the work order is completed other than the need to comply with SAR-145.55(c).

- 5 Appropriate sections of the sub-paragraphs 2 to 4 additional maintenance data means in relation to the maintenance work scope at each particular maintenance facility. In other words for example, a base maintenance facility should have almost complete set(s) of the maintenance data whereas a line maintenance facility may need only the maintenance manual and the parts catalogue.

- 6 A SAR-145 approved maintenance organisation *only* approved in class rating category D - Specialised services, should hold and use the following maintenance data where published in respect of the particular specialised service(s) specified in the approval schedule:

SAR-145 plus associated AMCs and IEMs and the specialised service(s) process specification, except that in the case of operator or customer provided maintenance data it is not necessary to hold such provided data when the work order is completed other than the need to comply with SAR-145.55(c).

**AMC 145.45(c) Maintenance data (Modification of maintenance instructions)**

The referenced procedure should address the need for a practical demonstration by the mechanic to the quality personnel of the proposed modified maintenance instruction. The quality personnel should approve (or not approve) the modified maintenance instruction and ensure that the type certificate holder or the supplementary type certificate holder is informed of the modified maintenance instruction. The procedure should include a paper/electronic traceability of the complete process from start to finish and ensure that the

relevant maintenance instruction clearly identifies the modified maintenance instructions. Modified maintenance instructions should only be used in the following circumstances.

- a) Where the type certificate / supplementary type certificate holders original intent can be carried out in a more practical or more efficient manner.
- b) Where the type certificate / supplementary type certificate holders original intent cannot be achieved by following the maintenance instructions. For example, where a component cannot be replaced following the original maintenance instructions.
- c) For the use of alternative tools / equipment.

**AMC 145.45(d) Maintenance data (Classification of repairs)**

- 1 A SAR-145 approved maintenance organisation is required by SAR-145.45 (d) to establish a procedure to process minor or major repairs. To satisfy the requirement, the organisation should describe the actions to be taken when the need for damage assessment and / or repair action arises. At minimum, the procedure should address the need to assess damage against published approved repair data and the action to be taken if damage is beyond the limits or outside the scope of such data. This could involve any one or more of the following options:
  - (a) Repair by replacement of damaged parts;
  - (b) Requesting technical support from the type certificate holder or from a DGCA approved Design Organisation
  - (c) Obtain the DGCA's approval of the particular repair data.
- 2 The reference in sub-paragraph 1 to published approved repair data means the data specified in SAR-145.45(b).
- 3 For the purpose of SAR-145.45(d) reference to minor or major repair relates only to design criteria and not to maintenance criteria.

**AMC 145.45(e) Maintenance data (Workcards/worksheets)**

- 1 Relevant parts of the organisation means with regard to aircraft base maintenance, aircraft line maintenance, engine workshops, mechanical workshops and avionic workshops. Therefore, for example engine workshops should have a common system throughout such engine workshops that may be different to that in aircraft base maintenance.
- 2 Complex maintenance tasks should be transcribed onto the workcards or worksheets and sub-divided into clear stages to ensure a record of the accomplishment of the maintenance task. Of particular importance is the need to differentiate and specify, when relevant, disassembly, accomplishment of task, reassembly and testing. In the case of a lengthy maintenance task involving a succession of personnel to complete such task, it may be necessary to use supplementary workcards or worksheets to indicate what was actually accomplished by each individual person.

**AMC 145.45(f)/(g) Maintenance data (Up-to-date data)**

- 1 To keep data up to date, a procedure should be set up to monitor the amendment status of all data and maintain a check that all amendments are being received by being a subscriber to any document amendment scheme.
- 2 Data being made available to personnel maintaining aircraft means that the data should be available in close proximity to the aircraft being maintained, for supervisors, mechanics and certifying staff to study.
- 3 Where computer systems are used, the number of computer terminals should be sufficient in relation to the size of the work programme to enable easy access, unless the computer system can produce

paper copies. Where microfilm or microfiche readers/printers are used, a similar requirement is applicable.

**AMC 145.50(a) Certification of maintenance (Requirements for release to service)**

- 1 A certificate of release to service is necessary before flight at the completion of any package of maintenance specified by the aircraft operator in accordance with Division 7 of the Air Navigation (91-General Operating Rules) Regulations 2018. The package of maintenance may include any one or combination of the following elements: a check or inspection from the operator's aircraft maintenance programme, Airworthiness Directives, overhauls, repairs, modifications, aircraft component replacements and defect rectification.

New defects or incomplete maintenance work orders identified during the above maintenance should be brought to the attention of the aircraft operator for the specific purpose of obtaining agreement to rectify such defects or completing the missing elements of the maintenance work order. In the case where the aircraft operator declines to have such maintenance carried out SAR-145.50(d) will apply.

- 2 A certificate of release to service is necessary before flight at the completion of any defect rectification whilst the aircraft operates flight services between scheduled maintenance.
- 3 A certificate of release to service is necessary at the completion of any maintenance on an aircraft component whilst off the aircraft.
- 4 The authorised release certificate identified as form CAAS(AW)95 (see Appendix 3) constitutes the aircraft component certificate of release to service when an aircraft component is maintained by one SAR-145 organisation for another SAR-145 organisation.
- 5 When a SAR-145 organisation maintains an aircraft component for use by the same organisation, a CAAS(AW)95 may not be necessary depending upon the organisation's release procedures defined in the maintenance organisation exposition.
- 6 In respect of aircraft base maintenance, the maintenance work and the certification of release to service for the aircraft should be carried out as follows:
  - (a) The authorised person who carried out the particular base maintenance task should sign that he has accomplished the task only when satisfied by self inspection that the task has been properly carried out in accordance with the approved maintenance instructions. Such task sign-offs support the issue of a release to service by the authorised certifying staff following base maintenance.
  - (b) If the aircraft maintenance programme requires a specific inspection in addition to the one performed under para 6(a), this duplicate inspection should be accomplished by another competent person, who should sign for the second inspection when satisfied.
  - (c) The base maintenance certifying staff should issue release to service for the aircraft when satisfied that the complete maintenance process has been carried out in accordance with the approved procedures.
- 7 In respect of aircraft line maintenance, the inspection and release to service should be carried out as follows:
  - (a) The person who carried out the scheduled line maintenance tasks and unscheduled defect rectification should carry out the inspection function. Such person should issue a release to service for the tasks completed only when satisfied by self inspection that the tasks have been properly carried out in accordance with the approved maintenance instructions.
- 8 In respect of aircraft component workshop maintenance, the inspection and release to service should be carried out as follows:
  - (a) The person who carries out a maintenance task specified in the maintenance instructions should sign that he has accomplished the task only when satisfied by self inspection that the task has been properly carried out in accordance with the approved maintenance instructions.

- (b) The workshop component certifying staff should issue release to service (including the ARC as appropriate) for the aircraft component after the completion of all tasks when satisfied that the complete maintenance process has been carried out in accordance with the approved procedures including additional inspection, when required.

**AMC 145.50(b) Certification of maintenance (Details of a certificate of release to service)**

- 1 The certificate of release to service should contain the following statement:

*“Certifies that the work specified except as otherwise specified was carried out in accordance with SAR-145 and the Air Navigation Order and in respect to that work the aircraft/aircraft component is considered ready for release to service.”*

Note: The Release to Service statement in Block 19 of the ARC – form CAAS(AW)95 – is slightly at variance with the above statement in that it refers to particular boxes on the form.

- 2 The certificate of release to service should relate to the task specified in the manufacturer's or AOC Holder's instruction or the aircraft maintenance programme which itself may cross-refer to a manufacturer's / operator's instruction in a maintenance manual, service bulletin, etc.
- 3 Where such instructions include a requirement to ensure a dimension or test figure is within a specific tolerance as opposed to a general tolerance, the dimension or test figure should be recorded unless the instruction permits the use of GO/NO GO gauges. It is not normally sufficient to state that the dimension or the test figure is within tolerance.
- 4 The date such maintenance was carried out should include when the maintenance took place relative to any life or overhaul limitation in terms of date/flying hours/cycles/landings etc., as appropriate.
- 5 When extensive maintenance has been carried out, it is acceptable for the certificate of release to service to summarise the maintenance so long as there is a unique cross-reference to the work-pack containing full details of maintenance carried out. Dimensional information should be retained in the work-pack record.
- 6 The person issuing the certificate of release to service should use his normal signature except in the case where a computer release to service system is used. In this latter case the DGCA will need to be satisfied that only the particular person can electronically issue the release to service. One such method of compliance is the use of a magnetic or optical personal card in conjunction with a personal identity number (PIN) known only to the individual which is keyed into the computer. A certification stamp is optional.

**AMC 145.50(d) Certification of maintenance (Incomplete maintenance)**

- 1 Being unable to establish full compliance with SAR-145.50(a) means that the maintenance required by the aircraft operator could not be completed due either to running out of available aircraft maintenance downtime for the scheduled check or by virtue of the condition of the aircraft requiring additional maintenance downtime.
- 2 The aircraft operator is responsible for ensuring that all required maintenance has been carried out before flight and therefore SAR-145.50(d) requires such operator to be informed in the case where full compliance with SAR-145.50(a) cannot be achieved within the operator's limitations. If the operator agrees to the deferment of full compliance, then the certificate of release to service may be issued subject to details of the deferment, including the operator's authority, being endorsed on the certificate.

NOTE: Whether or not the aircraft operator does have the authority to defer maintenance is an issue between the aircraft operator and the DGCA.

- 3 The procedure should draw attention to the fact that SAR-145.50(a) does not normally permit the issue of a certificate of release to service in the case of non-compliance and should state what action the mechanic, supervisor and certifying staff should take to bring the matter to the attention of the relevant department or person responsible for technical co-ordination with the aircraft operator so that the issue may be discussed and resolved with the aircraft operator. In addition, the appropriate SAR-145.30(a)

person(s) should be kept informed in writing of such possible non-compliance situations and this should be included in the procedure.

- 4 The referenced procedure should be specified in the maintenance organisation exposition.

**AMC 145.50(e) Certification of maintenance (Use of component without a suitable release certificate)**

- 1 Suitable serviceable tag means a tag which clearly states that the aircraft component is serviceable; that clearly specifies the organisation releasing the component together with the approval or authorisation reference.
- 2 Compliance with Singapore Airworthiness Requirements mean making an appropriate entry in the aircraft technical log, checking for compliance with type design standards, modifications, repairs, airworthiness directives, life limitations and condition of the aircraft component plus information on where, when and why the aircraft was grounded.

**AMC 145.50(f) Certification of maintenance (Hazard to flight safety)**

A non-compliance known to the SAR-145 approved maintenance organisation which could hazard flight safety means any instances where safe operation could not be assured or which could lead to an unsafe condition. It typically includes, but is not limited to, significant cracking, deformation, corrosion or failure of primary structure, any evidence of burning, electrical arcing, significant hydraulic fluid or fuel leakage and any emergency system or total system failure. An Airworthiness Directive overdue for compliance is also considered a hazard to flight safety. As stated in SAR-145.50(f) a certificate of release to service may not be issued under these circumstances.

**AMC 145.55(a) Maintenance records**

- 1 Properly executed and retained records provide owners, operators and maintenance personnel with information essential in controlling unscheduled and scheduled maintenance, and trouble shooting to eliminate the need for re-inspection and rework to establish airworthiness. As a minimum, records necessary to prove all requirements have been met for issuance of the certificate of release to service including sub-contractor's release documents should be retained. The prime objective is to have secure and easily retrievable records with comprehensive and legible contents. The aircraft record should contain basic details of all serialised aircraft components and all other significant aircraft components installed, to ensure traceability to such installed aircraft component documentation and associated SAR-145.45 maintenance data.
- 2 Some gas turbine engines are assembled from modules and a true total time in service for a total engine is not kept. When owners and operators wish to take advantage of the modular design, then total time in service and maintenance records for each module is to be maintained. The maintenance records as specified are to be kept with the module and should show compliance with any mandatory requirements pertaining to that module.
- 3 Reconstruction of lost or destroyed records can be done by reference to other records which reflect the time in service, research of records maintained by repair facilities and reference to records maintained by individual mechanics, etc. When these things have been done and the record is still incomplete, the owner/operator may make a statement in the new record describing the loss and establishing the time in service based on the research and the best estimate of time in service. The reconstructed records should be submitted to the DGCA for acceptance.

Note: Additional maintenance may be required.

- 4 The maintenance record can be either a paper or computer system or any combination of both.
- 5 Paper systems should use robust material which can withstand normal handling and filing. The record should remain legible throughout the required retention period.
- 6 Computer systems may be used to control maintenance and/or record details of maintenance work carried out. Computer systems used for maintenance should have at least one backup system which

should be updated at least within 24 hours of any maintenance. Each terminal is required to contain programme safeguards against the ability of unauthorised personnel to alter the database.

**IEM 145.55(b) Maintenance records**

A self-explanatory paragraph that requires the SAR-145 organisation to give the operator the certificate of release to service including basic details of maintenance carried out, whereas SAR-145.55(c) requires the SAR-145 organisation to retain the record of all maintenance.

**AMC 145.55(c) Maintenance records**

- 1 The records should be stored in a safe way with regard to fire, flood and theft.
- 2 Computer backup discs, tapes, etc. should be stored in a different location from that containing the working discs, tapes, etc., in an environment that ensures they remain in good condition.
- 3 Where a SAR-145 organisation terminates its operation, all retained maintenance records covering the last 2 years should be distributed to the last operator/customer of the respective aircraft or component. If it is impossible to trace the operator/customer, the maintenance records should be stored as required by the DGCA.

**IEM 145.60(a) Reporting of unairworthy conditions**

In respect of the SAR-145 organisation, conditions that could seriously endanger the safety of the aircraft include but are not limited to:

- (a) Serious structural damage (for example: cracks, permanent deformation, debonding, burning, excessive wear or corrosion) found during maintenance of the aircraft or component.
- (b) Significant malfunction of a safety-critical system or equipment including emergency system or equipment during maintenance testing or failure to activate these systems after maintenance.
- (c) Suspected unapproved parts received from a part supplier, OEM, an operator, or on an aeroplane or aircraft component.

Notes: (1) – intentionally left blank

(2) – intentionally left blank

- (d) Serious leakage or contamination of fluids (for example: hydraulic, fuel, oil, gas or other fluids).
- (e) Failure or malfunction of any part of an engine or powerplant and/or transmission resulting in any one or more of the following:
  - i. Non-containment of components/debris;
  - ii. Failure of the engine mount structure.
- (f) Damage, failure or defect of propeller, which could lead to in-flight separation of the propeller or any major portion of the propeller and/or malfunctions of the propeller control.
- (g) Incorrect assembly or installation of components of the aircraft during an inspection or test procedure not intended for that specific purpose.
- (h) Wrong assessment of a serious defect, or serious non-compliance with MEL, and Technical logbook procedures.
- (i) Serious damage to Electrical Wiring Interconnection System (EWIS).
- (j) Any defect in a life-controlled critical part causing retirement before completion of its full life.

- (k) Misleading, incorrect or insufficient applicable maintenance data or procedures that could lead to significant maintenance errors, including language used.
- (l) Releasing an aircraft to service from maintenance in case of non-compliance which endangers the flight safety.
- (m) Serious damage caused to an aircraft during maintenance activities due to incorrect maintenance or use of inappropriate or unserviceable ground equipment that requires additional maintenance actions.
- (n) Identified burning, melting, smoke, arcing, overheating or fire occurrences.
- (o) Any occurrence where the human performance, including fatigue of personnel, has directly contributed to or could have contributed to an accident or a serious incident.
- (p) Significant malfunction, reliability issue, or recurrent recording quality issue affecting a flight recorder system (such as a flight data recorder system, a data link recording system or a cockpit voice recorder system) or lack of information needed to ensure the serviceability of a flight recorder system.

#### **AMC 145.64(b) Safety Management System**

An organisation's SMS framework, in particular that of a foreign AMO, that is deemed by the DGCA as equivalent to this SAR-145.64(b) SMS framework may be regarded as an acceptable means of compliance

#### **IEM 145.65(a) Maintenance procedures and quality system (Quality policy)**

One example of a typical quality policy can be found in IEM 145.70(a)(10).

#### **AMC 145.65(b) Maintenance procedures and quality system (Maintenance procedures)**

- 1 The maintenance procedures should cover all aspects of carrying out the maintenance activity including the provision and control of specialised services and in reality lay down the standards to which the SAR-145 approved maintenance organisation intends to work. Such standards need at a minimum to be those required by SAR-145 and should also include procedures for:
  - (a) Receiving inspection – Inspection of aircraft components and material from outside contractors to ensure acceptable quality and authenticity.
  - (b) Initial inspection – Inspection of received parts for repair to determine initial condition, hidden damage and required repairs prior to commencement of maintenance.
  - (c) Final inspection – Inspection of maintained parts for the purpose of issuing the Authorised Release Certificate.
- 2 Specialised services includes any specialised activity, such as, but not limited to Non-Destructive Testing requiring particular skills and/or qualification. Requirements published by the DGCA on qualifications of personnel should be followed, and in addition, there is a need to establish maintenance procedures that cover the control of any specialised process.
- 3 Appendix 5 contains a procedure for subcontracting that meets the intent of part of SAR-145.1(c), (d) and (f) as specified in AMC-145.1.
- 4 In the case of aircraft line and base maintenance, procedures should be established to ensure that no one person be required to carry out and inspect in relation to a maintenance task involving some element of disassembly / reassembly of several aircraft components of the same type fitted to more than one system on the same aircraft during a particular maintenance check. The purpose of this procedure is to minimise the rare possibility of an error being repeated whereby the identical aircraft components are not reassembled thereby compromising more than one system. One example is the remote possibility of failure to reinstall engine gearbox access covers or oil filler caps on all engines of a multi-engined aircraft resulting in major oil loss from all engines.



The referenced procedure, if applicable, should be specified in the Maintenance Organisation Exposition.

- 5 The maintenance procedures should address SAR-145.25 to SAR-145.95 inclusive as also specified in SAR-145.70 (a)(11) and sub-paragraphs (1) to (4) inclusive. The Appendix 2 example exposition contains typical procedures that, where appropriate, should be addressed.
- 6 A SAR-145 approved maintenance organisation in carrying out maintenance will find that modifications and/or repairs constitute part of that maintenance. Some modifications and repairs may involve the fabrication of some aircraft components. Fabrication for modification and repair purposes under the SAR-145 approval may be accepted subject to the following limitations:
  - (a) The Maintenance Organisation Exposition required by SAR 145.70 should include a procedure for the fabrication of aircraft components in relation to items 2.9, 2.11 and 2.12 of the maintenance organisation exposition document (see Appendix 2).
  - (b) The SAR-145.45 engineering data should be sufficient in terms of material, dimensions and manufacturing processes to enable the fabrication to be completed.
  - (c) The SAR-145 approved maintenance organisation including any other organisation working under its quality system should have the capability to accomplish the fabrication process.
  - (d) The SAR-145 approved maintenance organisation may not fabricate aircraft components to pattern unless engineering data acceptable to the DGCA is available.

#### **AMC 145.65(c)(1) Maintenance procedures and quality system (Quality audits)**

- 1 The primary objectives of the quality system are to enable the SAR-145 approved maintenance organisation to ensure that it can deliver a safe product and that the SAR-145 approved maintenance organisation remains in compliance with the requirements.
- 2 An essential element of the quality system is the independent audit.
- 3 The independent audit is an objective process of routine sample checks of all aspects of the SAR-145 approved maintenance organisation's ability to carry out all maintenance to the required standards and includes some product sampling as this is the end result of the maintenance process. It represents an objective overview of the complete maintenance related activities and is intended to complement the SAR-145.50 (a) requirement for certifying staff to be satisfied that all required maintenance has been properly carried out before issue of the certificate of release to service. Independent audits should include a percentage of random audits carried out on a sample basis when maintenance is being carried out. This means some audits during the night for those organisations that work at night.
- 4 Except as specified in sub-paragraphs 7 and 9, the independent audit should ensure that all aspects of SAR-145 compliance are checked every 12 months and may be carried out as a complete single exercise or subdivided over the 12 month period in accordance with a scheduled plan. The independent audit does not require each procedure to be checked against each product line when it can be shown that the particular procedure is common to more than one product line and the procedure has been checked every 12 months without resultant findings. Where findings have been identified, the particular procedure should be rechecked against other product lines until the findings have been rectified after which the independent audit procedure may revert back to 12 monthly for the particular procedure.
- 5 Except as specified otherwise in sub-paragraphs 7, the independent audit should sample check one product on each product line every 12 months as a demonstration of the effectiveness of maintenance procedures compliance. It is recommended that procedures and product audits be combined by selecting a specific product example, such as an aircraft or engine or instrument and sample checking all the procedures and requirements associated with the specific product example to ensure that the end result should be an airworthy product.

For the purpose of the independent audit a product line includes any product under an Appendix 1 approval class rating as specified in the SAR-145 approval schedule issued to the particular organisation.

It therefore follows for example that a SAR-145 approved maintenance organisation with a capability to maintain aircraft, repair engines, brakes and autopilots would need to carry out 4 complete audit sample checks each year except as specified otherwise in subparagraphs 5, 7 or 9.

- 6 The sample check of a product means to witness any relevant testing and visually inspect the product and associated documentation. The sample check should not involve repeat disassembly or testing unless the sample check identifies findings requiring such action.
- 7 Except as specified otherwise in sub-paragraph 9, if a SAR-145 approved maintenance organisations falling under the category of a “smallest SAR-145 approved maintenance organisation” chooses to contract the independent audit element of the quality system in accordance with SAR-145.65 (c)(1), it is conditional on the audit being carried out twice in every 12 month period.
- 8 Except as specified otherwise in sub-paragraph 9, where the SAR-145 approved maintenance organisation has line stations listed as per SAR-145.75 (d) the quality system should describe how these are integrated into the system and include a plan to audit each listed line station at a frequency consistent with the extent of flight activity at the particular line station. Except as specified otherwise in sub-paragraph 9 the maximum period between audits of a particular line station should not exceed 24 months.
- 9 Except as specified otherwise in sub-paragraph 5, the DGCA may agree to allow the SAR-145 approved maintenance organisation to increase any of the audit time periods specified in this AMC-145.65(c)(1) by up to 100% provided that there are no safety related findings and subject to being satisfied that the SAR-145 approved maintenance organisation has a good record of rectifying findings in a timely manner.
- 10 A report should be raised each time an audit is carried out describing what was checked and the resulting findings against applicable requirements, procedures and products.
- 11 The independence of the audit should be established by always ensuring that audits are carried out by personnel not responsible for the function, procedure or products being checked.

It therefore follows that a SAR-145 approved maintenance organisation should have a dedicated quality group whose functions include conducting audits, raising finding reports and following up to check that findings are being rectified. In addition, the SAR-145 approved maintenance organisation may use competent personnel from one section/department not responsible for the production function, procedure or product to audit the section/department that is responsible subject to the overall planning and implementation being under the control of the quality manager.

The smallest SAR-145 approved maintenance organisations may contract the independent audit element of the quality system to another SAR-145 approved maintenance organisation or a competent person acceptable to the DGCA.

- 12 The referenced procedure should be specified in the Maintenance Organisation Exposition.

#### **AMC 145.65(c)(2) Maintenance procedures and quality system (Quality feedback)**

- 1 An essential element of the quality system is the quality feedback system.
- 2 The quality feedback system may not be contracted to outside persons. The principal function of the quality feedback system is to ensure that all findings resulting from the independent quality audits of the organisation are properly investigated and corrected in a timely manner and to enable the accountable manager to be kept informed of any safety issues and the extent of compliance with SAR-145.
- 3 The independent quality audit reports referenced in AMC 145.65(c)(1) sub-paragraph 10 should be sent to the relevant department(s) for rectification action giving target rectification dates. Rectification dates should be discussed with such department(s) before the quality department or nominated quality auditor confirms such dates in the report. The relevant department(s) are required by SAR-145.65 (c)(2) to rectify findings and inform the quality department or nominated quality auditor of such rectification.

- 4 The accountable manager should hold regular meetings with staff to check progress on rectification except that in the large organisations such meetings may be delegated on a day to day basis to the quality manager subject to the accountable manager meeting at least twice per year with the senior staff involved to review the overall performance and receiving at least a half yearly summary report on findings of non-compliance.
- 5 All records pertaining to the independent quality audit and the quality feedback system should be retained for at least 2 years after the date of clearance of the finding to which they refer or for such periods as to support changes to the AMC-145.65(c)(1) sub-paragraph 9 audit time periods, whichever is the longer.
- 6 The referenced procedure should be specified in the Maintenance Organisation Exposition.

**IEM 145.70(a) Maintenance organisation exposition**

- 1 The purpose of the Maintenance Organisation Exposition (MOE) is to set forth the procedures, means and methods of the SAR-145 approved maintenance organisation.
- 2 Compliance with its contents will assure compliance with the SAR-145 requirements, which is a prerequisite to obtaining and retaining an approved maintenance organisation certificate.
- 3 SAR-145.70(a)(1) to (a)(11) constitutes the 'management' part of the exposition and therefore should be made available to the SAR-145.30(a) person(s) who should be reasonably familiar with its contents. SAR-145.70(a)(6) List of Certifying Staff and SAR-145.70(a)(9) scope of work (such as a capability list) may be produced as a separate document subject to the agreement of the DGCA.
- 4 SAR-145.70(a)(12) constitutes the working procedures of the organisation and therefore as stated in the requirement may be produced as any number of separate procedures manuals. It should be remembered that these documents should be cross-referenced from the management MOE.
- 5 Personnel are expected to be familiar with those parts of the manuals that are relevant to the maintenance work they carry out.
- 6 The SAR-145 approved maintenance organisation will need to specify in the MOE who should amend the manual particularly in the case where there are several parts.
- 7 The Quality Manager should be responsible for monitoring the amendment of the MOE, unless otherwise agreed by the DGCA, including associated procedures manuals and submission of the proposed amendments to the DGCA unless the DGCA has agreed via a procedure stated in the amendment section of the exposition that some defined class of amendments may be incorporated without prior DGCA's approval.
- 8 In reality, therefore, the exposition has to cover four main parts:
  - (a) The management MOE covering the parts specified earlier.
  - (b) The maintenance procedures covering all aspects of how aircraft components may be accepted from outside sources and how aircraft will be maintained to the required standard.
  - (c) The quality system procedures including the methods of qualifying mechanics, inspectors, certifying staff and quality audit personnel.
  - (d) Contracted aircraft operators' procedures and paperwork.
- 9 The accountable manager's SAR-145.70(a)(1) exposition statement should embrace the intent of the following paragraph and in fact this statement may be used without amendment. Any modification to the statement should not alter the intent.

*"This exposition and any associated referenced manuals define the organisation and procedures upon which the Civil Aviation Authority of Singapore (CAAS) SAR-145 approval is based as required by SAR-145.70. These procedures are approved by the undersigned and must be*

*complied with, as applicable, when work/orders are being progressed under the terms of the SAR-145 approval.*

*It is accepted that these procedures do not override the necessity of complying with any new or amended regulation published by the CAAS from time to time where these new or amended regulations are in conflict with these procedures.*

*It is understood that the CAAS will approve this organisation whilst the CAAS is satisfied that the procedures are being followed and work standards maintained. It is further understood that the CAAS reserves the right to suspend, limit or revoke the SAR-145 approval of the organisation if the CAAS has evidence that procedures are not followed or standards not upheld.*

*Signed .....*

*Dated.....*

*Accountable Manager and ..... (quote position)*

*For and on behalf of ..... (quote organisation's name)"*

Whenever the accountable manager changes it is important to ensure that the new accountable manager signs the paragraph 9 statement at the earliest opportunity as part of the acceptance by the DGCA.

Failure to carry out this action could invalidate the SAR-145 Approval.

- 10 The SAR-145.65(a) quality policy should embrace the intent of the following paragraph:

*"Only by providing the standard of quality and service demanded by our customers, and constantly striving to maintain and improve the standard, can we continue to be a respected provider of services.*

*The basic quality requirements to achieve the standard are laid down in the exposition.*

*Quality standards are the responsibility of all personnel and it is the duty of all personnel to comply with this policy, to strive to both maintain and improve quality standards at every opportunity."*

- 11 When an organisation holds other CAAS approvals which contains a requirement for an exposition, a supplement covering the differences will suffice to meet the requirements except that the supplement must have an index showing where the common parts are covered.
- 12 SAR-145 approved maintenance organisations located in Singapore should use the exposition format prescribed in Appendix 2, however, additional supplements addressing the requirements of another authority may be permitted to be included in the maintenance organisation exposition.
- 13 However, organisations located outside Singapore approved by another authority against the regulations of that authority (such as the FAA/JAA) may use a common exposition provided that all SAR-145 requirements are met and the 'management' part of the SAR-145.70 maintenance organisation exposition be addressed in a unique section of the common exposition. Differences between the SAR-145 requirements and the requirements of the other authority/authorities should be identified and indicated. The common exposition should have an index showing where those parts pertaining to the SAR-145 are covered.

#### **IEM 145.80            Limitations on the approved maintenance organisation**

This paragraph is intended to cover the situation where the larger SAR-145 organisation may temporarily not hold all the necessary tools, equipment, etc. for an aircraft type or variant specified in the organisation's approval. This paragraph means that the DGCA need not amend the approval to delete the aircraft type or variants on the basis that it is a temporary situation and there is a commitment from the organisation to re-acquire tools, equipment, etc. before maintenance on the type may recommence.

**IEM 145.85            Changes to the approved maintenance organisation**

The primary purpose of this paragraph is to enable the SAR-145 organisation to remain approved if agreed with the DGCA during negotiations about any of the specified changes. Without this paragraph the approval would automatically be suspended in all cases.

**IEM 145.95            Equivalent safety case**

Once a SAR-145.95(a) equivalent safety case has been accepted by the DGCA, such equivalent safety cases may be published as amended SARs, AMCs, IEMs or Advisory Circulars.

**SINGAPORE AIRWORTHINESS REQUIREMENTS****PART 145****SECTION 2 APPENDIX 1****ORGANISATIONS APPROVAL CLASS AND RATING SYSTEM**

- 1 Except as stated otherwise for the smallest SAR-145 approved maintenance organisations in paragraph 13, Table 1 outlines the full extent of approval possible under SAR-145 in a standardised form. An organisation may be granted an approval ranging from a single class and rating with limitations to all classes and ratings with limitations.
- 2 In addition to Table 1 the SAR-145 approved maintenance organisation is required by SAR-145.20 to indicate scope of work in the maintenance organisation exposition. SAR-145.70(a)(9) also refers to the same scope of work and it should be noted that a capability list is deemed to be one form of scope of work. Regardless of the format used, the scope of work should also include, as a minimum, information relating to what or where maintenance can be performed depending on the ratings held. The type of information required can be found in paragraphs 4, 5 and 6. See also paragraph 10.
- 3 Within the approval class(es) and rating(s) granted by the DGCA, the scope of work specified in the maintenance organisation exposition defines the exact limits of approval. It is therefore essential that the approval class(es) and rating(s) and the organisations scope of work are compatible.
- 4 Category A class rating
  - a) The SAR-145 approved maintenance organisation may carry out maintenance on the aircraft and any component (including engines/APUs) only whilst such components are fitted to the aircraft, except that such components can be temporarily removed for maintenance when such removal is expressly permitted by the aircraft maintenance manual to improve access for maintenance subject to a control procedure in the maintenance organisation exposition acceptable to the DGCA.
  - b) The limitation section will specify the scope of such maintenance thereby indicating the extent of approval.
  - c) Category A class ratings are subdivided into 'Base' or 'Line' maintenance. A SAR-145 approved maintenance organisation may be approved for either 'Base' or 'Line' maintenance or both. It should be noted that a 'Line' facility located at a main base facility requires a 'Line' maintenance approval.
  - d) The scope of work should also include location, ratings, aircraft / engine type and capability eg. Line and / or base maintenance
- 5 Category B class rating
  - a) The SAR-145 approved maintenance organisation may carry out maintenance on the uninstalled engine/APU and engine/APU components only whilst such components are fitted to the engine/APU except that such components can be temporarily removed for maintenance when such removal is expressly permitted by the engine/APU manual to improve access for maintenance.
  - b) The limitation section will specify the scope of such maintenance thereby indicating the extent of approval.
  - c) A SAR-145 approved maintenance organisation with a category B class rating may also carry out maintenance on an installed engine during 'base' and 'line' maintenance subject to a control procedure in the maintenance organisation exposition acceptable to the DGCA. The maintenance organisation exposition scope of work should reflect such activity where permitted by the DGCA.

- d) The scope of work should also include ratings, engine type and capability eg. Inspection, repair, overhaul etc.
- 6 Category C class rating
- a) The SAR-145 approved maintenance organisation may carry out maintenance on uninstalled components (excluding engines and APUs) intended for fitment to the aircraft or engine/APU.
- b) The limitation section will specify the scope of such maintenance thereby indicating the extent of approval.
- c) Table 2 identifies the ATA specification 2200 chapter for the category C component rating.
- d) A SAR-145 approved maintenance organisation with a category C class rating may also carry out maintenance on an installed component during base and line maintenance or at an engine/APU maintenance facility subject to a control procedure in the maintenance organisation exposition acceptable to the DGCA. The maintenance organisation exposition scope of work should reflect such activity where permitted by the DGCA.
- e) the scope of work should also include ratings, part number, nomenclature and capability eg. Inspection, repair, overhaul etc.
- 7 Category D class rating
- a) This is a self contained class rating not necessarily related to a specific aircraft, engine or other component.
- b) The D1 - Non Destructive Testing (NDT) and D2 – Other Specialised Services ratings are only necessary for a SAR-145 approved maintenance organisation that carries out NDT or other specialised services as a particular task for another organisation.
- c) A SAR-145 approved maintenance organisation with a class rating in A or B or C category may carry out NDT or other specialised services on products it is maintaining subject to the maintenance organisation exposition containing relevant procedures, without the need for a D class rating.
- 8 Reserved
- 9 Reserved
- 10 The 'limitation' section is intended to give the DGCA maximum flexibility to customise the approval to a particular organisation. Table 1 specifies the types of limitation possible and whilst maintenance is listed last in each class rating it is acceptable to stress the maintenance task rather than the aircraft or engine type or manufacturer, if this is more appropriate to the organisation. An example could be avionic systems installations and maintenance.
- 11 Table 1 makes reference to series, type and group in the limitation section of class A and B. Series means a specific type series such as Airbus 300 or 310 or 319 or Boeing 737-300 series or RB211-524 series etc. Type means a specific type or model such as Airbus 310-240 type or RB 211-524 B4 type etc. Any number of series or types may be quoted. Group means for example Cessna single piston engined aircraft or Lycoming non-supercharged piston engines etc.
- 12 When a lengthy capability list is used which could be subject to frequent amendment, then such amendment should be in accordance with a procedure acceptable to the DGCA and included in the maintenance organisation exposition. The procedure should address the issues of who is responsible for capability list amendment control and the actions that need to be taken for amendment. Such actions include ensuring compliance with SAR-145 for products or services added to the list.
- 13 The smallest SAR-145 approved maintenance organisations can only hold a limited scope of approval rating. The maximum permissible limits are:-

<b>CLASS</b>	<b>RATING</b>	<b>LIMITATIONS</b>
AIRCRAFT	A2 AEROPLANES	PISTON ENGINED LINE & BASE 5700 KG AND BELOW
AIRCRAFT	A2 AEROPLANES	TURBINE ENGINED LINE 5,700 KG AND BELOW
AIRCRAFT	A3 HELICOPTERS	SINGLE ENGINED LINE & BASE 2,730 KG AND BELOW
ENGINES	B2 PISTON	LESS THAN 450 HP
COMPONENTS OTHER THAN COMPLETE ENGINES OR APU	C1 TO C20	AS PER CAPABILITY LIST
SPECIALISED	D1 NDT	NDT METHODS TO BE SPECIFIED
SPECIALISED	D2 SPECIALISED SERVICES	SPECIALISED SERVICES TO BE SPECIFIED

It should be noted that such an organisation may be further limited by the DGCA in the scope of approval dependent upon the capability of the particular organisation.



TABLE 1

Class	Rating	Limitation	Base	Line
AIRCRAFT	A1	Aeroplanes above 5,700 kg		
	A2	Aeroplanes 5,700 kg and below		
	A3	Helicopters		
ENGINES	B1	Turbine		
	B2	Piston		
	B3	Auxiliary Power Unit		
COMPONENTS OTHER THAN COMPLETE ENGINES OR APU	C1	Air cond & press		
	C2	Auto flight		
	C3	Comms & navigation		
	C4	Doors – hatches		
	C5	Electrical Power & Lights		
	C6	Equipment		
	C7	Engine / APU		
	C8	Flight Controls		
	C9	Fuel		
	C10	Helicopter - rotors		
	C11	Helicopter - trans		
	C12	Hydraulic Power		
	C13	Indicating/Recording Systems		
	C14	Landing Gear		
	C15	Oxygen		
	C16	Propellers		
	C17	Pneumatic & Vacuum		
	C18	Protection ice/rain/fire		
	C19	Windows		
	C20	Structural		
SPECIALISED SERVICES	D1	Non Destructive Testing		
	D2	Other specialised services		
DISTRIBUTOR (SUB-PART D)	MD1	General aeronautical parts		
	MD2	Special aeronautical parts		

TABLE 2

CLASS	RATING	ATA CHAPTERS
COMPONENTS OTHER THAN COMPLETE ENGINES OR APUs	C1 Air cond & press	21
	C2 Auto flight	22
	C3 Comms & navigation	23, 34
	C4 Doors – hatches	52
	C5 Electrical Power & Lights	24, 33, 85
	C6 Equipment	25, 38, 44, 45, 50
	C7 Engine / APU	49, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83
	C8 Flight Controls	27, 55, 57.40, 57.50, 57.60, 57.70
	C9 Fuel	28, 47
	C10 Helicopter - rotors	62, 64, 66, 67
	C11 Helicopter - trans	63, 65
	C12 Hydraulic Power	29
	C13 Indicating/Recording Systems	31, 42, 46
	C14 Landing Gear	32
	C15 Oxygen	35
	C16 Propellers	61
	C17 Pneumatic & Vacuum	36, 37
	C18 Protection ice/rain/fire	26, 30
	C19 Windows	56
	C20 Structural	53, 54, 57.10, 57.20, 57.30

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**SINGAPORE AIRWORTHINESS REQUIREMENTS****PART 145****SECTION 2 APPENDIX 2****MAINTENANCE ORGANISATION EXPOSITION**

The exposition should contain the information, as applicable, specified in this Appendix. The information may be presented in any subject order so long as all applicable subjects are covered. Where an organisation uses a different format, for example, to allow the exposition to serve for more than one CAAS approval, then the exposition should contain a cross reference Annex using this list as an index with an explanation as to where in the exposition the subject matter can be found.

Small SAR-145 approved maintenance organisations may combine the various items to form a simple exposition more relevant to their needs.

To facilitate the tracking of changes, each page should be identified by the part number, page number, date of issue or date of latest amendment, and amendment number (if applicable). The latest amendment on a page should be highlighted by marginal lines against the amended areas on the left hand side of the page.

The exposition should be in English or include an English translation.

**PART 1 MANAGEMENT**

Brief description and history of the company

Corporate commitment by the accountable manager.

Quality policy.

Management personnel.

Duties and responsibilities of the management personnel.

Management organisation chart.

List of certifying staff.

Manpower resources.

General description of the facilities at each address intended to be approved.

Organisation's intended scope of work (such as a capability list).

Notification procedure to the DGCA regarding changes to the organisation's activities/approval/location/personnel.

Exposition amendment procedures including, if applicable, delegated procedures.

**PART 2 MAINTENANCE PROCEDURES**

- 2.1 Supplier evaluation and subcontract control procedure.
- 2.2 Acceptance/inspection of aircraft components and material from outside contractors.
- 2.3 Storage, tagging and release of aircraft components and material to aircraft maintenance.
- 2.4 Acceptance of tools and equipment (including alternate tools).

- 2.5 Calibration of tools and equipment.
- 2.6 Use of tooling and equipment by staff (including alternate tools).
- 2.7 Cleanliness standards of maintenance facilities.
- 2.8 Maintenance instructions and relationship to aircraft/aircraft component manufacturers' instructions including updating and availability to staff.
- 2.9 Repair procedure. (Including initial and hidden damage inspection procedures)
- 2.10 Aircraft maintenance programme compliance.
- 2.11 Airworthiness Directives procedure.
- 2.12 Optional modification procedure.
- 2.13 Maintenance documentation in use and its completion.
- 2.14 Technical records control.
- 2.15 Rectification of defects arising during base maintenance.
- 2.16 Release to service procedure. (Including final inspection)
- 2.17 Records for the AOC operator.
- 2.18 Reporting of defects to the DGCA / Operator / Manufacturer.
- 2.19 Return of defective aircraft components to store.
- 2.20 Defective components to outside contractors.
- 2.21 Control of computer maintenance record systems.
- 2.22 Control of man-hour planning against scheduled maintenance work.
- 2.23 Control of critical tasks per AMC 145.65 (b)(4).
- 2.24 Reference to specific maintenance procedures such as -
  - Engine running procedures,
  - Aircraft pressure run procedures,
  - Aircraft towing procedures.

#### **PART L2 ADDITIONAL LINE MAINTENANCE PROCEDURES**

- L2.1 Line maintenance control of aircraft components, tools, equipment etc.
- L2.2 Line maintenance procedures related to servicing/fuelling/de-icing etc.
- L2.3 Line maintenance control of defects and repetitive defects.
- L2.4 Line procedure for completion of technical log.

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- L2.5 Line procedure for pooled parts and loan parts.
- L2.6 Line procedure for return of defective parts removed from aircraft.
- L2.7 Line procedure control of critical tasks per AMC-145.65 (b)(4).

### **PART 3 QUALITY SYSTEM PROCEDURES**

- 3.1 Quality audit of organisation procedures.
- 3.2 Quality audit of aircraft and aircraft components.
- 3.3 Quality audit remedial action procedure.
- 3.4 Certifying staff qualification and training procedures.
- 3.5 Certifying staff records.
- 3.6 Quality audit personnel.
- 3.7 Qualifying inspectors.
- 3.8 Qualifying mechanics.
- 3.9 Aircraft or aircraft component maintenance tasks exemption process control.
- 3.10 Concession control for deviation from organisations' procedures.
- 3.11 Qualification procedure for specialised activities such as NDT, welding etc.
- 3.12 Control of manufacturers' and other maintenance working teams.

### **PART 4 CONTRACTED AOC OPERATORS**

- 4.1 Contracted AOC operators.
- 4.2 AOC operator procedures and paperwork.
- 4.3 AOC operator record completion.
- 4.4 Procedures for issuing the one-off authorisation as per 145.30(g)(3), if nominated by the operator.

### **PART 5 APPENDICES**

Samples of documents.

List of suppliers

List of Sub-contractors as per SAR-145.75 (b), including a description of the maintenance function contracted to each Sub-contractor.

List of Line maintenance locations as per SAR-145.75 (d).

List of contracted SAR-145 organisations as per SAR-145.70(a)(16).

**PART 6 OPERATORS MAINTENANCE PROCEDURES**

This section is reserved for those maintenance organisations approved under SAR who are also AOC holders.

**PART 7 TRANSPORT CANADA CIVIL AVIATION (TCCA)/HONG KONG CIVIL AVIATION DEPARTMENT (HKCAD)/CIVIL AVIATION SAFETY AUTHORITY (CASA) SUPPLEMENTARY PROCEDURES**

This section reserved for those SAR-145 approved maintenance organisations which are accepted by TCCA/HKCAD/CASA under the respective Technical Arrangement on Aviation Maintenance.

Refer to the relevant Advisory Circular for details of the Part 7 contents.

**SINGAPORE AIRWORTHINESS REQUIREMENTS****PART 145****SECTION 2 APPENDIX 3****THE AUTHORISED RELEASE CERTIFICATE – FORM CAAS(AW)95****1 INTRODUCTION**

- 1.1 This appendix only covers the use of form CAAS(AW)95 for maintenance purposes. Use of the ARC for manufacture is covered in Section 6 of the Singapore Airworthiness Requirements.

**2 PURPOSE AND SCOPE**

- 2.1 The purpose of the Certificate is to release assemblies/items/components/parts (hereafter referred to as "item(s)") after manufacture and to release maintenance work carried out on such items under the approval of the Civil Aviation Authority of Singapore (CAAS) to allow items removed from one aircraft/aircraft component to be fitted to another aircraft/aircraft component.
- 2.2 The Certificate referenced form CAAS(AW)95 is called the authorised release certificate (ARC).
- 2.3 The Certificate is to be used for export/import purposes, as well as for domestic purposes, and serves as an official certificate for items from the manufacturer/maintenance organisation to users. The certificate is not a delivery or shipping note.
- 2.4 It can only be issued by organisations approved by the DGCA within the scope of the approval or by the DGCA itself.
- 2.5 The Certificate may be used as a rotatable tag by utilising the available space on the reverse side of the Certificate for any additional information and despatching the item with two copies of the Certificate so that one copy may be eventually returned with the item to the maintenance organisation. The alternative solution is to use existing rotatable tags and also supply a copy of the Certificate.
- 2.6 Under no circumstances may a certificate be issued for any item when it is known that the item has a defect considered a serious hazard to flight safety.
- 2.7 A Certificate should not be issued for any item when it is known that the item is unserviceable except in the case of an item undergoing a series of maintenance processes at several SAR-145 approved maintenance organisations and the item needs a Certificate for the previous maintenance process carried out for the next SAR-145 approved maintenance organisation to accept the item for subsequent maintenance processes. As mentioned for Block 13, a clear statement of limitation should be endorsed in Block 13.
- 2.8 Aircraft may not be released using the Certificate.

**3 GENERAL**

- 3.1 The Certificate must comply with the format attached including block numbers in that each block must be located as per the layout. The size of each block may however be varied to suit the individual application, but not to the extent that would make the Certificate unrecognisable. The overall size of the Certificate may be significantly increased or decreased so long as the certificate remains recognisable and legible. If in doubt consult the DGCA.
- 3.2 All printing must be clear and legible to permit easy reading.
- 3.3 The Certificate must either be pre-printed or computer generated but in either case the printing of lines and characters must be clear and legible. Pre-printed wording is permitted in accordance with the attached model but no other certification statements are permitted.



- 3.4 Completion of the Certificate shall be in English.
- 3.5 The details to be entered on the Certificate can be either machine/computer printed or handwritten using block letters and should permit easy reading.
- 3.6 Abbreviations should be restricted to a minimum.
- 3.7 The space remaining on the reverse side of the Certificate may be used by the originator for any additional information but must not include any certification statement.
- 3.8 The original Certificate should accompany the items and correlation should be established between the Certificate and the items. A copy of the Certificate must be retained by the organisation that manufactured or maintained the item. Where the Certificate format and data is entirely computer generated, subject to acceptance by the DGCA it is permissible to retain the Certificate format and data on a secure database.

Note: There is no restriction in the number of copies of the Certificate sent to the customer or retained by the originator.

- 3.9 The Certificate that accompanies the item may be attached to the item by being placed in an envelope for durability.

#### **4 COMPLETION OF THE RELEASE CERTIFICATE BY THE ORIGINATOR**

Except as otherwise stated, there must be an entry in all blocks to make the document a valid certificate.

- |         |  |
|---------|--|
| Block 1 | Pre-printed "Singapore".   |
| Block 2 | Pre-printed as shown in the sample copy of the Certificate.  |
| Block 3 | A unique number should be pre-printed in this block for Certificate control and traceability purposes except that in the case of a computer generated document, the unique number need not be pre-printed where the computer is programmed to produce the number.  |
| Block 4 | The full name and address plus mailing address if different of the approved organisation releasing the items covered by this Certificate. This block may be pre-printed. Logos, etc., are permitted if the logo can be contained within the block.   |
| Block 5 | The purpose of this block is to reference work order/contract/invoice or any other internal organisational process such that a fast traceability system can be established.  |
| Block 6 | This block is provided for the convenience of the organisation issuing the Certificate to permit easy cross-reference to the "Remarks" Block 13 by the use of item numbers. Completion is not mandatory.   |
|         | Where a number of items are to be released on the Certificate, it is permissible to use a separate listing cross-referring Certificate and list to each other. The total number of pages of the list should be reflected in the Certificate. The list should also be properly paginated and each page must bear the endorsement of the originator. |
| Block 7 | The name or description of the item shall be given. Preference should be given to use of the Illustrated Parts Catalogue (IPC) designation.  |
| Block 8 | State the part number. Preference shall be given to use of the IPC number designation.   |

- Block 9 Used to indicate the type-approved products for which the released items are eligible for installation. Completion of block is optional but if used, the following entries are permitted:
- (a) The specific or series aircraft, engine, propeller, or auxiliary power unit model, or a reference to a readily available catalogue or manual which contains such information. For example: "A300".
  - (b) "Various", if known to be eligible for installation on more than one model of type-approved product, unless the originator wishes to restrict usage to a particular model installation when it should so state.
  - (c) "Unknown", if eligibility is unknown, this category being primarily for use by maintenance organisations.
- Note: Any information in block 9 does not constitute authority to fit the item to a particular aircraft, engine, propeller or auxiliary power unit. The User/Installer must confirm via documents such as the Parts Catalogue, Service Bulletins etc., that the item is eligible for the particular installation.
- Block 10 State the number of items being released.
- Block 11 State the item Serial Number and/or Batch Number if applicable, if neither is applicable, state "N/A".
- Block 12 The following words in quotation marks, with their definitions, indicate the status of the item being released. One or a combination of these words shall be stated in this block:
- 1 "OVERHAULED"  
The process that ensures that aircraft component is in complete conformity with all the applicable service tolerances specified in the type certificate holder's, or equipment manufacturer's instructions for continued airworthiness, or in the data which is approved or accepted by the DGCA. The aircraft component will be at least disassembled, cleaned, inspected, repaired as necessary, reassembled and tested in accordance with the above specified data.
  - 2 "INSPECTED/TESTED"  
The examination of an item to establish conformity with an approved standard.
  - 3 "MODIFIED"  
The alteration of an item in conformity with an approved standard.
  - 4 "REPAIRED"  
The restoration of an item to a serviceable condition in conformity with an approved standard.
  - 5 "RETREADED"  
The restoration of a used tyre in conformity with an approved standard.
  - 6 "REASSEMBLED"  
The reassembly of an item in conformity with an approved standard.
- The above statements must be supported by reference in Block 13 to the approved data/manual/specification used during maintenance.
- Block 13 It is mandatory to state any information in this block either directly or by reference to supporting documentation that identifies particular data or limitations relating to the items being released that are necessary for the User/Installer to make the final airworthiness determination of the item. Information should be clear, complete, and

provided in a form and manner which is adequate for the purpose of making such a determination.

Each statement must be clearly identified as to which item it relates.

If there is no statement, state "None".

Some examples of the information to be quoted are as follows:

- The identity and revision/issue of maintenance documentation used as the approved standard
- Airworthiness Directives carried out and/or found carried out, as appropriate
- Repairs carried out and/or found carried out, as appropriate
- Modifications carried out and/or found carried out, as appropriate
- Replacement parts installed and/or parts found installed, as appropriate
- Deviations from customer work order
- Identity of national regulation if not SAR-145
- Usage restriction for repaired items
- Concessions applicable
- Life limited parts history
- Exceptions to the notified special requirements of the importing country
- Release statements to satisfy a foreign maintenance requirement
- Release statements to satisfy the conditions of an international maintenance agreement such as, but not limited to, the Technical Arrangement on Aviation Maintenance with Transport Canada

Note: The latter two statements allow the possibility of dual release against both SAR-145 and a foreign maintenance requirement or the single release by a SAR-145 approved maintenance organisation against a foreign maintenance requirement. However care should be exercised to tick the relevant box(es) in Block 19 to validate the release. It should also be noted that the dual release requires the approved data to be approved/accepted by both the DGCA and the appropriate foreign authority and the single release requires the approved data to be approved/accepted by only the appropriate foreign authority.

Blocks 14 – 18 Must not be used for maintenance tasks by SAR-145 approved maintenance organisations and should be crossed out. These blocks are specifically reserved for the release/certification of newly manufactured items by manufacturing organisations approved under Section 6 of the SAR.

Block 19 Contains the required SAR-145.50(b) release to service statement for all maintenance by SAR-145 approved maintenance organisations. When non SAR-145 maintenance is being released Block 13 should specify the particular national regulation. In any case the appropriate box should be 'ticked' to validate the release.

The certification statement 'except as otherwise stated in Block 13' is intended to address the following situations:

- (a) The case where the maintenance could not be completed
- (b) The case where the maintenance deviated from the standard required by SAR-145
- (c) The case where the maintenance was carried out in accordance with a non SAR-145 requirement

Whichever case or combination of cases should be specified in Block 13.

Block 20 For the signature of the certifying staff authorised by the SAR-145 approved maintenance organisation. This signature can be computer printed subject to the DGCA being satisfied that only the signatory can direct the computer and that a signature is not possible on a blank computer generated form.

A rubber stamp signature is not allowed. An impression of the authorised person's stamp may be made in addition to the signature.

Block 21 The SAR-145 approved maintenance organisation approval number given by the DGCA.

Block 22 The name of the Block 20 signatory and personal authorisation reference shall be typed or printed in a legible form.

Block 23 The date of signing the Block 19 release to service. The format should be d/m/y. The release to service should be signed at the completion of maintenance.

Note that the User Responsibility Statements are on the reverse side of the Certificate. These statements may be added to the front of the Certificate below the bottom line by reducing the depth of the form.

## **5 EFFECTIVITY**

- 5.1 Except as stated in paragraph 5.2 the ARC form CAAS(AW)95 published in the first issue of SAR-145 dated 1 January 1996 should be used for the release of all parts from the date that the maintenance organisation received its SAR-145 approval.
- 5.2 Issue 2 of the ARC form CAAS(AW)95 should be used for the release of all items from 1 January 2004 but may be used prior to that date if available to the SAR-145 approved maintenance organisation and approved by the DGCA.

1. Country <b>SINGAPORE</b>		2. <b>CIVIL AVIATION AUTHORITY OF SINGAPORE AUTHORISED RELEASE CERTIFICATE CAAS(AW)95</b>				3. Form Tracking Number	
4. Approved Organisation Name and Address					5. Work Order/Contract/Invoice		
6. Item	7. Description	8. Part No.	9. Eligibility *	10. Quantity	11. Serial/Batch No.	12. Status/Work	
13. Remarks							
<b>14. NEW PARTS</b> Certifies that the items identified above were manufactured in conformity to: <input type="checkbox"/> Approved design data and are in condition for safe operation <input type="checkbox"/> Non-approved design data specified in Block 13				<b>19. USED PARTS</b> <input type="checkbox"/> SAR-145.50 Release to Service <input type="checkbox"/> Other regulation specified in Block 13  Certifies that unless specified in Block 13, the work identified in Block 12 and described in Block 13, was accomplished in accordance with SAR-145 and the Air Navigation Order and in respect to that work the items are considered ready for release to service.			
15. Authorised Signature		16. CAAS Approval No.		20. Authorised Signature		21. CAAS Approval No.	
17. Name		18. Date (d/m/y)		22. Name		23. Date (d/m/y)	

CAAS(AW)95 - Issue 2

\* Installer must cross check eligibility with applicable technical data

(Front)

**USER / INSTALLER RESPONSIBILITIES**

NOTE:

1. It is important to understand that the existence of the Certificate alone does not automatically constitute authority to install the part/component/assembly.
2. Where the user/installer works in accordance with the national regulations of an Airworthiness Authority different from the Civil Aviation Authority of Singapore (CAAS), it is essential that the user/installer ensures that his/her Airworthiness Authority accepts parts/components/assemblies from the CAAS.
3. Statements 14 and 19 do not constitute installation certification. In all cases, the aircraft maintenance record must contain an installation certification issued in accordance with the national regulations by the user/installer before the aircraft may be flown.

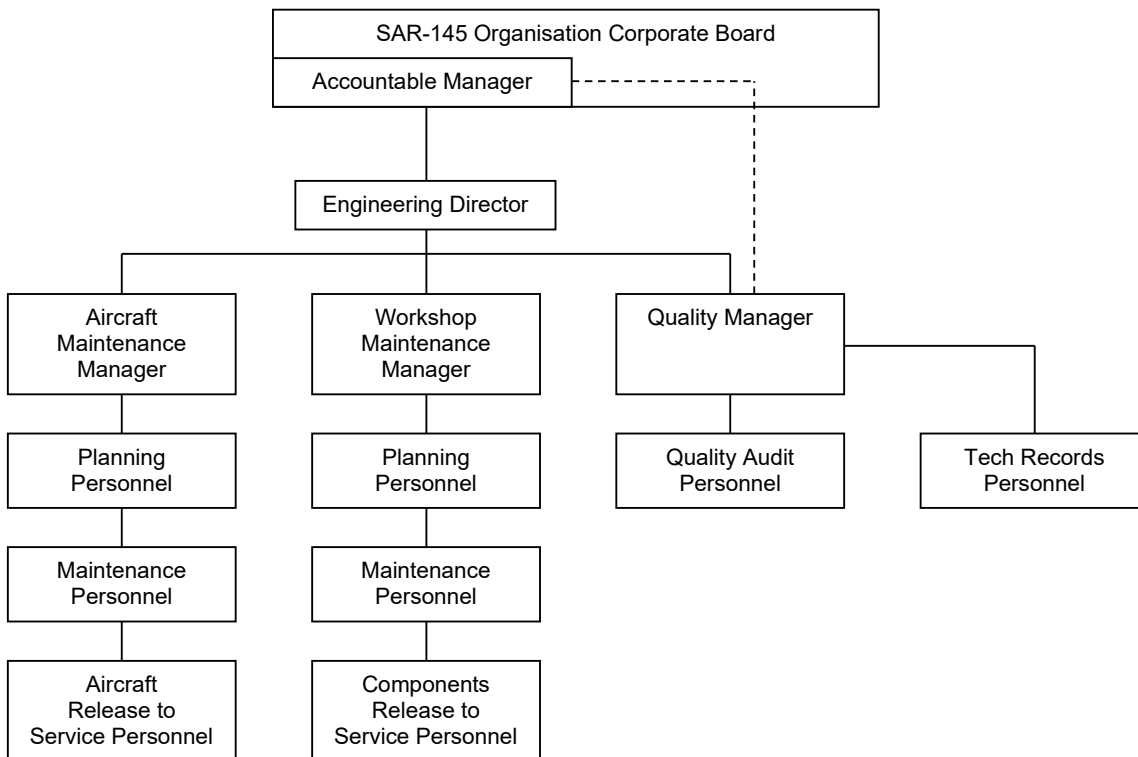
(Reverse)

## SINGAPORE AIRWORTHINESS REQUIREMENTS

## PART 145

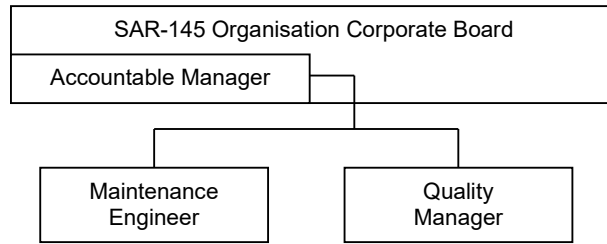
## SECTION 2 APPENDIX 4

## SOME OUTLINE EXAMPLES OF ORGANISATIONAL STRUCTURES POSSIBLE UNDER SAR-145

A. TYPICAL LARGE ORGANISATION

- 1 The Engineering Director may be the accountable manager if it is a Corporate Board position and meets the other requirements for accountable manager. Typically such a position is entitled Vice President (Engineering).
- 2 Quality Audit personnel must remain independent of the Maintenance Manager. Release to Service personnel may report instead to the Quality Manager position.
- 3 Technical records personnel may report instead to the Aircraft (Workshop) Manager.

B. TYPICAL SMALL ORGANISATION



**SINGAPORE AIRWORTHINESS REQUIREMENTS****PART 145****SECTION 2 APPENDIX 5****NON SAR-145 ORGANISATIONS WORKING UNDER THE QUALITY SYSTEM OF A SAR-145 APPROVED MAINTENANCE ORGANISATION (SUB-CONTRACTING)****1 INTRODUCTION**

- 1.1 SAR-145.1(c), (d), (f) and (i) permit an organisation that is not appropriately approved in accordance with SAR-145 to carry out certain maintenance under the quality system of an appropriately approved SAR-145 organisation. AMC 145.1 and this Appendix provide an acceptable means of compliance.
- 1.2 As working under the quality system of a SAR-145 approved maintenance organisation is more commonly referred to as sub-contracting, this latter phrase will be used throughout this Appendix.

**2 FUNDAMENTALS OF SAR-145 SUB-CONTRACTING**

- 2.1 The fundamental reasons for allowing a SAR-145 approved maintenance organisation to sub-contract certain maintenance tasks are:
- (a) To permit the acceptance of specialised maintenance services, such as, but not limited to, plating, heat treatment, plasma spray, fabrication of specified parts for minor repairs / modifications, etc., without the need for DGCA's approval in such cases.
  - (b) To permit the acceptance of component maintenance.
  - (c) To permit the acceptance of line maintenance carried out by a maintenance organisation whose SAR-145 application is being processed.
- 2.2 When maintenance is carried out under the sub-contract control system it means that for the duration of such maintenance, the SAR-145 approval has been temporarily extended to include the sub-contractor. It therefore follows that those parts of the sub-contractor's facilities, personnel and procedures involved with the SAR-145 approved maintenance organisation's products undergoing maintenance should meet SAR-145 requirements for the duration of that maintenance and it remains the SAR-145 organisation's responsibility to ensure such requirements are satisfied.
- 2.3 For the criteria specified in sub-paragraph 2.1, the SAR-145 approved maintenance organisation is not required to have complete facilities for maintenance that it needs to sub-contract but it should have its own expertise to determine that the sub-contractor meets the necessary standards. However a SAR-145 approved maintenance organisation cannot be approved unless it has the in house facilities, procedures and expertise to carry out the majority of maintenance for which it wishes to be approved in terms of the number of class ratings.
- 2.4 The SAR-145 approved maintenance organisation may find it necessary to include several specialist sub-contractors to enable it to be approved to completely certify the release to service of a particular product. Examples could be specialist welding, electro-plating, painting etc. To authorise the use of such subcontractors, the DGCA will need to be satisfied that the SAR-145 approved maintenance organisation has the necessary expertise and procedures to control such sub-contractors.
- 2.5 A SAR-145 approved maintenance organisation working outside the scope of its approval schedule is deemed to be not approved. Such an organisation may in this circumstance operate only under the sub-contract control of another appropriately approved SAR-145 organisation.
- 2.6 SAR-145.1 (f) and (i) limits the extent of sub-contracting.
- 2.6A Sub-contracting under SAR-145.1 (i) is permitted only when the sub-contractor's SAR-145 application is being processed by the Chief Executive, CAAS. Generally, subcontracting under SAR-145.1(i) is



permitted up to a maximum duration of 3 months. Under such a sub-contracting arrangement, the holder of the AOC who has sub-contracted the line maintenance work should have a programme to monitor its sub-contractor's performance. The programme should also monitor the progress of the sub-contractor's SAR-145 application.

- 2.7 Authorisation to sub-contract is indicated by the DGCA accepting the maintenance organisation exposition containing a specific procedure on the control of sub-contractors plus a list of sub-contractors as required by SAR-145.70 (a)(14) and SAR-145.75 (b).

### **3 PRINCIPAL SAR-145 PROCEDURES FOR THE CONTROL OF SUB-CONTRACTORS NOT SAR-145 APPROVED**

- 3.1 A pre-audit procedure should be established whereby the SAR-145 approved maintenance organisations' subcontract control section, which may also be the SAR-145.65(c) quality system independent audit section, should audit a prospective sub-contractor to determine whether those services of the sub-contractor that it wishes to use meets the intent of SAR-145.
- 3.2 The SAR-145 approved maintenance organisation needs to assess to what extent it will use the sub-contractor's facilities. As a general rule the SAR-145 approved maintenance organisation should require its own paperwork, approved data and material/spare parts to be used, but it could permit the use of tools, equipment and personnel from the sub-contractor as long as such tools, equipment and personnel meet the requirement of SAR-145. In the case of sub-contractors who provide specialised services it may for practical reasons be necessary to use their specialised services personnel, approved data and material subject to acceptance by the SAR-145 approved maintenance organisation. Specialised service personnel should meet any published SAR qualification standard except that where no SAR qualification standard is published, existing national requirements should be followed.
- 3.3 Unless the sub-contracted maintenance work can be fully inspected on receipt by the SAR-145 approved maintenance organisation it will be necessary for such SAR-145 approved maintenance organisation to supervise the inspection and release from the sub-contractor. For sub-contracting under SAR-145.1(i), the SAR-145 approved maintenance organisation is to supervise the sub-contractor on the maintenance work and release for the line maintenance work performed on the initial three flights. Non-scheduled maintenance activities have to be under the supervisory guidance of the operator/principal approved maintenance organisation. During the sub-contracting period, the holder of the air operator certificate should have a programme to monitor its sub-contractor's performance. The programme should also monitor the progress of the sub-contractor's SAR-145 application. Such programme or activities should be fully described in the SAR-145 approved maintenance organisation procedure or the operator's maintenance control manual as appropriate. The SAR-145 approved maintenance organisation will need to consider whether to use its own staff or authorise the sub-contractor's staff.
- 3.4 The certificate of release to service may be issued either at the sub-contractor or at the SAR-145 facility by staff issued a certifying staff certification authorisation in accordance with SAR-145.30 (d) to (g), as appropriate, by the SAR-145 approved maintenance organisation. Such staff would normally come from the SAR-145 approved maintenance organisation but may otherwise be a person from the sub-contractor who meets the SAR-145 approved maintenance organisation certifying staff standard which itself is approved by the DGCA via the maintenance organisation exposition. The certificate of release to service will always be issued under the SAR-145 approved maintenance organisation approval reference.
- 3.5 The sub-contract control procedure will need to record audits of the sub-contractor, to have a corrective action follow up plan and to know when sub-contractors are being used. The procedure should include a clear revocation process for sub-contractors who do not meet the SAR-145 approved maintenance organisation's requirements.
- 3.6 The SAR-145 quality audit staff will need to audit the sub-contract control section and sample audit sub-contractors unless this task is already carried out by the quality audit staff as stated in subparagraph 3.1.
- 3.7 The contract between the SAR-145 approved maintenance organisation and the sub-contractor should contain a provision for the DGCA staff to have right of access to the sub-contractor.

**SINGAPORE AIRWORTHINESS REQUIREMENTS****PART 145****SECTION 2 APPENDIX 6****SAFETY MANAGEMENT SYSTEM FRAMEWORK ELEMENTS**

The framework for the implementation and maintenance of a safety management system should include, as a minimum, the following 4 components and 12 elements:

**Safety Policy and Objectives**

- a) Management commitment
- b) Safety accountability and responsibilities
- c) Appointment of key safety personnel
- d) Coordination of emergency response planning
- e) SMS documentation

**Safety Risk Management**

- f) Hazard identification
- g) Safety risk assessment and mitigation

**Safety Assurance**

- h) Safety performance monitoring and measurement
- i) Management of change
- j) Continuous improvement of the SMS

**Safety Promotion**

- k) Training and education
- l) Safety communication

Note: Refer to AC 1-3 for CAAS SMS guidance materials. Reference may also be made to ICAO SMM Document 9859 for any supplementary guidance where appropriate.

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## SINGAPORE AIRWORTHINESS REQUIREMENTS

## PART 145

## SUB-PART D – APPROVAL OF DISTRIBUTORS

**SAR-145.201 General**

No person may certify that the Singapore Airworthiness Requirements have been complied with in respect of the procurement, storage and re-issue of new aircraft parts and materials obtained under cover of acceptable documents from approved sources unless approved under this sub-part and subject to compliance with the procedures set up in this sub-part.

**SAR-145.205 Definitions**

For the purpose of this sub-part, the SAR-145.5 definitions shall apply unless otherwise defined as follows:

“Authorised Release Certificate” means the form CAAS(AW)96.

“Copy” means certified true copy of the original.

“Re-issue” means the release to service of new aircraft components procured under cover of acceptable documents from approved sources and stored in accordance with prescribed conditions as specified by the DGCA and/or manufacturers.

**SAR-145.210 Applicability**

This sub-part prescribes the requirements for issuing approvals to organisations for the distribution of aircraft components and prescribes the general operating rules for approved distributors. The approval, when granted, will apply to the whole organisation headed by the accountable manager.

**SAR-145.215 Application and Issue**

- (a) An application for distributor approval or for the amendment of an existing distributor approval shall be made on form CAAS(AW)21 and in a manner prescribed by the DGCA and submitted with the distributor organisation's exposition or amendment thereto.

**SAR-145.220 Extent of approval**

The grant of approval is indicated by the issue of a certificate of approval to the organisation by the Authority. The certificate of approval will specify

the extent of approval.

**SAR-145.221 Display of Certificate**

An organisation certificated under this sub-part shall display the certificate in a prominent place within the organisation's premises and shall produce the certificate to the DGCA upon request.

**SAR-145.225 Facility requirements**

- (a) Facilities must be provided appropriate for all planned inspection, ensuring in particular, protection from the weather elements. Specialised inspection and storage areas must be segregated as appropriate, to ensure that environmental contamination is unlikely to occur.
- (b) Office accommodation must be provided appropriate for the management of the sub-paragraph (a) planned inspection including in particular, the management of quality, planning and technical records.
- (c) Storage facilities must be provided for aircraft parts and material. Storage conditions must be such as to provide security for serviceable parts, segregation of serviceable from unserviceable parts, and prevent deterioration of and damage to stored items.
- (d) The storage environment must be appropriate for the parts and material under storage, in particular, special requirements must be observed.
- (e) Quarantine storage facilities in accordance with the requirements of sub-paragraphs (c) and (d) shall be provided for aircraft parts and material awaiting confirmation of approval.

**SAR-145.230 Personnel requirements**

- (a) A senior person or group of persons acceptable to the DGCA, whose responsibilities include ensuring that the sub-part D approved distributor organisation is in compliance with sub-part D requirements, must be nominated. Such person(s) must ultimately be directly responsible to the accountable manager who must be acceptable to the DGCA.

- (b) The sub-part D approved distributor organisation must employ sufficient personnel to plan, perform and supervise the inspection in accordance with the approval.
- (c) The competence of personnel involved in inspection must be established in accordance with a procedure and to a standard acceptable to the DGCA.
- (d) In addition to paragraph (c) certifying personnel must meet the qualification specified by the DGCA and receive initial and continuation training in accordance with a programme acceptable to the DGCA. The training programme established by the maintenance organisation shall include training in knowledge and skills related to human performance, and where necessary, include co-ordination with other maintenance personnel and flight crew.

#### **SAR-145.235 Record of Certifying Staff**

- (a) The sub-part D approved distributor organisation must maintain a record of all certifying staff which must include details of their qualifications, training experience and the scope of their approvals.
- (b) Certifying staff must be provided with evidence of the scope of their approvals.

#### **SAR-145.245 Maintenance Data**

- (a) The sub-part D approved distributor organisation must be in receipt of all necessary maintenance data from the DGCA, the aircraft component design organisation and any other design organisation, as appropriate, to support the inspection and storage procedures.

Note: The DGCA may classify data from another authority or organisation as mandatory and may require the sub-part D approved distributor organisation to hold such data.

- (b) Where the sub-part D approved distributor organisation produces its own maintenance data additional to that specified in paragraph (a) such additional maintenance data must be produced in accordance with a procedures acceptable to the DGCA.
- (c) All maintenance data must be kept up to date and made available to all personnel who need access to such data to perform their duties.

#### **SAR-145.250 Certification of Release**

- (a) An authorised release certificate form CAAS(AW)96 may be issued by appropriately approved certifying staff on behalf of the sub-part D approved distributor organisation when satisfied that all required inspection and storage procedures of the new aircraft component have been properly carried out by the sub-part D approved distributor organisation in accordance with the procedures specified in the SAR-145.270 distributor organisation exposition.
- (b) The authorised release certificate must obtain basic details as specified in Appendix 2 of sub-part D.

#### **SAR-145.255 Technical Records**

- (a) The sub-part D approved distributor organisation must record all details of inspection carried out in a form acceptable to the DGCA.
- (b) The sub-part D approved distributor organisation must provide a copy of each authorised release certificate to the user.
- (c) The sub-part D approved distributor organisation must retain a copy of all incoming, inspection and outgoing certificates and any associated maintenance data in a manner acceptable to the DGCA. The records must be retrievable within a time acceptable to the DGCA.

Note: Essential records shall not be destroyed without written authorization from the DGCA.

#### **SAR-145.260 Reporting of unairworthy conditions**

The sub-part D approved distributor organisation or any person receiving components, equipment or materials that have been certified on an Authorised Release Certificate - Airworthiness Approval Tag or similar document, and which have been found to be unsuitable for aircraft use due to unserviceability, manufacturing discrepancies, inadequate quality control during manufacture, overhaul, repair, inspection or processing, deterioration, or contamination during storage shall advise the DGCA in writing of the following :

- (a) A description of the items, including part, drawing specification or serial numbers as applicable and where possible a parts catalogue reference.
- (b) The quantity received and quantity with discrepancies.
- (c) Details of the discrepancies.
- (d) Name of the person or organisation either in Singapore or overseas from whom the items were received.
- (e) In respect of items not received direct from the manufacturer - any additional details which could assist in tracing the history of the items, e.g. manufacturers identification markings, the name and address of the person or organisation who issued earlier certifications, etc.

**SAR-145.265 Inspection procedures and quality system**

- (a) The sub-part D approved distributor organisation must establish procedures acceptable to the DGCA to ensure good inspection, handling and storage practices and compliance with all relevant requirements in this SAR-145 such that aircraft components may be released to service in accordance with SAR-145.250.
- (b) In addition, except as provided for in paragraph (c), the sub-part D approved distributor organisation must establish an independent quality system to monitor compliance with and adequacy of the procedures to ensure good inspection, handling and storage practices and airworthy aircraft components. Compliance monitoring must include a feedback system to the person or group of persons specified in SAR-145.230(a) and ultimately to the accountable manager to ensure, as necessary, corrective action. Such systems must be acceptable to the DGCA.
- (c) The smallest sub-part D approved distributor organisation may contract the paragraph (b) independent quality system to a SAR-145 approved maintenance organisation (also approved under sub-part D) subject to agreement by the DGCA.
- (d) The sub-part D approved distributor organisation may procure aircraft parts and material only from approved sources for which it must establish an acceptable quality system to monitor their compliance with all relevant requirements.

**SAR-145.270 Distributor organisation exposition**

- (a) The sub-part D approved distributor organisation must provide a distributor organisation exposition for use by the sub-part D approved distributor organisation, containing the following information:
  - (1) A statement signed by the accountable manager confirming that the distributor organisation exposition, and any associated manuals, defines the sub-part D approved distributor organisation's compliance with SAR-145 sub-part D and will be complied with at all times.
  - (2) The title(s) and name(s) of the senior person(s) accepted by the DGCA in accordance with SAR- 145.230(a).
  - (3) The duties and responsibilities of the senior person(s) specified in sub-sub-paragraph (2) including matters on which they may deal directly with the DGCA on behalf of the sub-part D approved distributor organisation.
  - (4) An organisation chart showing associated chains of responsibility of the senior person(s) specified in sub-paragraph (2).
  - (5) A list of certifying staff.
  - (6) A general description of manpower resources.
  - (7) A general description of the facilities located at each address specified in the sub-part D approved distributor organisation's certificate of approval.
  - (8) A specification of the sub-part D approved distributor organisation's scope of inspection relevant to the extent of approval.
  - (9) The notification procedure of SAR-145.285 for sub-part D approved distributor organisation changes.
  - (10) The distributor organisation exposition amendment procedure.

Note: Sub-paragraphs (1) to (10) inclusive constitutes the management part of the distributor organisation exposition.

- (11) The sub-part D approved distributor organisation's procedures and quality system as required by SAR-145.225,

SAR-145.230, SAR-145.235, SAR-145.245, SAR-145.250, SAR-145.255, SAR-145.260, SAR-145.265, SAR-145.270 and SAR-145.275.

- (12) A list of approved sources as specified in SAR-145.265(d).
- (b) The distributor organisation exposition and any subsequent amendments must be approved by the DGCA.

#### **SAR-145.275 Privileges of the approved distributor organisation**

The sub-part D approved distributor organisation may only carry out the following tasks as permitted by and in accordance with the sub-part D approved distributor organisation exposition:

- (a) Inspect, handle and store class of aircraft component for which it is approved at the locations identified in the certificate of approval.
- (b) Issue authorised release certificates CAAS(AW)96 in respect of paragraph (a) on dispatching aircraft component in accordance with SAR-145.250.

#### **SAR-145.285 Changes to the approved distributor organisation**

- (a) The sub-part D approved distributor organisation must notify the DGCA as soon as it is practicable of any of the following changes, to enable the DGCA to determine continued compliance with this SAR-145 and to amend, if necessary, the certificate of approval:
- (1) The name of the organisation.
  - (2) The location of the organisation.
  - (3) Additional locations of the organisation.
  - (4) The accountable manager.
  - (5) Any of the senior persons specified in paragraph SAR-145.30 (a).
  - (6) The facilities, equipment, material, procedures, scope of inspection and certifying staff that could affect the approval.
- (b) The DGCA may prescribe the conditions under which the sub-part D approved distributor organisation may operate during such changes unless the DGCA determines

that the approval should be suspended.

#### **SAR-145.290 Continued validity of approval**

Unless the approval has previously been surrendered, superseded, suspended, revoked or expired by virtue of exceeding any expiry date that may be specified in the certificate of approval, the continued validity of approval is dependent upon -

- (a) The sub-part D approved distributor organisation remaining in compliance with this sub-part D; and
- (b) The DGCA being granted access to the sub-part D approved distributor organisation to determine continued compliance with this sub-part D; and
- (c) The payment of any charges prescribed by the DGCA.

#### **SAR-145.295 Equivalent safety case**

The DGCA may exempt a sub-part D approved distributor organisation from a requirement in this sub-part D when satisfied that there is such a need and subject to compliance with any supplementary condition the DGCA considers necessary to ensure equivalent safety in the particular case.

## SINGAPORE AIRWORTHINESS REQUIREMENTS

## PART 145

## SUB-PART D – APPROVAL OF DISTRIBUTORS

## ACCEPTABLE MEANS OF COMPLIANCE AND INTERPRETATIONS (ACS)

**ACS 145.201      General**

This portion contains the Acceptable Means of Compliance and Interpretative Material that has been included in the sub-part D to assist the sub-part D distributor organisation in meeting the necessary requirements. Where the sub-part D paragraphs refer to an AMC in Section 2 of the SAR-145 (e.g. see AMC 145.5), the sub-part D distributor need only extract whatever is applicable.

**ACS 145.220      Extent of approval**

- 1 Appendix 1 of Section 2 contains the two ratings available to the sub-part D distributor organisation.
- 2 The sub-part D approved distributor organisation should note the scope of the two ratings as follows:

CLASS MD1 General aeronautical parts/materials that do not belong to CLASS MD2.

CLASS MD2 Special aeronautical parts refer to those parts/materials which require specific handling or storage and/or have life limitations and/or are subject to compliance with any maintenance data (e.g. ADs, SBs, etc.).

The DGCA may limit a sub-part D approved distributor organisation to less than the above scope of approval. It should be noted that although general or standard parts with proper document cannot be issued with an ARC, they can still be kept in the bonded stores subject to a system acceptable to the DGCA.

**ACS 145.225(a)      Facility requirements**

- 1 Suitable accommodation of sufficient size and with adequate lighting, inspection equipment and facilities shall be provided for the activities to be undertaken.
- 2 Protection from the weather elements relates to the normal prevailing local weather elements that are expected throughout any twelve month period. Floors should be sealed to minimise dust generation.

**ACS 145.225(b)      Facility requirements**

Refer to AMC 145.25(b).

**ACS 145.225(c)      Facility requirements**

- 1 Storage facilities should be such as to ensure the working environment permits personnel to carry out work tasks in an effective manner. Adequate security should be implemented through the restriction of entry to nominated personnel.
- 2 Temperature and humidity should be maintained such that personnel can carry out required tasks without undue discomfort and that aircraft parts and material are protected against deterioration, contamination and damage. There shall be an acceptable system of monitoring these environmental factors.
- 3 Dust and any other airborne contamination should be kept to a minimum and not be permitted to reach a level in the work task area where visible aircraft component surface contamination is evident.



- 4 Lighting should be adequate for each inspection task to be carried out.
- 5 Noise levels should not be permitted to rise to the point of distracting personnel from carrying out inspection tasks. Where it is impractical to control the noise source, such personnel should be provided with the necessary personal equipment to stop excessive noise causing distraction during inspection tasks.
- 6 Where a particular inspection task requires the application of specific environmental conditions different to the foregoing, then such conditions should be observed.

**ACS 145.225(d)/(e) Facility requirements**

- 1 This means that secure storage facilities are required for serviceable aircraft components, whereas unserviceable aircraft components, material, tooling and equipment simply need to be separately stored. It is however required that separate and secure storage facilities be provided for unserviceable components, material, equipment and tooling.
- 2 Storage facilities for serviceable aircraft components should be clean, well-ventilated and maintained at an even dry temperature to minimise the effects of condensation. Manufacturers and standard recommendations should be followed for specific aircraft components.
- 3 Storage racks should be strong enough to hold aircraft components and provide sufficient support for large aircraft components such that the component is not distorted during storage.
- 4 All aircraft components, wherever practicable should remain packaged in protective material to minimise damage and corrosion during storage.

**ACS 145.245 Maintenance Data**

- 1 This primarily requires the sub-part D approved distributor organisation to hold copies of any inspection-related document issued by the DGCA, the type certificate holder or other appropriate design organisation and referenced equipment information. Referenced means that identified by the type certificate holder. Some examples of inspection-related documents are Singapore Airworthiness Requirements, SAR-145, the associated advisory material, airworthiness directives, manufacturers' maintenance manuals, service bulletins, service letters, service instructions, modification leaflets, etc.
- 2 To keep data up to date, a procedure should be set up to monitor the amendments status of all data and maintain a check that all amendments are being received by being a subscriber to any document amendment scheme.
- 3 Data being made available to personnel inspecting aircraft component means that the data should be available in close proximity to the aircraft component being inspected, for supervisors and certifying staff to study.
- 4 Where computer systems are used, the number of computer terminals should be sufficient in relation to the size of the work programme to enable easy access, unless the computer system can produce paper copies.

**ACS 145.250(a) Certification of Release**

- 1 The authorised release certificate/airworthiness approval tag identified as CAAS(AW)96 (see Appendix 2 of this sub-part D) constitutes the aircraft component certificate of release to service when a new aircraft component is released by a sub-part D distributor organisation.
- 2 An authorised release certificate may only be issued for new aircraft components with acceptable document as specified in Appendix I of this sub-part D. It is not meant for standard or used parts/materials.
- 3 The issue of an authorised release certificate, where eligible, is dependent on the customer, who may request for the original certification instead.

Note: Certifying staff should meet the DGCA requirements in respect of qualifications.

- 4 Before the issue of the authorised release certificate, the certifying staff must ensure evidence is available that :
  - (a) The item complies with the information stated on the authorised release certificate;
  - (b) The item is serviceable; and
  - (c) Will substantiate any statement referring to the time in service or life of the item.

**ACS 145.250(b) Certification of release**

- 1 The format of the authorised release certificate should be in accordance with that specified in Appendix 2 of this sub-part D.
- 2 The authorised release certificate should make reference to the original certification as well as any special requirements.
- 3 The person issuing the authorised release certificate should use his full signature and preferably an impression of the authorised person's stamp.

**ACS 145.265(a) Inspection procedures and quality system**

- 1 The inspection procedures should cover all aspects of carrying out the inspection, handling and storage activities and in reality lay down the standards to which the sub-part D distributor organisation intends to work. The standards laid down by the aircraft component manufacturers must be taken into account.
- 2 The inspection procedures should address SAR 145.225 to 145.260 inclusive and the limitations of SAR 145.275 to 145.295 inclusive.

**ACS 145.265(b) Inspection procedures and quality system**

- 1 The quality system is in fact an independent system under the control of the SAR145.230(a) quality manager looking at the SAR-145.265(a) inspection procedures and the correctness of the SAR-145.295 equivalent safety case process.
- 2 The DGCA expects the quality system to review all inspection procedures as described in the exposition in accordance with an approved programme. The quality system should show when audits are due, when they are completed and include a system of audit reports which can be seen by visiting CAAS officers on request. The audit system should clearly establish a means by which audit reports containing observations about non-compliance or poor standards can be actioned. The means should ultimately lead to the accountable manager.

**ACS 145.265(c) Inspection procedures and quality system**

- 1 Contracting quality monitoring to a SAR-145 approved maintenance organisation (also approved under sub-part D) means an organisation that holds an approval rating that at minimum covers the approved activities of the sub-part D organisation working to SAR 145.265(c). The DGCA will need to be satisfied that the arrangement is practical and that quality monitoring can be carried out.
- 2 - reserved -
- 3 The para 1 organisation should conduct at least two full audits in every twelve month period of which one audit should be unannounced. It is the responsibility of the sub-part D approved distributor organisation to comply with the findings of the contracted SAR145 quality monitoring organisation.

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**SINGAPORE AIRWORTHINESS REQUIREMENTS****PART 145****SUB-PART D APPENDIX 1****CERTIFICATION REQUIREMENTS FOR NEW AIRCRAFT PARTS****1 PURPOSE AND SCOPE**

The purpose of this Appendix is to inform the user/installer of the certification required of new aircraft parts from various countries as listed in Table 1. It should be noted that the list is by no means exhaustive and that the various authorities may change their documentation from time to time. It is the responsibility of the SAR-145 or the sub-part D organisations to ensure that the documentation at the time of issue is in accordance with the relevant authorities' requirements.

Should the SAR-145 or sub-part D organisations become aware of any changes to Table 1, they should inform the DGCA in writing at the following address:

Airworthiness & Flight Operations Division  
Civil Aviation Authority of Singapore  
Singapore Changi Airport  
P.O. Box 1  
Singapore 918141

or by fax at (65) 6545 6519.

Note : Amendments may take time to be carried out as it is not feasible to have piece-meal amendments. As such, the DGCA may issue Advisory Circular to inform the organisations of any changes.

This Appendix addresses only aircraft components/parts/materials. Standard parts, as identified by the aircraft manufacturers, may require only Certificates of Conformance and should not be given any form of aviation certification.

**2 GENERAL**

Notwithstanding anything contained in Table 1, a document is not a document of a kind for the purpose of this sub-part D of SAR-145 unless:

- (a) It is the original or a certified true copy issued by the originator;
- (b) It identifies the originator;
- (c) It states the quantity of and fully describes each item the document covers, by name, part number and/or specification and serial number, if applicable; and
- (d) It is duly endorsed by an appropriately qualified personnel in accordance with the requirements of the country of origin.

The DGCA may reject any documentation should it have reason to believe that they have not been properly completed by the originator or that the appropriate requirements have not been complied with.

All printing shall be clear and legible to permit easy reading.

Should the documentation be in a language other than English, a translation into English would be required.

Where a separate listing is attached, there must be proper cross-referencing between Certificate and list. The total number of pages of the list should also be reflected in the Certificate. The pages of the list should also be properly numbered and each page must bear the endorsement of the originator.

TABLE 1 - DOCUMENTS FOR NEW AIRCRAFT PARTS

REQUIRED DOCUMENT
<ol style="list-style-type: none"><li>1. CAAS (AW)95</li><li>2. CAAS (AW)96 – in the case of re-issued parts</li><li>3. EASA Form 1</li><li>4. FAA Form 8130-3</li><li>5. JAA Form 1 issued prior to 28 November 2003 by a production organisation approved by a JAA Full Member State</li><li>6. JAA Form 1 issued prior to 28 November 2005 by a production organisation approved by a competent authority in accordance with its national regulations</li></ol>
Prior approval from CAAS must be obtained for the acceptance of new parts with release documents other from the above mentioned.

**SINGAPORE AIRWORTHINESS REQUIREMENTS****SAR - 145****SUB-PART D APPENDIX 2****THE AUTHORISED RELEASE CERTIFICATE/AIRWORTHINESS APPROVAL TAG – CAAS(AW)96****1 PURPOSE AND SCOPE**

The purpose of the Certificate is to identify airworthiness and eligibility status of parts/components/assemblies (hereafter referred to as "part(s)") re-issued by distributors under the approval of the Civil Aviation Authority of Singapore (CAAS).

The Certificate referenced CAAS(AW)96 is called the authorised release certificate.

The Certificate is to be used for export/import purposes, as well as for domestic purposes, and serves as an official certificate for the delivery of parts from the approved distributor to users.

It can only be issued by organisations approved by the DGCA within the scope of the approval or by the DGCA itself.

Note : Whole aircraft, engines or propellers may not be released using the Certificate.

**2 GENERAL**

The Certificate shall comply with the format attached including block numbers in that each block must be located as per the layout. The size of each block may however be varied to suit the individual application, but not to the extent that would make the Certificate unrecognisable. The size of the Certificate may be significantly increased or decreased so long as the certificate remains recognisable and legible. If in doubt consult the DGCA.

All printing shall be clear and legible to permit easy reading.

The Certificate shall either be pre-printed or computer generated but in either case the printing of lines and characters must be clear and legible. Pre-printed wording is permitted in accordance with the attached model but no other certification statements are permitted.

Completion of the Certificate shall be in English.

The details to be entered on the Certificate can be either machine/computer printed or handwritten using block letters and must permit easy reading.

Abbreviations must be restricted to a minimum.

The space remaining on the reverse side of the Certificate may be used by the originator for any additional information but may not include any certification statement.

The top copy Certificate or a certified true copy shall accompany the parts and correlation shall be established between the Certificate and the part(s). A copy of the Certificate shall be retained by the organisation that re-issued the part. Where the Certificate format and data is entirely computer generated, subject to acceptance by the DGCA it is permissible to retain the Certificate format and data on a secure data base.

Note : There is no restriction in the number of copies of the Certificate sent to the customer or retained by the originator.

The Certificate that accompanies the part may be attached to the part by being placed in an envelope for durability.

### 3 COMPLETION OF THE RELEASE CERTIFICATE BY THE ORIGINATOR

Except as otherwise stated, there must be an entry in all blocks to make the document a valid certificate.

Refer to the attached copy of the Certificate:

- |         |  |
|---------|--|
| Block 1 | The country of origin of the CAAS is Singapore. It must be pre-printed.  |
| Block 2 | The first line in this block shall be the Civil Aviation Authority of Singapore. It must be pre-printed.   |
| Block 3 | A serial number must be pre-printed in this block for Certificate control and traceability purposes except that in the case of a computer generated document the serial number need not be pre-printed where the computer is programmed to produce the number. Nonetheless, for the later case, a pre-printed serial number is still required to account for the Certificates. |
| Block 4 | The full name and address of the organisation releasing the part covered by this Certificate. This block must be pre-printed. Logos, etc., are permitted if the logo can be contained within the block.  |
| Block 5 | The purpose of this block is to reference work order/contract/invoice or any other internal organisational process such that a fast traceability system can be established.  |
| Block 6 | This block is provided for the convenience of the organisation issuing the Certificate to permit easy cross-reference to the "Remarks" Block 13 by the use of item numbers. Completion is not mandatory.   |

Where a number of items are to be released on the Certificate it is permissible to use a separate listing cross-referring Certificate and list to each other. The total number of pages of the list should be reflected in the Certificate. The list should also be properly paginated and each page must bear the endorsement of the originator.

- |         |   |
|---------|---|
| Block 7 | The name or description of the part shall be given. Preference should be given to use of the Illustrated Parts Catalogue (IPC) designation.   |
| Block 8 | State the part number. Preference shall be given to use of the IPC number designate.  |
| Block 9 | Used to indicate the type-approved products for which the released parts are eligible for installation. The following entries are permitted: <ul style="list-style-type: none"> <li>(a) The specific or series aircraft, propeller, or engine model on which the part is eligible for installation or reference to a readily available catalogue or manual which contains such information. For example: "A300".</li> <li>(b) "Various", if known to be eligible for installation on more than one model of type-approved product, unless the originator wishes to restrict usage to a particular model installation when it should so state.</li> <li>(c) "Unknown", if eligibility is unknown, this category being primarily for use by maintenance organisations.</li> </ul> |

Note : Any information in block 9 does not constitute authority to fit the part to a particular aircraft, engine or propeller. The User/Installer must confirm via documents such as the Parts Catalogue, Service Bulletins etc., that the part is eligible for the particular installation.

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|----------|---|
| Block 10 | State the number of parts being released. |
|----------|---|

- Block 11 State the part Serial Number or Batch Number if applicable, if neither applicable, state "N/A".
- Block 12 The word "RE-ISSUED" must be pre-printed. It refers to the re-issue of new parts obtained under cover of acceptable document, as specified in Appendix 1 of this Subpart D, from approved sources.
- Block 13 It is mandatory to state any information in this block either direct or by reference to supporting documentation that identifies particular data or limitations relating to the parts being released that are necessary for the User/Installer to make the final airworthiness determination of the part. Information should be clear, complete, and provided in a form and manner which is adequate for the purpose of making such a determination.
- Each statement must be clearly identified as to which item it relates.
- If there is no statement, state "None".
- Some examples of the information to be quoted are as follows:
- Modification standard
  - Alternative approved parts supplied
  - Compliance with, or non-compliance with AD's, or Service Bulletins
  - Information on life limited parts
  - Condition of parts or reference to a document detailing this information
  - Manufacturing date or cure date
  - Shelf life data
  - Shortages
  - Exceptions to the notified special requirements of the importing country
- Block 14 The Certificate can be used only for new parts re-issued by distributors. The certification statement must be pre-printed.
- Block 15 The Certificate must be signed by a person who has the written approval to perform this function on behalf of the DGCA.
- A rubber stamp signature is not allowed.
- An impression of the authorised person's stamp may be made in addition to the signature.
- Block 16 The name of the person signing the Certificate shall be typed or printed in a legible form.
- Block 17 The date of signing the release statement.
- Block 18 The sub-part D approved distributor organisation reference number given by the DGCA. It shall be pre-printed.

Please note the User Responsibility Statements on the reverse side of the Certificate. These statements may be printed at the bottom of the front page of the Certificate if space allows.



1. Country <b>SINGAPORE</b>		2. <b>CIVIL AVIATION AUTHORITY OF SINGAPORE AUTHORISED RELEASE CERTIFICATE FOR RE-ISSUED PARTS BY DISTRIBUTORS</b>				3. Form Tracking Number	
4. Approved Organisation Name and Address					5. Work Order/Contract/Invoice		
6. Item	7. Description	8. Part No.	9. Eligibility *	10. Quantity	11. Serial/Batch No.	12. Status/Work	
						RE-ISSUED	
13. Remarks							
14. Re-issued Parts  Certifies that the part(s) identified above has (have) been received under procedures approved under the Singapore Airworthiness Requirements and that supporting documents are held in the records of this company. Certifies that unless otherwise stated in Block 13, the part(s) conform(s) to the specifications and conditions required by your order.							
15. Authorised Signature		17. Date (d/m/y)		18. Issued by and on behalf of the SAR-145 sub-part D approved distributor organisation under reference :			
16. Name				AWI /			

CAAS(AW)96 - Issue 2

\* Installer must cross check eligibility with applicable technical data

(Front)

**USER / INSTALLER RESPONSIBILITIES**

NOTE:

1. It is important to understand that the existence of the Certificate alone does not automatically constitute authority to install the part/component/assembly.
2. Where the user/installer works in accordance with the national regulations of an Airworthiness Authority different from the Civil Aviation Authority of Singapore (CAAS), it is essential that the user/installer ensures that his/her Airworthiness Authority accepts parts/components/assemblies from the CAAS.
3. Statement 14 does not constitute installation certification. In all cases, the aircraft maintenance record must contain an installation certification issued in accordance with the national regulations by the user/installer before the aircraft may be flown.

(Reverse)