Brunei Department of Civil Aviation

Negara Brunei Darussalam

www.mtic.gov.bn/dca

Brunei Aviation Requirements

BAR 8 – Part 26 General Requirements for Airworthiness – Volume 1

Table of Contents

Control of this Document

DC.1 Introduction

DC.1.1 Pursuant to Civil Aviation Order 2006 and the Civil Aviation Regulations 2006 and their subsequent amendments, the following requirements are hereby established for compliance by all persons concerned, the Director of Civil Aviation is empowered to adopt and amend Brunei Aviation Requirements. In accordance herewith, the following requirement is hereby established for compliance by all persons concerned. This requirement shall be known as BAR 8 – Part 26 General Requirements for Airworthiness – Volume and any reference to this title shall mean referring to the requirements to be met for civil aviation in Brunei Darussalam.

DC.2 Authority for this Requirement

DC.2.1 This BAR 8 – Part 26 General Requirements for Airworthiness – Volume is issued on the authority of the Director of Civil Aviation.

DC.3 Applicability

DC.3.1 This BAR 8 – Part 26 General Requirements for Airworthiness – Volume is applicable to the aviation industry of Brunei Darussalam.

DC.4 Scope

DC.4.1 BAR 8 Part 26 General Requirements for Airworthiness– Volume 1 contains the basic requirements to be met for civil aviation in Brunei Darussalam, and shows compliance with ICAO Annexes.

DC.5 Definitions

DC.5.1 Terms not defined within this document shall have the meaning given to them in the relevant legal instruments or international legal instruments in which they appear, especially as they appear in the Convention and its Annexes.

ICAO Compliance Statement

ICAO compliance statement to BAR 8 Part 26 General Requirements for Airworthiness– Volume 1

(a) As a contracting state to ICAO (Chicago Convention), Brunei DCA has to ensure that it acts consistently with the obligations placed on Brunei Darussalam under the Convention on International Civil Aviation (Chicago Convention) of December 1944.

(b) This document is published in support of Brunei DCA's discretionary powers contained in the Civil Aviation Order 2006 and Part 3 of the Brunei Civil Aviation Regulations 2006 and includes requirements based on certain International Standards and Recommended Practices (SARPs) contained in Annexes to the Chicago Convention.

(c) It is the policy of Brunei DCA to have reference to this document when exercising the discretionary powers referred to above and, in particular, it will exercise those powers to ensure the effective implementation of any such requirements based on SARPs.

Continuing Airworthiness (CAW)

CAW-001 Personnel Certification for Non-Destructive Testing of Aircraft, Engines, Components and Materials

1. **General**

1.1. This General Requirement advises the Brunei DCA's requirements for the training and qualification of Non-Destructive Testing (NDT) personnel involved in the manufacture and maintenance of aircraft or aircraft components, which shall be in accordance with the European Standard EN4179[1] and the BAR 8 Part 145 Approved Organisation's written practice/procedures for the authorisation of NDT personnel.

1.2. All examinations shall be conducted by personnel or organisations under the general control of the UK National Aerospace NDT Board (UK NANDTB).

1.3. The term NDT is used throughout this General Requirement to include, but not be limited to, all the common methods identified in EN4179 and shall also be applicable to all other NDT methods used by BAR 8 Part 145 Approved Organisations.

1.4. Non Destructive Inspection (NDI) as defined by BAR 8 Part 145, as opposed to EN4179, is not considered by the Brunei DCA as NDT and whilst relevant personnel engaged in NDI require appropriate training, they do not require qualification in accordance with EN4179. The UK NANDTB has published policy on the applicable training and qualification required for NDI and NDT methods and techniques ref. NANDTB 18.

1.5. Personnel may qualify in accordance with The British Institute of Non-Destructive Testing (BINDT) PCN/AERO scheme and may be issued an EN4179 authorisation by the organisation subject to any additional formal specific training and examination as determined by the Nominated Level 3 person (see paragraph 4). Such additional formal training and examinations should also be under the control of the UK NANDTB. All training and examinations that extend the scope of an individual's authorisation is to be under the control of the UK NANDTB. Additional training associated with new equipment, new product lines, new operating practices etc. constitute on the job training and do not fall under the UK NANDTB remit.

2. **Definitions**

Aerospace Sector: A particular section of industry or technology where specialised NDT practices are used requiring specific aerospace product related knowledge, skill, equipment or training.

Authorisation (of NDT personnel/Personnel Approval): The authority of persons to perform NDT on behalf of an employer based on a written statement issued by the Approved Organisation on the recommendation of the Nominated Level 3 attesting to the individual's competence as specified within the certificate.

Authorisation (of Certifying Staff): The authority of NDT personnel to certify the

[1] EN4179 (Aerospace Series – Qualification and Approval of Personnel for Non-Destructive Testing). All references to Standards within this Requirement are to be taken as referring to the latest issue and are available from the British Standards Institute,Chiswick High Road, London. W4 4AL

completion of tasks in accordance with approved design data via a Brunei DCA Form 1, issued by the Approved Organisation (see BAR 8 Part 145, 145.A.35). All Brunei DCA Form 1 certifying staff shall be referenced in the MOE, or cross referenced to a recognised register/database for certifying staff, with sample signatures/stamp number.

Authorisation (of NDT procedures): The act of signifying approval of NDT procedures by a Level 3 authorised in the method.

National Aerospace NDT Board (NANDTB): An independent organisation representing a nation's aerospace industry chartered by the participating prime organisations and recognised by the national regulatory authorities to provide or support NDT qualification services and examinations in accordance with an standard acceptable to the NAA.

NDT Instruction: A written description of the precise steps to be followed in testing to an established standard, code, specification or NDT procedure.

NDT Method: One of the disciplines of non-destructive testing (e.g. ultrasonic, radiography, etc.) within which different techniques may exist.

NDT Procedure: A written description of all essential parameters and precautions to be observed when applying an NDT technique to a specific test, following an established standard, code or specification.

NDT Technique: A category within an NDT method, e.g. ultrasonic immersion or ultrasonic testing of composites. The employer or approved body may define specific techniques within a method.

Qualification: The proven ability of NDT personnel to meet the requirements of a given specification in terms of physical requirements, training, knowledge and experience necessary to perform the applicable NDT method.

Qualification Examination: An examination administered by an independent certifying body, e.g. PCN, or by a body authorised within the employer's compliant written practice, which demonstrates the general, specific and practical knowledge of the candidate.

Type Certificate: For the purposes of this General Requirement, Type Certificate includes Type Acceptance Certificate, Type Certificate, Supplementary Type Certificates, FAA Technical Standard Orders (TSO's) or European Technical Standard Orders (ETSO) Authorisations.

Written Practice: The procedure that describes an employer's requirements and methodology for controlling and administrating the NDT personnel qualification and authorisation/approval process.

3. Procedures for the Qualificaiton of NDT Personnel

3.1. All Approved Organisations involved in any aspect of NDT shall develop and maintain procedures for the qualification and authorisation of their NDT personnel in accordance with EN4179. The Organisation's procedures and written practice as defined by EN4179 shall be approved by the Nominated Level 3. The procedures / written practice should normally be published as a separate document and cross referenced in the appropriate exposition, manual or quality management system as applicable.

3.2. With effect from the publication date of this General Requirement, training and examination of all NDT personnel working in Brunei based Organisations must be under the control of the UK NANDTB or another body acceptable to the Brunei DCA

3.3. NDT Personnel Certification does not relieve an Organisation of its responsibility to authorise staff to perform and certify work. Such Authorisations are to be granted in accordance with the Organisation's Quality Procedures and be subject to audit.

3.4. In all cases the Organisation's procedures for the training, examination and certification of NDT personnel should be subject to independent audit and review.

4. **Nominated NDT Level 3 Personnel**

4.1. Approved Organisations (BAR 8 Part 145) shall nominate in writing, using an AIR Form 4 supported with evidence of independent qualification, an individual responsible to the Accountable Manager, for the technical supervision of NDT. This individual will hold NDT qualification at NDT Level 3 in the Aerospace Sector and will be referred to as the Nominated Level 3. This position shall be identified within the Organisation's Exposition, and any change in this position advised to Brunei DCA.

4.2. The Brunei DCA recognises the following independent qualifications as appropriate for the position of Nominated Level 3:

4.3. EN4179 Level 3 as administered by a BINDT accredited Outside Agency

4.4. PCN/AERO Level 3

4.5. ASNT Level 3

4.6. Such an individual must also demonstrate evidence of specific knowledge andexperience appropriate to the Organisation's scope of work.

4.7. Where the Nominated Level 3 is not qualified in all NDT methods used by the Organisation, then additional personnel necessary to provide coverage shall be named in the exposition or quality manual and shall hold NDT Level 3 certification issued under those schemes detailed in para 4.2

4.8. The Brunei DCA may accept person's external to the Organisation as the Nominated Level 3, provided written agreement exists between the individual and the Organisation setting out the individual's responsibilities within the Organisation. The Brunei DCA will also need to be satisfied that an externally contracted Level 3 can commit to provide sufficient man-hours to cover the technical supervision of NDT.

4.9. **Note:** Where an individual is employed by another organisation, the agreement should include the consent of the external organisation contracting out the services of the particular Level 3 person.

4.10. As a nominated individual, the Nominated Level 3 must be provided with the necessary co-operation (access to facilities, company procedures, training records, audits and inspection reports etc) to allow that person to carry out their function under the Approval.

4.11. The Terms of Reference for the Nominated Level 3 to discharge his/her responsibilities shall include:

(a) Identify any additional NDT qualified Level 3 personnel necessary for coverage when the Nominated Level 3 is not qualified in all NDT methods used by the Organisation;

(b) Identify any additional Level 3 personnel necessary to provide adequate day-to-day coverage depending on the size/facilities of the Organisation;

(c) Approve the Organisation's NDT procedures and written practice for the Training and Qualification of NDT personnel as meeting this requirement and EN4179 as appropriate;

(d) Review the Organisation's written practice every 12 months to ensure that any changes in the regulations, applicable standards and the Organisation itself are reflected;

(e) Ensure that NDT procedures are reviewed every 12 months;

(f) Ensure that technical audits (both system and product) are carried out or supported by appropriately qualified personnel every 12 months in order to ensure compliance with the organisation's written practices / procedures and this requirement and to ensure that the acceptable standard of inspection is achieved. These audits shall form part of the approved organisation's internal quality management system.

5. Inspections and Certification of Inspections

5.1. NDT inspections shall be carried out by personnel approved in accordance with the Organisation's written practice or procedures. Where NDT procedures and part specific instructions are specified by the organisation responsible for the design and/or manufacture of the aircraft, material, structure or component, then these must be used except where change is permitted and authorised as defined in Section 6 of this General Requirement.

5.2. Where non-mandatory inspections are to be undertaken, for which the responsible design/manufacturing organisation has not specified part specific NDT procedures, then the NDT method, technique, procedure and instruction shall be prepared in accordance with Section 6 of this Requirement and approved by a Level 3 holder qualified in the applicable method.

5.3. Normally, certification of inspections will be made by authorised persons who hold NDT Level 2 or Level 3 NDT qualification. However, where an inspection task is determined by the Nominated Level 3 to have clearly defined acceptability and rejection criteria requiring no interpretation, then certification may be carried out by an authorised NDT Level 1 as detailed within the written practice.

5.4. Where a Level 3 is required to carry out and certify an NDT inspection he/she must either hold a current Level 2 NDT qualification in the relevant method(s), or, alternately be able to provide evidence that they have successfully completed an appropriate Level 2 practical examination and have maintained continuity in the application of practical testing as defined in the referenced standards and detailed in the written practice before the issuance of an authorisation.

5.5. The term certification as defined by EN4179 is used to denote 'operating authorisation/approval' and does not automatically permit an individual who meets the requirements of EN4179 to certify a DCA Form 1. An organisation must authorise a suitably qualified person before that person can certify NDT inspections.

6. NDT Techniques and Instructions and their Approval

6.1. NDT techniques, procedures and instructions, published and specified by the Type Certificate Holder in NDT Manuals, Service Bulletins, Approved Repair Drawings etc. constitute airworthiness data.

6.2. Where the continued airworthiness data published by the Type Certificate Holder permits changes (e.g. selection of equipment model, probe type etc.) then such

changes must be authorised in writing by a Level 3 qualified in the appropriate method.

6.3. Any other change to the Type Certificate Holder's airworthiness data requires the written agreement of the Type Certificate Holder responsible for the design of the product/structure before such a change is implemented.

6.4. NDT Instructions prepared by a Level 2 Holder shall be approved by a Level 3 Holder qualified in the applicable method. Co-ordination between the Level 3 Holder and Organisation responsible for the Type design must be maintained to ensure that the selected NDT inspection provides an appropriate level of defect sensitivity and probability of detection to the intended application.

6.5. The procedure for the control of all NDT techniques, procedures and instructions, including their preparation and authorisation shall be detailed in the Organisation's Exposition

7. Suppliers and Sub-Contractors

7.1. For a BAR 8 Part 145 Organisation performing maintenance on any aircraft or component for which it is approved, where NDT inspections are required, they may on occasions be granted the privilege within their scope of work to utilise sub-contractors working under the quality system of the BAR 8 Part 145 Organisation. Where sub-contracting includes NDT processes, the exposition and written practice shall define how the Organisation ensures that the training and authorisation of the sub-contractors NDT personnel is controlled and satisfies 145.A.30(f). See BAR 8 Part 145.A.75 (b) and the associated AMC and guidance material.

8. National Aerospace NDT Board

8.1. The UK NANDTB is responsible for but not limited to:

(a) control and support of the implementation of applicable standards covering qualification, certification and authorisation of NDT personnel;

(b) formulation of the necessary qualification policy framework;

(c) maintaining an overview of the implementation of its policy and approving the methods and levels of any charges in connection thereof;

(d) having the authority to set up working groups and committees, establish their terms of reference and set out the procedures whereby they report to the UK NANDTB;

(e) advising industry and regulatory authorities on training and qualification applicable to new and emerging NDT technologies not covered by EN4179.

8.2. The UK NANDTB will also provide a mechanism for maintaining an overview of EN4179 and PCN/AERO qualification examinations.

8.3. The UK NANDTB policies and procedures can be found on the following web site: http://www.bindt.org/NANDTB/NANDTB.html.

CAW-002 Airworthiness Flight Testing

1. **Introduction**

1.1 Brunei DCA has the responsibility for the continuing airworthiness regulation for all aircraft registered in Brunei Darussalam. Brunei DCA has published continuing airworthiness requirements in BAR 8 Part M.

Brunei DCA does not require the routine flight testing of aircraft for a Certificate of Airworthiness Issue, renewal or prior to the issue of a Certificate of Airworthiness for export. This General Requirement defines the Brunei DCA's policy for the airworthiness flight testing of aircraft on the register of Brunei Darussalam

1.2 This requirement will also apply to the BAR 8 Part M, Subpart I, Airworthiness Review Certificate process when this is introduced.

2. **Requirement**

2.1 The Brunei DCA may require the airworthiness flight testing of an aircraft on its register if concerns arise about the aircraft's ability to operate to the type certification performance requirements defined in the approved flight manual, pilots operating hand book or type certificate data sheet.

2.2 Circumstance that may require the flight testing of an aircraft include, but are not limited to:

(a) Following major repairs or modifications.

(b) After an incident or accident.

(c) If doubt exist about the performance of the aircraft.

(d) If the aircraft has been inactive for an extended period of time.

3. **Procedure**

3.1 The Brunei DCA will notify the owner/ operator that it requires the flight testing of an aircraft in a particular case. The airworthiness section will agree with the owner/ operator the format of the airworthiness flight test and also the flight test schedule to be used.

3.2 The pilot flying the aircraft should be experienced on the aircraft type. If necessary, an experienced test pilot from another authority or the aircraft manufacturer may be used. For aircraft above 5700kgs, the pilot flying the aircraft must have flown with a test pilot acceptable to the Brunei DCA before performing flight tests. In all cases, the person flying the aircraft should ensure they are fully briefed on the tests to be performed and able to fly the aircraft in the required manner.

3.3 For aircraft below 5700kgs, a Brunei DCA, flight test observer from the Flight Operations Department, will accompany the pilot on the test flight. The flight test observer will be responsible for monitoring that the flight test is performed in the required manner and the flight test schedule accurately completed.

3.4 For aircraft above 5700kgs, the owner/operator can use another pilot or flight engineer qualified on the aircraft type, as a flight test observer. The flight test observer must be carried in addition to the flight crew required by the approved flight manual. The Department reserves the right to require one of its flight test observers to be onboard the aircraft during the flight test.

3.5 On all flight tests, the Brunei DCA may require an Airworthiness inspector to be on board the aircraft.

3.6 For further advice on the flight testing of aircraft, please contact the Brunei DCA, Airworthiness Section.

Chapter 24. Electrical Power

24-001 Electrical Generation Systems – Aircraft below 5700 kg MTWA

1. **Introduction**

1.1. Investigations into accidents and incidents involving total loss of generated electrical power to aircraft, the maximum authorised weight of which does not exceed 5,700 kg, have shown certain inadequacies in the standard of failure warnings and indications provided. Experience has shown that the loss of generated electrical power can remain undetected for a significant period of time, resulting in the serious depletion of the available battery capacity and reduced duration of supplies to essential services under these conditions.

1.2. This General Requirement is for the retrospective modification of certain aircraft to ensure that a clear and unmistakable warning of loss of generated electrical power is given, and to preserve or provide sufficient electrical energy to operate essential services for an adequate period of time in the event of such a loss occurring

2. **Requirement**

2.1. For all multi-engined aircraft below 5700 kg MTWA compliance with paragraphs 2.2 to 2.6 inclusive of this General Requirement, or with a Brunei DCA approved alternative providing an equivalent level of safety, is required.

(a) Where it can be shown that an aircraft is fitted with such limited electrical and radio equipment, or is certificated to operate under such limited conditions (e.g. VMC day only) that the loss of generated electrical power would not significantly prejudice safe flight, the Brunei DCA will, on application, waive this General Requirement where it is satisfied that compliance would not be justified In the circumstances of a particular case.

2.2. Clear visual warning shall be provided, within the pilot's normal line of sight, to give Indication of either:

(a) reduction of the generating system voltage to a level where the battery commences to support any part of the main electrical load of the aircraft or

(b) loss of the output of each engine driven generator at the main distribution point or busbars

2.3. The battery capacity shall be such that In the event of a complete loss of generated electrical power, adequate power will be available for a period of not less than 30 minutes following the failure, to support those services essential to the continued safe flight and landing of the aircraft (see paragraph 3.1). This includes an assumed period of not less than 10 minutes from operation of the warning specified in paragraph 2.2 for completion of the appropriate drills. This delay period may be reduced to not less than five minutes if the warning system is provided with "attention getting" characteristics (e.g. a flashing light). For the purpose of calculations it shall be assumed that the electrical load conditions a. the time of failure are those appropriate to normal cruising flight at night (see paragraph 3)

2.4. Where all gyroscopic attitude reference instruments, i.e. bank and pitch indicator(s) and turn and slip indicator(s), are dependent on electrical power for their operation, at least one of these Instruments shall continue to operate without crew action for the prescribed 30 minute period.

Note 1: For certain aircraft types a turn and slip indicator may not be acceptable as the sole remaining attitude reference instrument.

Note 2: Certain aircraft are equipped with both electrically operated and air driven attitude reference instruments. In such cases the air driven instrument(s) will be accepted as providing the emergency attitude information provided that the requirements of paragraph. 2.5 are met.

2.5. The instrument(s) with which the requirement of 2.4 will be met shall be clearly designated and:

(a) shall be so located on the instrument panel that it will be visible to, and usable by the pilot from his normal position and

(b) shall be provided with means of indicating that the power supply to the instrument is operating correctly.

2.6. Precise drills covering crew action in the event of electrical generation system failures and malfunctions shall be included in the appropriate aircraft manual(s), together with a statement of the battery endurance under specified load conditions.

3. Additional Information

3.1. When ascertaining that the installed aircraft battery capacity is adequate for compliance with paragraph 2.3, the following loads should be taken into account:

(a) Attitude information (where applicable in accordance with paragraph 2.4).

(b) Essential Radio Communication.

Note: For the purpose of calculations it will normally be accepted that intermittent use of a single VHF communication equipment satisfies this requirement. Utilisation on the basis of a total of 15 minutes reception plus 3 minutes transmission in the 30 minute period would be an acceptable interpretation.

(c) Essential cockpit lighting.

(d) Pitot Head Heater (applicable only to those aircraft certificated for flight in icing conditions).

(e) Any other services essential for the continued safe flight and landing of the particular aircraft.

(f) Those services that cannot readily be shed when carrying out the drills required under paragraph 2.6.

3.2. In order to ensure that the essential services, taken into account in accordance with paragraph 3.1, will function adequately for the prescribed period, the calculation of the duration of battery supply should normally be based on the following assumptions:

(a) Only 75% of the ‘name plate’ rating of the battery is available (this is to take into consideration loss of capacity with age, and a realistic state of charge).

(b) The voltage/time discharge characteristic of the battery, appropriate to the load of the listed services, is not extended beyond a battery terminal voltage of 21•5 volts on a 24 volt system, pro rata for 12 volt systems, (this is to ensure that the voltage available throughout the prescribed period is adequate for the satisfactory operation of the services).

Note: *Only where compliance with this Requirement cannot be shown within the criteria of paragraphs 3.1 and 3.2, will consideration have to be given to the fitment of additional, or larger capacity, batteries to particular aircraft*.

3.3. Applications for the approval of modifications necessary to ensure compliance with this General Requirement should be made in the manner specified in BAR 8 Part 21 Subpart D.

24-002 Electrical Generation Systems – Bus-Bar Low Voltage Warning Single-Engined Aircraft with a Brunei Certificate of Airworthiness

1. **Introduction**

1.1. General Requirement 24-001 is intended for twin engine aircraft with more reliance on electrical systems. However systems which were once fitted only in the more complicated twin-engined general aviation aircraft, have now been developed and fitted to single-engined aircraft. Thus, greater reliance is being placed on the integrity of the electrical power supplies for such aircraft.

1.2. As a result of the above, this General Requirement has been produced and requires certain single-engined aircraft to be equipped with low voltage warning devices to give indication to the pilot of when the aircraft's battery commences to support all or part of the electrical load of the aircraft.

1.3. This General Requirement extends and clarifies the need for a clear and unmistakable warning of the loss of generated electrical power (to the main bus-bar) as detailed in paragraph 2.1(a). This will be by the introduction, where necessary, of retrospective modifications.

2. **Requirements**

2.1. For all single-engined aircraft with a Brunei Certificate of Airworthiness equipped with an engine driven electrical generating system, compliance with paragraphs 2.2 and 2.3, or with an approved alternative, providing an equivalent level of airworthiness, is required not later than 31 December 2016, or next annual check whichever is the latest.

(a) Where an aircraft is equipped to operate under day VMC conditions only and the loss of the generated electrical power could not prejudice safe flight and landing, the requirements of this General Requirement are considered to be satisfied without the provision of a specific warning.

2.2. A clear and unmistakable red visual warning shall be provided, within the pilot's normal scan of vision, to give indication of the reduction of the voltage at the aircraft bus-bar to a level where the battery commences to support all or part of the electrical load of the aircraft.

2.3. Guidance shall be given in the appropriate aircraft manual(s) on any actions to be taken by the pilot should the warning operate. (see also paragraph 3.2).

3. **Additional Information**

3.1. The recommended voltage levels for operating the warning required under paragraph 2.2 of this Requirement are 25 volts to 25•5 volts for a nominal 24 volt dc system and 12•5 volts to 13 volts for a nominal 12 volt dc system.

3.2. The battery duration should be sufficient to make a safe landing and should be not less than 30 minutes, subject to the prompt completion of any drills. This duration need only be a reasonable estimate and not necessarily calculated by a detailed electrical load analysis. However, when making this estimate, only 75% of the battery nameplate capacity should be considered as available because of loss of battery efficiency during service.

3.3. Owners and operators are recommended to contact the aircraft manufacturer or main agent for information regarding suitable means of compliance with this Requirement.

3.4. Owners and operators may, on application, submit proposals for their own means of compliance and may refer to the guidelines laid down in UK CAA CAP 562, Civil Aircraft Airworthiness Information and Procedures (CAAIP) Leaflet 24-50.

24-003 Emergency Power Supply for Electrically Operated Gyroscopic Bank and Pitch Indicators (Artificial Horizons)

1. **Introduction**

1.1. The purpose of this General Requirement is to require the retrospective modification of certain classes of aircraft to ensure that continuity of horizon information is maintained to enable the crew to maintain safe flight in the continuation of presentation to the pilot of reliable aircraft attitude Information.

1.2. Aircraft types fitted with air driven gyroscopic bank and pitch indicators are exempted from the requirements of this General Requirement.

2. **Requirement**

2.1. Compliance with paragraphs 2.3 and 2.4 of this General Requirement, or with a Brunei DCA approved alternative providing an equivalent level of safety is required as a condition for the issue of a Certificate of Airworthiness for aircraft within the following classifications:

(a) aircraft operated for the purpose of commercial air transport for the carriage of more than 19 persons over the age of three years.

(b) aircraft with an MTWA in excess of 15000 kg.

(c) newly constructed aircraft with an MTWA in excess of 5700 kg.

2.2. Where it cannot be shown that in the event of a total failure of the main electrical generating system an adequate supply will be available automatically to a suitable bank and pitch indicator for a minimum period of 30 minutes, assuming that no special crew action is taken for 10 minutes, then a separate emergency supply, independent of the aircraft electrical generating system, which will automatically supply such an instrument and its associated lighting for a minimum period of 30 minutes, shall be provided.

2.3. Where the emergency supply is provided by a separate battery it is permissible for this battery to be (trickle) charged from the main electrical generating system, provided that the installation is such that the battery cannot discharge back into the main system.

2.4. The instrument supplied in accordance with 2.2 shall be:

(a) the third instrument (standby horizon) where this is provided, or failing such provision.

(b) the bank and pitch indicator fitted to the Captain's flight instrument panel.

2.5. Where the third instrument is fitted it shall:

(a) operate independently of any other attitude indicating system.

(b) be so located on the instrument panel that it will be visible to, and usable by, both pilots from their normal positions.

(c) be compatible in presentation with the main attitude indicating system.

(d) be fitted with a failure warning device.

Alternatively, a means of indicating that the power supply to the instrument is operating correctly shall be provided.

2.6. Where the instrument on the Captain's flight instrument panel is utilised:

(a) The circuitry to the instrument shall be modified, as necessary, so that transfer to the emergency source of supply is automatically affected in the event of failure of the main supply.

(b) The requirements of paragraph 2.5(d) shall be met.

3. **Additional Information**

3.1. Experience has shown that under conditions of widespread adverse weather, or heavy traffic density at airports, a period of 30 minutes may be a less than desirable time for flight to a suitable airfield and landing, and clearly this period by itself is inadequate for long range aircraft.

3.2. The basis of Brunei DCA certification of all long range, and of certain short/medium range, aircraft types is that after a period of interruption of electrical supplies it will be possible for the crew to re-establish sufficient normal, or emergency, generated power to support all necessary essential services, including the instrument covered by this General Requirement, for the remainder of the flight. The prescribed period of 30 minutes is considered to be adequate to allow for appropriate crew action for this class of aircraft.

3.3. For those shorter range aircraft that are totally dependent on battery power to support all essential services to the completion of the flight, a period of 30 minutes assuming a crew delay time of 10 minutes, is the mandatory minimum endurance of the emergency supply for the horizon instrument prescribed in this General Requirement.

3.4. It is, however, strongly recommended that in circumstances where the crew do take prompt and correct actions in response to warning indications of the interruption of all generated electrical power, the aircraft installation should include adequate battery capacity to provide a 60 minute supply for both the subject instrument and the other services essential to complete the flight and make a landing.

24-004 Electrical Power Supplies for Aircraft Radio Systems

1. **Introduction**

This General Requirement draws attention to the dangers of operation of aircraft in which the entire radio installation is supplied in a single electrical feeder circuit, the loss of which could significantly affect the safety of the aircraft.

2. **Requirements**

The electrical feeder arrangements shall be such that:

2.1. Where more than one radio system is installed, no likely single failure (e.g. a fuse or a relay) will result in the loss of all radio systems.

Note 1: *It is strongly recommended that such a failure should only result in the loss of one radio systems*

Note 2: *The reference to radio system includes any associated audio system.*

2.2. Where duplicate radio systems, or radio systems which can duplicate a function, are installed, no likely single failure (e.g. a fuse or a relay) will result in the loss of both systems.

3. **Interpretation**

In examining electrical feeder arrangements to establish compliance with paragraph 2, the examination for likely single failures should include:

(a) the mechanical and electrical aspects of the supply circuit, including the return path of the electrical supply;

(b) the location within the electrical circuit of fuses, circuit breakers and power switching relays, their physical location in the aircraft and the manner in which they are interconnected; and

(c) panels for integrated control of radio systems, audio integration systems, and dimmer control equipment for electronic displays.

4. **Implementation**

4.1. Aircraft used for the purposes of public transport of passengers or cargo must comply with the requirements of paragraph 2.

4.2. Multi-engined aircraft used for any purpose must comply with the requirements of paragraph 2.

4.3. The Brunei DCA will consider applications for a waiver to this General Requirement in respect of multi-engined aircraft that is not used for the purposes of public transport, when it can be satisfied that the aircraft is fitted with such limited radio equipment, or is restricted to operations under such limited conditions, that the loss of the electrical supply to all radio equipment would not significantly affect the safety of the aircraft during its permitted normal operation.

5. **Recommendation**

It is strongly recommended that all single-engined aircraft (in addition to those for which compliance is required) should comply with the requirements of this General Requirement.

Chapter 25. Equipment / Furnishings

25-001 Flame Resistant Furnishing Materials

1. **Introduction**

1.1. The Brunei DCA requirements for compartment design safety precautions are satisfied by demonstrated compliance with the aircraft certification standards accepted via the issuance of a Brunei Type Acceptance certificate in accordance with BAR 8 Part 21 Subpart B for a new aircraft type.

1.2. Materials used for carrying out repairs or modifications to aircraft cabin furnishings are also required to have flame resistant properties, which are either at least equal to those of the materials and their specifications as required by the state of design and used in the original design or approved STC.

2. **Requirements for Initial Acceptance of Materials**

Wherever possible only inherently flame resistant materials shall be used. However, materials which meet the requirements by the use of a flame retardant process, applied either during or after manufacture, may also be used provided that (since all materials may at some time be dry-cleaned or washed) the material is shown to be flame resistant when tested both before and after being subjected to three representative cleaning processes.

3. **Requirements for Maintenance of Fire Resistance**

3.1. Continuance of the flame resistance properties of furnishing materials may depend upon their use in service and the methods used in their cleaning. Experience has shown that:

(a) The proprietary flame retardant processes often applied to furnishing materials during or after manufacture, in order to provide the necessary flame resistant properties, may be destroyed or seriously impaired where the incorrect dry cleaning, laundering or proprietary finishing processes which enhance durability and minimise soiling, are used.

(b) The application of one flame retardant process on top of another, of a different type may have the effect of inhibiting the properties of both processes.

(c) During service, seat covers become contaminated with perspiration which leaves a deposit of body salts etc. These deposits may accumulate, impairing the flame resistance properties of the materials.

(d) Disinfectants, etc., are often sprayed from aerosol containers in aircraft cabins. The accumulation of these agents may also affect the long term flame resistant properties of the furnishing materials.

3.2. Operators and maintenance organisations are reminded, therefore, that they must have adequate control over the cleaning of aircraft furnishing materials. For this, they need to have a knowledge of the material type, the recommended cleaning or proprietary finishing processing method, the effects of time in service on the flame resistance properties, the flame retardant processes applied, if any, and the method of re-application of such a process, where this is necessary. It is not acceptable to place reliance on unsubstantiated claims concerning the continuance of flame resistant properties of a material after durability or additional flame retarded processes have been applied. Where such processes have been applied, there is a

need to prove the continued acceptability of a particular material or process in service, and, thus, further flame resistance test must be conducted accordance with requirements identified in paragraph 1.1 of this General Requirement.

25-002 Galley Equipment

1. **Applicability**

This General Requirement is applicable to all galley equipment installed or carried for use on an aircraft. For the purpose of this General Requirement "Galley Equipment" includes service carts, catering trolleys and their means of restraint in the passenger area; galley inserts including ovens, water boilers, coffee makers, refrigerators, etc., and control panels dedicated to individual equipment.

2. **Introduction**

2.1. It has become increasingly apparent that some designers and installers of galley equipment installed or carried in aircraft have not recognised the need to satisfy the relevant requirements of the State of Design and that as a result in certain instances safety has been prejudiced.

Note: *For the purpose of this General Requirement, the "relevant requirements" are the aircraft certification standards associated with the type certification basis accepted by Brunei DCA for the issue of the Certificate of Airworthiness for the aircraft in which the galley equipment is installed.*

2.2. All equipment installed or carried in an aircraft shall be installed or stowed and kept stowed and so maintained and adjusted as not to be a source of danger in itself or to impair the airworthiness of the aircraft or the proper functioning of any equipment or services necessary for the safety of the aircraft.

2.3. This General Requirement is issued to rectify the situation in paragraph 2.1 and to emphasise that these requirements constitute the basis for certification of galley equipment, not only when they form part of the aircraft type design but also when they are fitted in an aircraft already issued with a Certificate of Airworthiness or when such equipment fitted to an aircraft is modified. It also defines the procedures which apply to the certification of galley equipment.

3. **Compliance**

With effect from 1 April 2016 all equipment used in all galley installations is required to satisfy the requirements stated herein.

4. **Procedure**

4.1. Trolleys and items of galley equipment which require electrical power are, unless otherwise specifically agreed by Brunei DCA, classified as "Controlled Items" of equipment as and approved in accordance with BAR 8 Part 21 Subpart K.

Note: For the purposes of this General Requirement, "controlled items" defines equipment the installation or failure of which could adversely affect the airworthiness and safe operation of an aircraft.

4.2. Catering boxes and equipment not requiring electrical power are classified as "Uncontrolled Items". It is therefore necessary for an appropriately approved BAR Part M, CAMO organisation to accept responsibility for the suitability and quality of such equipment.

Note: For the purposes of this General Requirement "Uncontrolled Items" defines items which in themselves are not inherently unsafe and, when installed, cannot adversely affect the airworthiness and safe operation of the aircraft and so installed that, in the event of their failure or malfunction, the items will not endanger the aircraft or its occupants.

4.3. Catering trolleys, designed for use in specific galleys on particular aircraft types, are considered as an extension of the aircraft structure via the galleys and are, therefore, required to be certificated as modifications in accordance with BAR 8 Part 21 Subpart D.

5. Applicable Requirements

5.1. The design of galley inserts shall comply with the requirements of the state of design or an equivalent standard acceptable to Brunei DCA which provides an equivalent level of safety. Additionally, the state of design requirements for all electrical equipment in respect of electrical and magnetic interference, shall apply.

5.2. The design of all galley equipment shall minimise the risk of personal injury to the user as required by the relevant state of design requirements. In particular, vessels containing heated liquids over 45 degrees C shall have closely fitting integral lids. The use of open hot-plates and open cooking utensils as frying pans is not permitted.

5.3. Galley equipment and its‟ installation shall have adequate strength to comply with the emergency alighting, flight and ground cases of the relevant state of design requirements.

5.4. Doors, including their hinges and catches, or catering boxes, etc, must be of strength compatible with the placarded contents weight, unless use of the box is restricted to stowage in completely enclosed galleys, or similar compartments. This also applies to the doors of catering trolleys, but in their case the total structure of the trolley must also be shown to be in compliance with the strength requirements, taking into account the means of retention of the trolley in the aircraft.

5.5. The design of the trolley should be such that the loads imposed on the aircraft floor do not exceed any floor loading limitations.

5.6. It is strongly recommended that duplicated catches are provided for means of retention for items which are habitually operated during flight, to allow for failure of one of the catches.

Where retention of a unit into its stowage compartment is by turn catch, operating the catch should not release more than one unit.

Note: In respect of galley equipment which is located in the vicinity of flight attendant seats, an additional restraint device (dual latching or equivalent) may be required depending on the state of design requirements.

5.7. Where catering trolleys have the facility for the collection of waste, they shall be designed and constructed to provide a standard of fire containment acceptable to Brunei DCA. Demonstrated compliance with the state of design requirements as applicable will be accepted by Brunei DCA in accordance with BAR 8 Part 21 Subpart D as meeting the fire containment requirement.

5.8. Where the basis of type certification of the aircraft requires the provision of means of trolley restraint in the passenger cabin capable of withstanding the loads associated with the flight cases, the trolleys shall be provided with attachment means compatible with the anchorage points provided in the aircraft. Such a method of restraint should be engineered so that it can be used by one person and so that its use will be likely to occur by virtue of its simplicity of operation.

5.9. The trolleys must also embody a brake system if they are to be removed from stowage in flight in the absence of evidence justifying an equivalent minimum breaking force then the braking mechanism must be qualified by loading the trolley

to its maximum loaded weight and ensuring that the breaking mechanism holds the trolley on an incline plane of 7.5 degrees.

5.10. Trolleys shall carry the following placarded instructions:

(a) that they must be stored and secured during taxi, take-off, turbulent weather and landing

(b) that the gross weight of the unit, or the combined gross weight of the unit and any other galley insert when stowed together, must not exceed the placarded maximum content weight of the compartment where stowed, and

(c) that when removed from their stowage they must not be left unattended.

5.11. The installation of all galley equipment shall be such that the size, weight, and means of restraint are compatible with the stowage facility provided, and that under design loads the item will not deform in such a manner so as to free itself from the means of restraint.

5.12. Account must be taken of the individual and total electrical power demand of galley equipment and an electrical load analysis must be included in the design documentation.

25-003 Improved Flammability Test Standards for Cabin Interior Materials

1. **Applicability**

This General Requirement is applicable to all Brunei registered aeroplanes over 5700 kg MTWA, certificated for Commercial Air Transport to carry 20 or more passengers and of a type for which a Type Certificate was issued (in any ICAO contracting states) on or after 1 January 1958.

2. **Introduction and Background**

2.1. Analysis of aircraft accidents in which cabin fire has been a major factor has indicated to major NAA's that currently approved cabin interior materials should meet more severe flammability test standards to reduce the risk of an uncontrolled in-flight cabin fire and extend the survival time in a ground fire emergency.

2.2. Cabin interior material flammability, smoke and toxic emissions are some of the critical factors which affect cabin occupant survivability. Over the past twenty years there has been extensive research carried out, particularly in the USA, in an attempt to quantify the hazards and to define meaningful test methods and airworthiness standards.

2.3. Recent research work, involving full scale fire tests, has established a significant correlation between flammability characteristics and both smoke and toxic emissions. As a result they have placed great emphasis on the introduction of fire-hardened materials into aircraft (i.e. materials with higher ignition temperatures, reduced heat release rates and lower content of thermally unstable components).

2.3. Under the provision of this General Requirement, aircraft already in service may continue without incorporating materials that comply with the new flammability and smoke emission test standards until such a time as the cabin interior is substantially renewed. In due course the Brunei DCA may consider it necessary to propose dates by which all aircraft shall be in compliance.

3. **Compliance**

3.1. With effect from 20 August 2016, but prior to 20 August 2018, all aeroplanes defined in paragraph 1 of this General Requirement, which are either newly manufactured or are the subject of a substantially complete cabin interior renewal, shall comply with the requirements of paragraph 4.1 of this General Requirement.

3.2. With effect from 20 August, 2018, all aeroplanes defined in paragraph 1 of this General Requirement, which are either newly manufactured or are the subject of a substantially complete cabin interior renewal, shall comply with the requirements of paragraph 4.2 of this General Requirement.

(a) Brunei DCA may be prepared to grant a dispensation for specific components of the cabin interior which do not meet the applicable flammability and smoke emission requirements, provided that special circumstances exist which makes compliance impractical. Such dispensations will be limited to aircraft which are newly manufactured or the subject of a substantially complete cabin interior renewal before 20 August 2018.

(b) A request for such a dispensation must include full details of the steps being taken to achieve compliance, acceptable reasons for such non-compliance and a thorough and accurate analysis of each component.

4. Requirements

4.1. In addition to meeting the existing state of design flammability test standards, Cabin interior ceiling and wall panels (other than lighting lenses), partitions, and the outer surfaces of galleys, large cabinets and stowage compartments (other than underseat stowage compartments and compartments for stowing small items such as magazines and maps), shall satisfy the test standards of the requirements the state of design except that the total heat release over the first two minutes of sample exposure shall not exceed 100 kilowatt-minutes per square meter, and the peak heat release rate shall not exceed 100 kilowatts per square metre.

4.2. Cabin interior ceiling and wall panels (other than lighting lenses), partitions, and the outer surfaces of galleys, large cabinets and stowage compartments (other than underseat stowage compartments and compartments for stowing small items such as magazines and maps), shall satisfy the test standards of the requirements of the state of design.

5. Additional Information

5.1. For the purpose of this General Requirement, the term 'substantially complete cabin interior renewal', has been used to cover the renewal of all sidewall panels, ceiling panels and/or overhead stowages, whether this is done at one refurbishment or progressively over a period of time as part of a planned cabin interior renewal programme.

5.2. The requirements of this General Requirement are not applicable to individual cabin interior components which are refurbished or have to be replaced due to unserviceability, e.g. individual sidewall or ceiling panels or overhead stowage doors. However, where these components are newly manufactured the Brunei DCA strongly recommends that they should meet the appropriate requirements of this General Requirement.

5.3. The requirements of this General Requirement are not normally applicable to the internal structures of galleys and overhead stowages, floor panels and floor coverings, transparent or translucent components such as lenses used in interior lights, illuminated signs and window anti-scratch panels, and other small cabin items such as door and window mouldings, curtains, window shades, seat trays, arm rests and parts of the passenger service units. However, these requirements would be applicable to large surface panels of passenger service units.

5.4. If there is any uncertainty as to the applicability of this General Requirement the Brunei DCA should be consulted for clarification.

25-004 Minimum Space for Seated Passengers

1. **Applicability**

This General Requirement is applicable to all Brunei registered aeroplanes over 5700 Kg MTWA, operated for the purposes of Commercial Air Transport and configured to carry 20 or more passengers.

2. **Introduction**

2.1. The layout of cabin interiors must be approved under modification approval Procedures in accordance with BAR 8 Part 21. As part of that approval each seat type shall be approved as required by the requirements of the state of design .The approval procedure for such controlled items is defined in BAR 8 Part 21 Subparts D and K.

2.2. At the initial evaluation of a seat, an assessment of the limiting conditions of use is made and, when agreed with the seat manufacturer, these are specified on the General Arrangement drawing, on the Declaration of Design and Performance (DDP) or specifically highlighted in a letter of approval. Included in these limitations is a minimum seat pitch at which approval for installation on an aeroplane has been granted. This minimum pitch is defined taking into account head, trunk and leg strike areas of the seat in front, the ability to occupy the seat and, if necessary, quickly vacate the seat and enter the aisle in an emergency.

2.3. To formalise the minimum acceptable seating standards the normal design extremes used for certification purposes for all occupied zones, (namely the anthropometric data for the 5th percentile female to the 95th percentile male), have been taken into account. In this regard the critical dimension for the seated occupant is the buttock-knee length. Additionally, affecting the ease with which the occupant can stand up and move from the seat to the main cabin aisle, is the minimum distance and the vertically projected distance between the seat and any seat or fixed structure immediately ahead of the occupant.

2.4. Use of these three dimensions as the criteria for the determination of the acceptability of any seating configuration is considered to provide a realistic minimum standard that can be uniformly adopted, whether the seating being considered is placed adjacent to seats of the same or different types, or other typical interior structures. These Requirements are not intended to supersede or replace existing occupant protection criteria prescribed in the state of design requirements.

3. **Compliance**

3.1. With effect from the date of issue of this General Requirement, all aeroplanes defined in paragraph 1 above and which are being subject to the provision of a new (not previously Brunei DCA approved) or amended seating configuration, shall comply with this General Requirement.

3.2. With effect from 3 years after date of issue of this General Requirement 25-004 all aeroplanes defined in paragraph 1 above shall comply with the requirements of this General Requirement.

4. **Requirements**

4.1. The minimum distance between the back support cushion of a seat and the back of the seat or other fixed structure in front, shall be 26 inches. (Figure 1, Dimension A).

4.2. The minimum distance between a seat and the seat or other fixed structure in front, shall be 7 inches. (Figure 1, Dimension B).

4.3. The minimum vertically projected distance between seat rows or between a seat and any fixed structure forward of the seat, shall be 3 inches. (Figure 1, Dimension C).

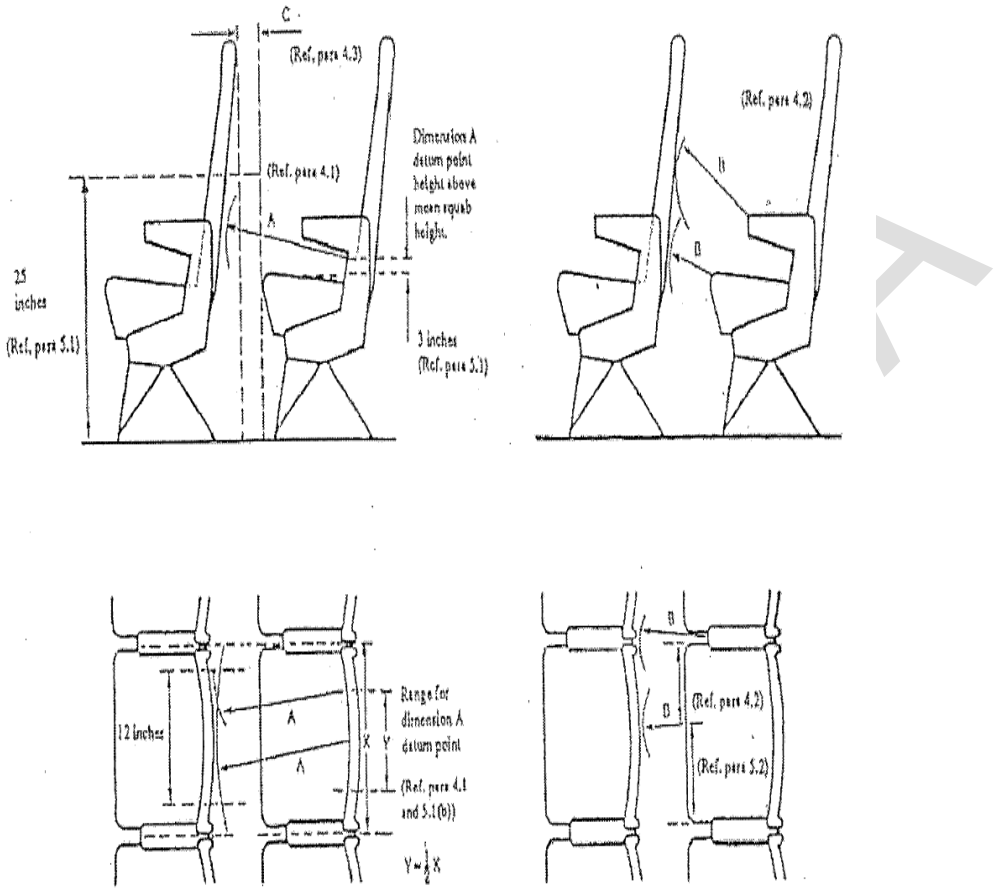


Figure 1 Minimum Dimension Required

5. Additional Information

5.1. The measurements required for the demonstration of compliance with the requirement given in paragraph 4.1 above are as follows:

(a) from a datum point in the centre of the seat back at a height of 3 inches above the mean uncompressed seat squab height to the seat or other fixed structure in front made in both vertical and horizontal arcs up to a limiting height of 25 inches above the carpeted floor level, over the full seat place width ‘X’ (see Figure 1.)

(b) from any point on the seat back within the centre one half ‘Y’ of the seat place width at a height of 3 inches above the mean uncompressed seat squab height to the seat or other fixed structure within the central 12 inch region in front made in vertical and horizontal arcs up to a limiting height of 25 inches above the carpeted floor level.

5.2. The full width of the forward edges of the seat squab cushion and the seat armrests shall be used as the datum points for the measurements of the minimum distance

required by paragraph 4.2 above. From these points the measurement of the distance shall be made in both horizontal and vertical unlimited arcs.

5.3. The vertically projected distance required by paragraph 4.3 above shall be measured between the forward edge of the seat squab cushion or the most forward extremity of the armrests and the most aft part of the seat or fixed structure in front.

5.4. Where a magazine rack is provided for the normal stowage of the cabin safety leaflet, sick bag and in-flight reading material provided by the operator, such normally provided material shall be in place during the measurements. Similarly, any fold down or other type of meal table attached to either seat or fixed structure should be in its normal stowed (take-off and landing) position for all measurements.

5.5. All measurements shall be made with the seats in the upright (take-off and landing) position, and the armrests shall be down.

5.6. No alleviation to these requirements will be granted on the basis of deformable soft furnishings.

5.7. All modifications to seats, their installation or any modification to adjacent fixed structures, necessary to achieve compliance with this General Requirement shall be the subject of approval in accordance with BAR 8 Part 21 Subpart D.

25-005 Helicopter Emergency Escape Facilities

1. **Applicability**

1.1. This General Requirement is applicable to those Brunei registered helicopters required to carry the equipment specified in the BAR 6 Part CAT and being operated:

(a) for the carriage of passengers or cargo to or from vessels or installations used in connection with oil or gas exploration or exploitation; or

(b) for the transfer of personnel to or from vessels or lighthouses. Additionally, this General Requirement also applies to helicopters being operated:

(c) over the sea or tidal estuaries in association with pollution monitoring; and

(d) in a dedicated offshore Search and Rescue role. It is issued to enhance safety and survivability to crew and passengers from a ditched helicopter.

2. **Compliance**

Compliance is required prior to operating any Brunei Registered helicopter defined in paragraph 1 above.

3. **Requirements**

3.1. All liferaft installations shall comply with the requirements of the state of design accepted by Brunei DCA which require liferaft installations to be suitable for use in all sea conditions in which helicopter ditching, flotation and trim are required to be evaluated.

3.2. All Emergency Exits, including crew Emergency Exits, shall be marked and illuminated to comply with state of design requirements, which requires exit markings to remain adequate if the helicopter capsizes after ditching and the cabin becomes submerged.

3.3. All non-jettisonable doors of Ditching Emergency Exits shall comply with state of design requirements, which requires such doors to have means of securing them in the open position so they do not interfere with occupants egress in all sea conditions up to the maximum required to be evaluated for ditching and flotation.

3.4. All openings in passenger compartments agreed by Brunei DCA as suitable for the purpose of underwater escape shall be equipped so as to be openable in an emergency.

3.5. All openings such as windows of a suitable size shall be designed to open from inside the helicopter.

4. **Additional Information**

4.1. Helicopter liferafts shall be designed to have a high level of damage tolerance. This can be provided in part by design of the liferaft, but action is also necessary to minimise the chances of liferaft damage while the liferaft is on the water adjacent to the helicopter, due to projections on the exterior of a helicopter.

Examples of projections which need to be considered are aerials, overboard vents, unprotected split pin tails, guttering and any projection sharper than a three dimensional right angled corner.

4.2. It is recommended that all projections likely to cause damage in a zone delineated by boundaries which are approximately 1•22 m (4 ft) above and 0•61 m (2 ft) below the established static water line, should be modified or suitably protected to

minimise the likelihood of their causing damage to a deployed liferaft, and that all relevant approved maintenance schedules should be amended to ensure that such protection remains effective.

While the boundaries specified in paragraph 4.2 are intended as a guide, the total area which should be considered should also take into account the likely behaviour of the liferaft after deployment in all sea states up to the maximum in which the helicopter is capable of remaining upright.

4.3. Operators and maintenance organisations are reminded that wherever a modification or alteration is made to a helicopter within the boundaries specified, consideration should be given to affording such protection as may be required to prevent the modification or alteration causing damage to a deployed liferaft.

4.4. Particular care should also be taken during routine maintenance to ensure that additional hazards are not introduced by, for example, leaving inspection panels with sharp corners proud of the surrounding fuselage surface, or allowing door sills to deteriorate to a point where sharp edges become a hazard.

4.5. The same considerations apply in respect of emergency flotation equipment.

4.6. As part of the overall assessment of flotation equipment and its operation brought about by the issue of this General Requirement, the maintenance aspects of the various systems were examined. This resulted in a rationalisation of all the relevant approved maintenance schedules to ensure a common approach to the maintenance of flotation systems across different operators fleets. Operators should therefore, ensure that the established common approach to the maintenance of on board flotation equipment is continued.

Chapter 26. Fire Protection

26-001 Fire Precautions - Aircraft Toilets

1. **Applicability**

This General Requirement is applicable to all aircraft over 5700 kg operating for the purposes of Commercial Air Transport.

The intent of the requirement is to reduce the probability of persons smoking in toilet compartments and minimising the potential fire hazard caused by persistent smokers.

2. **Requirements**

2.1. Inspection

(a) At intervals not exceeding 72 hours elapsed time, or at such other intervals as may be agreed with Brunei DCA on the basis of available data, the following inspection shall be performed:

(1) All receptacles shall be inspected to ascertain that all entry flaps or doors still operate, fit, seal and latch correctly, ashtrays are fitted, notices installed and receptacle stowage compartment is clean with all debris removed.

(2) Any defects revealed by the inspection of (a) (1) are corrected.

(b) This inspection shall be included in the Maintenance Programme/Schedules using the normal procedure.

2.2. Prohibition of Smoking in Toilet Compartments

(a) Smoking shall not be permitted in toilet compartments.

(b) No Smoking placards and ashtrays are required both inside and outside these compartments.

(c) The No Smoking placards shall be displayed so as to be prominent to, and the ashtrays shall be obviously and conveniently placed for, those about to enter and those within these compartments.

2.3. Re-Assessment

Except where agreement has been obtained from Brunei DCA that compliance would not be justified in the circumstances of a particular case, the design of all receptacles provided in the toilet compartments of aircraft over 5700 kg, operated for the purposes of Commercial Air Transport, shall be re-assessed against this General Requirement, and proposals shall be made, by the operators of such aircraft to Brunei DCA for the incorporation of modifications necessary to show compliance, including a date (to be agreed by Brunei DCA). The operator should consult the aircraft manufacturer regarding such modifications and obtain Brunei DCA approval in accordance with BAR 8 Part 21 Subpart D.

3. **Interpretation of Requirements**

3.1. State of Design Requirements (eg JAR 25, CS 25) state that all receptacles for used towels, papers and waste shall be constructed of materials resistant to fire. The receptacles shall incorporate covers or other provisions for containing fires if started in the receptacle.

3.2. For compliance to be shown, such receptacles (but see 3.4 for towel dispensers) shall be constructed of materials which are flame resistant, and which in addition, will retain sufficient mechanical properties as to contain such a fire as may develop by burning of materials such as paper towels, as may be within the receptacle. (It should be noted that although a thermoplastic material may be flame resistant it would not necessarily retain adequate mechanical properties in the case of a fire.) The receptacle shall be completely enclosed with the exception of a self-closing entry flap or door, which itself shall be rigid, and when closed, form as airtight a seal as is practicable. Entry flaps or doors shall be designed so that they remain self-closing even after exposure to a fire within the receptacle.

3.3. It is, however, permissible for receptacles to be open topped provided that they are mounted in a cabinet which itself complies with 3.2. In this instance, the door of the cabinet shall be of a robust construction and such as to ensure an adequate seal and to withstand misuse in service. Such cabinets shall not contain other flammable materials, potential fire sources (e.g. electrical apparatus) or apertures which would either allow air to feed a fire or permit a fire to spread beyond the cabinet (e.g. through apertures provided for services).

3.4. It is accepted that some receptacles, e.g. paper towel dispensers, cannot readily be designed to meet the above requirements. In such instances they shall be so designed and positioned within the compartment to ensure that:

(a) the likelihood of the depositing of cigarette ends, etc., into them is minimised, and

(b) a fire, which could be expected to start in another container, cannot readily spread to them; for example, a paper towel dispenser must not be positioned adjacent to, or immediately above, either the entry flap or door of a waste container or an ashtray provided in the compartment.

Chapter 32. Landing Gear

32-001 Tyre Bursts in Flight – Inflation Media

1. **Applicability**

1.1. This General Requirement is applicable to all Brunei registered aeroplanes with a Maximum Take-off Weight Authorised (MTWA) exceeding 5700 kg and fitted with retractable landing gears.

1.2. The intent of this General Requirement is to ensure continued compliance for the protection of equipment from the effect of tyre burst as required by the requirements state of design.

2. **Introduction**

2.1. State of Design Requirements (eg JAR 25, CS 25) require equipment to be protected from the effects of tyre burst. In addition the Brunei DCA requires the operational hazards due to tyre bursting in flight be minimised.

2.2. The majority of in-flight tyre bursts have been attributed to the tyre carcass being weakened by foreign object damage, scuffing, etc., such that a rapid release of pressure takes place. Such failures are usually experienced when the gear has been retracted for some time and the effects of brake heat transfer, internal tyre temperature and differential pressure are combined.

2.3. A fatal accident involving cabin decompression and fire has highlighted another mode of tyre failure in flight where a tyre may fail explosively without any significant prior degradation. A tyre inflated with air and subjected to excessive heating, possibly caused by a dragging brake, can experience a chemical reaction resulting in release of volatile gases. Such a chemical reaction in the presence of the oxygen in the contained air may result in a tyre explosion in a landing gear bay and/or an in-flight fire since it appears that the protection normally afforded by conventional pressure relief devices in the wheel would be incapable of responding adequately to the rapid increases in temperature and gas pressure associated with auto-ignition.

2.4. Laboratory material and tyre burst testing indicates that the risk of auto-ignition can be reduced by using an inert gas for tyre inflation and servicing.

2.5. Other potential benefits may accrue from the use of Nitrogen as it will tend to reduce wheel corrosion, tyre fatigue and the risk of fire when fusible plugs melt due to brake overheating.

3. **Compliance**

3.1. With effect from 1 January 2018, all braked wheels on aeroplanes defined in paragraph 1 will be required to have tyres inflated with Nitrogen, or other suitable inert gas, and maintained such as to limit the Oxygen content of the compressed gases to not greater than 5% by volume.

3.2. To ensure compliance with this requirement suitable inflation and servicing procedures must be adopted in consultation with the airframe constructor. At airfields where suitable inert gases are not normally available. It is acceptable to use air for inflation or servicing provided that a suitable entry is made in the Technical Log and that the tyre is re-inflated or serviced in accordance with-the agreed procedure at the earliest opportunity or within 25 flight hours, whichever is the sooner.

3.3.

4. Additional Information

In addition to compliance with the requirement of paragraph 3 above, tyre and wheel assemblies should be maintained such that greases, solvents, powders and rubber dust are excluded as far as practicable from within the inflation volume.

32-002 Landing Gear Aural Warning

Compliance with the requirement is demonstrated by complying with EASA CS 25.729, or equivalent or with the following:

(a) Large aeroplanes have a landing gear aural warning device that functions continuously under the following conditions:

(1) For aeroplanes with an established approach flap position, whenever the flaps are extended beyond the maximum certificated approach climb configuration position in the Aeroplane Flight Manual and the landing gear is not fully extended and locked.

(2) For aeroplanes without an established approach climb flap position, whenever the flaps are extended beyond the position at which landing gear extension is normally performed and the landing gear is not fully extended and locked.

(b) The warning system of sub-paragraph (a) of this General Requirement:

(1) does not have a manual shut-off means readily available to the flight crew such that it could be operated instinctively, inadvertently or by habitual reflexive action;

(2) is, in addition to the throttle-actuated device, installed under the airworthiness type certification specifications; and

(3) may utilise any part of the throttle-actuated system, including the aural warning device.

(c) The flap position sensing unit may be installed at any suitable place in the aeroplane.

Chapter 51. Standard Practices and Structures – General

51-001 Painting of Aircraft

1. **Applicability**

This General Requirement is applicable to all Brunei registered aircraft issued with a Certificate of Airworthiness.

2. **Introduction**

Experience has shown that a greater degree of control has to be exercised over the painting of aircraft exteriors. The term painting in this context embraces the associated processes of stripping and such terms as refinishing and refurbishing.

3. **Compliance**

3.1. All aircraft defined in paragraph 1 which are to have their external finish substantially altered, shall comply with this General Requirement.

3.2. The Owner, operator or the BAR 8, Part 145 Approved Maintenance Organisation must assess the proposed task for its airworthiness implication, taking into account the aircraft manufacturers published requirements and precautions in addition to any additional information the Brunei DCA may publish, and make a decision as to the need for a Certificate of Release to Service (CRS). Owners and operators should consult their Approved Maintenance Organisation prior to making such a decision.

3.3. When a CRS is judged to be necessary, the signatory to the CRS will take responsibility for the whole process and should, therefore, assess the extent of the work to establish the need to :

Carry out on-site supervision including stage inspections.

(a) Brief the work force to avoid any airworthiness hazard, particularly where significant problems could be concealed by subsequent work processes.

(b) Ensure that any task carried out is adequately defined by documented process specification containing sufficient information to control the procedure.

(c) Ensure that all necessary guidance material, including the aircraft manufacturers' published data and the paint manufacturers' instructions are provided.

(d) Anticipate potential problems resulting from partial restoration which could mean additional paint weight in significant areas and the need for balancing of control surfaces.

(e) Make provision to rectify any corrosion detected following paint removal.

(f) Ensure the restoration of corrosion inhibiting compounds where washing or use of solvents or other paint removal techniques may have removed them in areas adjacent to those being repainted.

(g) Determine the basic weight and corresponding centre of gravity position.

Note: It may benefit the owner to anticipate any scheduled structural inspections including Non-Destructive Inspections, which could be better accomplished following the paint removal.

4. **Requirement**

When the need for a Certificate of Release to Service has been judged necessary under paragraph 3 of this requirement, for an aircraft which has been externally painted or had some significant change to its finish, such as paint removal and subsequent polishing, then a Certificate of Release to Service must be issued upon completion of the process (see paragraph 6).

5. **Certification of Release to Service**

5.1. Brunei DCA will not grant specific Approval for painting of aircraft. Therefore, specialist painting organisations will not be entitled to issue any certification in respect of the airworthiness status of an aircraft following painting, unless the organisation holds an appropriate Brunei DCA BAR 8 Part 145 Organisation Approval.

5.2. A licensed aircraft engineer holding the relevant Category B1 Licence for the class of aircraft, with any Type Rating in the appropriate subcategory of BAR 1 Part 66, has authority to issue a CRS for the satisfactory completion of the external finish.

6. **Additional Information**

6.1. Examples of likely damage and hazards that must be avoided include:

(a) Damage caused during preparation work which could adversely affect the structural integrity of the aircraft, such as:

(1) reduction in fastener head size by uncontrolled use of power tools and abrasive media;

(2) surface scratching by use of paint scrapers;

(3) use of incorrect tools and equipment to remove paint and aerodynamic sealant from lap and butt joints;

(4) degrading of composite or plastic surfaces by abuse of particle blasting techniques;

(5) aluminium surface contamination by steel wool particles; and

(6) use of incorrect chemical paint strippers.

(b) Damage to transparencies, composites and sealants by solvent and paint removers, due to inadequate protection and/or the retention of these products in crevices.

(c) Inadvertent deletion of placards and markings, failure to renew them, or failure to comply with the required specification for, e.g. Registration Marks, mandatory door markings and break in zone identification.

(d) Blockage of vents, drains and other openings by debris, masking tape and residues of paint remover, paint or particle blast material; the possible ingress of water into fuel tanks through vent apertures or past filler cap seals when using high pressure hoses for washing down.

(e) Loss of correct mass balance moments on flight control surfaces.

(f) Uncontrolled variations to aircraft basic weight.

(g) Variation to surface profile and aerodynamic smoothness at critical points such as surface leading edges, by the uncontrolled use of fillers or excessive paint thickness.

(h) Inadequate knowledge of the manufacturers' finishing schemes for antennas and radomes.

(i) Overly aggressive paint stripping which could damage the sealant around air data ports/orifices on RVSM compliant aircraft (air flow over these areas is critical for the height keeping capability of the aircraft).

(j) For fabric coverings, special procedures which ensure proper adhesion and protection from the effects of ultra-violet light. Aggressive removal of the old finish may cause fabric damage. The exposed fabric should be assessed for its serviceability prior to refinishing. The advice published by the manufacturer of synthetic fabric would have to be made available and complied with in full as well as that of the aircraft manufacturer.

(k) The effects of excessive paint thickness on the application of non-destructive testing techniques using eddy current and ultrasonic methods.

(l) Jamming of flight control and landing gear mechanisms by preparation treatments and paint.

6.2. Examples of finishing work that would require the issue of a CRS:

(a) Complete repainting from bare metal or fabric, or overcoating an existing finish.

(b) Reversion from paint finish to polished metal.

(c) Repainting or reversion to bare metal on flying control surfaces or supercritical lifting surfaces.

(d) Extensive polishing of bare metal finish using abrasive polishes where skin thickness or fastener head dimensions are critical, particularly where polishing is to be a repetitive requirement.

(e) Finishing of radomes, antennas and composite materials used in Primary and Secondary structure.

(f) Painting in areas involving critical orifices or mandatory markings.

(g) Any alteration to the finish of Helicopter main rotor and tail rotor blades or any other critical parts.

Notes

1) It is not intended that the requirement for the issue of a CRS should include minor repairs to surface finish where airworthiness implications are minimal.

2) The above list of examples is not intended to be exhaustive.

6.3. It is recommended that aircraft issued with a Permit to Fly should be subject to the same principles of compliance with this General Requirement, although there is no legal requirement for the issue of a Certificate of Release to Service.

6.4. Operators and maintenance organisations are reminded that the use of self adhesive decals as an alternative to painting may totally preclude both visual and eddy current inspections. Operators and maintenance organisations need to address the impact on structural inspection tasks when using such decals and ensure that the aircraft maintenance programme requires their removal at the appropriate time.

Chapter 52. Doors

52-001 Cargo Containment

1. **Applicability**

This General Requirement is applicable to the approval of containers used in aircraft for the transportation of cargo in which the securing of the cargo to the aircraft structure is dependent upon the strength of the container. It includes containers used for the transportation of livestock e.g. pens and horseboxes.

2. **Introduction**

2.1. The appropriate state of design requirements (eg JAR or CS) require that cargo compartments and the means provided for the restraint of the cargo shall have sufficient strength to restrain the cargo under flight and ground conditions to prescribed acceleration factors. In addition, unless the compartment and cargo are so located that in the event of the cargo breaking loose in emergency alighting conditions it is unlikely to cause injury to the occupants of the aircraft, damage fuel tanks or lines, or to nullify any of the escape facilities, the compartment and the means provided for restraint of the cargo shall also comply with the emergency alighting conditions of the appropriate state of design requirements.

2.2. A survey of containers (such as pens and horseboxes) by another NAA shows that usually the restraint of the animals depends on the containers themselves and that these are not always of adequate design and construction to enable the requirements to be met.

3. **Requirements**

3.1. Containers, whether built into the aircraft or as self-contained units intended for transfer from one aircraft to another, shall with effect from the date of issue of this General Requirement, together with their means of installation into aircraft, comply with the appropriate strength requirements of either:

(a) the flight, ground and emergency alighting loads, or

(b) the flight and ground loads, depending on their intended location in the aircraft. depending on their intended location in the aircraft, and shall be approved in accordance with procedures acceptable to Brunei DCA

Note: For the purposes of this General Requirement, the “appropriate strength requirements” are the prescribed requirements associated with the type certification basis accepted by Brunei DCA for the issue of the Certificate of Airworthiness for the aircraft in which the containers will be installed.

3.2. Operators shall make adequate provision for care and maintenance of containers under their control and shall, where appropriate, formulate and adopt procedures for ensuring that containers to be used on their aircraft are of an approved type and in an acceptable condition. These procedures will be examined by Brunei DCA as part of the routine assessment of operators’ maintenance procedures for the issue or variation of an Air Operator’s Certificate.

3.3. Organisations responsible for the design of a container and its installation shall provide adequate instructions for its assembly, installation and maintenance. These Instructions shall be included in the operator’s loading manual or similar document.

4. Procedure

4.1. When a container is designed for use only in a particular type of aircraft, the container and its installation will be considered to be a modification to the aircraft. The approval procedure shall be in accordance with the Brunei DCA modification approval requirements of BAR 8, Part 21 .

4.2. A container designed for use on various types of aircraft will be considered as an accessory. The approval procedure shall be in accordance with the parts acceptance requirements of BAR 8, Part 21 as appropriate.

(a) The manner of installation into any particular aircraft will need to be certificated as being in compliance with the appropriate requirements of the state of design and with the associated Declaration of Design and Performance, in accordance with the modification approval requirements of BAR 8, Part 21 Subpart D

Note: *A container produced in compliance with JAR-TSO C90c or FAA TSO C90c (FAR37.199) will be accepted on the basis of having been manufactured to procedures equivalent to those referenced in paragraph 4.2.*

5. Additional Information

5.1. Brunei DCA approval will be limited to the airworthiness features of the container with regard to the aircraft, flight crew and other persons present on the flight. It will not cover the safeguarding of the cargo or, in the case of livestock, its welfare.

5.2. It is recommended that containers should be sufficiently robust and simple that assembly and/or installation into the aircraft would not constitute work necessitating the signing of a Certificate of Release to Service.

5.3. It is strongly recommended that, in view of the mishandling to which such equipment may be subjected, the instructions provided in accordance with paragraph 3.3 should also contain advice as regards tolerable damage and any resulting load limitations.

5.4. Operators are reminded that they are responsible for safeguarding the aircraft structure and equipment against the effects of corrosive liquids and any other materials which could cause damage or malfunction.

5.5. Where restraint of the cargo and container is provided by approved nets, bulkheads, etc. and no reliance is placed on the strength of the container, then such containers will not be subject to the above requirements.

52-002 Emergency exits

1. **Location of Energency Exits**

Compliance with this 52-002, Para 1 is demonstrated by complying with the following:

If one or more emergency exits are deactivated, the distance(s) between the remaining exits is (are) no more than 18.3 m (60 feet) from any adjacent passenger emergency exit on the same side of the same deck of the fuselage, as measured parallel to the aeroplane's longitudinal axis between the nearest exit edges.

2. **Emergency Exit Access**

Compliance with this 52-002, Para 2. is demonstrated by complying with CS 25.813(d) to (f) or equivalent, or with the following:

2.1. If it is necessary to pass through a passageway between passenger compartments to reach any required emergency exit from any seat in the passenger cabin, the passageway is unobstructed. However, curtains may be used if they allow free entry through the passageway.

2.2. No door is installed in any partition between passenger compartments.

2.3. If it is necessary to pass through a doorway separating the passenger cabin from other areas to reach any required emergency exit from any passenger seat, the door has a means to latch it in the open position. The latching means withstands the loads imposed upon it when the door is subjected to the ultimate inertia forces, relative to the surrounding structure, prescribed in CS 25.561(b), or equivalent, at the amendment level specified in the relevant Type Certificate Data Sheet, or equivalent document.

3. **Emergency Exit Markings**

Compliance with this 52-002, Para 3 is demonstrated by complying with CS 25.811(a) to (d), and (f)&(g), or equivalent, and CS 25.811(e) or equivalent, or with the following:

3.1. Each passenger emergency exit, its means of access, and its means of opening are conspicuously marked.

3.2. The identity and location of each passenger emergency exit is recognisable from a distance equal to the width of the cabin.

3.3. Means are provided to assist the occupants in locating the exits in conditions of dense smoke.

3.4. The location of each passenger emergency exit is indicated by a sign visible to occupants approaching along the main passenger aisle (or aisles). There is:

(a) a passenger emergency exit locator sign above the aisle (or aisles) near each passenger emergency exit, or at another overhead location if it is more practical because of low headroom, except that one sign may serve more than one exit if each exit can be seen readily from the sign;

(b) a passenger emergency exit marking sign next to each passenger emergency exit, except that one sign may serve two such exits if they can both be seen readily from the sign; and

(c) a sign on each bulkhead or divider that prevents fore and aft vision along the passenger cabin to indicate emergency exits beyond and obscured by

the bulkhead or divider, except that if this is not possible, the sign may be placed at another appropriate location.

Each sign listed in this sub-paragraph may use the word 'exit' in its legend in place of the term 'emergency exit' or a universal symbolic exit sign. The design of the exit signs is chosen to provide a consistent set throughout the cabin. (Guidance on the use of universal symbolic exit signs can be found in AMC 25.812(b)(1)).

3.5. The location of the operating handle and instructions for opening exits from the inside of the aeroplane are clearly shown in the following manner:

(a) each passenger emergency exit has, on or near the exit, a marking that is readable from a distance of 76 cm (30 inches);

(b) each passenger emergency exit operating handle and the cover removal instructions, if the handle is covered, are:

(1) self-illuminated with an initial brightness of at least 0.51 candela/m2 (160 micro-lamberts); or

(2) conspicuously located and well illuminated by the emergency lighting even in conditions of occupant crowding at the exit.

(c) All Type II and larger passenger emergency exits with a locking mechanism released by motion of a handle, are marked by a red arrow with a shaft at least 19 mm (0.75 inch) wide, adjacent to the handle, that indicates the full extent and direction of the unlocking motion required. The word OPEN is horizontally situated adjacent to the arrow head and is in red capital letters at least 25 mm (1 inch) high. The arrow and word OPEN are located on a background which provides adequate contrast. (See (e) below)

(d) Each emergency exit that is openable from the outside, and its means of opening is marked on the outside of the aeroplane. In addition, the following apply:

(1) The outside marking for each passenger emergency exit in the side of the fuselage includes one 5 cm (2 inch) coloured band outlining the exit.

(2) Each outside marking including the band, has colour contrast to be readily distinguishable from the surrounding fuselage surface. The contrast is such that if the reflectance of the darker colour is 15% or less, the reflectance of the lighter colour is at least 45%. 'Reflectance' is the ratio of the luminous flux reflected by a body to the luminous flux it receives. When the reflectance of the darker colour is greater than 15%, at least a 30% difference between its reflectance and the reflectance of the lighter colour is provided.

(3) In the case of exits other than those in the side of the fuselage, such as ventral or tail cone exits, the external means of opening, including instructions if applicable, are conspicuously marked in red, or bright chrome yellow if the background colour is such that red is inconspicuous. When the opening is located on only one side of the fuselage, a conspicuous marking to that effect is provided on the other side.

(e) Guidance:

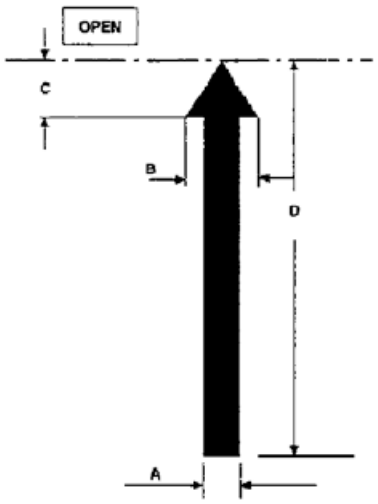
The indicating markings for all Type II and larger passenger emergency exit unlocking handle motions should conform to the general shapes and dimensions indicated by Figures 1 and 2.

Note: *As far as is practicable the markings should be located to avoid obscuring viewing windows located on or alongside the exits, or coincidence with any other required marking or safety feature.*

FIGURE 1

EXAMPLE MARKING FOR INDICATION OF LINEAR OPENING MOTION

Where practical and unambiguous arrow point and base of arrow shaft to be within ±25 mm (1 inch)



of fully unlocked and fully locked positions respectively

DIMENSIONS

A = 19 mm (0•75") minimum

B = 2 x A

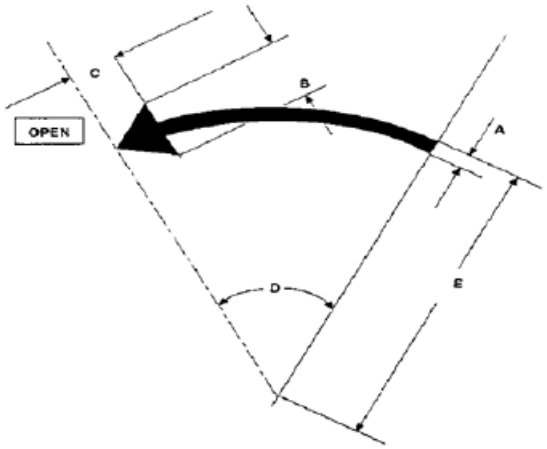
C = B (recommended)

D = Indicative of the full extent of handle travel (each installation to be individually assessed)

FIGURE 2

EXAMPLE MARKING FOR INDICATION OF ROTARY OPENING MOTION

Arrow point and base of arrow shaft to be within ±25 mm (1 inch) of fully unlocked and fully locked positions respectively



DIMENSIONS
A = 19 mm (0•75") minimum
B = 2 x A
C = B (recommended)
D = Full extent of handle centreline travel
E = Three quarters of handle length (where practicable)

3.6. Each emergency exit that is openable from the outside, and its means of opening is marked on the outside of the aeroplane. In addition, the following apply:

(a) The outside marking for each passenger emergency exit in the side of the fuselage includes one 5 cm (2 inch) coloured band outlining the exit.

(b) Each outside marking including the band, has colour contrast to be readily distinguishable from the surrounding fuselage surface. The contrast is such that if the reflectance of the darker colour is 15% or less, the reflectance of the lighter colour is at least 45%. 'Reflectance' is the ratio of the luminous flux reflected by a body to the luminous flux it receives. When the reflectance of the darker colour is greater than 15%,at least a 30% difference between its reflectance and the reflectance of the lighter colour is provided

(c) In the case of exits other than those in the side of the fuselage, such as ventral or tail cone exits, the external means of opening, including instructions if applicable, are conspicuously marked in red, or bright chrome yellow if the background colour is such that red is inconspicuous. When the opening is located on only one side of the fuselage, a conspicuous marking to that effect is provided on the other side.

Chapter 61 Propellers

61-001 Maintenance Requirements for variable pitch propellers installed on aircraft holding a Brunei Certificate of Airworthiness

1. **Applicability**

The requirements of this General Requirement are applicable to variable pitch propellers, variable pitch propellers which have been locked and to ground adjustable propellers. For modular propellers the calendar periods referred to in this General Requirement shall apply to propeller hubs and blades individually.

2. **Compliance**

2.1. Any overriding mandatory requirements in respect of particular propellers issued either by the Airworthiness Authority of the state of design of a propeller, will take precedence over this General Requirement. For the purposes of compliance with an AD which specifies requirements as a function of overhaul, the bare blade inspection required by paragraph 3.2(b) shall be deemed as an overhaul.

2.2. Propellers with no manufacturer recommended calendar overhaul limitation

(a) For propellers where no calendar overhaul interval is recommended by the Manufacturer paragraphs 2.2 (a) (i) and (ii) must be complied with;

(i) At 3 years since new or overhaul or the inspection defined in paragraph 3.2(b) of this General Requirement, complete the hub/blade inspection specified in paragraph 3.2.(a).

(ii) At 6 years since new or overhaul or the inspection defined in paragraph 3.2 (b) of this General Requirement, overhaul the propeller in accordance with the manufacturer's instructions.

(b) On reaching the manufacturer's recommended flight hour TBO period the propeller must be overhauled.

(c) For propellers with composite blades, in the absence of any manufacturer's overhaul periods in terms of calendar time, the composite blades should be subject to overhaul at a period not exceeding 6 years in accordance with the manufacturer's instructions. The 3 year inspection of paragraph 3.2(a) need not be carried out.

2.3. Propellers with a manufacturer recommended calendar overhaul limitation

(a) Propellers which are currently maintained in accordance with paragraphs 3.2 (a) (3 year inspection) and 3.2(b) (6 year bare blade inspection) of this General Requirement, may remain in service until the next scheduled inspection, in accordance with this General Requirement, at which point the following will apply;

(i) At 3 years since inspection defined in paragraph 3.2 (b) of this General Requirement, the propeller must either be overhauled in accordance with the manufacturer's instructions, or inspected in accordance with paragraph 3.2 (a) of this General Requirement.

(ii) On reaching 6 years since inspection defined in paragraph 3.2 (b) of this General Requirement, the propeller must be overhauled in accordance with the manufacturer's instructions. After this time the propeller shall continue to be overhauled in accordance with the

manufacturer's instructions at the manufacturer's recommended period unless varied by the Approved Maintenance Programme.

2.4. The periods of operation or elapsed calendar time prescribed in the Appendix I to this General Requirement shall be calculated from the date of the initial installation of the propeller on an aircraft following manufacture or complete overhaul of the propeller and may be preceded by a period of storage of up to 2 years which has been carried out in accordance with the manufacturer's recommendations. Periods of storage in excess of 2 years or subsequent to the initial installation shall be counted as if the propeller were installed. Where the specific manufacturer has provided information on this topic within their instructions then this should be followed.

2.5. The applicability and compliance requirements of this General Requirement are summarised in Tables 1 and 2 of the Appendix I to this GeneralRequirement.

3. **Propeller Inspections**

3.1. The inspection of propellers required by Tables 1 or 2 of Appendix I shall be undertaken by an organisation approved by the Brunei DCA for the purpose.

3.2. The inspections and re-work shall be carried out in accordance with the manufacturer's instructions and as a minimum shall include:

(a) Hub/blade inspection.

(i) Dismantling of the propeller sufficiently to gain access to the blade root bearing assemblies.

(ii) Thorough cleaning of the blade root assemblies in accordance with the manufacturer's instructions.

(iii) Examination for pitting, fretting, corrosion, cracking and other damage of the hub, bearings, blade roots, and housing, together with replacement of any disturbed seals. All of the blade surfaces shall be examined for damage, delamination (where applicable), and the presence of corrosion, removing the paint finish as necessary. In cases where de-icer boots or overshoes are installed on the blades, a detailed examination for corrosion around their edges shall be carried out, and, if any evidence is found, the boots/overshoes shall be removed to permit a full inspection of the masked areas. Any corrosion shall be removed and the blades reprotected. In cases where de-icer boots/overshoes are removed, replacement parts shall be installed using the facilities prescribed and under conditions and procedures specified, in the relevant manufacturer's Overhaul Manual.

(iv) Non Destructive Inspection of the hub and blade roots shall be carried out in accordance with the manufacturer's instructions except where it can be verified that Non Destructive Inspection of the hub and blade roots has been carried out in accordance with the manufacturer's instructions within the last 4 years.

(v) Checking the track of the propeller after refitting, then functioning throughout its operational range by means of an engine run to verify correct performance, and to establish that any vibration is within acceptance limits, in accordance with the manufacturer's instructions.

(b) Bare blade inspection.

In addition to the hub/blade inspection ref. 3.2(a):

(i) Removal of all de-icing boots or overshoes and fairings.

(ii) Removal of all paint and erosion protection.

(iii) Removal of all blade root bushings and plugs.

(iv) Inspection of the complete blade surface for the presence of corrosion. Any corrosion shall be removed and the blades re-protected and prepared for the reinstallation of the blade fittings.

(v) All NDI required for overhaul of the propeller shall be carried out in accordance with the manufacturer's instructions.

(vi) Full dimensional inspection of all blades.

4. **Record of Accomplishment**

A comprehensive record of the inspection and work done in accordance with paragraph 3 of this General Requirement shall be retained and an entry, making a reference to this record, shall be inserted in the Propeller Log Book.

Appendix 1 to 61-001

Propellers shall be maintained in accordance with (a) of the appropriate following Tables, unless no calendar overhaul period is published by the propeller manufacturer. In this case they shall be maintained in accordance with (b).

Table 1: Propellers fitted to Aircraft with MTOM of 5700 kg or above

(a)	Overhaul Period	Whichever occurs first of operating hours or calendar period as published by the propeller manufacturer unless varied by the Approved Maintenance Programme.
(b)	Overhaul Period	Operating hours as published by the propeller manufacturer or on condition where no life has been published subject to (i) and (ii) below.
	(i) Hub/ blade inspection period	Inspect at 3 years since new or overhaul or period inspection (ii) below; repeat at 1 year intervals.
	(ii) Bare blade inspection period	Not to exceed 6 years since new, overhaul or last bare blade inspection.

Table 2 Propellers fitted to aircraft with MTOM below 5700 kg

(a)	Overhaul Period	Whichever occurs first of operating hours or calendar period as published by the propeller manufacturer unless varied by the Approved Maintenance Programme.
(b)	Overhaul Period	Operating hours as published by the propeller manufacturer or on condition where no calendar life has been published subject to (i) and (ii) below.
	(i) Hub/ blade inspection period	Inspect at 3 years since new or overhaul or inspection (ii) below (but may be phased to next annual check or Certificate of Airworthiness Renewal provided period does not exceed 4 years).
	(ii) Bare blade inspection period	Not to exceed 6 years since new, overhaul or last bare blade inspection.

Note: Hub/blade inspections and bare blade inspections are to be in accordance with the procedures of para 3 of this General Requirement.

Chapter 72 Engines

72-001 Light Aircraft Piston Engine Overhaul Periods

1. Introduction

1.1. BAR 8, Part M, Subpart C, M.A.302 requires that aircraft registered in Brunei , for which a Certificate of Airworthiness (C of A) is in force, to be maintained in accordance with an approved Maintenance Programme. The instructions for continuing airworthiness requirements relating to overhaul of light aircraft piston engines are normally defined as the engine manufacturers' recommended overhaul periods, where these have been promulgated under a system approved by the airworthiness authority responsible for the engine. The Brunei DCA policy in respect of extensions to the recommended overhaul periods (operating time and calendar time) for piston engines used in light aircraft is set out in this General Requirement.

1.2. The Brunei DCA will permit the extension of recommended overhaul periods as defined in 3.1 (a) and 3.1 (b) on the basis of the effect on airworthiness only. The economics of operation is not the responsibility of the Brunei DCA, although this may have been considered by the manufacturer in establishing the recommended overhaul periods. Aircraft Owners/Operators must make their own decisions on these other aspects. Unless satisfied that the engine remains in an airworthy condition, the Owner/Operator should have the engine overhauled.

2. **Definition**

For the purposes of this General Requirement

2.1. Light aircraft piston engine' in this context means either:

(i) a piston engine installed in an aircraft, the Maximum Take Off Weight of which does not exceed 2730 kg; or

(ii) i) a piston engine of 400 hp (298 kW) or less.

2.2. For the purpose of this General Requirement the term 'engine' includes the components and equipment necessary for satisfactory functioning and control. The propeller and its associated equipment are excluded except for those components that are part of the engine type design.

3. **Compliance**

Continuation in service shall be subject to compliance with paragraph 3.1, as qualified by paragraphs 3.1 (a) and 3.1 (b), as appropriate.

3.1. Unless otherwise stated, engines may be operated to the overhaul periods which have been recommended by the manufacturer and promulgated under a system approved by the airworthiness authority responsible for the engine. All such recommendations, whether stated in terms of operating time or calendar time, constitute a recommended overhaul period for the purposes of this General Requirement , including recommendations by the manufacturer for reduced overhaul periods with particular types of operation or particular service bulletin/modification configurations.

(a) Under the provisions of this General Requirement, engines that have reached the operating time or calendar time limitation of a recommended overhaul period may recommended operating time or calendar time, whichever occurs first, subject to compliance with (i) to (vi).

(i) Compliance being shown with the appropriate limitations specified in Appendix 1paragraph 5, of this General Requirement.

(ii) Compliance being shown with any applicable Airworthiness Directive (AD) which requires compliance at engine overhaul, unless otherwise agreed by Brunei DCA

(iii) The engine must have been installed and operated in a Brunei registered aircraft, or in an aircraft whilst previously registered in another accepted ICAO Member State for a period of 200 hours immediately prior to completion of the engine manufacturer's recommended overhaul period expressed in hours, and 12 months prior to completion of the manufacturer's overhaul period expressed in terms of calendar time.

(iv) For engines on aircraft transferring to Brunei from operation on another ICAO Member State's register, where an engine manufacturer's recommended overhaul limit has already been exceeded, shall be subject to further assessment to determine the General Requirements eligibility. Under such circumstances, engines will only qualify under this requirement where it can be demonstrated that the previous continued in service operation was in accordance with maintenance programme instructions issued by the Competent Authority of the exporting ICAO Member State.

(v) The engine being inspected in accordance with paragraph 4 in order to assess its condition immediately prior to the increase, and subsequently at 100 hour or yearly intervals, whichever occurs first.

(vi) The data obtained during the inspections of paragraph 4 being entered in the engine log book.

(b) Engines that have complied with paragraphs 3.1 and 3.1(a), and have completed 120% of the recommended operating time or calendar time, whichever occurs first, may continue in service indefinitely, subject to compliance with (i) to (iv).

(i) The engine being installed in an aircraft which is not used for the purposes of Commercial Air Transport (with the exception of aircraft utilised for the purposes of towing gliders/sailplanes which are owned)

(ii) Compliance being shown with the appropriate limitations specified in Appendix I paragraph 5, to this General Requirement.

(iii) The engine being inspected in accordance with paragraph 4 in order to assess its condition before exceeding 120% of the recommended operating time or calendar time, whichever occurs first, and subsequently being inspected and re-assessed at 100 hour or yearly intervals, whichever occurs first.

(iv) The data obtained during the inspections of paragraph 4 being entered in the engine log book. A log book entry should also be made to restrict engine usage during this extension period to flying for the purposes of non commercial flight only.

3.2. In the event that the inspection referred to in paragraphs 3.1 (a) and 3.1 (b) results in rejection, a thorough engineering investigation must be carried out to establish the maintenance actions required to return the engine to an airworthy condition.

3.3. The inspections referred to in paragraphs 3.1(a) and 3.1(b) to assess the condition of engines shall be carried out by persons or Organisations as follows:

(a) Engines installed in aircraft that are used for the purposes of Commercial Air Transport by an BAR 6, approved Operator under an Air Operators Certificate, shall, in order to comply with paragraph 3.1(a), be inspected by a BAR 8, Part 145 Maintenance Organisation appropriately approved for the purpose.

(b) All other engines, in order to comply with paragraph 3.1 (a) and 3.1 (b), shall be inspected by an appropriately licensed aircraft maintenance engineer or BAR 8, Part 145 Organisation.

3.4. In no case shall any mandatory requirements be exceeded, and the compliance with mandatory bulletins/modifications/inspections shall be completed at the specified times.

If during the course of operating beyond the engine manufacturer's recommendedoverhaul limits in accordance with this General Requirement the engine experiences a mechanical failure or inspection requirement necessitating full or significant partial engine strip to rectify, then the engine must at this stage be overhauled. Examples of these include propeller strike events and follow up inspections, and crankshaft/camshaft replacements for wear-related issues. Defects requiring replacement of individual cylinder and piston assemblies, and oil pump (where such work does not involve the removal/replacement of individual gears) are not included in the category of maintenance necessitating full overhaul.

3.5. In the case of engines not incorporating all the service bulletins/modifications or parts that would enable it to qualify for any manufacturer's recommended overhaul period as defined in paragraph 3.1 of this General Requirement, or in the case of engine types not included in the manufacturers' bulletins, a specific statement of acceptability in writing must be sought from the engine manufacturer, and if this is not obtainable, an application must be made to the Brunei DCA. The Brunei DCA need not be consulted in a case where the only question is that an engine manufacturer's documents restrict recommended overhaul periods to engines embodying only parts specified by the engine manufacturer.

3.6. For clarity, the requirements of paragraph 3 are presented in tabular form in Appendix II to this General Requirement.

Appendix I to 72-001

1. The concept of allowing engines to run beyond the manufacturer's recommended overhaul period depends upon it being possible to assess the condition of the engine by prescribed inspections carried out at defined intervals. It is not intended to provide a freedom to run until the engine fails.

2. Although it is possible to identify engine degradation in many areas of the engine, there are some potential failure modes (e.g. crankshaft cracking, counterweight wear) for which predictive checks would not be effective without engine disassembly.

3. For the above reasons, the overhaul period extensions defined in 3.1 (a) and 3.1 (b) of this General Requirement may not be applied unless adequate in service reliability has been demonstrated, particularly in relation to failures which cannot be prevented by onwing inspection. Those engine types that are not eligible to make use of the provisions of this General Requirement are detailed in paragraph 4 of this Appendix.

4. Based on advice of the manufacturers of the majority of the piston engines currently used in light aircraft to try to identify those engine components which service experience has shown to have running time limits beyond which it would not be reasonable to operate.

(That is, components the failure of which are not susceptible to prior detection but which would result in either an unacceptably high failure rate or a hazardous failure). Any limits identified are reflected in paragraph 5 below.

5. Limitations

The provisions of this General Requirement are applicable to all light aircraft piston engines except where listed below:

5.1 Rolls-Royce (de Havilland) Gipsy Major Engines - Prior to running beyond 120% of the manufacturer's recommended overhaul period, engines other than Major 10 and earlier marks incorporating Modification 2385 (splined propeller attachment) must have the taper portion of the crankshaft "Sulfinuz" treated by Modification 2690 or appropriate alternative. In accordance with Rolls-Royce Technical News Sheet G15, engines must not exceed an overhaul period of 1000 hours unless Modification 2495 is embodied.

5.2 Rolls-Royce (de Havilland) Gipsy Engines - With effect from 1 January 2011, crankshafts fitted to engines on aircraft used for the purposes of Commercial Air Transport Transport or Aerial Work must be fully inspected in accordance with the relevant overhaul manual workshop instructions at intervals not exceeding 20 years, if operating hours limits requiring overhaul are not achieved within this period.

5.3 The following engine types have yet to accumulate sufficient service experience to demonstrate acceptable reliability when operating at the manufacturer' recommended overhaul period. The provisions of this General Requirement are not applicable to:

(a) Societe de Motorisations Aeronautique - All types;

(b) Rotax - All types, except when installed in self-launching or self-sustaining sailplanes;

(c) Thielert Centurion Engines - All types;

(d) Mid-West Engines - All types.

Appendix II to 72-001

	Commercial Air Transport	Non Commercial
Within Recommended Overhaul Period	Manufacturer's recommended overhaul period, defined in operating time and calendar time (if applicable), provided the engine conforms to appropriate service bulletin/modification configuration and types of operation. (Otherwise see paragraph 3.5 of this General Requirement)	
Extensions not exceeding 20% of Recommended Overhaul Period (operating time and calendar time)	Acceptable subject to: Compliance with Appendix 1 paragraph 5 to this General Requirement. Compliance with all applicable ADs required to be incorporated at engine overhaul. Inspections in accordance with paragraph 3 of this General Requirement at completion of recommended overhaul period (operating time or calendar time) and then at 100 hour or yearly intervals, whichever occurs first. The engine must have been installed and operated in a Brunei registered aircraft for a period of 200 hours prior to completion of the engine manufacturer's recommended overhaul period. (In some circumstances, aircraft imported from outside Brunei which have not exceeded the manufacturer's recommended overhaul period but which have less than 200 hours remaining could be considered for extension with suitable technical justification to the Brunei DCA).	
Extensions in excess of 20% of Recommended Overhaul Period	No further extension (In exceptional circumstances, the Brunei DCA may consider applications for extension for a limited period to address an urgent operational need).	Engines may continue in service indefinitely subject to: a) Compliance with Appendix 1 to this General Requirement. b) Further inspection in accordance with paragraph 4 of this General Req at 120% and then at 100 hour or yearly intervals, whichever occurs first.

Appendix III to 72-001

Light Aircraft Piston Engine Maintenance Requirements for Operation Beyond Manufacturers' Recommended Overhaul Periods

1 This Appendix gives guidance on the procedures which are necessary for a light aircraft piston engine to be accepted as being in a condition that will allow operation beyond the recommended overhaul period under the terms of this General Requirement.

2 A piston engine that has reached the end of its normal overhaul period may be expected to have suffered some wear to cylinders, pistons, valves, bearings and other moving parts, but an engine that has been carefully operated and maintained may still be in a condition suitable for a further period of service.

2.1 Many factors affect the wear that takes place in an engine, the most important of these include: the efficiency of the air intake filter, the techniques used in engine handling, particularly during starting, the quality of the fuel and oil used in the engine and the conditions under which the aircraft is housed when not in use. Conditions of operation are also relevant; the length of flights, the atmospheric conditions during flight and on the ground, and the type of flying undertaken. Many of these factors are outside the province of the maintenance engineer, but meticulous compliance with the approved Maintenance Programme and any instructions provided in the form of service bulletins or constructor's recommendations will undoubtedly help to prolong the life of an engine.

2.2 The inspections and tests that may be necessary to assess the condition of an engine in compliance with this General Requirement are detailed in the following paragraphs.

3 Inspection and Maintenance

A number of items included in the normal scheduled maintenance of an engine may be repeated to determine the condition of an engine at the end of its normal overhaul period, and additional inspections may also be specified.

3.1 **External Condition.** The engine should be examined externally for obvious defects such as a cracked crankcase, excessive play in the propeller shaft, overheating and corrosion, which would make it unacceptable for further use.

3.2 **Internal Condition.** Significant information concerning the internal condition of an engine may be obtained from an examination of the oil filters and magnetic plugs, for metal particle contamination. These checks may be sufficient to show that serious wear or breakdown has taken place and that the engine is unacceptable for further service.

3.3 **Oil Consumption.** Since the oil consumption of an engine may have increased towards the end of its normal overhaul period, an accurate check of the consumption over the last 10 flying hours would show whether it is likely to exceed the maximum recommended by the constructor, if the overhaul period were to be extended.

3.4 **Compression Check.** Piston ring or cylinder wear, or poor valve sealing could, in addition to increasing oil consumption, result in a significant loss of power. A cylinder compression check is a method of determining, without major disassembly, the standard of sealing provided by the valves and piston rings. This should be carried out in accordance with the manufacturer's recommendations. In the absence of any published recommendations for a particular engine type, one of the methods of 3.4(a) to 3.4(c) should be used.

(a) On engines with a small number of cylinders, a simple compression check may be carried out by rotating the engine by hand and noting the resistance to rotation as each cylinder passes through its compression stroke. The check should normally be made shortly after running the engine while a film of oil remains on the rubbing surfaces, to assist sealing and prevent scoring the working parts. If this is not possible, the constructor may recommend that oil is introduced into each cylinder and the engine turned through a number of revolutions before making the test. This method may be used to determine serious loss of compression on a single cylinder or the difference between the compressions of individual cylinders, but may not accurately show a similar partial loss of compression on all the cylinders of an engine.

An alternative method, which will give a more accurate result, is to fit a pressure gauge (reading up to 1400 kPa (200 lbf/in2)) in place of one sparking plug in each cylinder in turn and note the reading as the piston passes through top dead centre (TDC) on the compression stroke.

(b) Another method of carrying out a direct compression test is by the use of a proprietary type of compression tester equipped with a means of recording cylinder pressure on a graph card. One set of plugs should be removed immediately after an engine run, and the compression tester fitted to each cylinder in turn while rotating the engine by means of the starter motor. The effectiveness of combustion charge sealing can be judged by assessment of the graph records obtained.

(c) A further method of checking engine compression is the differential pressure test. In this test a regulated air supply (normally 560kPa (80 lbf/in2)) is applied to each cylinder in turn and a pressure gauge used to record the actual air pressure in the cylinder.

Since some leakage will normally occur, cylinder pressure will usually be less than supply pressure and the difference will be an indication of the condition of the piston rings and valves. By listening for escaping air at the carburettor intake, exhaust and crankcase breather, a defective component may be located. As with the previous tests, it is usually recommended that the differential pressure test is carried out as soon as possible after running the engine.

4. Power Output of Aeroplane Engines.

The power developed by an aeroplane engine after initial installation is established in the form of a reference engine speed, which is recorded in the appropriate log book so that a comparison can be made during subsequent power checks. The reference engine speed is the observed engine speed obtained using specified power settings and conditions, corrected, by means of graphs supplied by the engine constructor (or those contained in the UK Civil Aviation Authority's Aircraft Airworthiness Information and Procedures (CAAIP), CAP 562, Leaflet 70-70 Piston Engine Overhaul - Correcting Engine Test Results), to the figure which would be obtained at standard sea-level atmospheric temperature and pressure; changes in humidity do not produce large changes of power and are ignored for the purpose of establishing a reference engine speed or subsequently checking engine power. Power checks should be corrected in the same way.

4.1 **Power Checks.** The majority of light aeroplane piston engines are air-cooled and rely on an adequate flow of air for proper cooling of the cylinders. This condition can only be obtained during flight, and ground runs should, therefore, be as brief as possible.

Cooling can be assisted by facing the aircraft into wind, but high wind conditions must be avoided when making power checks, as they will significantly affect the results obtained. Before running the engine at high power the normal operating temperatures should be obtained (not the minimum temperatures specified for operation) and during the test careful watch should be kept on oil and cylinder temperatures to prevent the appropriate limitations being exceeded.

(a) Normally-aspirated engines are tested at full throttle and, where a controllable-pitch propeller is fitted, with fully fine pitch selected. The changes in barometric pressure affecting engine power are considered to be balanced by changes in propeller load, so that only a temperature correction is necessary. This correction factor may be obtained from a graph supplied by the engine constructor or, if this is not available, from the graph shown in CAAIP (CAP 562) Leaflet 70-70 Piston Engine Overhaul - Correcting Engine Test Results (Figure 1). The observed full throttle speed multiplied by the correction factor will give the corrected speed.

(b) Although normally-aspirated engines are often fitted with variable-pitch propellers, the engine speed obtained at full throttle is usually less than the governed speed and the propeller remains in fully fine pitch. With supercharged engines, however, the propeller is usually governed to a constant speed at high power settings and small changes in power will not affect engine speed. The power of a supercharged engine is, therefore, checked by establishing a reference speed at prescribed power settings.

(1) Since a supercharged engine is run at a specified manifold pressure regardless of the atmospheric pressure, corrections must be made for both temperature and pressure variations from the standard atmosphere.

(2) The procedure is to run the engine until normal operating temperatures are obtained, open up to maximum take-off manifold pressure, decrease power until a fall in engine speed occurs (denoting that the propeller blades are on their fine pitch stops), then throttle back to the manifold pressure prescribed by the constructor and observe the engine speed obtained.

(3) The correction factor to be applied to the observed engine speed of supercharged engine may be obtained from graphs supplied by the engine constructor.

(c) Although the engine speed obtained during a check of engine power is corrected as necessary for atmospheric temperature and pressure, no correction is made for humidity, ambient wind conditions or instrument errors and, consequently, the corrected engine speed is seldom exactly equal to the reference speed even if engine condition is unchanged. However engine power may usually be considered satisfactory if the corrected speed obtained during a power check is within 3% of the reference speed.

(d) If it is not possible to assess power deterioration by means of a power check (e.g. due to fitting a different propeller), a rate-of-climb flight test should be carried out.

5. Power Output of Helicopter Engines.

The power developed by the engine of a single-engined helicopter is considered to be adequately checked during normal operations any loss of power should be readily apparent. It is thus not considered necessary to check the power output of a helicopter engine separately specifically for the purpose of complying with this General Requirement.

6. Power Loss.

If the power check (paragraph 4) or normal engine operation reveal an unacceptable loss of power or rough running, it may be possible to rectify this by carrying out certain normal servicing operations or by replacement of components or equipment. The replacement of sparking plugs, resetting of tappets or magneto contact breaker points, or other adjustments to the ignition or carburetion systems, are all operations that may result in smoother running and improve engine power.

7. Servicing.

If the engine proves to be suitable for further service, a number of servicing operations will normally be due, in accordance with the approved Maintenance Programme. Unless carried out previously (paragraph 6) these operations should be completed before the engine is returned to service.

8. Log Book Entries

A record of the checks made, and any rectification or servicing work, must be entered and certified in the engine log book before the engine is cleared to service for its recommended or extended life under the provision of this General Requirement. The log book entry made should also specify any restriction on further use (see paragraph 3.1(b) of this General Requirement).

9. Maintenance Programme and Amendments

The aircraft maintenance programme should reflect the maintenance requirements required and their periodicity, to operate the aircraft engine beyond its recommended overhaul period as detailed in this General Requirement.