SOUTH AFRICAN
CIVIL AVIATION AUTHORITY

TECHNICAL GUIDANCE MATERIAL

MAJOR REPAIRS ON AERONAUTICAL PRODUCTS

Subject: TECHNICAL GUIDANCE MATERIAL FOR MAJOR REPAIRS ON AERONAUTICAL PRODUCTS

Date: 21 JUNE 2013

TABLE OF CONTENTS PAGE

1. PURPOSE 2
2. APPLICABILITY 2
3. REFERENCE DOCUMENTS 2
4. DEFINITIONS AND ABBREVIATIONS 3
5. REGULATORY REQUIREMENTS 4
6. APPLICATION AND APPROVAL 5
7. COMPATIBILITY OF REPAIRS 6
8. RECORDS 6
9. CONTENTS OF REPAIR SUBSTANTIATION REPORT 6-9

1. PURPOSE

The purpose of this technical guidance material (TGM) is to provide procedural guidelines applicable to the data approval process for Major Repair and alterations on class I aeronautical products.

2. APPLICABILITY

This TGM is applicable to Approved Maintenance Organizations (AMO), Approved Design Organizations (ADO), Aircraft operators and other aviation industry stakeholders. It prescribes the requirements for approval of repair design data prior to a relevant repair work being undertaken on the affected aircraft, components and equipment.

3. REFERENCE DOCUMENTS

It is intended that the following reference materials be used in conjunction with this document:

3.1 Part 43 Subpart 1 of the Civil Aviation Regulations (CAR's);

3.2 Part 43 Subpart 2 of the Civil Aviation Regulations (CAR's);

3.3 Part 43 Subpart 3 of the Civil Aviation Regulations (CAR's);

3.4 Part 147 Subpart 2 of the Civil Aviation Regulations (CAR's);

3.5 SA-CATS-43, South African Civil Aviation Technical Standards (SACATS),

4. DEFINITIONS AND ABBREVIATIONS

For the purposes and context of this document, the following definitions and abbreviations apply:

"Aircraft Type" - means all aircraft of the same basic design, including all modifications thereto, except those modifications which result in a change in handling or flight characteristics;

"Aircraft" - means an aircraft as defined in the Act, including its engines, propellers, rotor, components, parts, equipment, instruments, accessories and materials;

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

Minor repair is one that has no appreciative effect on the mass, balance, structural strength, reliability, operational characteristics, noise, fuel venting, exhaust emissions, or other characteristics affecting the airworthiness of the aircraft.

"Major repair" means a repair –

(a) which, if improperly done, may appreciably affect weight, balance, structural strength, performance, power plant operation, flight characteristics, or other qualities affecting airworthiness; or

(b) which is not done according to accepted practices or cannot be done by elementary operations;

"Major modification" means a modification not listed in the aircraft, aircraft engine, or propeller specifications –

(a) which may appreciably affect weight, balance, structural strength, performance,

powerplant operations, flight characteristics, or other qualities affecting airworthiness; or

(b) which is not done according to accepted practices or cannot be done by elementary operations;

Approved data*:* Data that can be used to substantiate major repairs/major alterations derived from the following:

a) Type Certificate Data Sheets
b) Supplemental Type Certificates (STC) data, provided that it specifically applies to the item being repaired/altered
c) Airworthiness Directives (AD)
d) Airframe, engine, and propeller manufacturer's approved maintenance manuals and/or instructions

"Airworthiness Data" - means any information necessary to ensure that an aircraft or aircraft component can be maintained in an airworthy condition;

"Authority" - the National Airworthiness Authority of the certifying country or State of Design

"Class I Product" - means a complete aircraft, aircraft engine or propeller, which –

a) has been type certificated in accordance with the provisions of these Regulations and for which the South African Specifications or type certificate data sheets have been issued; or

b) is identical to a type certificated product referred to in paragraph (a) in all respects except as in otherwise acceptable to the appropriate authority of the importing State;

"Class II product" means –

(a) a major component of a Class I product, including wings, fuselages, empennage assemblies, landing gears, power transmissions, control surfaces and installed equipment, the failure of which will jeopardise the safety of a Class I product; or

(b) a part, material or appliance, approved and manufactured under the TSO system as prescribed in subpart 12 of Part 21;

"ICAO" - International Civil Aviation Organisation

"NAA" - National Aviation Authority

"Product" - means an aircraft, aircraft engine or propeller, and includes the classes of products or types of aircraft referred to in Part 21;

"SACAR" - South African Civil Aviation Regulations of 2011, as amended.

"SA-CATS" - South African Civil Aviation Technical Standards

5. REGULATORY REQUIREMENTS

a) As per South African Civil Aviation Regulation (SACAR) Part 43.01.6, repairs to an aircraft, aircraft engine or component or fixed or removable equipment required as a result of either damage caused by a forced or hard landing or defects that occasioned a forced landing, the entry or entries made in the relevant logbook or books in respect of such repairs shall state that they were so required and shall identify the forced or hard landing in question.

b) SACAR Part 43.02.2 (3) states that routine maintenance, scheduled inspections, structural integrity inspections, overhaul, modification, major repairs and structural repairs on aircraft with a MCM in excess of 5 700 kg or on helicopters with a MCM in excess of 3 175 kg shall be undertaken and certified by an appropriately rated approved AMO only.

c) SACAR Part 43.02.5 (2) states that overhaul of a Class I or Class II product and repairs to the primary structure of an aircraft, its engine(s) or propeller(s) shall be undertaken by an appropriately rated approved AMO only.

d) SACAR Part 43.02.16 (1) states that after any major repair or major modification to an aircraft, test flights shall be carried out in the aircraft under such conditions and in the manner as prescribed in the SACATS 43.

e) SACAR Part 43.02.17 (1) states that any repair to an aircraft or aircraft component, which has been damaged after an accident or an incident, shall be carried out in accordance with the requirements as prescribed in Document SA-CATS 43.

f) SACAR Part 43.02.17 (2) states that following the permanent repair of an aircraft that has been involved in an accident, as defined in paragraph (b) of the definition of 'accident' in Part 1 of these Regulations, the aircraft shall be inspected by an authorised officer, inspector or authorised person of the Authority, or another person specifically appointed for the purpose in writing by the Director, before it is released to service.

g) SACAR Part 43.02.17 (3) states that the maintenance organisation or repair facility that carried out the repair shall pay the applicable inspection fees as prescribed in Part 187.

h) SACAR Part 43.03.3 states that any person who carries out a major repair or a major modification shall, in addition to the entry referred to in regulation 43.03.1, record the repair or modification and process the certificate relating to the maintenance of the aircraft in the manner as prescribed in Document SA-CATS 43.

i) SACAR Part 43.04.7 states that if the approved data for a repair or modification to an aircraft or aircraft component include changes to the operating limitations or flight data in the AFM, the person certifying

release to service shall not certify the release to service until the changes have been incorporated into the flight manual.

j) SACAR Part 147.02.7 (2) states that the Director shall refuse to issue the approval if the application concerned is not appropriate for the purpose of assisting applicants for, or holders of, type certificates, supplemental type certificates, part design approvals, repair design approvals or ZA-TSO authorisation in demonstrating technical capability.

6. APPLICATION AND APPROVAL

a) The application form CA 43-14, together with accompanying repair substantiation report must first be submitted to the SACAA for review. Following the review of the report and some additional data as necessary, the repair will be classified as minor or major.

b) The application form for repair approval is effective for one aircraft only and the forms are available for download from the SACAA website www.caa.co.za

c) Proof of payment of the application fee must accompany the application form. The current application fee is reflected in SACAR Part 187.

d) Only the SACAA or a Design Organisation (DO) approval holder shall classify the repair as major or minor. Assessment of repair classification shall be in accordance with the DO approved assessment procedures. A repair must first be classified as major or minor as a way to determine whether a minor or a major repair approval process will be applicable.

e) Operators have two standard ways to obtain approved repair data, i.e. OEM structural repair manual (SRM) or alternatively applying directly to the SACAA for data approval.

f) For data originating from foreign sources, the SACAA will only approve such repair design data provided it is traceable to approval from States considered having equivalent safety standards to the State of Design.

g) The Major Repair Design approval is issued by the SACAA following satisfactory review and approval of the submitted repair design data.

7. COMPATIBILITY OF REPAIRS

a) Consideration should be given during the repair design process for compatibility between the proposed repair design and other existing design changes, such as modifications, repairs, ELOS findings, special conditions, exemptions and airworthiness directives (AD).

b) The operator has the responsibility to inform the design approval holder for any airworthiness deficiencies discovered in service which relate to the design change. The design approval holder (DO) has responsibility to assist the operator and the SACAA to correct such deficiencies being informed.

c) The installer of the repairs on the aircraft has a responsibility to verify compatibility with other existing modifications and repairs before implementing any repairs.

d) The AMO and the operator have the overall responsibility to ensure the compatibility of all repairs incorporated in their aircraft. The AMO and/or operator should report any repair incompatibilities detected during implementation of the repair or in service to the design approval holder, to the installer and to the SACAA

8. RECORDS

a) Records of incorporation of all repairs affecting the airworthiness of an aircraft, its components or equipment shall be maintained in the appropriate log book or in a separate record by the owner or operator of the aircraft.

b) For all repairs, the design approval holder should retain the records of the analyses and tests performed to demonstrate compliance until the aircraft is permanently withdrawn from service.

c) All relevant repair design information, drawings, test reports and records shall be held at the disposal of the SACAA. No such records shall be destroyed or disposed of without authorisation from the SACAA.

9. CONTENTS OF REPAIR SUBSTANTIATION REPORT

COVER PAGE

Application Report Number:

Company Name:

Aircraft Type/Model:

Name of applicant:

Signature:

Aircraft Serial Number:

Aircraft Registration:

Position of applicant:

Date:

PARAGRAPHS

1. Description of Repair.

This paragraph describes how the repair will be performed.

2. Reason for the Repair

This paragraph explains why the repair is required.

3. Classification of the Repair

This paragraph shall contain a written assessment of the classification in cases where the approved design organization (DO) conducted classification assessment.

4. Certification Basis

This paragraph contains the State of Design and its TC and TCDS number.

5. Compliance with the Certification Basis

Compliance with the certification basis must be clearly demonstrated in this paragraph.

Examples of acceptable means of compliance are:

- *TC holder's support along with approval issued by the State of Design, e.g. Airbus RAS or RDAS, Boeing FAA Form 8110-9, etc.*
- *Stress analysis report*
- *Electrical load analysis*
- *Substantiation report*
- *Compliance statement*
- *Test report*

6. Repair Procedures and Accomplishment Instructions

This paragraph shall list out the document reference for the procedures and accomplishment instructions such as Service Bulletin, Engineering Order, Master Drawing List, etc.

7. Environmental Considerations

Consideration of environmental issues such as noise, engine emissions, cooling, vibration, contamination risks, etc. must be addressed in this paragraph.

8. Aircraft Flight Manual Supplement (AFMS)

As a result of the repair embodiment, if any AFMS is introduced, it must be stated in this paragraph.

9. Weight and Balance Schedule (W&B) Amendment

Assessment on W&B schedule amendment must be addressed in this paragraph.

10. Interface Considerations

Effects on other systems, previous repairs, operating procedures, must be stated in this paragraph.

11. Limitations

This paragraph shall detail out any limitations affecting the approval, such as limited cycles, flight hours, calendar time, operating limitation (airspeed, flight rule and etc.), Airworthiness Limitations (mandatory inspections), required equipment, number of crew/passenger, etc.

12. Post Installation Ground Checks

For design verification, any conformity inspection, operational and functional ground checks must be stated in this paragraph.

13. Flight Test Requirements

This paragraph shall consist of an approved flight test schedule in order to verify the design with regard to performance and system functions.

14. Instruction to Continued Airworthiness (ICA)

This paragraph shall detail the ICA and operational requirements with its associated supporting document/drawings amendment as follows:

- *Aircraft Maintenance Manual Supplement*
- *Aircraft Wiring Manual (AWM)*
- *Layout of Passenger Accommodation (LOPA)*
- *Airworthiness Limitations*
- *Special Inspection Techniques*
- *Reliability Assessment*
- *Etc*

15. Substantiation Master Document List

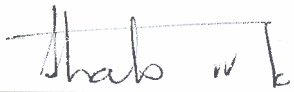
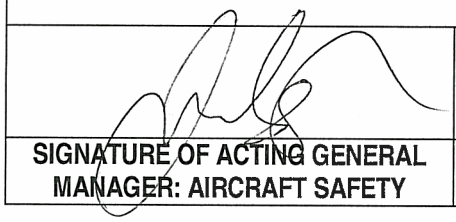
All substantiation documents for showing of compliance to the requirements must be submitted together with the report and included in the MDL as shown in the table below. The table is an example of the list of reference documents:

No	Title of Document	Document Number	Issuer	Issue Date	Revision
1	Flammability Report	FR-001	ABC (Pty) Ltd	June 5, 2013	1
2	ELA report	ELA-001	XYZ (Pty) Ltd	June 5, 2013	2

Please Note:

The above listing as a whole should not be considered to be exhaustive, it is conceivable that some additional information may be requested in order to substantiate, investigate and review any unusual design features of the repair.

DOCUMENT AUTHORISATION

DEVELOPED BY:		
	EDWIN PHEFO	20 JUNE 2013
SIGNATURE OF ACTING MANAGER: CERTIFICATION ENGINEERING	NAME IN BLOCK LETTERS	DATE
REVIEWED & VALIDATED BY:		
	LOBANG THABANTSO	20 JUNE 2013
SIGNATURE OF ACTING SENIOR MANAGER: CERTIFICATION	NAME IN BLOCK LETTERS	DATE
APPROVED BY:		
	SUBASH DEVKARAN	20 JUNE 2013
SIGNATURE OF ACTING GENERAL MANAGER: AIRCRAFT SAFETY	NAME IN BLOCK LETTERS	DATE