

***SOUTH AFRICAN***



***CIVIL AVIATION  
AUTHORITY***

PART MANUFACTURING APPROVAL



<b>GUIDANCE MATERIAL FOR PART MANUFACTURING APPROVAL</b>
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## Table of Contents

1.	RECORD OF AMENDMENTS .....	3
2.	LIST OF EFFECTIVE PAGES .....	4
3.	PURPOSE .....	5
4.	APPLICABILITY .....	5
5.	REFERENCE DOCUMENTS .....	5
6.	DEFINITIONS AND ABBREVIATIONS .....	6
7.	BACKGROUND.....	7
8.	PHASE ONE – PRE-APPLICATION AND PRODUCT FAMILIARISATION .....	7
8.1	Pre-Application Inquiries / Meetings .....	7
8.2	Concept Briefing .....	8
9.	PHASE TWO - APPLICATION .....	8
9.1	Minimum Substantiation Data.....	8
9.2	Fees .....	9
9.3	Identify SACAA project Team Members.....	9
9.4	Reports / Meeting Minutes.....	9
10.	PHASE THREE – CERTIFICATION BASIS FOR DESIGN APPROVAL AND COMPLIANCE PROGRAM .....	10
10.1	Certification Basis for Design Approval .....	10
10.2	Design Review Meetings .....	13
10.3	Establish the Compliance Program .....	14
10.4	Create LOI Matrix .....	14
10.5	Accept and Review Documents.....	15
11.	PHASE FOUR – DEMONSTRATE AND RECORD COMPLIANCE .....	15
11.1	Refine Certification Plan and Project Schedule .....	15
11.2	Establish Configuration Control System .....	16
11.3	Define Conformity Inspection Requirements .....	16
11.4	Prepare Test Plans.....	18
11.5	Witnessing of Tests .....	18
11.6	Quality Control.....	19
11.7	Applicant/SACAA Certification Readiness Review Meeting .....	19
11.8	Finding of Compliance and Compliance Checklist Sign-Off .....	20
12.	PHASE FIVE – ZA-PMA AUTHORISATION LETTER.....	21
12.1	Confirm Compliance and Close Action Item List .....	21
12.2	Issuance of ZA-PMA Authorization.....	22
12.3	Transferability and period of validity .....	22

**GUIDANCE MATERIAL  
 FOR PART MANUFACTURING APPROVAL**

12.4 ZA-PMA Marking Requirements.....23  
 13. DOCUMENT AUTHORISATION .....23

**1. RECORD OF AMENDMENTS**

(All amendments to this Manual must be made in accordance with GP002 which contains the Manual Amendment Procedure see GP002c)

Amendment Number	Pages Affected	Date Amended	Approved By: Name	Signature
001	Revised TGM	14 May 2020	Simon Segwabe	

**GUIDANCE MATERIAL  
FOR PART MANUFACTURING APPROVAL**

**2. LIST OF EFFECTIVE PAGES**

Revision No.: 001

Column 1				Column 2			
*	PAGE	REVISION	DATED	*	PAGE	REVISION	DATED
	7,8,9,10 & 12	001	14 May 2020				

\* Indicates page revised, added or deleted by this revision. Column 2 should be completed only when column 1 is full.

### 3. PURPOSE

The purpose of this Technical Guidance Material (TGM) is to provide procedural guidelines concerning manufacturing approvals of aircraft related parts in line with SACAR Subpart 9: Approval of Parts and Appliances of South African Parts Manufacturing Approvals (ZA-PMA) certification activities for domestic aeronautical products.

### 4. APPLICABILITY

This TGM is applicable to the manufacture of parts, including replacement and modification parts, for sale and installation on type-certificated aircraft, aircraft engines or propellers under the provisions of SACAR Subpart 9. The PMA is both a design and production approval issued to an applicant who has demonstrated the capability to design and manufacture to specific SACAA requirements. The applicant for a ZA-PMA shall be a holder of a Part 148 Manufacturing Approval.

The information contained herein does not apply to: -

- (a) parts produced under a Type Certificate
- (b) parts produced by an owner or operator for maintaining its own product
- (c) parts produced under ZA-TSO
- (d) standard parts conforming to established civil aviation industry or South African civil aviation specifications.

### 5. REFERENCE DOCUMENTS

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

- 5.1. Part 21, Subpart 5 of the Civil Aviation Regulations (CAR's), General;
- 5.2. Part 21, Subpart 12 of the CAR's A-TSO Authorizations;
- 5.3. SA-CATS 21, Civil Aviation Technical Standards (CATS), Airworthiness Requirements
- 5.4. Part 147 of the CAR's, Design Organisations for Products, Parts and Appliances;
- 5.5. Part 148 of the CAR's, Manufacturing Organisations;
- 5.6. SA-CATS 147 Design Organisations (DO);
- 5.7. Part 187 of the CAR's, Fees
- 5.8. SA-CAR Part 43

## 6. DEFINITIONS AND ABBREVIATIONS

The following definitions and terms will be used in this document:

TERM	DEFINITION
<b>Accept</b>	means the acknowledgement by SACAA that an item or plan should lead to compliance.
<b>Approve</b>	means to make formal acknowledgement that a product or document meets the regulations and requirements. Within this instruction the word approve is limited to Type Certificates (TC), Supplemental Type Certificates (STC), Technical Standard Order (ZA-TSO), Type Certificate Data Sheet (TCDS), Airworthiness Limitations Section of the Instructions for Continued Airworthiness (ICA), Flight Manual and refers to approvals issued by the Director of Civil Aviation;
<b>Applicant</b>	means the person/organisation that is the legal entity on whose behalf the application was made. This will normally be the entity to which the ZA-PMA approval is issued once certification is completed;
<b>Certification Project Team</b>	means those individuals who have been assigned to a particular ZA-PMA project, including the applicant, SACAA personnel and personnel authorised by the SACAA;
<b>Certification Plan</b>	refers to a comprehensive plan detailing activity and means of achieving compliance to the chosen airworthiness standard, other relevant airworthiness standards, applicable SACAR's and SA-CATS 21 to ensure that the article meets the required Minimum Performance Standards (MPS).
<b>Conformity</b>	means examination of an aeronautical product against the relevant design, test and quality system data.
<b>Engineering Inspection</b>	means inspections performed by a CAA Certification Engineer. This inspection provides an opportunity to review an installation and its relationship to other installations on a product to determine compliance with airworthiness requirements that cannot be determined adequately from an evaluation of the technical data;
<b>Finding of Compliance</b>	means a determination that an element of the design satisfies the relevant airworthiness standards;
<b>Means of Compliance</b>	means the principle method by which compliance to the specified airworthiness standard is demonstrated. Examples are: analysis, test, similarity, flight test, compliance inspection, drawing review, process specification,
<b>Project Leader</b>	means the assigned individual from within the SACAA Airworthiness Engineering Department, who manages the certification project. The applicant may also have a project leader, who will be referred to as the "applicant project leader" in this document;
<b>Level of Involvement (LOI)</b>	means the summation of SACAA activities undertaken during a certification program, as the SACAA share of the overall certification activity, to be satisfied that aeronautical products are compliant with accepted standards using accepted interpretations and that they have no unsafe features.
<b>Compliance Program (CP)</b>	refers to the process followed to ensure that all the items in the compliance checklist are covered to ensure that the PMA article/product certification basis is maintained.

## 7. BACKGROUND

The requirements of CAR 21.09.1 is for any Manufacturing Organisation approved under SACAR Part 148 producing a replacement or modification part for sale for installation on a type certified aircraft, aircraft engine or propeller to do so in accordance with a PMA issued under CAR 21.09.4. Since an STC is a design data approval only, parts manufactured for an STC kit must also have a PMA approval that covers the production processes.

When a specific item receives a PMA approval, it can be installed on the specific type of aircraft on which it receives approval. However, a specific installation approval is also required prior to installing the part on the aircraft. The PMA is an approval of replacement or modification parts of simple design whose failure **will not** affect the safe operation of the aircraft. The approval allows a manufacturer to produce and sell parts for installation on type certificated aircraft and is valid only for the aircraft model that the part is approved for. The applicant demonstrates compliance through tests and analysis as specified in Part 21 Subpart 9, however there are no set PMA minimum aviation standards which are internationally recognised that the applicant may demonstrate compliance to.

This document is meant to provide a consistent process to explain the phased PMA process and what is expected at each phase of the certification process of the specific aircraft part or component. The details of each phase are covered in later sections of this document. The phases are:

- (a) **Phase One:** Pre-Application and Product Familiarisation
- (b) **Phase Two:** Application
- (b) **Phase Three:** Certification Basis for Design Approval and Compliance Program
- (c) **Phase Four:** Demonstrate and Record Compliance
- (d) **Phase Five:** ZA-PMA Authorisation Letter

## 8. PHASE ONE – PRE-APPLICATION AND PRODUCT FAMILIARISATION

### 8.1 Pre-Application Inquiries / Meetings

Upon receipt of a certification inquiry, a representative from the Airworthiness Engineering Department may communicate with the potential applicant to obtain a preliminary assessment of the general features and degree of complexity of the given product. These discussions are useful in assessing the need for and setting the parameters for a concept briefing. It is highly recommended that the applicant contacts the SACAA at an early

stage so that the SACAA and the applicant can discuss requirements and begin to develop a certification plan.

The SACAA Level of Involvement (LOI) shall be determined at the beginning of the project. It is advisable that the applicant shall not begin any certification activities without agreement with the designated SACAA project leader.

## 8.2 Concept Briefing

A concept briefing is suggested for complex projects. During a concept briefing the potential applicant should be prepared to provide a detailed description of the product. The concept briefing is the first formal discussion of the basis for the design approval and means of compliance. Attendees at the briefing should include the potential applicant, SACAA Airworthiness Engineers and managers if applicable.

## 9. PHASE TWO - APPLICATION

The applicant for the issuance of a PMA shall submit an application in accordance with the requirements of SACAR 21.09.3. The applicant shall be the holder of a Part 148 Manufacturing Organisation Approval or shall ensure that the PMA article is manufactured by an entity that holds a Part 148 Manufacturing Organisation Approval. The completed application form CA 21-09 shall be forwarded to [eng@caa.co.za](mailto:eng@caa.co.za) and also be accompanied by the appropriate fee as stipulated in SACAR Part 187.

### 9.1 Minimum Substantiation Data

Applications should also be accompanied by the following information:

- a) The identity of the type certified product for installation of the PMA part. This should include the make, model, series and (if applicable) the serial number of the product.
- b) The name and address of the manufacturing facilities at which these articles are to be manufactured.
- c) The design data of the article, which consists of:
  - i) Drawings and specifications which show the configuration of the part or appliance.
  - ii) Information on dimensions, materials and processes that define the structural strength of the part.
  - iii) Test reports and computations necessary to show that the design of the part complies with the



<p><b>GUIDANCE MATERIAL FOR PART MANUFACTURING APPROVAL</b></p>
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airworthiness design standards applicable to the product on which the part is to be installed; a copy of the licencing agreement if the design of the part was obtained by such.

- iv) An applicant for a PMA must provide a statement certifying that the applicant has complied with the airworthiness requirements of SACAR 21.09.3.
- v) For replacement parts, the identity of the TC holders part, including the part's name and number.

## 9.2 Fees

SACAR Part 187, Subpart 187.01.2 defines the relevant application fees for the product design and manufacturing approval. Fees shall be charged to the applicant based on the hourly rate for the time spent on the project by SACAA personnel.

## 9.3 Identify SACAA project Team Members

Once the SACAA has received the application form and payment of relevant fees have been made, the SACAA representative shall facilitate the formation of the certification project team. The team shall consist of the project leader and team members identified from relevant departments. The certification project team will review the certification basis with the applicant. Any deviations to the airworthiness design standard must be reviewed and approved by the project leader.

## 9.4 Reports / Meeting Minutes

Reports are generated as an output from formal meetings, ad hoc meetings, test witnessing and some telephone calls or e-mails. A report might be generated anytime throughout the certification process. The rule of thumb should be that if a decision was made or an action item agreed upon, this should be recorded. The essentials of the meeting should be captured, including: identification of personnel involved, date, place, topic, decisions made, and action items generated.

In addition, the report should indicate the agreement of the participants to the accuracy of the decisions or action items identified in it. All team members shall ensure that the project leader and the applicant are aware of new action items and decisions made. The project leader will ensure that the action item database is populated with any new items.

Either the applicant or a SACAA team member may write a report. In either case, copies must be forwarded to both the project leader and the applicant. Both sides shall review the report for accuracy. Signatures may be

**GUIDANCE MATERIAL  
FOR PART MANUFACTURING APPROVAL**

used to record agreement to the accuracy of the report.

## 10. PHASE THREE – CERTIFICATION BASIS FOR DESIGN APPROVAL AND COMPLIANCE PROGRAM

The certification basis is the set of design standards, regulations, special conditions, equivalent safety findings and exemptions to the rules that identify the airworthiness design standards and other requirements to which the applicant must show compliance. The certification basis for the PMA part is the same as the certification basis for products affected by part installation (see the TCDS). The applicant must demonstrate compliance with all elements of the certification basis to the satisfaction of the SACAA before the PMA may be issued.

The compliance program specifies each item within a compliance checklist as a means of compliance (MOC) by which the applicant is proposing to demonstrate compliance with the requirements. The applicant is requested to produce a compliance program for review and acceptance by SACAA. A requirement can be complied with for example by analysis, flight test, static test and/or substantiation report.

### 10.1 Certification Basis for Design Approval

Approval of an application for PMA requires an approval of the design under SACAR Part 21 and approval of the Quality System under SACAR Part 148. There are **two** methods through which the certification basis is established for the approval of the design data. These are:-

#### (a) Approved Data

The applicant stipulates use of data approved under Part 21 to produce the modification part. To obtain a PMA through this method is the simplest, since design data of the part is already approved, only the assessment of the manufacturing capabilities to produce the part will be carried out.

#### (b) Identity

Applicants typically use this approach to duplicate attributes of the part without the original design data in order to produce a replacement part. If the applicant can design a replacement part and show that the design and manufacturing capabilities will produce the part identical to the original approved part, a PMA based on identity can be considered. Applicants must sufficiently define their designs to allow comparison of dimensions, tolerances, materials, processes, and specifications. The SACAA shall diligently evaluate identity as this approach will not normally produce an identical design to the original approved part. The applicant shall show that tolerances, processes, and manufacturing specifications are identical, failure to do so

shall result in the rejection of the application.

The process may entail disassembly, measurement of features, and material and functional analyses of the original part. The applicant's data shall be reviewed to confirm that it adequately defines the original part's design using appropriate sample sizes. This data defines dimensions, material properties (e.g. microstructure and chemical composition), special processes (e.g. welds, heat treat, coatings), and continued airworthiness requirements of both the original and duplicate part. The use of qualified or accredited laboratories for analyses of materials and processes shall also be assessed.

### 10.1.1 Design Data Methodologies

Applicable design data is defined as all necessary drawings, specifications and other technical information provided by the applicant for, or holder of a design organisation approval or approved STC released in a controlled manner to a Manufacturing Organisation approval holder under Part 148. This should be sufficient for the development of production data to enable repeatable manufacturing to take place in conformity with the design data. The data pack shall be assessed to confirm the application includes adequate detailed design data to define the characteristics of the part sufficient to conform it. These data include drawings, technical data that confirms structural strength, part marking information, manufacturing and process specifications that define the configuration, and other pertinent data.

The applicant shall also demonstrate by analysis that the design of the part meets the requirements of all applicable airworthiness standards. This analysis should discuss how the part meets these requirements and address elements such as material composition, condition, fabrication, configuration, and interface with other parts.

The applicant shall also carry out tests to determine the criticality and complexity of the replacement part. If required, the component testing shall be designed to test the performance and durability of the part to the extent required by the applicable airworthiness standards. Certification testing (as opposed to developmental testing) includes protocols such as conformity inspections of the test article and acceptance of a proposed test plan that should be discussed and agreed to by the SACAA project leader before proceeding with the testing. The tests must be supported by appropriate analysis and engineering assessment to both the next higher assembly, and the aeronautical product as a whole to test the integration should the part fail to perform its intended function.

<b>GUIDANCE MATERIAL FOR PART MANUFACTURING APPROVAL</b>
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In the event that the applicant is using third party design data, a Licensing Agreement with the design holder will need to be produced. This is a document from the Design Organisation authorising the use of their design data package.

The applicant shall use the certification basis of the eligible product from its TCDS to establish the relevant airworthiness requirements for the part. A part's nature lies in its purpose, physical characteristics, interfaces with systems and how its failure modes impact safety. This analysis is at least qualitative and considers the effect of article failure on the next higher assembly and its performance. Additionally, the analysis describes failure effects of the next higher assembly on the product and its performance given the failure of the embedded part. The scope and rigor of each test and computation will vary with the nature of the part and includes at least the following:

- A safety assessment that characterizes the nature of the part and its effect on safety;
- Computations that show regulatory compliance and substantiate the comparative analysis;
- Test results that show direct regulatory compliance and verify the comparative analysis.

The eligibility to produce the part under a ZA-PMA will be determined from this assessment.

### 10.1.2 Certification Planning

The applicant shall provide a certification plan to describe the certification work scope, schedule, means of compliance and tests and quality control system evaluations to the certification project team for approval. The main objective of the certification plan is to ensure that the proposed PMA part complies with the applicable airworthiness design standard.

Once the product certification plan is submitted and agreement reached between the applicant and the SACAA certification project team, it shall be ready for acceptance and implementation. The plan shall also include a compliance checklist. The applicant and SACAA team shall agree on the specific means of compliance to the airworthiness design standards and regulations shown in the compliance checklist.

A typical certification plan shall consist of some of the following items:

- (a) Introduction;

**GUIDANCE MATERIAL  
FOR PART MANUFACTURING APPROVAL**

- (b) A brief description of the part;
- (c) Applicable requirements and airworthiness design standards;
- (d) Reference to the certification basis as specified on the TCDS of the type certificated product;
- (e) Safety Assessment;
- (f) A Compliance Checklist – A list of applicable airworthiness standards or specific certification basis such as FAR's, SACAR's and SA-CATS, etc. versus proposed means of compliance (MOC) on an item by item basis;
- (g) List of all the activities pertaining to compliance demonstrations such as test witnessing, compliance tracking, compliance inspections and records, conformity statements;
- (h) Program time schedule for achieving compliance, milestones and action item assignments, etc.

Other information included, such as a proposal for the LOI by SACAA in terms of delegation and test witnessing, as well as the deliverables to SACAA such as documents required for showing of compliance to the applicable requirements and their scheduled date of availability shall be included in the Certification Plan for each compliance item.

## 10.2 Design Review Meetings

Design review meetings are generally intended to allow SACAA specialists to perform detailed reviews of specific areas of the product design with their counterparts. Design review meetings should be scheduled well in advance but they may be arranged as required. Typically, project management is not represented at these meetings. The objectives of the meetings are to gain detailed knowledge of the product design in specific areas and enable SACAA to accept the company proposals on finding compliance. The applicant is responsible and expected to prepare meeting minutes and have SACAA sign-off on such minutes.

Furthermore, the airworthiness engineer attending a design review meeting will among others review the design and production aspects of the PMA part. The following are some of the key items forming the focus of the review:

- (a) To check the adequacy and validity of technical data and ensure its compliance with the applicable airworthiness design standard.
- (b) To check applicant's quality control system;
- (c) If the applicant requests approval to deviate from any airworthiness design requirement of a PMA, to check that the equivalent level of safety is satisfactory;

**GUIDANCE MATERIAL  
FOR PART MANUFACTURING APPROVAL**

The design review meeting shall produce a detailed report consisting of the following elements:

- (a) the specific topics discussed, and the aspects of the product reviewed;
- (b) the report identifies agreements reached and records any outstanding action items; and
- (c) a copy of the report is given to the project manager for updating of the overall project status, the action item database, the LOI Matrix and the compliance plan, and to aid in preparation of engineering review board and management meetings.

### 10.3 Establish the Compliance Program

The compliance program specifies each item within the compliance checklist as a means of compliance (MOC) by which the applicant is proposing to demonstrate compliance with the airworthiness design requirements set out in the compliance checklist. The applicant is requested to produce a compliance program for review and acceptance by SACAA. A requirement can be complied with for example by flight test, static test and/or substantiation report.

Some typical means of compliance may be listed as follows:

- (a) Calculation/Analysis: Reports for the evaluation of loads, strength, performance, flying qualities and other characteristics.
- (b) Safety Assessment: Safety analysis philosophy and methods, system safety assessment, zonal safety assessment and others.
- (c) Flight Test: Flight test reports.
- (d) Inspections: conformity inspections to verify that materials, parts, processes and fabrication procedures conform to type design.

### 10.4 Create LOI Matrix

The LOI should be depicted in a "matrix format" created by the applicant in consultation with the SACAA project leader. Each activity, such as conducting a test, completing a report or assembling data is listed. The levels of involvement for SACAA for each report, data element or test can then be shown next to the activity.

The matrix should include references to the certification schedule and to any pertinent SACAA resource constraints that could affect the schedule. It should be possible to identify the responsibilities in the matrix at

the level of the individual responsible for the specific activity. The level of detail that can be presented for each requirement using a LOI matrix ensures that SACAA and the applicant understand their respective expectations and obligations. The SACAA and with the applicant must agree to the LOI.

## 10.5 Accept and Review Documents

Reports submitted for review as part of SACAA LOI, are sent to the project leader who then forwards these to applicable team members. Comments from the team members are received by the project manager, consolidated into an official correspondence and forwarded to the applicant. Once the applicant has shown compliance to appropriate requirements, the SACAA specialists may sign-off the compliance program.

## 11. PHASE FOUR – DEMONSTRATE AND RECORD COMPLIANCE

The objective of this phase is to demonstrate compliance with the relevant airworthiness design standard, certification basis and the acceptance thereof.

Having established and agreed on the means of compliance (MOC), the applicant must provide the SACAA with tests and calculations demonstrating compliance with the certification basis, normally by means of substantiation documents and reports.

Phase four will culminate in a declaration by the applicant that the design complies with the stipulated requirements.

### 11.1 Refine Certification Plan and Project Schedule

The certification plan is developed by the applicant in phase two. In phase three, SACAA and the applicant shall discuss, negotiate and modify the certification plan as necessary prior to acceptance by SACAA. Acceptance of the certification plan accomplishes the core goal of phase three, which is to agree on the means and methods of compliance and LOI. The witnessing of compliance requirements should be identified in the discussions and should be documented in the plans as appropriate.

In phase three, the baseline project schedule produced by the applicant for the initial design review board meeting shall be expanded into a detailed schedule. The exact testing requirements shall be developed mainly

from the certification plan. The detailed schedule shall be compared to the LOI matrix to provide early identification of busy periods and timing conflicts for SACAA. This schedule shall be regularly updated and shared with SACAA.

The applicant is responsible for updating the overall project schedule in line with the changes in project activities. Updates to the project schedule are likely to affect the LOI matrix and the LOI schedule. Regular communication between the applicant and the project leader is needed to avoid conflict with other SACAA commitments and constraints.

The project leader may convene team meetings or make use of other information sharing methods to ensure that team members and other stakeholders are aware of significant changes in scheduled activities.

## 11.2 Establish Configuration Control System

The applicant is expected to have an effective configuration tracking system in place at all times. Before each certification test, for example, ground tests or flight tests, the applicant must document the configuration of the product and must ensure that the product conforms to the design data.

If the design is changed subsequent to a certification test, the applicant may have to either repeat the test or substantiate that the design change does not affect compliance with the relevant design standard requirements.

SACAA may conduct conformity inspections as necessary. At the end of the PMA certification project, the configuration control system must result in a definition of the approved product.

## 11.3 Define Conformity Inspection Requirements

At this phase SACAA shall identify all the conformity inspections required. The inspections shall verify and provide objective documentation that the test articles, parts, assemblies, installations, functions, and test setups conform to the design data. The Conformity Inspection is a phased process and the applicant is advised to read and adhere to the Guidance Material for Conformity Inspection accessible from the SACAA website.



**GUIDANCE MATERIAL  
FOR PART MANUFACTURING APPROVAL**

The SACAA shall conduct conformance inspections of the certification article at its own discretion. The inspections are meant to verify that the article conforms to applicable airworthiness standards, drawings, specifications, production and manufacturing processes.

The applicant must submit to the SACAA, a Statement of Conformity attesting that the articles conform to the proposed design. The Statement of Conformity shall be submitted to SACAA before any conformity inspections by the SACAA can be conducted. This sequencing of events is meant to ensure that the test articles are true representations of the proposed PMA article.

The conformity inspection shall be successfully accomplished before any certification ground or flight tests are conducted.

The applicant shall perform all inspections and tests necessary to demonstrate compliance with the applicable type-certification basis and environmental protection requirements. Before each test required is undertaken, the applicant shall have determined for the test specimen that:

- (a) materials and processes adequately conform to the specifications for the proposed type design;
- (b) parts of the products adequately conform to the drawings in the proposed type design;
- (c) the manufacturing processes, construction and assembly adequately conform to those specified in the proposed type design; and
- (d) the test equipment and all measuring equipment used for tests are adequate for the test and are appropriately calibrated.

The applicant shall allow the SACAA to make any inspection necessary to check compliance as per (a) to (d) above.

The applicant shall allow the SACAA to review any report and make any inspection and to perform or witness any ground and flight test necessary to check the validity of the declaration of conformance submitted by the applicant under SACAR 21.09.4 (1) (b) and to determine that no feature or characteristic makes the product unsafe for the uses for which certification is requested.

For tests performed or witnessed by the SACAA under point (d) the applicant shall submit to the SACAA a statement of conformity and ensure that no change relating to the test that would affect the statement of conformity may be made to a product, part or appliance between the time conformance is requested and the time it is presented to the SACAA for test.

#### **11.4 Prepare Test Plans**

At the beginning of a project, an agreement must be reached between the certification project team and the applicant on the required tests and the responsibility for test witnessing. The applicant must prepare a test plan to show compliance to the regulations and the airworthiness design standard. The applicant shall also submit the test plan early enough to allow the SACAA time to review and approve the test plan before the start of the envisaged test. Applicants are cautioned that if the test plan is not accepted or if SACAA's test witnessing requirements are not satisfied before a test is conducted, there is a risk that SACAA will not accept the test results.

The test plan is used to ensure orderly and complete testing is accomplished. At a minimum, a description of the items to be tested and a list of all equipment necessary to conduct the test should be in the test plan. It is also important to include a description of how the equipment is to be calibrated (when calibration is required) and approved before the test, required conformance of the test article and test setup, a list of the specific airworthiness design standards, a description of how compliance is expected to be shown, and a test procedure written in a step-by-step format with defined pass/fail criteria.

Test articles will be built to an agreed build standard and shown by the applicant to conform to that standard. In some cases, the SACAA airworthiness engineer will request that an additional conformance inspection be performed before the test is conducted.

#### **11.5 Witnessing of Tests**

When witnessing official tests, the SACAA airworthiness engineer who is authorised to witness the test will verify that the test procedures described in the applicant's SACAA-approved test plan are followed and that any data captured by test instrumentation appears to be valid for the test in question.

After the test, the designated SACAA airworthiness engineer shall sign the relevant test record showing the results were obtained by properly following the approved test plan. This record shall identify the test and include the results obtained, the decisions reached, and any recommendations made to the applicant. The test result record may be attached to the final test report and it is not a substitute for the applicant's test report showing completion of the test plan.

## 11.6 Quality Control

A total quality control system meeting the requirements of CAR 148.02.4 would provide control over all phases of manufacture, including control over the manufacture of all supplier-furnished articles. The quality control exercised by the manufacturing approval holder over articles furnished to the approval holder by a designated supplier/subcontractor may be limited to the approval of the supplier/subcontractor's material review systems, design changes, and the manufacturing approval holder's standard incoming quality control procedures employed after articles are received from outside sources.

A totally integrated quality control system would include the following major functions:

- (a) Technical Data Control
- (b) Manufacturing Processes
- (c) Special Processes
- (d) Inspection/Identification
- (e) Non-destructive Inspection
- (f) Tool and Gauge Control
- (g) Supplier Control
- (h) Testing
- (i) Materials Review
- (j) Airworthiness Certification
- (k) Service Difficulties

## 11.7 Applicant/SACAA Certification Readiness Review Meeting

Near the end of phase four it is useful to hold one or more certification readiness review meetings. In such a meeting, specialists and applicant discuss the entire design with the goal of determining how close the project is to the goal of certification. Topics will include open action items, unfinished tests, determination of the flight

envelope to be approved, closure of issue papers, approval of airworthiness limitations and of the flight manual, and any other items from the “to-do” list.

There might be three certification readiness review meetings: one held by the applicant alone, one held by the SACAA team alone and a combined certification team meeting. The purpose of the separate meetings is to prepare for the combined meeting.

At the end of phase four there will be a declaration made by the applicant that the design is compliant with its certification basis and that no unsafe feature is known to exist. Both are equally important. It is the goal of the certification readiness review to discuss and agree on actions needed to make this declaration.

### **11.8 Finding of Compliance and Compliance Checklist Sign-Off**

Sign-off of compliance checklist by SACAA is done in phase four. The compliance checklist sign-off process is a systematic means to record compliance with all the applicable airworthiness requirements. It provides confidence that the approval of the PMA is warranted.

The typical sign-off includes each applicable paragraph of the certification basis signed by the person showing compliance. It is countersigned by SACAA specialists in areas where SACAA has expressed a need for involvement.

The original paper copy of the compliance checklist is signed by the applicant near the end of phase four. Ideally, signatures should be applied at the earliest opportunity once compliance has been shown for an item.

There are essentially four situations that may exist at the end of phase four with respect to findings of compliance:

- (a) Applicant and SACAA agree compliance have been demonstrated: The applicant indicates their finding or recommendation of compliance by signing the compliance checklist against the specific requirement. The SACAA specialist indicates his concurrence that compliance has been shown by also signing the compliance checklist against the requirement.
- (b) Compliance with limitations and/or mandated inspections: In some instances, compliance can only be found by the imposition of a limitation and/or inspection. If a limitation/inspection can enable compliance

**GUIDANCE MATERIAL  
FOR PART MANUFACTURING APPROVAL**

to be found, the applicant and the SACAA specialist shall sign the compliance checklist. SACAA must provide explicit agreement on the acceptability of the limitations before the applicant can sign. The compliance checklist should be annotated to include the nature and location of the limitation/inspection that enabled the finding to be made. Such limitations/inspections must also be included as part of the appropriate approved publication: Airworthiness Limitations Section of the ICA, etc. Compliance items falling into this category are fully compliant, and as such could remain as permanent situations.

- (c) A non-compliance with limitations and/or mandated inspections: Sometimes the SACAA cannot make a finding of compliance because compliance has either not been fully established or the design change has been found not to be compliant with the product certification basis. The SACAA is therefore not able to sign the compliance checklist. Requirements that cannot be signed shall be listed as such and clear and agreed reasons shall be defined for each. Compliance items falling into this category may require interim limitations or mandatory inspections to be imposed to assure that these are satisfied.
  
- (d) Disagreement between the SACAA and the applicant: In cases where disagreement exists between the applicant and the specialist concerning compliance or means and methods of compliance, the compliance program shall not be signed. Such a disagreement would normally result in the creation of an issue paper as a vehicle to resolve the problem.

## **12. PHASE FIVE – ZA-PMA AUTHORISATION LETTER**

The bulk of the compliance demonstrations and findings were made in phase four. Phase five primarily concerns the approval of the proposed PMA.

### **12.1 Confirm Compliance and Close Action Item List**

Action items shall be closed as soon as practical. Often, they will be closed in phase four. Closure should be based on an agreed position and not necessarily on the demonstration of compliance. For example, should the issue concern a means of compliance, it shall be closed as soon as SACAA and the applicant have agreed on the appropriate means of compliance.

As per the project compliance program, the sign-off on the compliance checklist by the applicant and by SACAA is done in both phase four and phase five. At the end of phase four the original compliance checklist will be sent

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to SACAA for completion.

At this point the applicant will have signed the compliance checklist completely, indicating either a finding of compliance or recommendation of such a finding. The project leader will have custody of the original compliance checklist. The project leader ensures that designated specialists have access to provide compliance finding signatures.

It is expected that all action items would be closed before a ZA-PMA approval is issued.

## 12.2 Issuance of ZA-PMA Authorization

After document review of the quality control system description and relevant manufacturing and process specifications, and after on-site evaluation of the applicant's quality control system, the quality control system description and relevant manufacturing and process specifications shall also be approved prior to the issuing of the PMA approval letter.

When all the required data, certification tests, accompanying reports and scheduled inspections are completed satisfactorily as indicated in the certification plan as well as the determination that the PMA part complies with the relevant applicable airworthiness design standards and relevant SACAR's and SA-CATS, the application for the issuance of a PMA shall be ready for approval.

Before a PMA letter of approval may be issued to the applicant, the project leader shall ensure that the applicant is invoiced for the hours covered by all the SACAA team members involved in the PMA certification project. Payment for the invoiced hours shall be settled in full prior to issuance of the approval letter.

## 12.3 Transferability and period of validity

A ZA-PMA issued in terms of regulation 21.09.4 shall:-

- (a) not be transferable;
- (b) be valid until it is surrendered by the holder thereof, or is suspended by an authorised officer, inspector or authorised person, or cancelled by the Director.




**GUIDANCE MATERIAL  
 FOR PART MANUFACTURING APPROVAL**

The holder of a PMA which is suspended, shall forthwith produce the approval upon suspension thereof, to the authorised officer, inspector or authorised person concerned for the appropriate endorsement. The holder of a PMA which is cancelled, shall within 30 days from the date on which the approval is cancelled, surrender such approval to the Director. In the event that the holder of the approval loses the privileges of the Part 148 approval, the PMA shall be rendered invalid.

**12.4 ZA-PMA Marking Requirements**

All markings on a PMA part should be permanent and legible. The markings should identify the part as a PMA. They should also identify the manufacturer, part number, and the affected type-certified products. The applicant's part number must be different or distinguishable from that of the type certificate holder's part number.

**13. DOCUMENT AUTHORISATION**

<b>DEVELOPED BY:</b>		
	JABULANE NGCONGWANE	14 MAY 2020
SIGNATURE OF M: AW:ENG	NAME IN BLOCK LETTERS	DATE
<b>REVIEWED &amp; VALIDATED BY:</b>		
	LOBANG THABANTSO	14 MAY 2020
SIGNATURE OF ACTING SM:AW	NAME IN BLOCK LETTERS	DATE
<b>APPROVED BY:</b>		
	SIMON SEGWABE	14 MAY 2020
SIGNATURE OF E:ASO	NAME IN BLOCK LETTERS	DATE