



Technical Guidance Material for PART 21 ZA-TSO

Subject: GUIDANCE MATERIAL FOR PART 21, ZA-TSO AUTHORIZATION

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1. Purpose

The purpose of this technical guidance material (TGM) is to provide procedural guidelines concerning the planning and conduct of ZA-Technical Standards Order (ZA-TSO) certification activities for domestic aeronautical products.

2. Applicability

This TGM is applicable to domestic ZA-TSO design and production approval issued by SACAA to a manufacturer of an aeronautical part which has been certified to meet the requirements of a specific ZA-TSO standard.

A TSO standard specifies (usually by reference to an RTCA, SAE MPS, etc) the minimum operational performance requirements for the equipment, part and appliance used in civil aircraft and in addition, the environmental conditions under which such TSO item must perform.

3. Reference Documents

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

- 3.1 Part 21 Subpart 5 of the Civil Aviation Regulations (CAR's), General;
- 3.2 Part 21 Subpart 9 of CAR's Approval of parts and appliances;
- 3.3 Part 21 Subpart 12 of the CAR's A-TSO Authorizations;
- 3.4 A-CATS-AR, South African Civil Aviation Technical Standards (SACAT's), Airworthiness Requirements;
- 3.5 Aeronautical Information Circular (AIC) 61.6
- 3.6 Part 147 of the CAR's, Design Organisations for Products, Parts and Appliances;
- 3.7 Part 148 of the CAR's, Manufacturing Organisations for Products, Parts and Appliances
- 3.8 SA-CATS Design Organisations (DO);
- 3.9 Part 187 of the SACAR's, Fees;

4. Definitions and Abbreviations

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

- (a) **Accept** -- means the acknowledgement by SACAA that an item or plan should lead to compliance. Applicants' tests and engineering reports are accepted;
- (b) **Approve** -- means to make formal acknowledgement that a product or document meets the regulations and requirements. Within this instruction the word approve is limited to the Type Certificate, STC, ZA-TSO, Type Certificate Data Sheet (TCDS), Airworthiness Limitations section of the Instructions for Continuing Airworthiness (ICA), the Flight Manual and refers to approvals issued by the Commissioner for Civil Aviations;
- (c) **Applicant** -- means the person/organization that is the legal entity on whose behalf the application was made. This will normally be the entity to which the ZA-TSO approval is issued when the certification activity is completed;
- (d) **Certification Project Team** -- means those individuals who have been assigned to a particular type certification project, including the applicant, SACAA personnel and personnel authorized by the SACAA;
- (e) **Certification Plan** -- A comprehensive plan detailing activities and means of achieving compliance to the chosen TSO standard, other relevant airworthiness standards, applicable SACAR's and CATS-AR to ensure that the article meets the required Minimum Performance Standards (MPS).
- (f) **Conformity** -- means examination of an aeronautical product against the relevant design, test and quality system data.
- (g) **Engineering Inspection** -- Engineering inspections are physical inspections performed by a SACAA Certification Engineer/Inspector. 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;
- (h) **Finding of Compliance** -- means a determination that an element of the design satisfies the applicable TSO standard and other relevant standards of airworthiness;
- (i) **Means of Compliance** -- means the principle means by which compliance to the specified TSO standard is demonstrated. Examples are: analysis, test, similarity, flight test, compliance inspection, drawing review, process specification, and other activities and documents;
- (j) **Project Manager** -- means the assigned individual from within the SACAA Certification Engineering Section, who manages the certification project. The applicant may also have

a project manager, who will be referred to as the “applicant project manager” in this document;

- (k) **Level of Involvement (LOI)** -- 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.
- (l) **Compliance Program (CP)** – Process to ensure that all the items in the compliance matrix are covered to ensure that the TSO article/product certification basis is maintained.
- (m) **Minimum Performance Standards (MPS)** – Prescribes the minimum performance standard or requirements to which the certification article must be designed to and tested to in order to ascertain that each article that will be produced henceforth will be in compliance to the given performance standards, notably Radio Technical Commission for Aeronautics (RTCA) and Society of Automotive Engineers (SAE) standards.

5. Background

The ZA-TSO authorization is a certification approval process that authorizes a designer/manufacturer to produce aircraft components, parts and appliances ranging from simple hardware to complex avionics systems to a specific TSO standard. When a specific item receives a ZA-TSO approval, it can be installed on any aircraft. A specific installation approval is also required prior to mounting the device on an aircraft.

The important aspect of attainment of a TSO authorization is that the article concerned shall meet a specific TSO specifications and relevant minimum performance requirements independent of the article's intended installation on any type of aircraft or model. In addition, the TSO article must also conform to a quality control process that shall provide assurance that each article released under the specific TSO marking shall indeed meet the design and manufacturing requirements.

This document is meant to provide a consistent process to clarify what is expected at each phase in the ZA-TSO certification process of the specific aircraft part or component. Details of each phase are covered in later sections of this document.

❖ The phases are:

- (a) Phase One: Application Procedures and Product Familiarization
- (b) Phase Two: Establish Certification basis and Compliance Program
- (c) Phase Three: Demonstrate and Record Compliance
- (d) Phase Four: ZA-TSO Authorization Approval

6. Phase One – Application Procedures and Product Familiarization

6.1 Pre-Application Inquiries / Meetings

Upon receipt of a certification inquiry, a representative from the Certification Engineering Section may communicate with the potential applicant to obtain a preliminary assessment of the general features and degree of complexity of the given product. The holding of exploratory discussions is useful in assessing the need for and setting the parameters of a concept briefing.

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

6.2 Concept Briefing

A concept briefing is suggested for complex projects. During a Concept Briefing the applicant should be prepared to provide a detailed description of the product. The applicant is also expected to advise SACAA how they intend to show compliance for novel or unusual features although at this time the applicant need do so only in a top-level fashion. The Concept Briefing is the first formal discussion of certification basis and means of compliance. Attendees at the briefing should include the applicant, SACAA specialists and managers.

The agenda may include the following general topics:

- a. Any applicable lessons learned from previous programs;
- b. Novel and unusual features;
- c. Schedule for follow-up specialist meetings;

6.3 Application

The applicant for the issuance of a ZA-TSO authorization shall submit an application in accordance with the requirements of Subpart 12 of 21 of the SACAR's and the associated technical standards SA-CATS-AR. Furthermore, the applicant shall also be the holder of a design organization approval, and shall ensure that the TSO article is manufactured by a person/entity approved under SACAR part 148 manufacturing approval. The completed application form CA 21.12 shall also be accompanied by the appropriate fee as stipulated in Subpart 187.00.2 of Part 187 of the SACAR's.

The applicant shall also submit a copy of applicable TSO technical design data: design standard, drawings, function/environmental tests and minimum performance standard.

6.4 Fees

Subpart 187.00.2 of Part 187 of the SACAR's defines the relevant application Fees for the product design and manufacturing approval under a specific ZA-TSO standard. Fees shall be charged to the applicant based on the hourly rate for the time spent on the project by SACAA personnel.

6.5 Identify SACAA project Team Members

After the SACAA has received the application forms and payment of relevant fees made, The SACAA representative shall facilitate the formation of the Certification Project Team. The team shall consist of the Project Manager and team members identified from sections such as engineering, manufacturing and continuing airworthiness and other relevant departments.

After the certification project team is formed, the team will review the certification basis with the applicant. Any deviation to the TSO standard must be reviewed and approved by the Project Manager.

6.6 Reports / Meeting Minutes

6.6.1 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, some form of report should be made. 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 Manager and the applicant project manager are aware of new action items and decisions made. The Project Managers will ensure that the action item database is populated with the new items.

6.6.2 Either the applicant or a SACAA team member may write a report. In either case, copies must be forwarded to both the Project Manager and the applicant project manager. Ideally, both sides of the team will have reviewed it for accuracy. Signatures may be used to record agreement to the accuracy of the report.

6.6.3 Larger, pre-planned meetings should have a secretary named ahead of time who will be responsible for generating minutes / reports.

7. Phase Two - Certification Basis and Compliance Program

The certification basis is the set of regulations, standards, special conditions, equivalent safety findings, exemptions to the rules that identify the airworthiness standards and other requirements to which the applicant must show compliance and alternative means of compliance. The applicant must demonstrate compliance with all elements of the certification basis to the satisfaction of the SACAA before the ZA-TSO approval may be issued.

One of the important responsibilities of the applicant and the SACAA certification Project Team is to reach an agreement on which certification basis or relevant TSO standard will be used to certify the product/appliance. If the SACAA does not have its own ZA-TSO standard available for the product type, the applicant shall be free to propose an equivalent international TSO standard such as FAA TSO to which compliance shall be shown following approval from the Project Manager.

7.1 Applicable TSO Standard and Certification Plan

The applicant shall provide the 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 TSO article complies with the applicable TSO standard and associated minimum performance requirements.

Once the product certification plan is made 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 or matrix as its important element.

The applicant and SACAA team shall agree on the specific means of compliance to the airworthiness standards and regulations shown in the compliance matrix.

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

- a. Introduction
- b. A brief System description
- c. System Safety Assessment Report
- d. Applicable requirements and airworthiness standards
- e. Reference to the certification basis as specified on the TCDS of the type certificated product
- f. A Compliance Checklist – A list of applicable airworthiness standards or specific certification basis such as SACAR's and SA-CATS, FARS, RTCA's, 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.
- i. Required compliance documents, e.g. Flight test plan, PSAC, FHA, 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.

7.2 Design Review Meetings

7.2.1 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.

7.2.2 Furthermore, the Specialists attending a design review meeting will among others review the design and production aspects of the TSO article. 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 TSO standard.
- b) To check applicant's quality control system;
- c) If manufacturer requests approval to deviate from any performance standard of a TSO, one should check the equivalent level of safety is satisfactory;

7.2.3 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.

7.3 Establish the Compliance Program

The compliance program specifies each item within the compliance matrix 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 flight test, static test and/or substantiation report.

Applicants may voluntarily elect to comply with later versions of the standards specified by the SACAR's and/or relevant standards such as RTCA, SAE, etc. It must be understood that any additional standards with which the applicant elects to comply with shall henceforth form an integral part of the certification basis for the given ZA-TSO article and will no longer be optional for subsequent changes to the design.

Some typical means of compliance may be listed as follows:

- a. **Calculation/Analysis:** Report for the evaluation of loads, strength, performance, flying qualities and other characteristics.
- b. **Safety Assessment:** Safety analysis philosophy and methods, safety evaluation plans (e.g. software), 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.

7.4 Deviation Request and Equivalent Level of Safety

There might be situations whereby the proposed design consists of systems, components or parts which have not been previously certified, new materials, features and or safety challenges which may not be sufficiently covered by the applicable TSO certification and related airworthiness standards for the specific aeronautical product concerned e.g. the use of composite materials.

An applicant may apply to the Commissioner for Civil Aviation (CCA) for an Exemption or deviation from a particular section/s or elements of the TSO standard such as a particular environmental protection specification, acceptable means of compliance, etc. In cases where deviation applications are requested, the certification project team shall request the applicant to demonstrate that the equivalent level of safety is maintained.

An approval for deviation may be granted whereby it is the discretion of the CCA that it is in the public interest and not likely to affect aviation safety. Part 21.12.5 of the SACAR's is the applicable regulation governing deviation approval requests.

7.5 Provide Fundamental Certification Documents

Certain compliance documents are required very early in the certification program as aids to discussion and to improve the certification teams' understanding of the applicant's product. These early deliverables are called the Fundamental Certification Documents (FCD). The FCDs should be drafted by the applicant during Phase One and submitted for discussion and acceptance by SACAA early in Phase Two. The list includes, but is not limited to:

- a. TSO design data: design standard, design drawings, function/environmental tests and minimum performance standard
- b. Safety Assessment;
- c. Certification Plan;
- d. Project Description
- e. Baseline Certification Project Schedule.
- f. Plan for software aspects of certification (PSAC) for systems that contain software

7.6 Create LOI Matrix

7.6.1 The LOI should be depicted in a "matrix format" created by the applicant in consultation with the SACAA Project Manager. 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 specialists and managers, both at SACAA and with the applicant, must agree to the LOI.

7.6.2 The SACAA LOI can be considered as the total of all:

- a. Reports to be reviewed and accepted;
- b. Reports received for information;
- c. Test witnessing;
- d. Conformity inspections conducted by SACAA;

- e. Engineering inspections conducted by SACAA;
- f. Flight testing activities conducted by SACAA;
- g. Software process reviews on site, including those for programmable logic devices;
- h. SACAA findings of compliance.

7.7 Accept and Review Documents

Reports submitted for review as part of SACAA LOI, are sent to the Project Manager logged in and forwarded to applicable team specialists. Comments from the specialists 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.

The applicant and SACAA responsibilities are as follows:

- a. The applicant is encouraged to discuss report content with the SACAA specialist prior to submitting the report to SACAA;
- b. The applicant is responsible for submitting to SACAA the certification deliverables identified in the Certification Plans;
- c. The Project Manager shall monitor the submission schedules. Should serious delays occur, he will advise the certification team and management;
- d. The Project Manager shall also ensure that copies of all other documents referred to in the compliance plan are available to the team;
- e. The certification team shall review the submissions in a timely manner and provide concise technical comments or acceptance of the documents; and
- f. The Project Manager shall facilitate discussions between specialists as needed and collate all technical comments in a letter to the applicant. Once acceptance on a report is reached, the applicant or Project Manager should note acceptance on the LOI matrix.

7.8 Establish Baseline Project Schedule

The applicant is required to include a proposed baseline project schedule, which is essentially a top-level schedule that only identifies major milestones. The Project Manager is expected to work with the applicant towards the development of a more detailed project schedule.

Ideally, the applicant, who has the most control over the timing of events, writes this schedule and disseminates it to the certification team. Typical events to schedule in addition to the major milestones are design review meetings, major ground or flight tests, and submission and acceptance of major certification reports.

The Project Manager will endeavour to assure that any SACAA resource constraints are accommodated in the schedule. The schedule should cover milestones, accomplishments and the expected levels of involvement of both the applicant and the SACAA project team.

8. Phase Three – Demonstrate and Record Compliance

The objective of this phase is the demonstration of compliance with the relevant TSO standard certification basis and the acceptance of relevant compliance demonstrations.

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 documents and reports.

- ❖ ***Phase Three will culminate in a declaration by the applicant that the design complies with the stipulated requirements.***

8.1 Refine Certification Plan and Project Schedule

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

In Phase Two, 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 communications between the applicant and the Project Manager is needed to avoid conflict with other SACAA commitments and constraints.

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

8.2 Establish Configuration Control System

- a. The applicant is expected to have an effective configuration tracking system in place at all times.
- b. Before each certification test such as, for example, flight test, ground test, fault board analyses, etc., the applicant must document the configuration of the product and must ensure that the product conforms to the design data as well as the relevant TSO minimum performance requirements.
- c. 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.
- d. SACAA may conduct conformity inspections as necessary. At the end of the TSO certification project, the configuration control system must result in a definition of the approved product.

8.3 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 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 are in conformity with the proposed design. The Statement of Conformity shall be submitted to SACAA before any conformity inspections can be conducted. This sequencing of events is meant to ensure that the test articles are true representations of the proposed TSO article.

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

8.4 Prepare Test Plans

At the beginning of a project, an agreement must be reached between the 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 applicable TSO 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 conformities of the test article and test setup, a list of the specific airworthiness 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 many cases the SACAA specialist will request that an additional conformity inspection be performed before the test is conducted. The SACAA Manufacturing section will conduct this compliance inspection.

8.5 Witnessing of Tests

When witnessing official tests, the SACAA specialist who is authorized 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 data for the test in question.

After the test, the designated SACAA specialist 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.

SACAA specialists witnessing tests do not participate in the tests. This ensures that the individual remains impartial and can concentrate on the overall activity rather than being tasked with performing a specific function while the test is going on.

8.6 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:

- i. Technical Data Control
- ii. Manufacturing Processes
- iii. Special Processes
- iv. Inspection/Identification
- v. Nondestructive Inspection
- vi. Tool and Gauge Control
- vii. Supplier Control
- viii. Testing
- ix. Materials Review
- x. Airworthiness Certification
- xi. Service Difficulties

8.7 Applicant/SACAA Certification Readiness Review Meeting

- 8.7.1 Near the end of Phase Three 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.
- 8.7.2 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.
- 8.7.3 The end of Phase Three will be a declaration 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.

8.8 Finding Of Compliance and Compliance Matrix Sign off

- 8.8.1 Sign-off of compliance matrix by SACAA is done in Phase Three. The Compliance Matrix sign-off process is a systematic means to record compliance with all the applicable airworthiness requirements. It provides confidence that the approval of the Supplemental Type Certificate is warranted.
- 8.8.2 The typical sign-off includes each applicable paragraph of the certification basis signed by each applicable specialty area within the applicant's design approval organization. It

is countersigned by SACAA specialists in areas where SACAA has expressed a need for involvement.

8.8.3 The original paper copy of the Compliance Matrix is signed by the applicant near the end of Phase Three. Ideally, signatures should be applied at the earliest opportunity once compliance has been shown for an item.

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

- a. **Applicant and SACAA agree compliance has been demonstrated.** The applicant indicates their finding or recommendation of compliance by signing the Compliance Matrix against the specific requirement. The SACAA specialist indicates his concurrence that compliance has been shown by also signing the Compliance Matrix 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 to be found, the applicant and the SACAA specialist shall sign the Compliance Matrix. SACAA must provide explicit agreement on the acceptability of the limitations before the applicant can sign. The Compliance Matrix 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 exists:** 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 Matrix. Requirements that cannot be signed shall be listed as such and clear and agreed reasons shall be defined for each. Compliance finding items falling into this category may require interim limitations or mandatory inspections to be imposed to assure that these are satisfied.
- d. **Applicant and the specialists are known to be in disagreement:** 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.

9. Phase Four –TSO Authorization Approval

The bulk of the compliance demonstrations and findings were made in Phase Three. Phase Four concerns primarily the approval of the design change, its continued airworthiness limitations and maintenance of its operating envelope.

9.1 Confirm Compliance and Close Action Item List

Action items shall be closed as soon as practical. Often they will be closed in Phase Three. 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.

It is expected that all action items would be closed before TSO approval certificate issuance.

As per the project compliance program, the sign-off on the Compliance Matrix by the applicant and by SACAA is done in both Phase Three and Phase Four. At the end of Phase Three the original Compliance Matrix will be sent to SACAA for completion.

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

9.2 Deviation from Applicable ZA-TSO Performance Standards

A deviation from the minimum performance standards (MPS) of a particular ZA-TSO refers to any variation from the specified performance criteria as detailed within the designated TSO standard.

In accordance with SACAR 21.12.5, a relevant ZA-TSO article manufacturer who intends to deviate from a specific ZA-TSO or TSO standard shall request and prove to the Commissioner that the standards from which a deviation is requested, are compensated for by factors or design features providing an equivalent level of safety.

9.3 Issuance of ZA-TSO 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 TSO authorization approval letter.

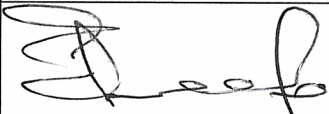
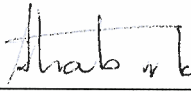
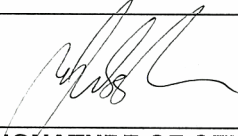
When all the required data, certification tests, accompanying reports and scheduled inspections are completed satisfactorily as indicated in the certification plan as well as the determination that the TSO article complies with the relevant Minimum Performance Standards (MPS), applicable airworthiness design standards and relevant SACAR's and SA-CATS-AR, the application for the issuance of TSO shall be ready for approval.

Before a TSO letter of approval may be issued to the applicant, the project manager shall ensure that the applicant is invoiced for the work (Man-hours) covered by all the SACAA team members involved in the TSO certification project. Payment for the invoiced man-hours shall be settled in full prior to the sitting of the Engineering Review Board (ERB), which is the technical committee responsible for making appropriate approval recommendations to the Commissioner for Civil Aviation.

9.4 TSO Marking

Once the TSO article has been proved to meet the relevant minimum performance standards (MPS), quality standards and applicable airworthiness standards, it shall be eligible for marking with the following identification information:

- a. The name and address of the manufacturer.
- b. The name, type, part number, or model designation of the article.
- c. The serial number or the date of manufacture of the article or both.
- d. The applicable TSO number.

DEVELOPED BY:		
	EDWIN PHEFO	21 JUNE 2013
SIGNATURE OF ACTING MANAGER: CERTIFICATION	NAME IN BLOCK LETTERS	DATE
REVIEWED & VALIDATED BY:		
	LOBANG THABANTSO	21 JUNE 2013
SIGNATURE OF ACTING SENIOR MANAGER: CERTIFICATION	NAME IN BLOCK LETTERS	DATE
APPROVED BY:		
	SUBASH DEVKARAN	21 JUNE 2013
SIGNATURE OF GENERAL MANAGER: AIRCRAFT SAFETY	NAME IN BLOCK LETTERS	DATE