

31 Aug 11

MAA/RI/07/11 (DG) – CERTIFICATION OF UK MILITARY REGISTERED AIR SYSTEMS

Rationale

In order to ensure that an air system's design meets appropriate safety requirements, a systematic, independent certification process is required for both new types of military registered air systems and for major changes to existing designs.

Implementation

This RI is effective immediately.

Contents

(1) Certification of UK Military Registered Air Systems

Regulation

(1)

Certification of UK Military Registered Air Systems

(1) New UK military air systems¹ requiring registration by the MAA, and Major Changes to the Type Designs of such systems and those already on the Military Register, **shall** be certified prior to their Release to Service.

Acceptable Means of Compliance

(1)

1. TAAs responsible for the introduction of new UK military registered air systems or Major Changes to the Type Designs of new and in-service air systems **should** ensure that they are certified in accordance with the Military Air Systems Certification Process (MACP), that comprises the following 6 phases:

- a. Phase 1 – Identify the requirement for and obtain organizational approvals.
- b. Phase 2 – Establish and agree the Type Certification Basis.
- c. Phase 3 – Agree the Certification Programme.
- d. Phase 4 – Demonstrate compliance.
- e. Phase 5 – Produce Final Report and issue Certificate.
- f. Phase 6 – Undertake post-Certification actions.

Further guidance on the 6 phases of the MACP process and what constitutes a Major Change to a Type Design are at Annexes A and B respectively.

2. **Full MACP.** The MACP **should** be applied in full for the certification of:

¹ Military registered air systems include fixed and rotary wing aircraft, remotely piloted air systems and loitering munitions.

- a. New UK military registered air systems that are pre Main Gate² approval on 1 Sep 11.
 - b. Major Changes to the Type Designs of UK military registered air systems, that are pre Main Gate, or Business Case Approval for lower value programmes, on 1 Apr 12.
3. **Tailored MACP.** An individually tailored version of the MACP **should** be applied to:
- a. New UK military registered air systems and Major Changes that will result in a change of Mark number that are post Main Gate approval and have not achieved RTS on 1 Sep 11.
 - b. All other Major Changes to the Type Designs of UK military registered air systems, that are post Main Gate, or Business Case Approval for lower value programmes, but have not achieved RTS on 1 Apr 12.
 - c. UORs falling within the descriptions in the sub-paras above. The MAA will take due note of the degree of urgency of the Requirement when determining the level of rigour in the independent assessment of compliance.
4. **Flow-chart.** A flow-chart showing the applicability of the MACP to UK military registered air systems and to Type Design changes is at Annex C.

**Guidance
Material**

(1)

Background

5. The requirement for the MACP stems from the MOD's response to the Haddon-Cave recommendations relating to the Release to Service and initial certification of air systems, and covers solely the Equipment DL0D. The intention to introduce the MACP was signalled in MAA/RN/03/11. It is not intended to apply the MACP retrospectively to in-service UK military registered air systems; however, future Major Changes to the Type Design of such air systems will be subject to the MACP.

The MACP

6. The MACP comprises 6 phases that are described at Annex A. For those new air systems and Major Changes that are to be subject to the Tailored MACP, the MAA will agree how each of the 6 phases will be addressed to ensure that the underlying principles of the MACP are applied to the most appropriate extent. This will be set out in a project-specific Certification Assurance Strategy issued by the MAA. Where it is determined that MACP requirements have already been decided or completed, the MAA will review independently whether they are adequate and auditable.

MACP Outcomes

7. **Full MACP: New Air System.** Successful completion of the full MACP for a new air system will result in the MAA issuing a Military Type Certificate (MTC) to the TAA. Unlike a civil TC, a MTC covers the entire air system including engines and propellers, where applicable. The MTC certifies that the air system:
- a. Has been designed by an approved organization.
 - b. Meets the approved Type Certification Basis (TCB), or that any airworthiness provisions not complied with are compensated for by factors that provide an equivalent level of safety.

² See the Acquisition Operating Framework, www.aof.mod.uk for guidance.

- c. Will remain airworthy in its approved roles when operated and maintained in accordance with the Approved Data.

The MTC will list any conditions, restrictions or operating limitations and will be accompanied by the MTC Data Sheet describing the TCB and giving general information about the Type design.

8. **Full MACP: Major Change.** Successful completion of the full MACP for a Major Change to a Type Design will usually result in the MAA up-issuing the MTC if one exists, or issuing an Approved Design Change Certificate (ADCC) in cases where an MTC has not been issued. An ADCC is the equivalent of a MTC, but is limited to the scope of the design change. Where the change to the Type Design of an in-service air system is so extensive that a substantially complete investigation of compliance with the applicable TCB is required, eg on the introduction of a new Mark, then the outcome of the MACP could be the issue of an MTC rather than an ADCC.

9. **Tailored MACP.** Tailored application of the MACP will normally result in the issue of a Statement of Type Design Assurance (STDA) to the TAA. The STDA will identify the extent to which the MAA has been able to assure the certification evidence provided and detail any areas where the evidence is unavailable, incomplete or inadequate. If the MAA's certification assurance activities conclude that the requirements of the MACP have been met in full, a MTC or ADCC (as appropriate) may be issued rather than a STDA. For programmes undergoing the Tailored MACP shortly after the introduction of this RI, it will probably not be possible to issue a formal STDA, although the MAA will assure the equipment DLOD of the RTSR.

Relationship with RTS Recommendations

10. The MTC, ADCC or STDA will be used by the TAA in support of the RTS Recommendations made for the new air system or Major Change.

Queries

11. Any queries or requests for further guidance on the content of this RI are to be submitted, in the first instance, by email to MAA Hd Tech Cert at MAA-Tech-Cert-Hd@mod.uk.

DG MAA

Annexes:

- A. MACP Phases.
- B. Major Changes to Type Design.
- C. MACP Applicability Flowchart.

MACP PHASES

1. The MACP comprises 6 phases, some of which may run concurrently. The first 2 phases will be completed before Main Gate approval, or before Business Case Approval for lower value programmes.

Phase 1 - Identify the requirement for and obtain organizational approvals

2. Organizations with airworthiness responsibilities for the design of new air systems or Major Changes must hold appropriate approvals. Normally these should be under the MOD DAOS, but alternative approvals may be acceptable where the TAA can demonstrate to the MAA that they are appropriate and equivalent.

3. TAAs involved in the introduction of new air systems or Major Changes must hold appropriate Letters of Airworthiness Authority.

Phase 2 - Establish and agree the Type Certification Basis (TCB)

4. It is necessary to establish the TCB for the Type Design of the air system or the Major Change. This must be included in the airworthiness strategy and involves:

a. **Selection of Applicable Certification Specification(s).** The applicable certification specification, or combination of specifications, proposed by the TAA must be agreed by the MAA. The default specification is Def Stan 00-970 but other specifications may be acceptable where they can be shown to be appropriate and equivalent.

b. **Version of Specification to be applied:** Normally, the most recent version of a specification will be applied. Exceptionally, an earlier version may be acceptable for a Major Change for compatibility with the baseline design of the air system.

c. **Special Conditions.** Any requirement to include Special Conditions in the TCB, to cater for areas where extant certification specifications are judged to be inadequate, will be identified.

5. **Period of Validity of TCB.** The TCB will be effective for a period of 5 years from the date of agreement. Should RTS not be achieved within that timescale, a review of the changes to the specifications that defined the TCB will be required to assess any shortfall against contemporary requirements. The MAA will agree with the TAA which of these changes need to be adopted as part of an updated TCB.

Phase 3 - Agree the Certification Programme

6. The Certification Programme will be owned and managed by the TAA and agreed with the MAA, and will usually form part of the Integrated Test, Evaluation and Acceptance Plan (ITEAP). For each element of the TCB, the Certification Programme will identify the following, typically in the form of a compliance checklist or matrix:

a. The proposed Means of Compliance that may include:

(1) Compliance statement, design review, calculation, analysis, safety assessment, simulation, inspection or equipment qualification.

(2) Laboratory test, ground test on aircraft or flight test.

In the case of tests, the TAA must certify that either the test specimen conforms to the Type Design, or that any deviations from the Type Design do not influence the test.

b. The compliance documents or evidence to be presented.

7. The Programme will also identify when the compliance documents or evidence will be available and include periodic progress reviews between the MAA, TAA and other relevant organizations.

Phase 4 – Demonstrate Compliance

8. In order to demonstrate compliance, the TAA must provide the MAA with the evidence identified in the Certification Programme. The extent to which the MAA will audit that evidence will be informed by both the extent of the 3rd-party assurance that the TAA has put in place and a broader risk assessment conducted by the MAA. TAAs will be expected to have appointed suitably competent ITEs, and design organisations will be expected to have arranged for independent airworthiness scrutiny of their designs.

9. A Type Certificate (TC) issued by a recognised civilian or foreign military authority may be used as evidence, in part or in full, of compliance with the TCB. EASA and the FAA are automatically recognised by the MAA, but other civilian or foreign military authorities will need to be assessed on a project-by-project basis under arrangements agreed in Phase 1.

10. At the conclusion of this Phase, the TAA must produce a Type Certification Exposition (TCE) that demonstrates compliance with each element of the TCB, identifying any airworthiness provisions not complied with that are compensated for by factors that provide an equivalent level of safety. The TCE must include details of the Type Design, operating limitations and a draft MTC Data Sheet (MTCDS).

Phase 5 – Produce Final Report and issue Certificate

11. The MAA will review the TCE to confirm that the design conforms to the TCB, and to determine any areas where compliance evidence is incomplete. The outcome of the MAA's analysis will be a formal Certification Report that will underpin the subsequent issue of a MTC, ADCC or STDA as appropriate.

Phase 6 – Undertake post-Certification actions.

12. After a new air system has been certified there will be ongoing involvement from the MAA in approving Major Changes to the Type Design and in monitoring Type Airworthiness throughout the air system's lifecycle. This latter activity will include assurance activities, such as attendance at: Type Airworthiness Reviews; safety meetings; Structural, Systems and Propulsion Integrity Working Groups; condition surveys; and Ageing Aircraft Audits.

MAJOR CHANGES TO TYPE DESIGN

1. The need for MAA certification of a design change is related to the airworthiness implications of the change, including any associated with integration of new equipment or capabilities into the baseline aircraft. Design changes that have significant potential to affect airworthiness must be categorised as Major by the TAA and notified to the MAA who will carry out independent certification of the change using the MACP. Design changes must be classed as Major when:

- a. The change results in a Mark number change or the addition of a suffix to the Mark number.
- b. The change involves multiple systems and areas, eg as part of a mid-life update, capability sustainment programme or US-style block upgrade programme, but does not result in a Mark number change.
- c. The change results from mitigation action taken for:
 - 1) An Equipment Risk that is categorized by the TAA as Category A or B.
 - 2) A Risk to Life that is categorized by the Duty Holder as High or Very High.
- d. The worst credible unmitigated risk of a failure related to the design change is categorized by the TAA as Category A or B.
- e. The change involves any of the following:
 - 1) Structural changes to the air vehicle that could invalidate previous airworthiness assessments, such as increases in air vehicle all up mass, manoeuvre limits or cleared life.
 - 2) Introduction of a new engine type or Mark number to an existing air system.
 - 3) Changes with the potential to introduce fire or explosion hazards, eg the introduction or modification of any air-to-air refuelling systems, modification of fuel systems, modification of hot air systems.
 - 4) Modification to the weapons release/firing system.
 - 5) Extensive modification of cockpit instrumentation such as the introduction of a 'glass cockpit' or head-up display.

2. Other design changes may be self-certified by TAAs iaw extant procedures. In case of any doubt over categorisation, TAAs must seek advice from the MAA. The appropriate categorisation and approval of Type Design changes will be subject to routine MAA assurance and audit.

MACP Applicability Flowchart

