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Criticality classification for Indigenisation of Airborne Items by User Services

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Abstract	This Airworthiness Directive is aimed at bringing out the detailed implementation guidelines for the authorisation of Base Repair Depots (BRDs), other IAF Depots (CIMD), Naval Aircraft Yards (NAYs), Army Base Workshops etc. pertaining to Criticality Classification of airborne items, by respective Command HQs or equivalent, based on the available expertise/ task allocation and to be closely monitored for maintaining highest safety standards.
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1 Introduction

1.1 Introduction

Indigenous substitution mainly deals with development, prototyping, testing, evaluation and clearance of an Airborne Store as a replacement of the existing Airborne Stores procured from foreign sources. The indigenous substitution can be undertaken by organisations within User Services such as Base Repair Depots (BRDs), other IAF Depots (CIMD), Naval Aircraft Yards (NAYs) and Army Base Workshops etc.

1.1.1 The present provisions of IMTAR-21 restrict organisations within User Services such as Base Repair Depots (BRDs), other IAF Depots (CIMD), Naval Aircraft Yards (NAYs) and Army Base Workshops etc. to carry out Criticality Classification iro airborne items besides calls for constitution of Local Type Certification Committee (LTCC) chaired by CEMILAC/ RCMAs with members from, department of indigenisation, the Design & Quality representatives of Main Contractor, DGAQA and User Services. This results in additional task and extra scrutiny for RCMAs, specially for airborne items of the fleets wherein BRDs and equivalent organisations have requisite expertise and adequate knowledge.

1.2 Purpose

This Airworthiness Directive is aimed at bringing out the detailed implementation guidelines for the authorisation of Base Repair Depots (BRDs), other IAF Depots (CIMD), Naval Aircraft Yards (NAYs), Army Base Workshops etc. pertaining to Criticality Classification of airborne items, by respective Command HQs or equivalent.

1.3 Applicability

This directive is applicable from the date of release and is to be delegated to Base Repair Depots (BRDs), other IAF Depots (CIMD), Naval Aircraft Yards (NAYs), Army Base Workshops etc. post detailed scrutiny by respective Command HQs or equivalent, based on the available expertise/ task allocation and to be closely monitored for maintaining highest safety standards.

1.4 References

1.4.1 DDPMAS Version 1.0, February 2021, Framework and Procedure for Design, Development and Production of Military Air Systems and Airborne Stores.

1.4.2 IMTART-21 Version 1.0, February 2021 Indian Military Technical Airworthiness Requirements

2 Approach for Criticality Classification

2.1 Any item being taken up for indigenisation needs to be classified as either Critical or Non Critical. This classification should be based on following criteria: -

(a) **Critical**. Failure of Component, System or Item would endanger the safety of the aircraft or crew or lead to mission failure. The criticality classifications can be further sub-divided in to Safety Critical and Mission Critical as per survivability criteria.

(b) **Non critical**. Failure of component, System or item does not endanger the safety of the aircraft or crew and there are adequate in built redundancies/warning indications in the system.

2.2 The critically classification for **all the items under indigenisation towards maintenance of fleet (AGS spares, mandatory/ non-mandatory & ARS spares)** can be decided either by BRDs or equivalents. The Command HQs or equivalent may delegate this privilege to BRDs or equivalent against their capabilities. The initial criticality accorded by User/ Prod division in these cases, can be reviewed and ratified by the BRDs' Local Technological Committee (LTC), before commencement of the indigenisation process. AOC or equivalent may chair the committee or nominate a competent officer on his/ her behalf as the chairmen of the committee. The internal QA, Chief of Quality Assurance (CQA) or equivalent must be the member for this committee.

2.2.1 System Safety Analysis (SSA) must be carried out while deciding Criticality Classification. The broad guidelines for SSA are placed at **Annexure**.

2.2.2 BRDs or equivalent must ensure that appropriate documentation in this regards must be kept in repository for random check by Inspection Agencies of respective Service HQs/ local RCMAs/ CEMILAC.

2.2.3 The item list along with recommendations of LTC towards criticality classification must be shared with respective Command HQs or equivalent/ tagged RCMAs on quarterly basis for monitoring.

2.2.4 Command HQs or equivalent must initiate withdrawal of privileges along with appropriate Administrative/ Disciplinary action, in case of any discrepancies being noticed by Inspection Agencies of respective Service HQs/ local RCMAs/ CEMILAC.

2.2.5 Once the item is classified as Non-Critical, the Depot or equivalent can internally certify these items through Self Reliance Committee (SRC). AOC or equivalent may be the Chairman for this committee. For all other cases, the process required for development of critical items as per DDPMAS-21 Ver 1.0 and IMTAR-21 shall be followed.

2.3 **The criticality classification of items which are import substitutes (complex in nature, require extensive design and development activities, warrant in change of material grade/ manufacturing process/ functionality or for which sufficient technical details, failure data or ICDs are not available) shall be done through LTCC as per existing practices.**

2.4 In case an item is declared non-critical post SSA and during product development or usage, random failures are noticed, **the criticality classification of such items must be reviewed immediately**.

2.5 Post scrutiny of SSA documents submitted by BRDs or equivalent on quarterly reviews by RCMAs/ CEMILAC, as the case may be, if it is noticed that a critical item has been declared as non-critical erroneously, **CEMILAC/ RCMAs shall not be held accountable for delay in development of the item or for the financial implications, as the case may be**.

2.6 To fast track, the RCMAs activities in order to support fleet serviceability, it is directed that **First Saturday of each month to be designated as LTCC Day**. Irrespective of the number of items, LTCC meetings are to be conducted and issues

are to be discussed/ disposed off. In case of **Nil** agenda, LTCC meeting can be cancelled with mutual consent.

3 Conclusion

3. This Airworthiness Directive will continue to be in vogue and will be subsumed in the next revision of IMTAR-21 in due course of time.

Annexure (Refers para 2.2.1)

Guidelines for System Safety Assessment for Criticality Classification of Indigenous Substitution

1. The safety assessment shall be carried out by a group of experts with members from Maintenance Organization, User Organization, Flight Testing, CSDO/NASDO/MAGAV under chairmanship of AOC or equivalent of respective BRDs or equivalent or a competent officer nominated by him/ her.

2. The safety assessment process shall be carried out as per a structured approach in accordance with procedures promulgated by the respective service headquarters.

3. The safety assessment shall follow a quantitative analysis and may not be based on heuristic approaches.

4. The safety assessment shall use, to the extent possible, published/authentic publications from OEM and actual field data.

5. The level of detail needed for the various safety assessment activities is dependent on the aircraft-level failure condition classification (Safety, Survivability, Mission accomplishment, No effect), the degree of integration, and the complexity of the implementation. Hence, the safety assessment process shall not restrict to the functional roles of the item, but also its interfaces (mechanical, electrical, data etc), redundancy, life, technology of implementation, environmental conditions, usage, self-test, inspection/testability, TBO for arriving at the criticality. Safety assessment may be restricted to the role and effect of the system under analysis. External standby systems and bypass provisions shall not be fed into the safety assessment, since they are mitigation mechanisms and are not design drivers.

6. All possible contributing factors leading to failure conditions may be identified by using fault tree analysis and/or any equivalent methodology. A detailed FMECA (Failure Modes Effect and criticality analysis) shall be generated. FMECA requires detailed design knowledge, therefore user's involvement is essential. Also it may be entirely different for an ab-initio design vis a vis old design of item being indigenised.

7. To the extent possible Safety assessment tools may be employed to carry out various analysis.

8. If an item is used at multiple locations/ multiple purposes in an aircraft, then most severe condition shall determine the criticality.

9. The safety assessment process, in addition to providing the criticality classification, should also provide the necessary design assurance guidelines pertaining to ensuring safety in the item being indigenised.

10. The Safety Assessment process shall be properly documented and preserved for future references.