



AEROSPACE INFORMATION REPORT

AIR4757™

Issued

2026-06

ARP4754B Clarification Notice

RATIONALE

This document will clarify several topics in ARP4754B/ED-79B based on comments deferred at the time of document release and feedback received since the release of Rev B. This document is technically identical to ER-035, except section 3.7, which is specific to AIR4757.

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Documents

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1. SCOPE

1.1 Purpose

The purpose of this AIR is to provide additional information on some areas of ARP4754B/ED-79B that may need additional clarification in order to be put into practice. This document should be used in conjunction with ARP4754B/ED-79B. The contents are recommendations and should not be construed to be regulatory requirements. This document may be revised with additional information as ARP4754B/ED-79B is put into practice.

1.2 Overview

The additional information is arranged by topic in Section 3 of this AIR and includes the referenced section of ARP4754B/ED-79B.

2. APPLICABLE DOCUMENTS

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable version of other publications shall be the issue in effect on the revision date of this document, or later issue. ARP4754B/ED-79B takes precedence over this document. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 1-877-606-7323 (U.S. and Canada only) or 1-724-776-4970 (outside U.S. and Canada), www.sae.org

ARP4754A Guidelines for Development of Civil Aircraft and Systems

ARP4754B Guidelines for Development of Civil Aircraft and Systems

ARP4761A Guidelines for Conducting the Safety Assessment Process on Civil Aircraft, Systems, and Equipment

2.2 EUROCAE Publications

Available from EUROCAE, The MINT Building, 2 Avenue François Mitterrand, 93210 Saint-Denis, France, Tel: +33 1 49 46 19 65, www.eurocae.net.

ED-79A Guidelines for Development of Civil Aircraft and Systems

ED-79B Guidelines for Development of Civil Aircraft and Systems

ED-135 Guidelines for Conducting the Safety Assessment Process on Civil Aircraft, Systems, and Equipment

3. DISCUSSION

3.1 Requirements Validation and Implementation Verification

3.1.1 Validation and Verification Methods (ARP4754B/ED-79B Sections 5.4.6 and 5.5.5)

Tables 6 and 7 from ARP4754A/ED-79A were intentionally removed in ARP4754B/ED-79B due to confusion and misinterpretation regarding the number of methods recommended for requirements validation and implementation verification respectively, specifically for Function Development Assurance Levels (FDALs) A and B. The ARP4754B/ED-79B text clarifies the intent, which has not changed since ARP4754A/ED-79A, that there is no specific recommended number of methods for either process. The method or methods utilized for each requirement should be sufficient to assure requirement validation and implementation verification. Refer to ARP4754B/ED-79B and see 3.1.2 in this document for further information.

Methods utilized for validation and verification should be documented in the respective summaries.

3.1.2 Validation Methods (ARP4754B/ED-79B Section 5.4.6)

ARP4754B/ED-79B Section 5.4.6 contains a list of examples of types of requirements where an additional validation method may be needed. This list neither implies that these types of requirements listed will always need an additional validation method nor that these are the only times where an additional method should be considered.

The need for an additional validation method should be assessed on a case-by-case basis, with a level of confidence commensurate with the FDAL. While for FDAL A and B, ARP4754B/ED-79B provides guidelines related to selection of additional validation methods, for lower FDALs, higher reliance on traceability and/or rationale and engineering review may be acceptable to fully validate the requirement without adding additional validation methods.

The need for additional methods is related to the difficulty of assuring correctness or completeness for a given requirement with only traceability and engineering review, not to the intent or type of the requirement being validated (e.g., performance, safety, derived).

The list in ARP4754B/ED-79B Section 5.4.6 provides examples among the types of requirements that might need to be validated with additional validation methods because they include additional or modified content (e.g., refinement of parent requirement, behavior introduced in the requirement) that might render confirmation of completeness and/or correctness difficult by engineering review and traceability alone. It should neither be interpreted that such types of requirements are always associated with extensive additional/modified content, nor that confirmation of correctness and completeness with engineering review and traceability alone is always difficult for such types of requirements. For example, a complex state machine or a performance requirement may be adequately validated by engineering review and traceability alone if its added content is limited, especially if it is only a minor adaptation of its parent requirement.

Conversely, some requirements not belonging to the types of requirements listed as examples might need an additional validation method. For example, a complex algorithm requirement satisfying a higher-level simple functional requirement or a simple functional requirement with complicated parent traceability might need an additional validation method, such as analysis or modeling.

Furthermore, the presence in the list of a "Safety monitor definition" should not be interpreted to mean that the safety requirements would need a specific or complementary treatment regarding validation methods. The recommendation to use an additional validation method for a given safety requirement is still driven by the need to assure completeness and correctness, not by its particular relationship to safety assessments.

3.1.3 Verification Procedures (ARP4754B/ED-79B Appendix A)

Verification Process Objective 5.1 of ARP4754A/ED-79A (Table A-1) has been revised in ARP4754B/ED-79B (Table A1) as shown below.

Excerpt of ARP4754A/ED-79A Table A-1:

Objective		Section	Objective Applicability and Independence by Development Assurance Level (see 5.2.3)					Output	Comments
Objective Number	Objective Description		A	B	C	D	E		
5.1	Test or demonstration procedures are correct.	5.5.4.3	R*	R	R	A	N	Verification Procedures	

Excerpt of ARP4754B/ED-79B Table A1:

Objective		Section	Objective Applicability and Independence by FDAL (see 5.2)					Output	Comments
Objective Number	Objective Description		A	B	C	D	E		
5.1	Verification methods and procedures are sufficient.	5.5	R*	R	R	A	N	Verification procedures	Sufficient verification methods and procedures ensure that the implementation of each requirement can be fully verified.
								Evidence of verification procedure sufficiency	

As shown in the preceding excerpts, the ARP4754A/ED-79A Verification Process Objective 5.1 wording focused exclusively on the correctness of procedures involved in defining the test and demonstration that supported verification. ARP4754B/ED-79B expands this objective to cover all selected verification methods. This includes whatever procedures may be involved in those methods that are sufficient to verify the implementation of requirements.

This change of this objective wording should not be interpreted to prescribe development of verification procedures for all verification methods. For example, while verification procedures are recommended in Section 5.5.5.3 for testing and demonstration methods, they are generally not expected for an analysis method. However, a developer may still elect to use verification procedures for some specific verification methods in the analysis or inspection categories, if judged beneficial (e.g., for coordination purposes, or to support the documentation of verification method sufficiency).

Verification Process Objective 5.1 includes the selection of the verification method(s) and whether the method(s) can sufficiently verify the entire requirement. This objective also includes any procedures that have been written for the requirement, and whether they fully verify all aspects of the requirement being verified by the procedure. This assessment should include an evaluation of the procedure(s) that have been written, whether they are for test or other methods. Note that the method(s) chosen should be included in the Verification Matrix, but the actual evidence that the requirements implementation has been verified is covered by Verification Process Objective 5.2.