

ARSAG

AERIAL REFUELING SYSTEMS ADVISORY GROUP

Guidance document

AERIAL REFUELING CLEARANCE PROCESS GUIDE

Document Number 43-08-14R1
Date 22 March 2024



[signed]

ARSAG Executive Director
Dexter H. Kalt

[signed]

ARSAG Secretary
Col Gomer C. Custer, USAF, ret.

[signed]

Richard J. Simms
Working Group Lead / Group Number 5

[signed]

Kees A. M. Vergurg
Document Manager

[signed]

Kathleen M. Kyle, AFLCMC/EZFA
Chair, Joint Standardization
Board (JSB) for Aerial Refueling
Systems

[signed]

Farhad H. Choudhury
Deputy Chair, Joint Standardization Board
(JSB) for Aerial Refueling
Systems

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14. ABSTRACT This Aerial Refueling (AR) Clearance Process Guide is a revision of ARSAG document # 43-08-14 published in 2014. This new, revised document provides updated guidance and recommended procedures as a standard for the establishment of standardized aerial refueling clearances. These standardized clearance procedures will not only facilitate AR clearances but also provide for efficient use of time and resources. However, this clearance process guide is not intended to address initial certification/qualification for the individual tanker or receiver aircraft. This guide is designed to be applicable to tanker and receiver aircraft operated by cooperating and coalition nations, military and commercial organizations. Safe, efficient AR operations between two or more aircraft are contingent on their technical compatibility. There are four categories of AR clearances, 0.1.2.3., where CAT 3 represents the highest category which can be technically certified based on fully compliant results of a Technical Compatibility Assessment (TCA). A published AR TCA for a specific tanker/receiver pairing only verifies that the subject tanker/receiver are technically capable of conducting AR operations with each other. It does not constitute authority or clearance to conduct AR operations.					
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RECORD OF REVISIONS

REVISION	DATE	REASON FOR REVISION
1.0	04 Feb 2020	Quinquennial requirement
	Feb 2021	This document does not include a checklist. Original document contained a checklist that is now a separate document.

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1.0 Executive Summary

The Aerial Refueling Clearance Process Guide, ARSAG Document No 43-08-14R1, (Clearance Process Guide) provides guidance and procedures as a standard for the establishment of aerial refueling (AR) clearances. These standardized clearance procedures will not only facilitate aerial refueling clearances but also provide for efficient use of time and resources. However, the Clearance Process Guide is not intended to address initial certification/qualification for the individual tanker or receiver aircraft.

The Clearance Process Guide is designed to be applicable to tanker and receiver aircraft operated by cooperating and coalition nations, military and commercial organizations. The processes, guidelines and procedures contained in this document are intended as guidance for multi-national standardization. They are not mandatory and do not supersede national directives.

Safe, efficient AR operations between two or more aircraft are dependent on their technical compatibility. There are four categories of AR clearances, 0, 1, 2 and 3 where CAT 3 represents the highest category which can be technically certified based on fully compliant results of a Technical Compatibility Assessment (TCA). A published AR TCA for a specific tanker/receiver combination only verifies that the subject tanker and receiver are technically capable of conducting AR operations with each other. Importantly, a TCA does not constitute an authority or clearance to conduct AR operations.

1.1 Project Initiation Form



ARSAG Workshop / DOD Joint Standardization Board (JSB) for Aerial Refueling Systems

PROJECT INITIATION FORM (PIF)

Items 1 through 3 to be Completed by Requester						
1. PROJECT SPONSOR OR INITIATING AGENCY						
Name of Individual:	Kees Verburg					
Name of Organization:	RNLAFLIGHT TEST					
poc information:	phone	+31638332344	e-mail	kverburg.eft@icloud.com		
	Mobile		Alt			
2. PROJECT REQUEST						
Project Purpose and Scope	<p>ARSAG document 43-08-14 is opened for 5-year revision.</p> <p>This document provides standardized guidance and procedures for establishment of aerial refueling clearances. Revision encompasses improved clearance category definitions and addition of annexes to aid in furnishing more comprehensive and robust guidance through the process.</p>					
Proposed Project Title:	Aerial Refueling Clearance Process Guide					
Proposed Product Outcome: (Mark with X)	ARSAG Document:	Guide Document		Recommended Requirements		
		x				
	Input to DoD Standardization Document:	Specification	Standard	JSSG	Other	
	Input to NATO Document:	ATP/ STANAG	STANREC	SRD	Allied Publications	
				x		
Input to Industry Document:	Standard		Other			
Would you be willing to participate as Document Manager for your proposed project?		Yes	x	No		
3. PROJECT TIMELINE						
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Requested Completion Date:	Date	28 Feb 2022	
Item 4 to be Completed by ARSAG			
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Declined as ARSAG Project: Initial & Date			
		ARSAG Executive Director (ED)	
Approved as ARSAG Project: Initial & Date		DHK, 4 March 2021	
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Priority Assessment	1	Project Number Assignment:	43-08-14R1
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ARSAG Response to Sponsor/Initiating Agency: ED initial & Date			DHK, 8 March 2021
Transfer to ARSAG/JSB Working Group: ED Initial & Date			DHK, 8 March 2021

SEE PAGE 2

Form Version: 24 Feb 2021

<p>ARSAG Document Name and Number</p>	
<p>Need for Project</p>	
<p>Background</p>	
<p>Changes to Original Project Purpose and Scope</p>	<p>Removed Checklist.</p> <p>Original document, ARSAG 43-08-14 dtd. 21 August 2014, contained a checklist.</p> <p>That checklist has been removed from ARSAG 43-08-14R1 and is now a separate draft document, ARSAG 64-08-24WD</p>

2.0 Acknowledgements

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Kees Verburg (Calidore)

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Mercedes Cardeña, César García de Torres (INTA)

Duncan Marfell (QinetiQ)

Gordon Parry (UK MoD)

Geoff Winterbottom (Air Tanker)

Mark Burket, Larry Strong, Clinton Spitler (ARCA)

Robert Tyler Pegg (USN NAWCAD)

Alvaro Pete Abrales (CASS-ADSI)

Laurent Donnet (Metrea)

Mark Gillett (HAF/A3 A3TM)

Volkan Arslan, Laurent Cueille, Eric van Osch, Julien Le Ven (MCCE)

David Pitoniak (L3 Harris)

Zachary Wilkey (FMS, E-3 Sys Eng)

Sherry Evans, Timothy Long (Boeing)

Adrian Puga (Lockheed)

Chris Hargett (505CTS)

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3.0 References

<i>N°</i>	<i>TITLE</i>	<i>REFERENCE</i>	<i>ISSUE</i>	<i>DATE</i>	<i>SOURCE</i>
1.	A guide to obtaining Air-to-Air Refueling Clearances and Compatibility Assessments	ATP 3.3.4.2.1, Standards Related Document 1		May 2018. Published on JAPCC.ORG	NATO Standardization Office (NSO)
2.	Certification Specifications (CS) and Acceptable Means of Compliance (AMC)/Guidance Materiel (GM) for Air-to-Air Refueling Tanker/Receiver pairing Technical Compatibility Assessment	ATP 3.3.4.2.1, Annex C		Feb 2020. Published on JAPCC.ORG	
3.	AR Clearance Initiation Request	ARSAG Document 16-88-98R		14 July 2016	AD102579
4.	Standardized Technical Data Survey (STDS)	ARSAG Document 17-81-03R		April 2014	AD1027954
5.	Air-to-Air Refuelling	NATO STANDARD ATP-3.3.4.2	Edition D Version 1	April 2019. Published on JAPCC.ORG	
6.	Boom-Receptacle System and Interface Requirements	NATO STANDARD ATP-3.3.4.5 (STANAG 7191)	Edition A Version 1		
7.	Probe-Drogue Interface Characteristics	NATO STANDARD ATP-3.3.4.6 (STANAG 3447)	Edition A Version 1		
8.	AAR Signal Lights in Hose and Drogue Systems	NATO STANDARD ATP-3.3.4.7 (STANAG 7215)	Edition A Version 1		

4.0 Associated Documents

<i>TITLE</i>	<i>REFERENCE</i>	<i>ISSUE</i>	<i>DATE</i>	<i>SOURCE</i>
Aerial Refueling Compatibility Assessment Checklist	ARSAG Document 64-08-24WD		N/A	
Aerial Refueling Test Methods Guide	ARSAG Document 41-09-15		13 Apr 2015	AD10030015
Aerial Refueling Pressures Definitions & Terms, Design & Verification Guide	ARSAG Document 03-00-03R		21 Sept 2010	AD1025801
Aerial Refueling Systems Incident Investigation Guide	ARSAG Document 50-17-19		27 June 2018	AD1076311

5.0 Abbreviations and terminology

A/C	Aircraft
AAR	Air-to-Air Refueling
AR	Aerial Refueling
Commander	Risk acceptance authority
OEM	Original Equipment Manufacturer
Receiver aircraft	An aircraft that receives fuel through a receptacle when matched with a boom equipped tanker and/or a probe when with a drogue equipped tanker.
SRD	Standards Related Document
Tanker Aircraft	An aircraft that carries extra fuel available for transfer to a receiver aircraft through a boom when matched with a receptacle equipped receiver and/or a drogue when with a probe equipped receiver.

6.0 Introduction

6.1 Foreword

From its beginning in 1978, a basic element of ARSAG's work has been development of commonly accepted guidance and standards for national and international aerial refueling clearances between tanker and receiver aircraft. In 1981, an ARSAG document identified tanker and receiver aircraft aerial refueling technical and operational characteristics for both the boom/receptacle and probe/drogue methods. This document was titled "Performance and Interface Survey" (P&I). This document and the need for standardized aerial refueling procedures was a high priority for ARSAG work in both our ensuing annual conferences and our workshops. (See Reference Documents listed herein) In 2003, the P&I Survey was revised and updated. The name of the document was changed to Standardized Technical Data Survey (STDS), offering guidance and a minimum standard for exchange of required data as the first step in pursuit of any AR Clearance.

Work over the following years resulted in the first edition of the AR Clearance Process Guide in 2014. In this guide five key elements, "pillars", to any AR Clearance were identified: Technical Compatibility, Operational Compatibility, Minimum Training/Currency, Maintenance requirements and Financial/Legal arrangements. These elements underpinned an AR Clearance that could fall in Category 1, 2 or 3.

Using this guidance, over time a common view within the AR community evolved that the Categorization as defined, although valid in its intent, proved difficult or even impossible to work with. Within a single category, requirements from both technical nature and operational nature were mixed and not always all met, rendering tying a category to an AR Clearance open for interpretation. Also, financial and/or legal agreements were often not of a standing nature but dealt with based on a given operational need at any point in time, leaving this requirement unanswered in many cases.

Based on this experience the North Atlantic Treaty Organization (NATO) decided to separate the technical element from the operational element and had the AR Clearances Categorization definitions in ATP 3.3.4.2.1 (SRD-1), NATO's derivative of ARSAG's AR Clearance Process Guide, reflect technical compatibility only. Furthermore, it was emphasized that operational compatibility assessment is predominantly a matter of identification and acceptance of a certain level of risk. In this view, Operational Compatibility encompasses Minimum Training/Currency and Maintenance requirements too. Lastly, although financial and legal agreements should be addressed, this element was considered to have no relevance to the safety of flight aspect of an AR Clearance.

The views and experiences from the AR community as described thus underpin this revision and are reflected in the revised category definitions and guidance herein.

Severing the technical element from the operational element led to the desire to better reflect the latter's compatibility assessment. Since this assessment of operational compatibility is described as a risk management process, three (3) quantifying terms were added to the AR Clearance categorization in this guide; Low, Medium, and High.

To enhance transparency within the AR community regarding performed tanker/receiver pairing assessments, also those with a negative result, a Category 0 AR Clearance was defined and included herein.

6.2 Purpose

The Clearance Process Guide is designed to facilitate clearances between tanker and receiver aircraft for aerial refueling missions. Tanker and receiver aircraft may have

been initially designed and certified/qualified to a set of fuel system and aerial refueling contractual requirements. Tanker aircraft may have been designed and certified to off-load fuel to specific receivers. Receiver aircraft may have been designed and certified to on-load fuel from specific tanker aircraft. This Clearance Process Guide document does not supersede or replace those initial contractual certifications and qualifications.

ARSAG guidance serves the global AR community. This document's guidance is embraced by NATO and resulted in ATP 3.3.4.2.1, commonly known as SRD-1, to ATP 3.3.4.2 (Reference 1 and 8). Although NATO's guidance is largely similar, minor differences may be observed. Therefore, for those Nations and/or organizations outside NATO aspiring to engage in AR operations with NATO member Nations it is recommended to take note of NATO's Joint Air Power Competence Centre (JAPCC) site, JAPCC.org, where the referenced documentation is accessible.

6.3 Scope

The Clearance Process Guide recognizes the requirement for definitive aerial refueling agreements between cooperating parties, including commercial tanker support organizations, and nations. Aerial refueling clearance process support agreements may include monetary agreements, contracted military, civilian and/or commercial technical support, and/or contractual tanker/receiver support requests from one organization or nation to another organization or nation.

The Clearance Process Guide assumes that these agreements will be comprehensive and as necessary regard the strategic requirements to interoperability: Technical Compatibility, Operational Compatibility, and Financial/Legal Arrangements.

The Clearance Process Guide is not intended to include directions for the development or content of contractual agreements.

7.0 Aerial Refueling Clearance Process Guidelines

7.1 General

An AR clearance is used to document the interoperability of aircraft to safely on-load and off-load fuel to each other in flight. This interoperability should be confirmed and promulgated prior to the platforms performing AR operations. It is important to keep in mind an AR clearance is the result of a complex process that requires appropriate authority to examine all applicable technical and operational variables.

Since tanker and receiver aircraft are designed independently of each other, the AR systems must be evaluated for compatibility to ensure safe AR operations. AR limitations may have to be imposed to mitigate risks resulting from identified hazards resulting in some form of restriction to the AR operations. Identified compatibility concerns may require ground/flight testing with instrumentation to better assess the impact of their associated hazards and minimize restrictions. In some cases, incompatibilities may require tanker and/or receiver AR system or aircraft modifications to achieve the desired compatibility level.

An AR Clearance is the result of assessed risk determined to be acceptable for conducting AR operations between tanker and receiver aircraft as well as legal, financial, and political considerations. In AR, there are two types of risk to consider: technical and operational. Technical risk is assessed through a Technical Compatibility Assessment (TCA). A TCA is accomplished to determine the airworthiness and technical risk of a tanker and receiver pairing. This is further discussed in section 7.4.3. Operational Risk is assessed through an Operational Compatibility Assessment (OCA) discussed in section 7.4.4. An OCA is accomplished to determine individual and organizational qualification and operational risk in conducting AR.

This AR Clearance Process Guide explains an acceptable means of complying with the above assessments and presents general guidelines for nations and organizations/agencies to navigate these processes. It also provides standardized definitions and terms to ensure greater international interoperability.

The Aerial Refueling Tanker/Receiver Clearance Compatibility Assessment Checklist (under development) will be provided to assist AR clearance evaluators as they ensure all aspects of the AR operation are considered and to assist both the technical and operational organizations/agencies in assuring the tanker and the receiver aircraft are compatible for safe AR operations.

7.2 AR Clearance Publication and Re-Utilization

After an assessment of all key variables, an AR Technical Compatibility Assessment defines the authorized conditions under which coupling and transfer of fuel can occur between two aircraft during flight. The resultant AR envelope, limitations and guidance should be available for reference by all relevant/cleared nations or organizations/agencies engaged or planning to engage in AR operations with either or both of these aircraft types or type variants. AR clearances or TCAs are promulgated in National/Organizational Standards Related Documents to the NATO Standard ATP-3.3.4.2 Air-to-Air Refueling by ratifying Nations/Organizations.

Although an AR clearance may already exist between a similar tanker and a similar receiver, the existing AR clearance cannot automatically be utilized by other operators. For further guidance on this refer to 7.4.3.5.

7.3 AR CLEARANCE CATEGORIES

There are four categories of AR clearances, 0, 1, 2 and 3 where CAT 3 represents the highest category which can be technically certified based on fully compliant results of a TCA.

While an AR Clearance in its entirety includes the TCA, OCA and other (legal, financial, political) considerations, the numerical assignment of clearance category numbers will be TCA-driven as further described in following paragraphs.

Before aircraft are planned and paired, the TCA (categorization) should be combined with the OCA, legal, financial and/or political concerns, and any other considerations. Together these documents provide a planning overview for a Commander or their authorized delegate's approval.

A published AR TCA for a specific tanker/receiver combination only verifies that the subject tanker and receiver are technically capable of conducting AR operations with each other. Importantly, a TCA does not constitute an authorization or clearance to conduct AR operations. That authorization is ultimately a Commander's (reference Abbreviations and Terminology) decision which should factor the results of the TCA, OCA and any other considerations before it is provided.

7.3.1 Category 0 AR Clearance

7.3.1.1 Definition

Technical Compatibility Assessment of the Tanker/Receiver pairing under consideration has concluded that the platform configurations are NOT compatible for AR operations as requested.

7.3.1.2 Amplifying information

Category 0 is used to allow an entry to be made in documents, either technical or operational, to indicate a negative result from an assessment. It also permits documents to differentiate between pairings where no analysis has been carried out from those with negative results to avoid nugatory work in the future.

7.3.2 Category 1 AR Clearance

7.3.2.1 Definition

No requisite technical aspects regarding airworthiness/safety of flight for the targeted tanker/receiver pairing have been satisfied through acceptable means of compliance for the targeted scope specified by the nation/organization requesting and/or conducting the analysis, beyond an in-principle form/fit desktop evaluation of available data.

7.3.2.2 Amplifying information

A level of safety as required by the agreed certification basis (set of criteria to be assessed by test, evaluation, and certification community) cannot be assured for any portion of the scope of the AR envelope. Mitigation of residual technical risk depends entirely on engineering judgement.

7.3.3 Category 2 AR Clearance

7.3.3.1 Definition

Some of the requisite technical aspects regarding airworthiness/safety of flight for the targeted tanker/receiver pairing have been satisfied through acceptable means of

compliance for the targeted scope specified by the nation/organization requesting and/or conducting the analysis.

7.3.3.2 Amplifying information

A level of safety as required by the agreed certification basis (set of criteria to be assessed by test, evaluation, and certification community) can be partially assured for the scope of the AR envelope. Some aspects within the scope of the AR envelope have not been evaluated, while the associated residual technical risk cannot be mitigated through limitations on the scope of the AR envelope. For CAT 2 residual technical risks, the only mitigation resides in restricting the chance of exposure through limiting how long a clearance is valid.

7.3.4 Category 3 AR Clearance

7.3.4.1 Definition

All requisite technical aspects regarding airworthiness/safety of flight for the targeted tanker/receiver pairing have been satisfied through acceptable means of compliance for the targeted scope specified by the nation/organization requesting and/or conducting the analysis.

7.3.4.2 Amplifying information

The CAT 3 may be deliberately limited to any acceptable scope provided it has been completely evaluated for all required technical aspects within this scope. The full level of safety required by the pre-agreed certification basis can be assured, in accordance with applicable national requirements.

7.3.5 AR Clearance considerations

7.3.5.1 Risk

Each clearance category carries a different level, amount, and type of risk. Broadly speaking, a CAT 1 has a higher level of risk than a CAT 2 which has a higher level of risk than a CAT 3. There are three owners of risk in terms of AR; the tanker nation/organization, the receiver nation/organization, and the nation over which the AR event takes place. Although, the location of the event may yet to be determined, thus, the latter risk is difficult to quantify. Risks to all three should be considered at the appropriate level.

Rationale for accepting a CAT 1 or CAT 2 AR Clearance could be a matter of urgency driven by factors such as war, conflict, contingency operations, or other urgent operational needs. The governing operational need and limiting factors such as insufficient time, unavailability of supporting assets, expertise and/or funding may drive acceptability of an AR Clearance lower than CAT 3.

Lack of critical data will often generate AR restrictions that will be listed in the AR Clearance. These restrictions may limit the AR envelope or could restrict the operation of certain systems/equipment during AR. Moreover, acceptance of a CAT 1 or CAT 2 AR Clearance means acceptance of elevated, possibly unknown risk.

Nations should not be content to operate on CAT 1 or CAT 2 clearances indefinitely.

7.3.5.2 Duration of validity

Clearances can have an open-ended duration of validity but are subject to review if there are changes impacting key elements of the AR Clearance such as changes in tanker/receiver equipment, visual aids, refueling/mission procedures, and other

specifications to be eventually discussed in future versions of the STDS (Reference 4). Transfer of ownership should also be regarded as key element since this can impact many factors underpinning an AR Clearance, markedly the governing regulations. In addition, it is recommended that all AR clearances be reviewed periodically to ensure currency.

While no formal process is in place yet to ensure continued airworthiness of a tanker/receiver pairing in a similar fashion to that laid down in regulations for individual civilian commercially used aircraft, it is paramount that the global AR community recognizes the importance of considering other operators involved in the same tanker/receiver pairing. The Original Equipment Manufacturers (OEMs) and JAPCC can serve to facilitate expeditious sharing of crucial information.

7.3.5.3 Cost

The cost of obtaining clearances will be mutually agreed by the tanker and receiver nations/organizations or a third party who may be involved in the clearance process.

7.3.5.4 AR Clearance categories relation to Certification

Since CAT 1 and CAT 2 clearances do not satisfy the full level of safety required by the pre-agreed certification basis can be assured, these clearances would typically not meet the requirements for certification by the relevant aviation authority. Therefore, operations under a CAT 1 or CAT 2 would be akin to operations under an exemption having been subject of technical risk management.

In contrast, a CAT 3 having satisfied all relevant certification specifications would meet the requirements for certification by the relevant aviation authority. It is understood that at this time not all nations/organizations conduct certification under an independent aviation authority and thus the organization they do use might have equivalent terms such as “qualification” or “approval” which essentially equate to “certification” as it applies to this paragraph and is used in this document.

7.3.5.5 AR Clearance process enablers

Elements enabling a successful AR Clearance process include but are not limited to:

- Ready availability and maximum use of applicable technical information including full access to relevant accurate data from all equipment manufacturers. Nations and commercial operators that appoint either the OEM or another representative as the platform engineering authority should confirm that responsibility for engineering related communication has been transferred to that party.
- Ready availability and use of fully completed STDS for receiver aircraft and tanker aircraft specifying the AR method to be used.
- Meetings to involve technical, operational, and identified test agencies as well as aircraft hardware manufacturers.
- Completed ground and flight tests with instrumentation as necessary to minimize limitations to the AR envelope and other systems/equipment operation.
- Consensus on AR requirements (for example, whether the AR clearance is required for day and/or night AR).

7.4 AR Clearance Process

7.4.1 AR Clearance Elements

The fundamental elements that need to be addressed throughout the entire AR clearance process include Technical Compatibility, Operational Compatibility and Legal/Financial/Political Arrangements.

While Legal/Financial/Political Arrangements are important to address, they do not affect airworthiness/safety of flight of a tanker/receiver pair and are dealt with outside the TCA and OCA processes.

The OCA comprises operational aspects such as procedural standards, intended use (i.e. role, environment), crew training and currency standards and maintenance standards.

7.4.2 Formalized Request

A formal request for an AR Clearance could be tanker, receiver or third party initiated. The following information is the minimum required to be sent by the requesting party. The requesting Nation/Organization should make its request to the POC identified in the other Nation's/Organization's National SRD to ATP-3.3.4.2. National SRDs should list a formatted letter/example of the required information. Reference 3, AR Clearance Initiation Request, offers a template to fulfill this requirement. The below information is an example of, but not limited to, what should be included in the formal request.

- AR Clearance Category sought. (CAT 1, CAT 2, CAT 3)
- Estimated magnitude of support. Location and timeline of support required.
- Operational Mission Requirements.
- Type of refueling system involved. (hose/ drogue, boom/receptacle, BDA or all three)
- Type and mark of all aircraft requiring AR.
- Authority for direct contact with receiver and tanker aircraft manufacturers, AR system manufacturers, OEM or others.
- POC of receiver and tanker aircraft and AR system manufacturers, OEM or others.
- Previous AR clearances between the designated receiver and other variants of the tanker.
- Previous AR clearances between other variants of the receiver and the designated tanker.
- Fuel type required.

NOTE: Submission of previous AR clearances between the specified receiver aircraft and other (similar) tankers or vice versa will provide evidence of previous compatibility assessments, AR envelope parameters, cautions, warnings and general information that may be useful in the development of the requested clearance. Also, if the receiver aircraft type is established as having significant technical and operational similarities to those already having an AR clearance, the scope of the AR interoperability assessment may be reduced.

7.4.3 Technical Compatibility Assessment

Safe, efficient AR operations between aircraft are dependent on their technical compatibility. STANAGs provide some specifications for AR equipment. The Technical Compatibility Assessment confirms that the aircraft are (or are not) able to mechanically couple, off-load or on-load fuel and then decouple without damaging either aircraft or creating an unsafe situation. The TCA should be issued by the appropriate engineering organization for the respective aircraft. There are multiple means of conducting a TCA which can include verification through analysis of flight, ground, or lab test data and/or validation through read-across using acceptable data collected previously or by third parties. Finally, even if all desired testing and data collection/analysis is completed, there

may be some incompatibilities that are identified, and limitations may need to be in place to negate this incompatibility.

Each nation/organization should confirm via bi-lateral or multi-lateral agreements that the aircraft they operate complies with applicable agreed-upon AR procedures and design standards such as NATO STANDARD ATP-3.3.4.2 (STANAG 3971), NATO STANDARD ATP-3.3.4.5 (STANAG 7191), NATO STANDARD ATP-3.3.4.6 (STANAG 3447), and NATO STANDARD ATP-3.3.4.7 (STANAG 7215) (Reference 8 through 11).

7.4.3.1 TCA Content

A TCA should include all available detail and may include, but is not limited to, all or some of the following not included in ATP-3.3.4.2, aircraft documentation or the tanker/receiver National SRD:

- 1) The specific aircraft and nations/organizations for which the TCA is valid.
- 2) Compatibility. AR envelope for the specified aircraft.
- 3) Limitations. The limitations specific to either the tanker or the receiver aircraft for the purposes of mitigating risk during AR.
- 4) Procedural requirements specific to the tanker and receiver pairing.
- 5) Warnings and/or Cautions. The warnings and cautions for both the tanker and receiver.
- 6) General information. Any additional information with respect to the aircraft and procedures, relevant to AR.
- 7) Associated references. Documentation relevant to the compatibility assessment process including existing compatibility documentation or data and reference to standards against which such assessment was made..
- 8) Instructions for continued airworthiness. Any limitations or procedural changes affecting the aircraft maintenance program should be addressed and incorporated in the relevant aircraft documentation such as maintenance manuals.

NOTE: The specific decision to ignore a portion or all of the TCA will be considered addressing that aspect.

7.4.3.2 Considerations for a successful TCA process

A successful outcome will be enabled by:

- 1) An open and rapid exchange of information between all agencies through any manner including but not limited to meetings to involve technical, operational, and identified test agencies as well as aircraft hardware manufacturers.
- 2) Ready availability and maximum use of applicable technical information including full access to accurate data from all equipment manufacturers. Nations and commercial operators that appoint either the OEM or another representative as the platform Engineering Authority should confirm that responsibility for engineering related communication has been transferred to that party.
- 3) Ready availability and use of a fully completed Standardized Technical Data Survey (STDS) for receiver and tanker aircraft specifying the refueling method to be used (Reference 4).
- 4) Mutual agreement on the applicable certification specifications, and acceptable means of compliance.
- 5) An early consensus on AR requirements including, but not limited to factors such as where will the AR be conducted, in what weather, whether or not the AR clearance is required for day and/or night operations, if night vision devices will be used, and whether

AR under degraded system (failure states) conditions is desired. This is generally captured under intended use.

7.4.3.3 Elements of the TCA process

To accomplish a TCA, nations/organizations will identify the agreed scope that such assessment should cover. This scope is submitted in a request.

Once a request is accepted, there will be a need for sharing of relevant data to identify whether a requested technical compatibility is in principle feasible. An STDS (Reference 4) can aid Nations/Organizations in fulfilling this requirement.

After determining the feasibility of technical AR compatibility within the agreed scope, the involved parties then must agree on the relevant criteria against which to perform the assessment. This is often referred to as a “certification basis” although it is acknowledged that some Nations may refer to this as “qualification” or “approval”.

Certification Specifications covering all conceivable relevant criteria for certification of a tanker/receiver pairing known to date should be developed. ATP-3.3.4.2.1, SRD 1, Annex C, Certification Specifications (CS) and Acceptable Means of Compliance (AMC)/Guidance Materiel (GM) for Air-to-Air Refueling Tanker/Receiver pairing Technical Compatibility Assessment (Reference 2) offers a standard that is accepted within NATO.

These Certification Specifications are used for developing the certification plan which can take different forms in varying organizations. Such a plan will identify acceptable means of compliance and the methods for verification/validation (Means/Method of Compliance, MoC). Where these acceptable means of compliance are identified as requiring flight test, a test plan is developed with applicable flight test techniques.

7.4.3.4 Scope

Nations/organizations may agree to restrict the targeted/requested AR Clearance for various reasons such as a limited resource of money, time, and asset or personnel availability. It should be noted that even in the case of such a voluntarily limited scope, a TCA that satisfactorily meets all applicable certification specifications will still be able to support a CAT 3 Clearance.

7.4.3.5 Read-Across

The TCA process will be greatly assisted, and potentially accelerated, by the provision of previous AR Compatibility Assessments and/or Clearances between specified receivers and tankers (e.g., from a different nation/organization). If the technical data and intended use of the tanker/receiver aircraft are similar (e.g., a variant of another nation’s receiver), the depth and scope of the AR Compatibility Assessment Process may be significantly reduced. This read-across of information may contain evidence from previous Compatibility Assessments, AR envelope parameters, cautions, warnings, and general information that is important to note.

Furthermore, accreditation of the organizations/authorities involved in the production of the relevant data in the TCA used for read-across reference may eliminate the requirement for verification.

Many factors will determine the required depth of analysis to complete an AR Clearance process using read-across or if the existing clearance is even applicable. Some of these factors include:

- The operator of the similar tanker/receiver. One nation may operate under very different rules than another.
- The certification/qualification specifications, standards and/or guidelines under which the first AR clearance was produced. The AR clearance may have been approved with a simple handshake and no assessment.
- The qualifications of personnel involved in the assessment.
- The similarity of the tankers/receivers that are involved. Aircraft are frequently modified, and different operators may have made hardware or software changes to the aircraft that could impact an AR clearance.
- The existence of a multi-national or user agreement on AR configuration. To help eliminate repetitive AR clearance efforts, users can agree to keep the AR configuration standardized. This allows the technical compatibility of one operator's aircraft to be fully applicable to all operators of the same type of aircraft that participate in the agreement.

7.4.4 Operational Compatibility Assessment

The Operational Compatibility Assessment (OCA) is a process which assesses the ability and risk of two aircraft conducting AR in accordance with operational considerations and procedures. This assessment considers operational aspects such as maintenance, , procedures, crew training, and currency.

ATP-3.3.4.2 details NATO AR procedures with individual National/Organizational SRDs covering data and procedures specific to AR-capable countries, agencies, and organizations. OCAs should be conducted by both the tanker and receiver command elements. The applicable staff conducting an OCA should make every effort to brief their Commanders (reference Abbreviations and Terminology) on the risk they will be accepting for the assessed pairing.

7.4.4.1 Considerations for Operational Compatibility Assessment

An OCA should consider and may include, but is not necessarily limited to, all or some of the below aspects. These aspects may or may not be addressed in ATP-3.3.4.2, aircraft documentation, or the tanker/receiver National/Organizational SRD.

- 1) The specific aircraft and nations/organizations for which the OCA is valid.
- 2) Crew compliment (or composition), qualification, training, currency, and experience. Nations/organizations should decide whether they are satisfied with ATP-3.3.4.2 standards or those of the nation/organization with which they will be conducting AR. Considering a nation's/organization's training/evaluation program does not necessarily require an audit. ATP-3.3.4.2.2 (SRD-2 to ATP-3.3.4.2) discusses some topics to consider regarding training. Each nation/organization may have additional requirements for the applicable entity with whom they may be conducting AR and these should be listed within their National/Organizational SRD.
- 3) Maintenance organization. For the purposes of the OCA, maintenance organization is considered to be how the maintenance organizations train and execute their maintenance programs. To address or consider maintenance organization for an OCA does not necessarily require an audit of such organizations.
- 4) Trust. Ultimately, an OCA, like a TCA and the entire compatibility and clearance process, relies heavily on trust and relationships between nations/organizations.
- 5) Environment where AR will be conducted, including threat, mission workload, and the use of Night Vision Devices.
- 6) Type of mission to be conducted before, during, or after the AR by the receiver or tanker.

- 7) Operations tempo, including crew fatigue, duty cycles and circadian rhythm.
- 8) Operational necessity of a given pairing.

Note: The specific decision to ignore a portion or all of the OCA is considered addressing that aspect.

7.4.4.2 Operational Risk Analysis

An essential component of an Operational Compatibility Assessment is the Operational Risk Analysis. The analysis will assess hazards and their operational risks identified by either of the Operational Authorities who are usually the operational commanders for the aircraft type. At any point the authorities may assess the risk and choose to accept it or they may choose to further assess identified risk(s) by requesting a test agency to conduct applicable ground/flight test activities. These activities should evaluate whether any design/procedural changes to mitigate the hazard and/or likelihood of occurrence are required or if the extant risk is acceptable. A report with recommendations should be provided to the Operational Authority. This operational analysis process provides the AR clearance process with the second of two risk mitigation loops.

The conclusion of the Operational Risk Assessment process should be quantified into one of the three below categories:

Low: The overall risk assessment of the pairing is identified as low.

Medium: The overall risk assessment of the pairing is identified as medium.

High: The overall risk assessment of the pairing is identified as high.

7.5 Other considerations regarding AR Clearances

Legal and financial agreements, memorandums of understanding, or a common framework that permits multinational AR activity should be addressed. Fiscal and legal arrangements are a critical component of being able to conduct AR operations. Although these aspects are typically bi-lateral in nature, or tied to a specific operation or theatre, it is recommended that they be addressed early in the AR clearance process. Many of the required agreements can take months or years to formalize.

7.5.1 Legal considerations

Liability in the case of an accident or incident needs to be considered. Possible legal mechanisms include Status of Forces Agreements (SOFAs), bi-lateral or multi-lateral agreements, Special Instructions (SPINS) or Operations Plans (OPLANs) for specific theatres of operation. Third-party liability should also be considered regarding ownership of the airspace in and/or the land over which the AR will be conducted.

7.5.2 Financial considerations

Key financial issues include how payment for flight hours and fuel will be handled, and how transit time or loiter time will be paid for if conducting operations with numerous nations. Services can be compensated for, if desired, using multi-national/bi-lateral agreements such as the Air Transport and Air to Air Refueling and other Exchange of Services (ATARES) Agreement, cross-servicing agreements, replacement in kind agreements, Foreign Military Sales agreements, or with cash transfers.

7.6 ACTIVITY APPROVAL

7.6.1 AR Clearance Authorization

The formal authorization to conduct AR varies by nation/organization and may be manifested in an Execution Order, Operations Order, Air Tasking Order, schedule, or other formalized bi-lateral agreement. Nations/organizations at a minimum should reflect (in chart, list or other form) the status of TCAs and OCAs in their National/Organizational SRD and should also list completed standing authorized AR Clearances to the maximum extent possible.

7.6.2 AR Clearances Documentation and Status

ARSAG documents are available through ARSAG at arsaginc@earthlink.net. Additional ARSAG information is available online at www.arsaginc.com.

Also, the Joint Air-Power Competence Center (JAPCC) publishes NATO AR documentation and tracks the status of participating nations'/organizations' TCAs, OCAs and/or AR Clearances through the AAR Clearance Matrix.

Nations/organizations, Operators, or their designated representatives should provide all publicly releasable source documentation to include any technical or operational compatibility authorizations to the JAPCC for inclusion in and update of the NATO AAR Clearance Matrix. Information that is not publicly releasable (up to NATO Secret) can be sent to the JAPCC via the appropriate secure means. This information will be stored appropriately and released only to those who have proper access. The JAPCC AAR Section can be reached via email at aar@japcc.org.

8.0 ENCLOSURE 1

AR Compatibility Assessment Process

