Australian Government
Civil Aviation Safety Authority

ADVISORY CIRCULAR
AC 23-01 v1.1

Airspeed airworthiness standards for the installation of equipment that protrudes into the airflow

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Advisory circulars are intended to provide advice and guidance to illustrate a means, but not necessarily the only means, of complying with the Regulations, or to explain certain regulatory requirements by providing informative, interpretative and explanatory material.

Advisory circulars should always be read in conjunction with the relevant regulations.

Audience

This advisory circular (AC) applies to:

- holders of design approval for modification or repair of aeronautical products
- approved maintenance organisations
- applicants for approval of modifications or repairs.

Purpose

The purpose of this AC is for the Civil Aviation Safety Authority (CASA) to give information and guidance to applicants and authorised persons on airspeed airworthiness standards that are applicable when developing and gaining approval of an external equipment installation on an aircraft.

If any of the information contained in this advisory circular is not clear or understood, then additional information or advice from an appropriate source should be sought to obtain the required understanding.

For further information

For further information, contact CASA's Airworthiness Standards (telephone 131 757) or email aircraft.certification@casa.gov.au.

Status

This version of the AC is approved by the Branch Manager Airworthiness & Engineering.

Version	Date	Details
v1.1	November 2022	Administrative review only.
v1.0	December 2013	Initial AC.

Unless specified otherwise, all subregulations, regulations, Divisions, Subparts and Parts referenced in this AC are references to the *Civil Aviation Safety Regulations 1998 (CASR)*.

Contents

1 Reference material

1.1 Acronyms

The acronyms and abbreviations used in this AC are listed in the table below.

Acronym	Description
AC	Advisory Circular
CASA	Civil Aviation Safety Authority
CASR	*Civil Aviation Safety Regulations 1998*
FAR	Federal Aviation Regulation
CS	Certification Standard
NAA	National Aviation Authority
V_C	Design Cruise Airspeed
V_D	Design Dive Airspeed
VNE	Never Exceed Airspeed

1.2 Definitions

Terms that have specific meaning within this AC are defined in the table below. Where definitions from the civil aviation legislation have been reproduced for ease of reference, these are identified by 'grey shading'. Should there be a discrepancy between a definition given in this AC and the civil aviation legislation, the definition in the legislation prevails.

Term	Definition
Aeronautical product	An aircraft, aircraft engine, aircraft propeller, appliance or their parts.
Airworthiness requirements	The collective requirements that consist of, but are not limited to, the approval or acceptance of the type design to an airworthiness standard (see definition), conformity to production or manufacturing standards, performance of inspection, maintenance, repair and modification in accordance with standards that ensure the continuing airworthiness of the aircraft. Airworthiness requirements for aeronautical products are set out in Part 21 of the CASR.
Airworthiness standards	Detailed and comprehensive design and safety criteria, applicable to the category of the aeronautical product, that are acceptable to CASA. These design standards are detailed in nature and cover aspects such as, but not limited to, flight performance and handling characteristics, structural strengths and durability, general design and construction, powerplant and systems, aircraft and systems architecture, equipment specifications, overall function and reliability criteria, tests and inspections methods, and operating limitations and information. Airworthiness standards for the class of aircraft, aircraft engine and propeller are detailed in Parts 22 to 35 of the CASR.
Certification basis	The applicable airworthiness standards accepted by the national aviation authority (NAA) as the basis by which the type design of an aeronautical product, or change to that type design, was approved or accepted. The

Term	Definition
	certification basis may also include Special Conditions, Equivalent Level of Safety findings, and/or Exemptions when determined by the NAA to apply to the type design.
Compliance summary	Compliance summary specifies the airworthiness requirements that are applicable to the design and how compliance with those requirements was shown. It is used to ensure, systematically and comprehensively, that a design complies with all applicable airworthiness requirements. A compliance summary is also called a compliance check list.
Type design	The basic design of a certificated aeronautical product.

1.3 References

Legislation

Legislation is available on the Federal Register of Legislation website https://www.legislation.gov.au/

Document	Title
Parts 21-35 of CASR	

Other

Document	Title
FAR/CS 23.335	Design airspeeds
FAR/CS 23.1501	Operating limitations and information–general
FAR/CS 23.1505	Airspeed limitations
FAR/CS 23.1581	Airplane flight manual and approved manual material–general

2 Airworthiness standards

2.1 Background

2.1.1 All civil certificated aircraft and aeronautical products are certificated against a comprehensive set of airworthiness standards. These standards prescribe many parameters, such as:

- structural strength
- performance and flight characteristics
- powerplant and systems equipment operation
- environmental characteristics
- other qualities affecting airworthiness, including weight and centre of gravity limitations that can be dictated by any one of the other parameters.

The applicant should demonstrate that design changes made are compliant with the certification basis and safe operation, and that an authorised person or CASA has agreed and approved the design changes, for any of the following:

- any design changes made to the approved type design
- modifications or repairs to an individual aeronautical product
- installation of additional equipment
- substitution of a part or appliance

  or
- removal of already installed equipment.

This advisory circular provides information and guidance on the approval of the installation or removal of equipment onto an airframe that protrudes into the airflow. It does not cover approval of the actual equipment itself as the approval of the equipment itself will depend on its purpose.

2.1.2 For the purposes of this AC, external equipment is a piece of equipment that protrudes into the airflow (e.g. cameras, sensor units, nightsuns, forward looking infrared system). As with all modifications made to an aircraft, it is necessary to ensure that the design change is assessed for compliance against the applicable airworthiness standards by the applicant and the approving authority. This AC identifies some of the Federal Aviation Regulation (FAR) or Certification Standard (CS) airspeed airworthiness standards that should be considered by applicants and persons approving the design change. It is important to note that this AC does not cover all airworthiness standards that require consideration, as the need to comply with some standards will depend on the type and location of the installed equipment.

2.2 Standards relevant to a design change

2.2.1 As a minimum, the following FAR Part 23 or CS 23 airworthiness standards need to be considered when installing equipment that protrudes into the airflow from an airspeed perspective. These standards include, but may not be limited to, standards 23.335, 23.1501 and 23.1581.

2.2.2 FAR/CS 23.335—Design airspeeds

2.2.2.1 If the applicant does not intend to change the design cruise airspeed (V_C) then there is no need to alter the design dive speed (V_D) and operational never exceed speed (V_{NE}).[1] However, limiting airspeeds will need to be defined and flight tested to verify compliance with any other applicable airworthiness standards that are identified in the compliance summary.

2.2.3 FAR/CS 23.1501—Operating limitations and information–general

2.2.3.1 For modifications that involve equipment that protrudes into the airflow, the operational flight envelope must be defined and tested. This will require the applicant to propose and demonstrate, by test, their operational flight envelope. As a result of the approval process it may be necessary for CASA or an authorised person to request flight test validation of the operational envelope. They will then define the limiting airspeed/s and/or flight envelope, which may be within the currently approved flight envelope for the unmodified aircraft that conforms to its type design.

2.2.3.2 If it is intended to define an airspeed/flight envelope outside the currently approved type design then it will be necessary to comply with all the applicable airworthiness standards including those for V_D and V_{NE}.

2.2.4 FAR/CS 23.1581—Airplane flight manual and approved manual material–general

2.2.4.1 The flight envelope that is defined under FAR 23.1501 and has been cleared by flight test will need to be made available to the pilot. The presentation of this information to the pilot will most likely be in the form of an approved flight manual supplement and/or placard. This information will be provided by the person who is responsible for the approved data.

2.3 Conclusion

2.3.1 An aircraft is eligible to remain in its currently approved category if the operational airspeed/flight envelope is:

- defined flight tested
- within the airspeed/flight envelope defined for the type design
- compliant with applicable airworthiness standards that have been identified in the compliance summary for the design change.

[1] Airspeeds are as defined by FAR/CS 23.1505.