Notification of a Proposal to issue a Certification Memorandum

Determination of Aircraft Tyre Speed Rating

EASA Proposed CM No.: Proposed CM–HS-005 Issue 01 issued 18 January 2019

Regulatory requirement(s): CS 25.733

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Log of issues

Issue	Issue date	Change description
01	18.01.2019	First issue.

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1. Introduction

1.1. Purpose and scope

The purpose of this Certification Memorandum is to provide specific guidance for new applications for determining the tyre speed rating, specifically in the case that the rating exceeds 190mph. The applicable regulation is CS 25.733 "Tyres". This guidance is also appropriate for CS23 "High Performance Fixed Wing Aircraft", as defined in COMMISSION REGULATION (EU) No 319/2014 on Fees and Charges.

Two aspects are included in this document:

i) Determination of Speed Rating
ii) How to address exceedance of the Speed Rating

1.2. References

It is intended that the following reference materials be used in conjunction with this Certification Memorandum:

Reference	Title	Code	Issue	Date
CS 25.733	"Tyres"	CS-25	Initial Issue up to Amdt 21	17.10.2003 - 27.3.2018
ETSO C62e	"Aircraft Tyres"	-	Issue e	05.07.2012
ARP 5257	"Tire Overspeed Landing Test"	SAE	B	07.2002

1.3. Abbreviations

a/c	Aircraft
AFM	Aircraft Flight Manual
ARP	Aerospace Recommended Practice
(E)TSO	(European) Technical Standard Order
mph	Miles Per Hour
OEM	Original Equipment Manufacturer
SAE	Society of Automotive Engineers
STC	Supplemental Type Certificate

2. Background

Extracts From Existing Regulations:

a. CS 25.733(a)

…the wheel
must be fitted with a suitable tyre of proper fit
with a speed rating approved by the Agency
that is not exceeded under critical conditions…

b. CS 25.733(c)

…each wheel must be
fitted with a suitable tyre of proper fit with a
speed rating approved by the Agency that is
not exceeded under critical conditions,…

c. ETSO C62e

(Tests are performed to)…the most critical combination of takeoff weight and speed, and aircraft center (sic)-of-gravity position. When determining the most critical combination of the above, be sure to account for increased speeds resulting from high field elevation operations and high ambient temperatures, if applicable…

A tyre speed rating is required to allow (E)TSO approval of the tyre and compliance to CS regulations. A consistent approach is necessary in the determination of the tyre speed.
Excessive speed has the potential to cause a tyre to lose integrity, the effects of which range from a weakening of the internal construction of the tyre to a tyre failure, with the consequent overloading of adjacent tyres and the ejection of high energy debris. As well as possible damage to the aircraft and its systems, the resulting unsafe condition could result in difficulties in controlling and decelerating the aircraft on ground, leading to subsequent lateral excursion and runway overrun.

The term “critical condition” in the above regulations and standards has been a source of confusion and discussion on some recent programmes. It has sometimes been deemed to include aircraft failure conditions in the determination of the Speed Rating. The purpose of this CM is to clarify the Agency’s position.

Implicit in the above concept of tyre speed rating is that certain failure conditions of the aircraft, its systems and equipment may cause the Speed Rating to be exceeded. Typical of such failure conditions are an overweight landing or a landing with the high lift system failed (note that these are examples and are not intended to be definitive).

3. EASA Certification Policy

3.1. EASA POLICY

The Tyre Speed Rating is intended to cover the “worst case” (or “most conservative” or “maximum”) ground speed of the aircraft in all approved configuration, environmental and operating conditions without consideration of any failure conditions. The speed rating must be chosen by the aircraft OEM and agreed with the authority. The aircraft OEM may elect to add a margin for failures within the speed rating, but this is not the intent of the “critical condition” statements within the applicable regulations.

As stated in the ETSO extract above, the determination of the tyre rated speed must at-least include factors which can affect the ground speed, for example weight, take-off speed, high-altitude airfields, high ambient temperature and wind direction.

It must be assured that the Tyre Speed Rating is a firm limit for the aircraft by clearly identifying it in a document approved by the Agency (e.g. the limitations section of the AFM).

Following any detected exceedance of the Tyre Speed Rating the approved maintenance documentation must make it clear that the affected tyres must be removed prior to further flight. The tyres must either be scrapped or determined to be suitable for further flight, by the tyre manufacturer (or retreader) or maintenance organisation, using criteria previously agreed by a competent authority. It is not required that the tyre should necessarily have any useful life following the flight on which the overspeed incident occurred.

It should be assured that any possible exceedance of the tyre Speed Rating is indicated to the flight or ground crew (e.g. via a monitoring of the ground speed which triggers an alert if the ground speed is higher than the tyre Rated Speed, during the on-ground phase). The intent is to prevent subsequent dispatch with tyres having experienced overspeed, without an investigation of these tyres.
Each new tyre design (including retread) should be subjected to a one-off overspeed landing test. An acceptable example of such a test (and associated pass/fail criteria) may be found in SAE ARP 5257 at its rev. B.

The applicant should consider the following points when conducting the systems safety analysis and evaluating the risk of exceeding the tyre speed rating:

i) Combinations of failures leading to tyre speed rating exceedance should be considered, although failure combinations determined to be Extremely Improbable (as per CS/AMC 25.1309(b), or the appropriate equivalent for High Performance CS-23 aircraft) need not be considered.

ii) It is generally expected that failure conditions which are not extremely improbable should not cause a tyre speed rating exceedance of more than 25 mph. Any combination of failures which is not extremely improbable, and lead to a tyre speed rating exceedance of more than 25mph, should be discussed with the Agency. The value of 25 mph originates from the SAE ARP 5257 standard.

3.2. Who this Certification Memorandum affects

This Certification Memorandum affects applicants who need to show compliance with CS 25.733 concerning aircraft tyres. As per Section 1.1 above, it may also affect applications for High Performance CS23 Aircraft.

4. Remarks

1. This EASA Proposed Certification Memorandum will be closed for public consultation on the **18th of February 2019**. Comments received after the indicated closing date for consultation might not be taken into account.

2. Comments regarding this EASA Proposed Certification Memorandum should be referred to the Certification Policy and Safety Information Department, Certification Directorate, EASA. E-mail CM@easa.europa.eu.

3. For any question concerning the technical content of this EASA Proposed Certification Memorandum, please contact:

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