

Deviation request #116 for an ETSO approval for CS-ETSO applicable to Aircraft Tyres (ETSO-C62e)

Consultation Paper

1 Introductory Note

The hereby presented deviation requests shall be subject to public consultation, in accordance with EASA Management Board Decision No 7-2004 as amended by EASA Management Board [Decision No 12-2007](#) products certification procedure dated 11th September 2007, Article 3 (2.) of which states:

“2. Deviations from the applicable airworthiness codes, environmental protection certification specifications and/or acceptable means of compliance with Part 21, as well as important special conditions and equivalent safety findings, shall be submitted to the panel of experts and be subject to a public consultation of at least 3 weeks, except if they have been previously agreed and published in the Official Publication of the Agency. The final decision shall be published in the Official Publication of the Agency.”

2 Deviation Request

2.1 ETSO-C62e Aircraft Tyres

2.1.1 Summary of Deviation

Deviate from ETSO C62e paragraph 5.a.(2), where a maximum duration between rotation and liftoff is specified to be “3 seconds maximum”.

2.1.2 Original Requirements

ETSO C62e paragraph 5.a.(2), specifies:

(2) Takeoff cycles: the 50 takeoff cycles shall realistically simulate tire performance during runway operations for the most critical combination of takeoff weight and speed, and aircraft center-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. Specify the appropriate load-speed-time data or parameters that correspond to the test envelope in which the tire is to be tested. Figures 1, 2, and 3 are graphic representations of the test. Starting at zero speed, load the tire against the dynamometer flywheel. The test cycles must simulate one of the curves illustrated in Figure 1 or 2 (as applicable to speed rating), or Figure 3.

- Figure 1 defines a test cycle that applies to any aircraft tire with a speed rating of 120 mph or 160 mph.
- Figure 2 defines a test cycle that applies to any aircraft tire with a speed rating greater than 160 mph.
- Figure 3 defines a test cycle that applies for any speed rating, is based on the most critical takeoff loads, speeds, and distances, and is aircraft specific.

Figure 1
 Graphic Representation of a Typical Universal Load-Speed-Time Test Cycle
 (For 120 MPH and 160 MPH Tires)

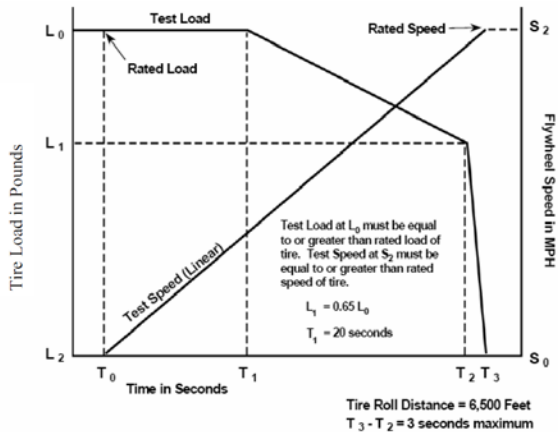


Figure 2
 Graphic Representation of a Typical Universal Load-Speed-Time Test Cycle
 (For Tires Rated above 160 MPH)

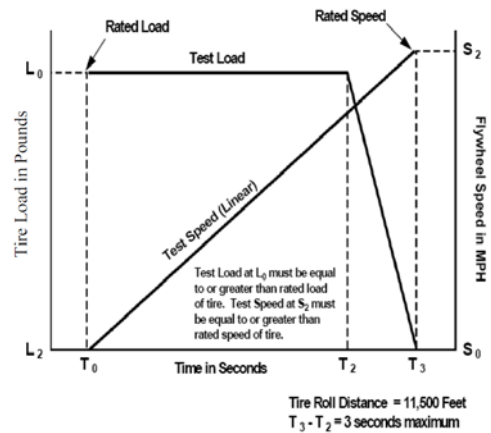
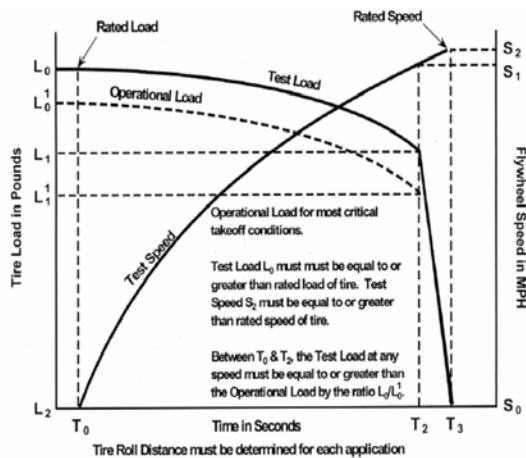


Figure 3
 Graphic Representation of a Typical Rational Load-Speed-Time Test Cycle



Symbol Definitions (Figures 1, 2, and 3)

- L_0 Tire load (lbs) at start of takeoff (not less than the load rating), Figures 1, 2, and 3.
- L_0^1 Tire load (lbs) at start of takeoff for the operational load curve, Figure 3.
- L_1 Tire load (lbs) at rotation, Figures 1 and 3.
- L_1^1 Tire load (lbs), Figure 3.
- L_2 Tire load at liftoff, 0 lbs, Figures 1, 2, and 3.
- S_0 Zero (0) mph, Figures 1, 2, and 3.
- S_1 Speed at rotation in mph, Figure 3.
- S_2 Tire speed at liftoff in mph (not less than the speed rating), Figures 1, 2, and 3.
- T_0 Time at start of takeoff, 0 s, Figures 1, 2, and 3.
- T_1 20 seconds, Figure 1.
- T_2 Time to rotation in seconds, Figures 1, 2, and 3.
- T_3 Time to liftoff in seconds, Figures 1, 2, and 3.

2.1.3 Industry

The requirement to unload the tyre in “3 seconds maximum” for 50 take-off cycles, is not realistically attainable for dynamometers with manually operated loading systems. For these systems, 3 seconds is used as a target unload time, but inevitably some variation in this time occurs over the 50 take-off cycles. It is therefore proposed that a conservative approach would be obtained if the “3 seconds maximum” requirement were replaced with “Unloading time shall not be less than 3 seconds when averaged over the 50 take-off cycles”, and “Unloading time shall also not be less than 3 seconds for the overload take-off cycles.”

Also, this requirement only applies to tyres tested to the universal load-speed-time (LST) curves of figures 1 and 2 of ETSO C62e paragraph 5.a.(2). The rational LST curve does not specify an unload time.

2.1.4 Equivalent Level of Safety

ELOS is provided because although the specified unload time is exceeded, this represents an overtest of the tyre due to the reducing test load being maintained on the dynamometer for longer.

2.1.5 EASA position

We accept the deviation as an exceedance of the 3 seconds specified (averaged over the 50 take-off cycles) meets the intent of the requirement. The assertion that this represents an overtest has not been substantiated by industry.

This does not require the existing test facilities to be retrofitted with automated loading systems.