



Department of Transportation
Federal Aviation Administration
Aircraft Certification Service
Washington, D.C.

TSO-C62e

Effective
Date: 09/29/06

Technical Standard Order

Subject: AIRCRAFT TIRES

1. PURPOSE. This technical standard order (TSO) is for manufacturers applying for a TSO authorization (TSOA) or letter of design approval (LODA). In it, we (the Federal Aviation Administration, or FAA) tell you what minimum performance standards (MPS) your aircraft tires, **excluding tailwheel tires**, must meet before their approval and identification with the applicable TSO marking.

2. APPLICABILITY. This TSO affects new applications submitted after its effective date.

a. All prior revisions to this TSO are no longer effective. Generally we will not accept applications after the effective date of this TSO. However, we may do so up to six months after this approval date, if we know that you were working against the earlier MPS before the new change became effective.

b. Aircraft tires approved under a previous TSO/LODA may still be manufactured under the provisions of their original approval.

c. Major design changes to aircraft tires approved under this TSO will require a new authorization. See Title 14 of the Code of Federal Regulations (14 CFR) § 21.611(b).

d. Previously Approved Articles.

(1) Notwithstanding 14 CFR § 21.603(a) and the terms of any specific previous TSO approval, after December 31, 1982, you may not identify or mark a tire having a speed rating above 160 mph with TSO numbers TSO-C62, TSO-C62a, or TSO-C62b. Further, you may not manufacture a tire having a special rating above 160 mph approved before December 31, 1979, under its original approval.

(2) You can continue to manufacture tires, except for those specified in paragraph **2.d.(1)** above, under their original approval.

3. **REQUIREMENTS.**

a. New models of aircraft tires identified and manufactured on or after the effective date of this TSO must meet the MPS qualification and documentation requirements in appendix 1 of this TSO.

b. **Deviations.** We have provisions for using alternate or equivalent means of compliance to the criteria in the MPS of this TSO. If you invoke these provisions, you must show that your equipment maintains an equivalent level of safety. Apply for a deviation under 14 CFR § 21.609 before submitting your data package.

4. **MARKING.** Instead of the marking requirements of 14 CFR § 21.607(d), mark tires manufactured under this TSO legibly and permanently with the following:

a. Applicable TSO number.

b. Balance marker, consisting of a red dot, on the sidewall of the tire immediately above the bead to indicate the lightweight point of the tire.

c. Brand name and the name, or registered trademark, of the manufacturer responsible for compliance.

d. Production date code (may be included in the established serial number).

e. Part number.

f. Plant code: the tire may have the manufacturer's country code instead of the plant code on the sidewall if only one manufacturing plant exists within the country. Codes may also be encoded in the serial number.

g. Ply rating must be established. Submit these ratings to the Tire and Rim Association, Inc. (TRA) or European Tyre and Rim Technical Organization (ETRTO). If the ply rating is marked on the tire, the load rating marked on the tire must be consistent with the ply rating established.

NOTE: for a new program aircraft, define new tire dimensions and submit them to TRA for publication in the TRA Data Book. You do not have to wait until your submitted dimensions are incorporated into the Data Book before applying for the TSO.

h. Serial number: the plant code and production date code may be included.

i. Size and load ratings, established and identified in a timely manner in the TRA *Aircraft Year Book*, latest edition or in the ETRTO *Aircraft Tyre and Rim Data Book*, latest revision. See the NOTE at paragraph 4.g.

j. Skid depth, marked in inches to the nearest one-hundredth as defined in appendix 1.

k. Speed rating, in MPH and as identified in appendix 1, paragraph 4.b that is equal to or less than the speed at which the tire has been qualified.

l. Tire type. Mark tires requiring a tube with the words “Tube type.”

m. Non-re-treadable tires must be marked accordingly.

5. APPLICATION DATA REQUIREMENTS. As a TSO manufacturer-applicant, you must give the FAA aircraft certification office (ACO) manager responsible for your facilities, a statement of conformance, as specified 14 CFR § 21.605(a)(1) and one copy each of the following technical data to support our design and production approval. (Under 14 CFR § 21.617(a)(2), LODA applicants submit the same data through their civil aviation authority:)

a. Size.

b. Ply rating, if specified.

c. Tire speed rating.

d. Load rating.

e. Rated inflation pressure.

f. Tire outside diameter measurement.

g. Tire section width measurement.

h. Skid depth.

i. Tire shoulder diameter and shoulder width measurement or envelope drawing. See the NOTE at paragraph **4.g.**

j. Nominal loaded radius at rated load and inflation pressure and permissible tolerance on the nominal loaded radius.

k. Actual loaded radius of the test tire at rated load and inflation pressure.

l. Weight of tire.

m. Casing burst pressure per appendix 1, paragraph 4.c.

n. Test tire static unbalance.

o. Wheel rim size designation.

- p. Tire manufacturer part number.
- q. Load deflection curve at loads up to 1.5 times the load rating at rated pressure.
- r. Summary of the load-speed-time parameters used in the dynamometer tests.
- s. Material and process specifications list.

t. Care and maintenance instructions. The maintenance data must include inspection criteria for the new tire to determine eligibility for in-service tires to remain in operation. Include special nondestructive inspection techniques and re-treading procedures, if applicable, in the maintenance information with any special repair methods applicable to the tire. Further, following 14 CFR § 21.3, notify us of known or potential problems with in-service tires that affect aviation safety. Tire size (outside diameter, shoulder diameter, etc.) must be maintained within tolerances set by TRA or ETRTO.

u. Limitations. TSO approval does not automatically constitute authority to install and use the tire on an aircraft. We may require further aircraft testing or analysis to approve installing a re-qualified tire (with a new part number) on an aircraft. Such aircraft tests would be appropriate to substantiate changes in tire materials, design and/or manufacturing processes that could:

(1) Alter the basic mechanics of the tire (such as the way the tire supports the load, distributes the load in the footprint, and transmits torsional and lateral forces to the landing gear structure), and

(2) Affect previously established performance levels (such as handling and stopping distance). For example, we require additional aircraft tests to substantiate changes that affect the casing construction, identified in appendix 1, paragraph 6.

- v. Include a note with the following statement:

The conditions and tests for TSO approval of this article are minimum performance standards. Those installing this article, on or within a specific type or class of aircraft, must determine that the aircraft operates under conditions within the TSO standards. TSO articles must have separate approval for installation in an aircraft. The article may be installed only according to 14 CFR part 43 or the applicable airworthiness requirements.

6. MANUFACTURER DATA REQUIREMENTS. Besides the data given directly to us, have the following technical data available for review by the responsible ACO or civil aviation authority:

- a. Functional qualification specifications for qualifying each production article to ensure compliance with this TSO.

- b. Equipment calibration procedures.
- c. Corrective maintenance procedures.
- d. Schematic drawings or a photograph with a resolution suitable for identifying key characteristics of the tire cross-section.
- e. Material and process specifications.

7. FURNISHED DATA REQUIREMENTS. If furnishing one or more tires manufactured under this TSO to one entity (such as an operator or repair station), provide one copy of the data in paragraphs **5.a, b, c, d, e, h, j, l, o, p and t** and **6.c and d** of this TSO for each tire. Add any other data needed for the proper installation, certification, use, or for continued airworthiness, of the aircraft tires.

8. HOW TO GET REFERENCED DOCUMENTS.

a. Order copies of 14 CFR Part 21, Subpart O, from the Superintendent of Documents, Government Printing Office, P.O. Box 37154, Pittsburgh PA 15250-7954. Telephone (202) 512-1800, fax (202) 512-2250. You can also order copies online at www.access.gpo.gov. Select "Access," then "Online Bookstore."

b. You can find a current list of technical standard orders on the FAA Internet website Regulatory and Guidance Library at www.airweb.faa.gov/rgl. You will also find the TSO Index of Articles at the same site.

c. Order TRA yearbooks and other publications from the Tire and Rim Association Inc., 175 Montrose West Avenue, Suite 150, Copely, Ohio 44321. Telephone (330) 666-8121. You can also order online at: <http://www.us-tra.org>.

d. Order the ETRTO standards manual and other documents from the European Tyre and Rim Technical Organisation, 32/2 Avenue Brugmann B-1060, Brussels, Belgium. Telephone 011-32-2-344-40-59. You can also contact the organization at www.etrto.org for instructions on how to order publications.

/s/ Susan J. M. Cabler

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Acting Manager, Aircraft Engineering Division
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APPENDIX 1. FAA STANDARD FOR AIRCRAFT TIRES

1. **PURPOSE.** Minimum performance standards for new and re-qualified radial and bias tires, excluding tailwheel tires, to be identified as meeting the standards of TSO-C62e.

2. **SCOPE.** Minimum performance standards apply to aircraft tires having speed and load ratings based on the speeds and loads to which the tires have been tested.

3. **DEFINITIONS.**

Bias tire: a pneumatic tire whose ply cords extend to the beads and are laid at alternate angles substantially less than 90° to the centerline of the tread. May also have a bias belted tire with a circumferential belt.

Radial tire: a pneumatic tire whose ply cords extend to the beads and are laid substantially at 90° to the centerline of the tread, the carcass being stabilized by an essentially inextensible circumferential belt.

Load rating: maximum permissible static load at a specific inflation pressure. Use the rated load combined with the rated inflation pressure when selecting tires for application to an aircraft, and for testing to the performance requirements of this TSO.

Rated inflation pressure: Specified unloaded inflation pressure which will result in the tire deflecting to the specified static loaded radius when loaded to its rated load against a flat surface.

Static loaded radius (SLR): perpendicular distance between the axle centerline and a flat surface for a tire initially inflated to the unloaded rated inflation pressure and then loaded to its rated load.

Ply rating: an index of tire strength from which a rated inflation pressure and its corresponding maximum load rating are determined for a specific tire size.

Speed rating: maximum ground speed at which the tire has been tested in accordance with this TSO.

Skid depth: distance between the tread surface and the bottom of the deepest groove as measured in the mold.

APPENDIX 1. FAA STANDARD FOR AIRCRAFT TIRES, *continued*

4. DESIGN AND CONSTRUCTION.

a. General Standards. Tires selected for use on a specific aircraft must demonstrate suitability through appropriate laboratory simulations described in paragraphs **5.a** or **5.b**, this appendix, as appropriate. Determine material suitability by:

(1) Temperature: show by tests or analysis that the physical properties of the tire materials are not degraded by exposure to temperature extremes of -40°F and +160°F for a period of not less than 24 hours at each extreme.

(2) Wheel rim heat: substantiate by the applicable tests or show by analysis that the physical properties of the tire materials have not been degraded by exposure of the tire to a wheel-bead seat temperature of not lower than 300°F for at least 1 hour, except that low-speed tires or nose-wheel tires may be tested or analyzed at the highest wheel-bead seat temperatures expected to be encountered during normal operations.

b. Speed Rating. See Table 1 below for applicable dynamometer test speeds for corresponding maximum takeoff ground speeds. For takeoff speeds over 245 mph, the tire must be tested to the maximum applicable load-speed-time requirements and identified with the proper speed rating.

TABLE 1. Applicable Dynamometer Test Speeds

Max Takeoff Speed <i>Mph at liftoff over:</i>	<i>But not over:</i>	Max takeoff Speed Of Aircraft <i>Max Tire mph:</i>	Min Dynamometer Speed (Figures 1, 2 or 3) <i>Min Tire mph:</i>
0	120	120	120
120	160	160	160
160	190	190	190
190	210	210	210
210	225	225	225
225	235	235	235
235	245	245	245

c. Overpressure. The tire must successfully withstand a hydrostatic pressure of at least four times its rated inflation pressure for 3 seconds without bursting.

d. Helicopter tires. You may use aircraft tires qualified according to this TSO on helicopters. In such cases for standard tires, you may increase the maximum static load rating

APPENDIX 1. FAA STANDARD FOR AIRCRAFT TIRES, continued**4.d. DESIGN AND CONSTRUCTION, continued**

by a factor of 1.5 with a corresponding increase in rated inflation pressure without additional qualification testing (round loads to the nearest 10 lbs and inflation pressures to the nearest whole psi.). If significant taxi distance is expected, these guidelines may not apply. Consult tire and rim manufacturers for appropriate tire size selection. Maximum permissible inflation for aircraft tires used on helicopters is 1.8 times the rated inflation pressure.

e. Dimensions. Maintain the tire size (outside diameter, shoulder diameter, section and shoulder width), within specified tolerances.

NOTE: for a new program aircraft, define new tire dimensions and submit them to TRA for publication in the TRA Data Book. You do not have to wait until your submitted dimensions are incorporated into the Data Book before applying for the TSO.

(1) Outside diameter, shoulder diameter, section width and shoulder width: For the bias ply tire, outside diameter and section width are specified to a maximum and minimum value after a 12 hour growth period at rated inflation pressure. Shoulder diameter and width dimensions are specified to a maximum value after a 12-hour growth period at rated inflation pressure. Radial tire dimensions are limited by the grown tire envelope according to the static loaded radius (SLR) requirements in paragraph **4.e.(3)** below.

(2) Due to the increased inflation pressures permitted when using an aircraft tire in a helicopter application, we permit tire dimensions to be 4% larger.

(3) Static loaded radius (SLR):

(a) Bias tires: provide the nominal SLR. The actual SLR is determined on a new tire stretched for a minimum of 12 hours at rated inflation pressure.

(b) Radial tires: provide the nominal SLR. The actual SLR of a radial tire is determined at rated inflation pressure after running 50 takeoffs, following paragraph **5.a.(2)** requirements.

(4) Helicopter tires: maximum dimensions for new tires used on helicopters are 4% larger than maximum aircraft tire dimensions. (In calculating maximum overall and shoulder diameters, rim diameter should be deducted before applying 4%.)

f. Inflation retention. After an initial 12-hour minimum stabilization period at rated inflation pressure, the tire must retain the inflation pressure with a loss of pressure not exceeding 5% of

APPENDIX 1. FAA STANDARD FOR AIRCRAFT TIRES, continued**4.f. DESIGN AND CONSTRUCTION, continued**

the initial pressure for 24 hours. Measure the ambient temperature at the start and finish of the test to ensure that any pressure change was not caused by an ambient temperature change.

g. Balance. Test all tires for static unbalance. A balance marker, consisting of a red dot, must be affixed on the sidewall of the tire immediately above the bead to indicate the lightweight point of the tire. The dot must remain for any period of storage plus the original tread life of the tire.

(1) Auxiliary tires (not main or tailwheel tires): the moment of static unbalance (M) for auxiliary tires shall not be greater than the value determined using this equation:

$$M = 0.025D^2$$

Round the computed equation values to the next lower whole number where M is in inch-ounces and D is the standardized maximum new tire inflated outside diameter in inches. Your design must include requirements to measure the level of unbalance on each tire, and approved procedures to correct the unbalance within the above limits if necessary.

(2) All main tires and all tires with 46-inch and larger outside diameter: the moment of static unbalance (M) for main tires shall not be greater than the value determined using this equation:

$$M = 0.035D^2$$

Round the computed equation values to the next lower whole number where M is in inch-ounces and D is the standardized maximum new tire inflated outside diameter in inches. Your design must include requirements to measure the level of unbalance on each tire, and approved procedures to correct the unbalance within the above limits if necessary.

5. TIRE TEST REQUIREMENTS.

a. Use a single test specimen for a qualification test. The tire must withstand the following dynamometer cycles without detectable signs of deterioration, other than normal expected tread surface abrasion, except when the overload takeoff condition is run last (see paragraph **5.a.(8)** below).

(1) Dynamometer cycle requirements: all aircraft tires must satisfactorily withstand 58 dynamometer cycles as a demonstration of overall performance, plus 3 overload dynamometer cycles as a demonstration of the casing's capability under overload. The 58 dynamometer cycles consists of 50 takeoff cycles, per **5.a.(2)**, and 8 taxi cycles, per **5.a.(7)**. The overload cycles consist of 2 taxi cycles, per **5.a.(7)** at 1.2 times rated load and 1 overload takeoff cycle per **5.a.(8)** starting at 1.5 times rated load. Run the dynamometer cycles in any order. However, if the overload takeoff cycle is not run last, the tire must not show detectable signs of deterioration after the cycle completion, other than normal expected tread surface abrasion.

APPENDIX 1. FAA STANDARD FOR AIRCRAFT TIRES, continued**5.a. TIRE TEST REQUIREMENTS, continued**

(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.

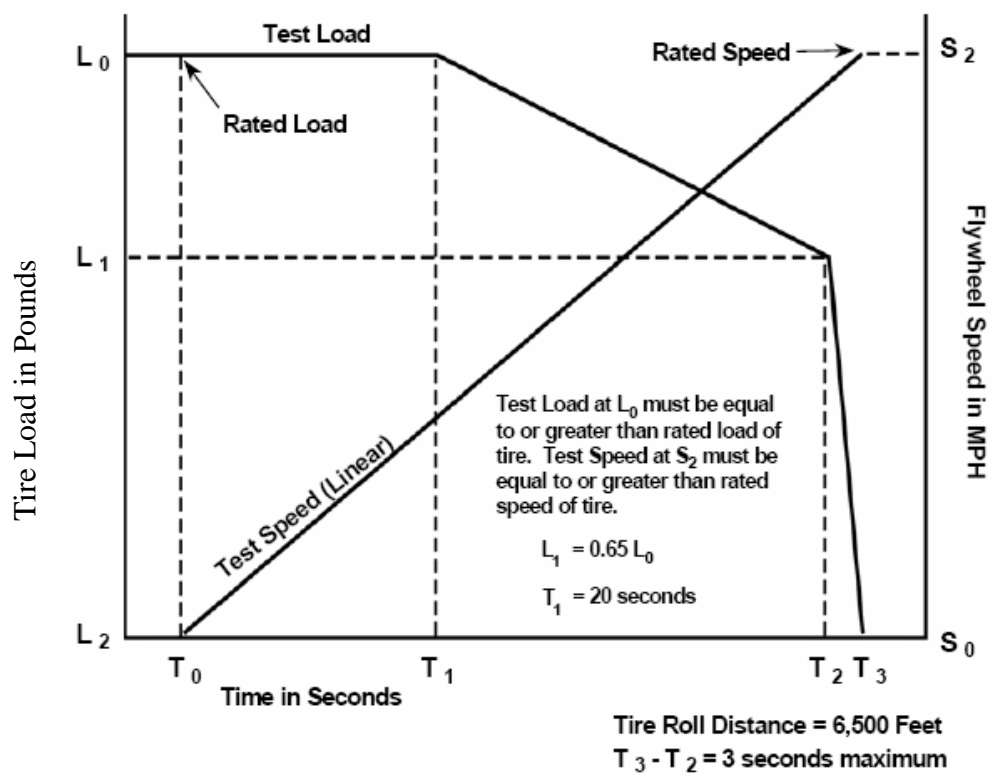
- Figure 2 defines a test cycle that applies to any aircraft tire with a speed rating greater than 160 mph.

- 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.

APPENDIX 1. FAA STANDARD FOR AIRCRAFT TIRES, continued

5.a.(2) TIRE TEST REQUIREMENTS, continued

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



APPENDIX 1. FAA STANDARD FOR AIRCRAFT TIRES, continued**5.a.(2) TIRE TEST REQUIREMENTS, continued****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.

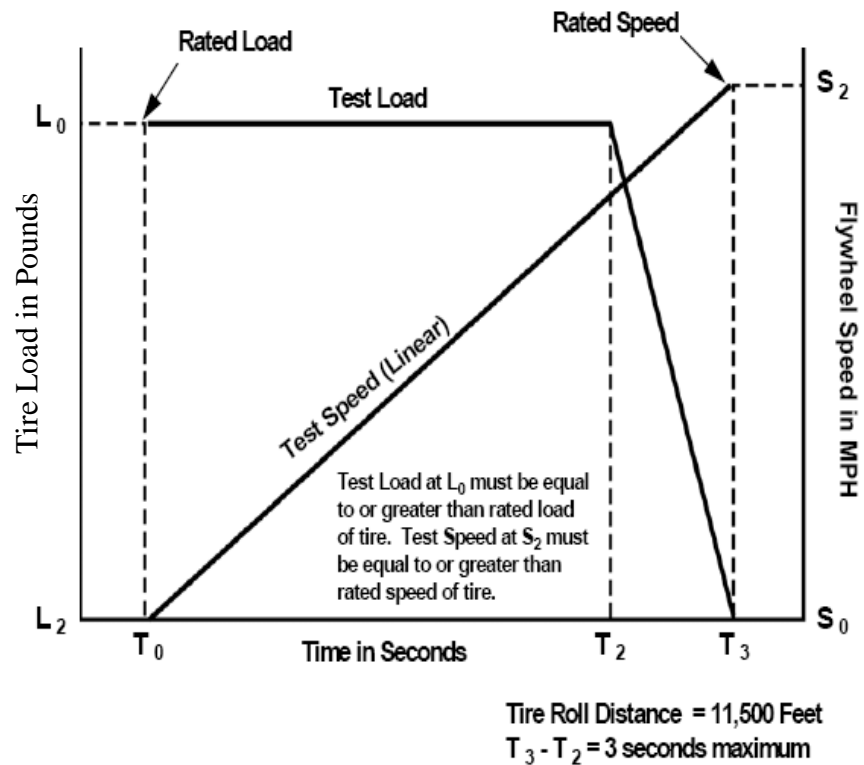
T_2 Time to rotation in seconds, Figures 1, 2, and 3.

T_3 Time to liftoff in seconds, Figures 1, 2, and 3.

APPENDIX 1. FAA STANDARD FOR AIRCRAFT TIRES, continued

5.a.(2) TIRE TEST REQUIREMENTS, continued

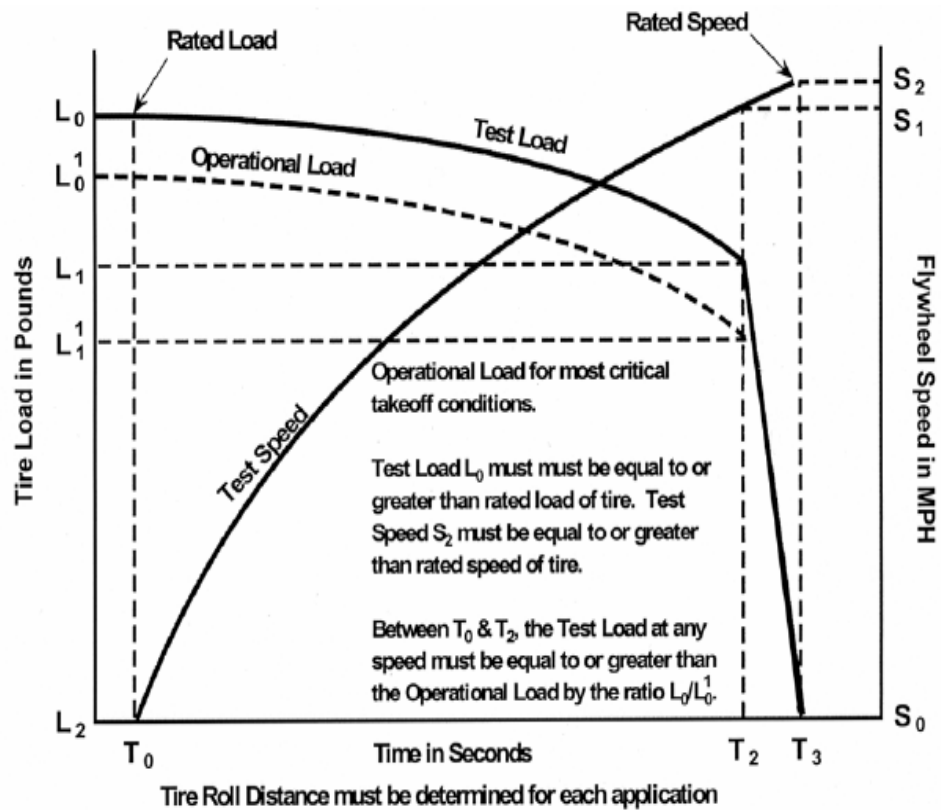
Figure 2
Graphic Representation of a Typical Universal Load-Speed-Time Test Cycle
(For Tires Rated above 160 MPH)



APPENDIX 1. FAA STANDARD FOR AIRCRAFT TIRES, continued

5.a.(2) TIRE TEST REQUIREMENTS, continued

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



APPENDIX 1. FAA STANDARD FOR AIRCRAFT TIRES, continued

5.a. TIRE TEST REQUIREMENTS, continued

(3) Test load: the minimum allowable load at the start of the test is the rated load of the tire. The test loads must conform to Figures 1 or 2 (as applicable), or Figure 3. Figures 1 and 2 define a test cycle generally applicable to any aircraft. If you use Figure 3 to define the test cycle, select the loads based on the most critical takeoff conditions you established. At any speed throughout the test cycle, the ratio of the test load to the operational load must be the same as, or greater than, the ratio at the start of the test.

(4) Test inflation pressure: the pressure needed to provide the same loaded radius on the flywheel as was obtained on a flat surface at the rated tire load and inflation pressure. Make both determinations at the same ambient temperature. Do not adjust the test inflation pressure to compensate for changes created by temperature variations during the test.

(5) Test temperatures and cycle interval: the temperature of the gas in the tire or the casing temperature measured at the hottest point of the tire may not be:

(a) Lower than 105°F at the start of the overload takeoff cycle and at the start of at least 45 of the 50 takeoff cycles, and

(b) Lower than 120°F at the start of at least 9 of the 10 taxi cycles.

For the remaining cycles, the contained gas or casing temperature may not be lower than 80°F at the start of each cycle. Rolling the tire on the dynamometer flywheel is an acceptable method for obtaining the minimum starting temperature.

(6) Dynamometer takeoff cycle speeds: see Table 1 for the dynamometer test speeds for the corresponding maximum aircraft takeoff speeds.

(7) Taxi cycles: tire must withstand 10 taxi cycles on a dynamometer under the test conditions in Table 2 below.

TABLE 2. Test Conditions

Number of Taxi Runs	Min Tire Load (lbs)	Min Speed (mph)	Tire speed rating 120/160 mph	Tire speed rating Over 160 mph
			Min Rolling Distance (ft)	Min Rolling Distance (ft)
8	Rated	40	25,000	35,000
2	1.2 x Rated	40	25,000	35,000

APPENDIX 1. FAA STANDARD FOR AIRCRAFT TIRES, continued**5.a. TIRE TEST REQUIREMENTS, continued**

(8) Overload takeoff cycle: the overload takeoff cycle shall duplicate the test described in paragraph 5.a.(2) with the test load increased by a factor of 1.5 throughout. Good condition of the tire tread is not required after completion of this test cycle, if you run this test last. If the overload takeoff cycle is not run last, the tire must withstand the cycle without detectable signs of deterioration, other than normal expected tread surface abrasion.

(9) Diffusion test: after completing the 61 test cycles, the tire must retain the inflation pressure to within 10% of the initial test pressure for a period of 24 hours. Measure the ambient temperature at the start and finish of this test to ensure that any pressure change was not caused by an ambient temperature change.

(10) Tire/wheel slippage: tires should not slip on the wheel rim during the first five dynamometer cycles. Any slippage that subsequently occurs must not damage the tube valve of tube type tires, or the gas seal of the tire bead of tubeless tires.

b. Alternate qualification procedures: 120 mph rated tires. For 120 mph speed rating tires, you may use the following variable mass flywheel procedure:

(1) Test load: load must meet or exceed the tire rated load throughout the entire test roll distance.

(2) Test inflation pressure: pressure needed to provide the same loaded radius on the flywheel as was obtained on a flat surface at the rated tire load and inflation pressure. Make both determinations at the same ambient temperature. Do not adjust the test inflation pressure to compensate for changes created by temperature variations during the test.

(3) Temperature and cycle interval: the temperature of the gas in the tire, or the casing temperature measured at the hottest point of the tire, may not be lower than 105°F at the start of at least 180 of the 200 landing cycles. For the remaining cycles, the contained gas or casing temperature may not be lower than 80°F at the start of each cycle. Rolling the tire on the dynamometer is an acceptable method for obtaining the minimum starting temperature.

(4) Kinetic energy: calculate the kinetic energy of the flywheel to be absorbed by the tire using this equation:

$$KE = CW(V^2) = \text{Kinetic energy (ft-lbs)}$$

where

C = 0.0113

W = Load rating of the tire (lbs)

V = 120 mph

APPENDIX 1. FAA STANDARD FOR AIRCRAFT TIRES, continued**5.b. TIRE TEST REQUIREMENTS, continued**

(5) Dynamometer cycle requirements: tire must satisfactorily withstand 200 landing cycles on a variable mass dynamometer flywheel. If you cannot use the exact number of flywheel plates to obtain the calculated kinetic energy value, select a greater number of plates and adjust the dynamometer speed to obtain the required kinetic energy. Divide the total number of dynamometer landings into two equal parts having the speed ranges provided in paragraphs **5.b.(5)(a)** and **5.b.(5)(b)**.

(a) Low speed landings: in the first series of 100 landings, the maximum landing speed is 90 mph and the minimum unlanding speed is 0 mph. Adjust the landing speed so the tire will absorb 56% of the kinetic energy calculated using the equation in paragraph **5.b.(4)** above. If the adjusted landing speed is calculated to be less than 80 mph, then determine the landing speed by adding 28% of the calculated kinetic energy (see paragraph **5.b.(4)** above) to the flywheel kinetic energy at 64 mph, and determine the unlanding speed by subtracting 28% of the calculated kinetic energy from the flywheel kinetic energy at 64 mph.

(b) High speed landings: in the second series of 100 landings, the minimum landing speed is 120 mph and the nominal unlanding speed is 90 mph. Adjust the unlanding speed as needed to ensure that the tire will absorb 44% of the calculated kinetic energy (see paragraph **5.b.(4)** above).

6. REQUALIFICATION TESTS.

a. Re-qualify altered tires, with changes in materials, design and/or manufacturing processes that could adversely affect the performance and reliability, to the dynamometer tests described under paragraph 5. Some examples include (1) or (2) below, or both:

(1) Changes in casing construction, such as the number of plies and/or bead bundles, ply cord makeup (material, denier, number of strands) and configuration (radial and bias).

(2) Changes in tread construction, such as number or composition of tread reinforcing and/or protector plies, tread compound formulations, number and location of tread grooves, and an increase in skid depth.

b. Re-qualification by similarity (based on load rating). Re-qualifying a given load rated tire due to a change in material or tread design, automatically qualifies the same changes in a lesser load tire of the same size, speed rating, and skid depth, if:

(1) The lesser load rated tire was qualified to the applicable requirements specified in this TSO, and

APPENDIX 1. FAA STANDARD FOR AIRCRAFT TIRES, continued**6.b. REQUALIFICATION TESTS, continued**

(2) The ratio of qualification test load to rated load for the lesser load rated tire does not exceed the same ratio to the higher load rated tire at any given test condition.

c. Re-qualification by similarity (blanket change). You can gain re-qualification of any change that affects all sizes by similarity, if:

(1) Five representative sizes, including tires of the highest load rating, speed rating and angular velocity, were qualified to the minimum performance standard with the change, and

(2) You submit data supporting the change in the listed sizes to the appropriate FAA approving office.