SAE INTERNATIONAL

AEROSPACE RECOMMENDED PRACTICE

ARP5265 REV. A

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Superseding ARP5265

Minimum Operational and Maintenance Responsibilities for Aircraft Tire Usage

RATIONALE

ARP5265A has been reaffirmed to comply with the SAE five-year review policy.

1. SCOPE

This SAE Aerospace Recommended Practice (ARP) sets forth criteria for the installation, inflation, inspection, maintenance and removal of aircraft tires as well as criteria for the maintenance of the operating environment so as to achieve the purpose stated in 1.1. (Definitions of terms related to aircraft tires is found in 2.2.)

1.1 Purpose

This document sets forth the minimum recommended care and maintenance responsibilities of the operators and the airport authorities to assure the safety of support personnel and the safe operation of aircraft.

2. REFERENCES

2.1 Applicable Documents

There are no referenced publications specified herein.

2.2 Definitions

AIRCRAFT: In the sense of this document refers principally to “fixed wing” and non-military fleets. Although rotary winged and military aircraft share many of the care and maintenance practices of the civilian community, certain operational regimes and unique duty cycles may not be covered by this document.

BEAD: This term may be properly applied to entire zones that are in contact with the rim areas of the wheel, or it may be as specific as the coils of steel wire that provide anchors for the plies.

BIAS TIRE: A pneumatic tire in which the principal reinforcing cords are fabricated parallel to one another in layers called plies. These cords lie at an angle which is substantially less than 90° to the centerline of the tire. Adjacent plies are at alternate angles. Most plies are anchored by the beads.

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CASING: The structural part of a tire.

FLATSPOTTING: This term covers two conditions:

1. A localized, accelerated wear condition associated with landings.

2. A short lived “out-of-round” condition resulting from a loaded hot tire having not rotated while it cooled to ambient. (Most prevalent on bias nylon tires due to “plastic memory” of the nylon cords.)

INNERLINER: The rubber lining of a tubeless tire that is engineered to prevent the diffusion of the inflation gas into the casing.

INNERTUBE: A gas-tight rubber device placed inside tube-type tire casings for the purpose of containing the inflation gas. It is provided with an integral valve assembly.

RADIAL TIRE: A pneumatic tire in which the ply cords that extend to the beads are laid substantially at 90° to the centerline of the tire. Additional stabilizing is provided by essentially inextensible belting in the area of the tread.

SIDEWALL: The rubber covering and the underlying structure that extends from the beads to the tread.

SIDEWALL VENTS: Specific perforations in the lower sidewalls of tubeless tires, usually located above the rim centering rib and defined by paint marks. These perforations release detrimental casing pressure.

TIRE (PNEUMATIC): The term “tire” refers to a complex engineered structure made of rubber and cables (of textiles or steel) providing, thereby, a protective enclosure for the inflating gas. It is resilient, yet dimensionally stable, possessing great strength and a capacity for the transferal of energy.

TREAD: The expendable rubber wearing surface of any pneumatic tire. It contains the groove pattern designed to facilitate water removal from the contact patch and may or may not possess integral fabric materials.

3. BACKGROUND

Aircraft tires are unique in their content, applications, and service requirements. To minimize physical size and weight, aircraft tires are rated at high deflections (32 to 35%) and inflated to high pressures (100 to 250 psi [0,7 to 1,7 megapascals] for commercial aircraft) to carry the required loads. The service interval for an aircraft tire is relatively short (taxi and takeoff or landing/taxi) and intermittent (substantial rest periods between service usage). When the aircraft tire, given its design, is operated in its standard environment, safe and reliable performance is realized.

Changes in this response occur when a tire experiences one of two damages: (1) overheating or (2) invasion by foreign objects. Both of these conditions can be directly influenced by the operational practices of the operator and/or the local airport authority.

4. TIRE HANDLING AND PREPARATION FOR SERVICE

4.1 Mounting Tubeless Tires

Determine that the tire, the wheel, and the valve assembly are correct for the particular application and that the wheel and tire are clean inside and out and devoid of burrs, roughness or any foreign material. Install a new O-ring that is approved by the wheel manufacturer. Carefully follow the wheel manufacturer’s instructions with regard to lubricants and installation of the O-ring. Inspect the valve (the body and the valve core seat) for condition and install a new valve core.

The use of tire mounting lubrication is not recommended. If lubrication is to be used, consult the tire and wheel manufacturer(s).

4.1.1 Mounting Tube Type Tires

Select a new tube of the correct size for the tire. Dust the interior of the tire and the exterior of the tube with talc. Confirm that a new valve core is installed in the valve stem and partially inflate the tube to achieve a slightly rounded condition. Insert the tube into the tire so as to align the yellow stripe on the tube with the red spot on the tire. Mount the assembly on the wheel so that the valve stem is properly aligned with the valve hole in the wheel.

Complete the assembly of the tire and wheel in accordance with the wheel manufacturer's Component Maintenance Manual (CMM) recommendations.

4.2 Initial Inflation for Tubeless Tires

Inflate the assembly in a safety cage using dry nitrogen. The regulator on the nitrogen source must be pre-set to a value that is consistent with the in-service tire pressure. A drop in inflation pressure will occur after initial inflation as a result of tire growth. Stabilization normally occurs within 12 h. After an initial stabilization period the pressure loss rate, for a 24 h period, must not exceed 5%. If losses exceed the 5% rate, the leak source must be discovered.

The tire is only one of many components in the pressure retention system. All components must be checked.

NOTES:

a. For a leaking assembly: If no leak site is found, repeat the inflation pressure check. If the assembly still exceeds the 5% pressure loss rate, demount the tire in accordance with 5.9. Tag the tire with appropriate comments and return tire to supplier.

b. It is normal for the sidewall vent holes of tubeless tires to exhibit some bubbling of leak-check fluid following initial inflation. Conclusions regarding a leaking assembly should not be based on sidewall vent hole bubbling.

c. Leak test results can be influenced by changes in ambient temperature. An ambient change of ±5 °F absorbed by an inflated assembly undergoing leak testing will yield a corresponding gauge pressure change of 1%. Changes of this order can have a negative influence on the accuracy of the perceived losses being monitored.

4.3 Initial Inflation for Tube Type Tires

Inflate the assembly to rated pressure in a safety cage. Deflate in accordance with 5.9 to optimize tube stretch. Re-inflate to rated pressure in a safety cage. Monitor pressure to determine that the loss rate does not exceed 5% in a 24 h period.

NOTES:

a. It is possible for air trapped between the tire and tube, and not released in the inflation process, to have affected the gauge pressure. The subsequent natural venting of this trapped air can impact negatively on the accuracy of the pressure loss test.

b. Leak test results can be influenced by changes in ambient temperature. An ambient change of ±5 °F absorbed by an inflated assembly undergoing leak testing will yield a corresponding gauge pressure change of 1%. Changes of this order can have a negative influence on the accuracy of the perceived losses being monitored.

5. IN-SERVICE MAINTENANCE OF TIRE-WHEEL ASSEMBLY

Operator: On Aircraft

5.1 Inflation Pressure Control

Pressure should be checked on a daily basis using a calibrated gauge (within ±2% tolerance) whose scale is suited to the pressure range that is being monitored.

Accurately maintaining the correct pressure is the single-most effective task in the preventative maintenance regimen for safe tire operations!

5.2 Deferred Pressure Maintenance

Due to the operational environment of the aircraft tire-wheel assembly and its high operating pressure, deferring pressure checks to multiple day intervals is not recommended and is not in keeping with best industry accepted practices.

5.3 Inflation Control During Service

Pressure checks are most meaningful on “cold” assemblies. “Cold” assemblies are those that are at ambient temperature or at least 2 h since their last duty cycle.

5.4 Service Pressure

Service pressure is the inflation pressure necessary to support the maximum operating load for a wheel position, measured with the assembly under load. When pressure testing a loaded assembly, gauge pressure should indicate a range between 100 to 105% of the specified pressure, provided that the rated pressure of the tire or the wheel’s TSO qualification pressure is not exceeded.

5.5 Reinflation

Any assembly found to be between 95 and 100% of the minimum loaded service pressure should be reinflated to the specified service pressure range.

Any assembly discovered to have been operating at less than 90% of the minimum loaded service pressure should be removed from service.

Any assembly which was operated at less than 80% of the minimum loaded service pressure requires that it and its axle-mate be removed from service.

If the user does not scrap tires on site, he/she should return them to a full service repair facility with a description of removal reason.

5.6 Tire Operating Environment

Tires should be inspected after each duty cycle. Where this is impractical, they should be inspected as often as possible, at least at every crew change, certainly at each pressure check.

Since aircraft tires operate at high loads and inflation pressures, they can be easily damaged when rolling over hard objects protruding above any paved surface. Damage from these objects can vary from a superficial mark to a serious injury. Penetration into the casing could result in tread loss during operations. Total penetration will result in loss of inflation integrity and over-deflection.

Foreign Object Damage (FOD) represents the second-most treatable cause of premature tire removals. The operator must daily clean (i.e., pickup and remove foreign objects and sweep) all areas for which he/she has responsibility as per the following schedule (see Figure 1):

Gate Areas (areas beneath and adjacent to aircraft)	
1) Daily Walk-around inspection and Pickup or at least before the first flight of the day	2) Twice weekly mechanically sweep the entire area

FIGURE 1

5.7 Operational Practices (Operator Flight and Ground Crews)

While on the ground, flight crews and ground handling crews can have a large influence on the safe performance of aircraft tires.

5.7.1 Turns

As configured, aircraft are capable of being maneuvered through tight turns placing high lateral loads on the tires. When subjected to those conditions the tire can experience either external damage to the tread or sidewall, internal damage to the casing structure, or bead unseating with pressure loss.

Ground maneuvers should be made at the largest possible turn radius in all cases. For nose landing gear tires, the aircraft should begin rolling with the tires aligned in a straight ahead position and then begin the turn maneuver. The minimum radius of turn should still allow the tire closest to the center of the turn to continue rolling.

5.7.2 Temperature

Aircraft tires generate internal heat during normal operations. Under high aircraft load conditions, the heat build-up is accelerated by excessive departure taxi speed (over 35 knots [18 meters per second]), and/or excessive taxi distances (greater than 35 000 ft [10.660 m]). Where a combination of these conditions have occurred, it is advisable to delay takeoff.

5.8 In-Service Inspections (Operator)

5.8.1 Removal Criteria for Tread Damages

Tires that exhibit certain degradations should be removed from service. This will minimize the risk of these visible deteriorations progressing to failure.

1. Cracking and/or cutting in a tread groove that is under-cutting (material adjacent to the crack or cut has lifted or can be lifted).

2. Cutting in a tread rib that is under-cutting (material adjacent to the cut has lifted or can be lifted).

3. Transverse crack in the tread that is visible at the surface and shows progression along an angular path down into the rubber.

4. Internal separation characterized by bulges or distortions in the tread.