Keep this handy pocket guide as a quick reference on aircraft tires. Additional maintenance and operational guidelines can be found in Michelin’s comprehensive Aircraft Tire Care & Service Manual. See your Michelin representative for details.
## Contents

<table>
<thead>
<tr>
<th>Topic</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>MICHELIN® Aircraft Tires</td>
<td>2–3</td>
</tr>
<tr>
<td>Proper Inflation</td>
<td>4–5</td>
</tr>
<tr>
<td>Tire Inspection Procedures</td>
<td>6–7</td>
</tr>
<tr>
<td>Inspection; Vibration &amp; Balance</td>
<td>8–9</td>
</tr>
<tr>
<td>Mounting &amp; Demounting</td>
<td>10–11</td>
</tr>
<tr>
<td>Non-Repairable Tire Damage</td>
<td>12–13</td>
</tr>
<tr>
<td>Q &amp; A; Operating Tips</td>
<td>14–15</td>
</tr>
<tr>
<td>Pre-Flight Tire Checklist</td>
<td>16</td>
</tr>
</tbody>
</table>
MICHELIN® Aircraft Tires

For more than a century, the MICHELIN® name has been synonymous with excellence and innovation in tire manufacturing. Today, Michelin is the single largest tire manufacturer in the world.

MICHELIN® AIR X®
Michelin invented the world’s first radial tire, and our MICHELIN® AIR X® radial tires are currently available for a wide range of commercial, military and corporate aircraft. MICHELIN® AIR X® radial tires offer numerous advantages over traditional bias-ply aircraft tires, including substantial weight savings, longer treadwear and improved overload capacity.

MICHELIN® AIR™
The MICHELIN® AIR™ is our top-of-the-line bias-ply tire. It offers a number of exclusive features designed to help improve performance and extend tire life including a sidewall compound that is optimized to provide substantial ozone and ultraviolet light protection, the MX®2000 tread compound which is Michelin’s toughest, and the Air Cushion™ Inner Liner that provides a protective cushion over the casing plies.

MICHELIN® Aviator®
The MICHELIN® Aviator® tire has many of the same features found on our top-of-the-line MICHELIN® AIR™. Like the MICHELIN® AIR™, the MICHELIN® Aviator® offers exceptional balance and an extra strong nylon casing. It also features our tough MX®1000 tread compound for long life, and a specialized sidewall compound to protect against ultraviolet light.
Typical MICHELIN Radial Aircraft Tire Construction.

- Tread
- Protector Ply
- Undertread
- Belt Plies
- Sidewall
- Carcass Plies
- Carcass Ply Turn-Ups
- Liner
- Bead
- Flipper Strip

Typical MICHELIN Bias Aircraft Tire Construction.

- Tread
- Tread Reinforcing Ply
- Undertread
- Sidewall
- Carcass Plies
- Carcass Ply Turn-Ups
- Liner
- Bead
- Chafer Strips

When You Change Tires, Change Tubes

MICHELIN® AIRSTOP® aircraft inner tubes offer a long list of unique features, and they’re compatible with most tire brands.
Proper Inflation

Tire pressures should be checked at ambient temperatures with an accurate gauge.

Tube-Type Tires
Inflate to the recommended pressure, deflate, then reinflate to assure a proper fit of the tube inside the tire. This procedure helps remove any wrinkles in the tube and helps prevent pinching the tube under the toe of the bead. It helps eliminate the possibility of one section of the tube stretching more than the rest and thinning out in that area. Further, it assists in the removal of air that might be trapped between the inner tube and the tire. Let stand for 12-24 hours to compensate for tire growth and to allow any air trapped between the tube and the tire to escape. After placing in service, check pressure before each flight and for several days, adjusting pressure as necessary, until the tire stabilizes.

Tubeless Tires
Always check the condition of tubeless wheels prior to mounting tires. Once the tires are mounted, check for proper bead seating by applying a soap solution along the rim flange. Bubbling in this area indicates a poor tire-to-rim seat. The tire must be demounted and the bead seating areas must be cleaned prior to remounting the tire.

Once proper bead seating has been confirmed, check for air diffusion by applying a soap solution to the vent markings on the tire’s sidewall. Bubbling here is normal and indicates diffusion. Pressure loss should not, however, exceed 5% for any 24-hour period.

Newly Mounted Tires
12–24 hours after initial inflation and before placing in service, reinflate aircraft tires to compensate for “tire growth” or cord body stretch (see page 10 for tolerances). Recheck again after tire has been at stable ambient temperature for 12 hours.
The most important service you can perform on your aircraft’s tires is to make sure they are properly inflated at all times. If you make one or more flights a day, tire pressure should be checked daily. Tire pressure should be checked on the tires before the first flight of the day. If you fly less than one time per day, you should check tire pressure before each flight.

Whether using tube-type or tubeless tires, the operating pressures should be set following the instructions given by the airframe manufacturer.

---

**Tires Mounted As Duals**
Maintain equal operating pressures. For any difference of more than 5%, inflate both tires to proper pressure.

**At All Times...**
Follow specified load recommendations. Do not overload tires.

---

**Normal Tread Wear**

**Overinflation**

**Underinflation**
Tire Inspection: When Mounted On Wheel

Tire/wheels should be inspected before the first flight of the day, or before each flight if you fly less than one time per day.

Testing for Pressure Loss

• Check valves for leaks: put a small amount of water on the end of the valve stem. If bubbles appear, replace the valve core and repeat check.

• Inspect valve threads. If damaged, repair or replace as appropriate.

• Make sure the valve is not rubbing against the wheel. If it is bent, cracked or severely worn, demount the tire and replace the tube or valve at once.

• Apply a soap and water solution to the entire tire/wheel assembly to check for other points of pressure loss. Bubbles at any point, other than the vents in the sidewalls, indicate a leak.

Tire Injuries – Tread or Sidewall

• Inspect the tread area for cuts or other injuries. Mark all damaged areas while the tire is inflated.

• Caution: Do not probe objects or cuts while the tire is inflated! The tire should be deflated when prying out foreign material to avoid embedded objects becoming self-propelled. Use a blunt awl to probe injury and remove any foreign objects that may be embedded in the tread.

• Replace the tire if the injury exposes or penetrates the cord body.

• Remove any tires that show signs of a bulge in the tread or sidewall.

• Inspect both sidewalls for evidence of weather or ozone checking, radial cracks, cuts, snags and gouges. Remove tire from service if cords are exposed or damaged.
Caution: Do not probe objects or cuts while the tire is inflated! The tire should be deflated when prying out foreign material to avoid embedded objects becoming self-propelled.

Mark and remove foreign objects.

Remove foreign object with a blunt instrument.

Check air pressure for proper inflation.

When sidewall plies are damaged, scrap the tire.
Look for Signs of Uneven Wear
• Always use a tread depth gauge for accurate wear readings. Tires that show uneven wear can be demounted, turned around and remounted to even up the wear.
• Check for spotty, uneven wear due to faulty brakes.

Check for Wheel Damage
• Wheels that are cracked or damaged should be taken out of service for repair or replacement.

Assure Proper Tire Clearance
• Make sure nothing is caught between the landing gear and the tire.
• Make sure no parts of the landing gear are rubbing against the tire.
• Check the landing gear well for loose or broken parts.

Inspection: Tire Demounted
Establish a regular schedule to inspect tires, tubes and wheels for injury, sidewall condition, bead damage, bulges and broken cords. After any rough landing, demount and inspect the tire, tube and wheel as soon as possible.

Important:
• Do not use an awl or other pointed tool on the inside of a tubeless tire for probing or inspection.
• Do not pierce, puncture or cut the liner blisters, especially in tubeless tires.
• Examine the fusible plugs in the aircraft wheels for damage.
• Replace the tire if the rubber coating in the rim contact area appears gummy or soft. This indicates a condition in which the rubber reverts to its pre-cured state due to excessive heat.
Vibration & Balance

Vibration, shimmy and other similar conditions may be caused by the following:

• Wheel assembly installed before full tire growth has been achieved. (Tires must stand 24 hours at maximum pressure to attain full growth.)

• Loose wheel bearing. (Check axle nut.)

• Wrinkled or misshaped tube. (Check tire inflation.)

• Air trapped between tire and tube. (Check tire inflation.)

• Improper inflation pressure. (Check gauge.)

• Tubeless tire improperly mounted. (Align balance mark on tire with wheel valve.)

• Tube-type tire improperly mounted. (Align balance marks on tire and tube.)

• Improper wheel balance. (Refer to manufacturer's assembly procedure.)

• Poor gear alignment.

• Damaged wheel.

• Worn or loose landing gear components.

• Dual tire inflation not equalized.

• Improperly seated beads.

• Tire flat-spotted. (See photo above.)
Mounting

General Procedures.
• Before mounting, examine tire and tube carefully for defects and/or foreign material.
• After tire is mounted on wheel, place tire in safety cage and inflate with nitrogen.
• Let new mounted assembly stand for at least 12 hours, then check pressure. A 10% drop is normal; reinflate to correct pressure. After reinflating to the proper pressure, more than a 5% drop in any 24-hour period indicates a problem. See page 6, Testing for Pressure Loss.

Tube-Type Tires
• Before installing tube, dust the tube and inside of tire with tire talc or soapstone.
• Align balance mark/valve on tube with balance mark on tire.
• Install locking nut(s); tighten securely. Install valve cap; finger tighten.

Tubeless Tires
• Lubricate the “O” ring and install in wheel groove. Make sure the “O” ring is free of kinks/twists and is seated properly.
• Align balance mark on tire with valve mounted in the wheel (unless manufacturer instructs otherwise – see photo on facing page).
• Lubricate and tighten nuts, washers and bolts in proper order and according to manufacturer’s torque values.

Demounting
• Always deflate tire completely before demounting.
• Use caution when unscrewing valve cores which can eject like a bullet.
• Handle beads and wheels with care.
Proper mounting procedures simplify the job of servicing aircraft tires, while at the same time increasing safety and reducing the chances of damaging tires or wheels. Do not mount aircraft tires without the proper equipment, instructions and operator training.

Be sure to know and understand all chemicals used on the tire and wheel. It is possible that under the high pressures and load exerted by the tire on the wheel, normally inert chemicals may contribute to rapid corrosion and/or abrasion of the wheel, or deterioration of the rubber surface.

Virtually all modern aircraft wheels are of two types: split wheel type, i.e., two “halves” joined by removable tie bolts, or the removable flange type. Both designs facilitate the mounting (and demounting) of the tire. Show careful attention in handling, assembling and disassembling wheel components to avoid damage to critical surfaces.
Learn to Spot Common Non-

Any damage to the beads or in the bead area.

Weather checking or ozone cracking of tread or sidewall that results in exposed body cords.

Rubber reversion from hydroplaning that exposes the reinforcing ply or protector ply, or creates an unacceptable vibration.

Ply separation.
Repairable Tire Damage

Punctures that go through the cord body plies and liner.

Flat spots and skid burns that have penetrated more than one carcass ply.

Excessive brake heat damage.

Tires that are heavily oil soaked.
Q: Can a tube be used with a tubeless tire?
A: When used in accordance with the Tire and Rim Association’s recommendations and all other applicable standards, tubeless tires may be operated with tubes approved for the appropriate tires sizes and applications on tube-type wheels.

Q: What does the red mark in the bead area mean?
A: The red dot or triangle indicates the circumferential location of the light spot on the tire. This mark should be aligned with the valve stem or the tube balance mark when mounting the tire.

Q: What is the purpose of the concentric colored markings on the lower sidewall of the tire?
A: These are the tire vent markings which allow for normal diffusion of air or nitrogen through the tire’s sidewall. Green dots indicate tubeless tires, while the white dots indicate tube-type tires. This venting prevents pressure buildup in the cord body. Permissible pressure drop due to diffusion is 5% in any 24-hour period. The amount of diffusion through the holes will vary.

Q: What is meant by tire growth?
A: All aircraft tires of nylon construction undergo a certain amount of stretch after the tire has first been inflated to operating pressure. A 10% pressure loss after the initial inflation is normal, however, once this has occurred, inflation should be adjusted to the correct pressure.
Q: Is there a standard age limit or “shelf life” for aircraft tires.

A: No. The shelf life of a tire is entirely dependent on the storage conditions. Proper storage of tires includes keeping them away from fluorescent lighting or other bright light, electric motors, oil or chemicals, and sharp objects. Even with optimal storage conditions, a thorough tire inspection is recommended prior to installation.

Operating Tips

Taxiing
Keep taxi runs to a minimum and at speeds no greater than 25 mph, particularly for aircraft not equipped with nose wheel steering. Make sure that ramps, parking areas, taxi strips, runways and other paved areas are regularly cleaned and cleared of all objects that might cause tire damage.

Idle Aircraft
To avoid nylon flat-spotting, an aircraft that is to remain idle for an extended period of time should be blocked up, so that no weight is on the tires.

Turning
Reduce ground speed to avoid severe or prolonged application of brakes. Avoid sharp turns at excessive speeds.

Roll Out After Landing
Minimize use of brakes and avoid high-speed turns.
Pre-Flight Tire Checklist

- **Pressure**
  Compensate for initial tire growth. Equalize dual mounts. Adjust for air diffusion in tubeless tires.

- **Tire Damage to Tread**
  Replace tire if injury exposes or penetrates cord body.

- **Tire Damage to Sidewall**
  Replace tire if cords are exposed due to injury, weather checking or ozone cracking.

- **Uneven Wear**
  Demount tire, turn around, and remount to even up the wear. Make sure tread is not worn beyond grooves.

- **Valve Stem**
  Should be straight up and down. Slanted or skewed stem indicates tube has rotated inside tire.

- **Tube Inspection**
  Check valves for leaks, pad separation and damage. Inspect for chafing and thinning.

- **Wheel**
  Replace if cracked or damaged.

- **Tire Clearance**
  Check between landing gear and tire; check landing gear well for loose or broken parts.

- **Vibration/Shimmy**
  Can result from faulty tire installation, loose wheel bearing, wrinkled or misshaped tube, improper mounting, improper inflation pressure, unequal pressure in dual mounts, improper alignment, poor gear alignment, improper wheel balance, bent wheel, worn or loose landing gear components, improperly seated beads or flat-spotted tires.
Michelin Aircraft Tyre
23, place des Carmes-Déchaux
63040 Clermont-Ferrand Cedex 9 France
Ph : +33 (0)4 73 32 61 06
Fax : +33 (0)4 73 32 76 44

Michelin Aircraft Tire Company
One Parkway South
Greenville, South Carolina 29615 USA
Ph: +1-877-503-8071
Fax: +1-864-458-6746

Michelin Siam Co. Ltd.
Aircraft Tyre Operations
SPE Tower 11th Floor
252 Phaholyothin Road
Samsean Nai, Payathai
Bangkok 10400 - Thailand
Ph: +66 (2) 619-3530
Fax: +66 (2) 619-3529