Tire Care & Maintenance

BRIDGESTONE
AIRCRAFT TIRES

TIRE SPECIFICATION &
MAINTENANCE MANUAL

I. Tire Care and Maintenance

1. Purpose

This manual forwards information relevant to maintenance and servicing of Bridgestone aircraft tires; new and retreaded. The practices and supporting information presented hereinafter are intended to maximize tire performance and life in service by ensuring appropriate procedure in inspection, storage, and maintenance.

2. Inspection Prior to Mounting

Upon receipt and before assembling with wheel, the tire should be visually inspected for anomalies that may have occurred during transportation. Such as :

- Deterioration of sidewall markings impeding to confirm tire identification such as; brand name, size, ply rating, serial number, part number, authorization number (TSO, etc.) and fabrication date.
- Permanent deformation of tire profile or radial-runout, unless disappear in 24 hours after inflation.
- Permanent deformation (bent, kink) at bead area.
- Surface deterioration; such as swelling, hardness, cracking, and discoloration due to contamination. Check condition after removing the contaminants by alcohol and water.
- Surface blister, unless disappear in 24 hours after inflation.

3. Mounting Tires on Wheels

The mounting of aircraft tires requires careful attention and adherence to established procedures.
Care should be taken to abide by wheel/airframe manufacturer's instructions for assembling wheels and mounting tires.
Bridgestone commercial aircraft tires are tubeless. It is prohibited to mount these tires with an inner tube unless otherwise specified.

Standard tire/wheel mounting procedure

In general, it is recommended to mount without grease or lubricated agents on the tire bead area. A tire with adjusted balance is stamped with a red dot on the sidewall immediately above the bead to indicate the lightweight point of the tire.
The following step-by-step instructions generally apply for mounting tubeless tires on split wheels :

1) Make sure that the tire is clean inside. Visually inspect the bead area and wipe them clean with a cloth moistened with denatured alcohol, allow the tire beads to dry.
2) Wipe the "O-ring" seal of the wheel halves with an alcohol dampened cloth. Lubricate the O-ring seal with a light coat of grease following manufacturer's instructions, if any. Place seal carefully in its groove without stretching or twisting.
3) Place the tire on the inboard wheel half being careful not to disturb the "O-ring".
4) Set the outboard half in the tire. Align red-dot on tire with the wheel valve or wheel's heaviest point if indicated.
   Align bolt holes in accordance with manufacturer's instructions.
5) Install wheel bolts, washers and nuts, tighten in a criss-cross fashion, and torque according to the wheel manufacturer's instructions.
6) Inflate the assembly to the rated inflation pressure. Make sure to do this inflation in a safety cage.
   In case bead-fitting is not appropriate, spray de-ionized water over tire bead area before the inflation.
7) Ensure "tire rim line" is perfectly concentric to the wheel flange edge on both sides.

4. Inflation in the Tire Shop

The aircraft tire is designed to be operated at specific "deflection". If the inflation pressure is incorrect, this deflection becomes out of designed range. Such operating condition may cause significant adverse influence on durability, leading to substantial consequences such as quicker tire fatigue, internal separation, and burst.

A. Recommended Inflation procedures

The inflation must be done by using the safety cage. Nitrogen is recommended for prevention of combustion and reduction of oxidization of the "innerliner". The tire structure stretches after the inflation for a significant period of time, since the nylon cords are used as reinforcing material. This stretch results in reduction in the inflation pressure. Therefore, re-adjustment of inflation pressure after stabilization-period is mandatory to ensure the correct pressure. The stabilization period is shown in the Table 1. The readjustment can be done at PNO (unloaded service pressure) instead of the rated pressure.

Pressure Gauge:
Recommended specifications are error of 0.25% and less, and minimum digit of 2 psi.

Table 1: Period for Stabilization

Period	Procedure
Min. 12 hours*	Normal
Min. 2 hours	Alternate

* : "Min. 12hours" for the stabilization is recommended in AC 20-97B issued by FAA.

Natural pressure loss may occur even after the stabilization. If the loss does not exceed criteria specified in the Table 2 , the tire is normal and serviceable.

Table 2: Air Retention Criteria

Period	Criteria of pressure loss	Procedure
24 hours**	5 percent	Normal
12 hours	2.5 percent	Alternate

** : "Min. 24hours" for the retention test is recommended in AC 20-97B issued by FAA.

In case the pressure loss exceeds the criteria, the following measure shall be taken.

a) Confirm change in ambient temperature. If the room becomes cooler, the pressure descends naturally. Pressure goes down 3.7% for room temperature down by 10 deg C.

b) If temperature variation is not the cause, most probable cause is attributed to condition of wheel. Check shall be done as shown below.

1) To investigate air leak from the wheel. By spraying soap solution, find air bubble on the surface of the wheel and components, such as air valve, thermal fuse.
2) When the cause is not detected, dismount the wheel, check the wheel elements and readjust.
3) If the problem persists, the tire should be remounted on a different wheel. If the problem still persists, put the tire aside for investigation by Bridgestone engineers.

[Emergency inflation procedure]

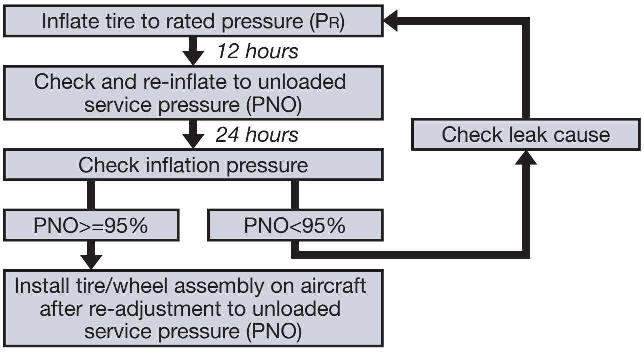
When time does not allow the above procedure to be applied, the following procedure may be applied for pressure retention check.

The inflated tire is stabilized for minimum 1 hour. Readjust the pressure at 105% of PNO (unloaded service pressure). Check air leakage by spraying water or soap solution over the tire and entire wheel surface. If there is no air bubble, the assembly can be installed on aircraft.
For 48 hours after the installation, the inflation pressure must be checked before each flight.
"The use of TPIS or TPMS is an acceptable means for checking the inflation pressure during this period for pressure check, if it is in accordance with the airframe manufacturer's AMM"
If the pressure retention is below 90 percent of the service pressure, the tire should be removed.

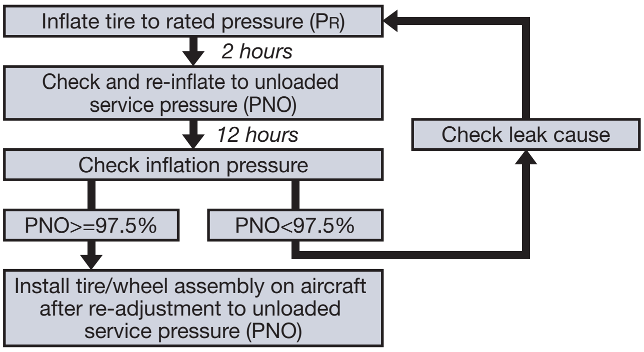
Flow chart

[Recommended Procedure]

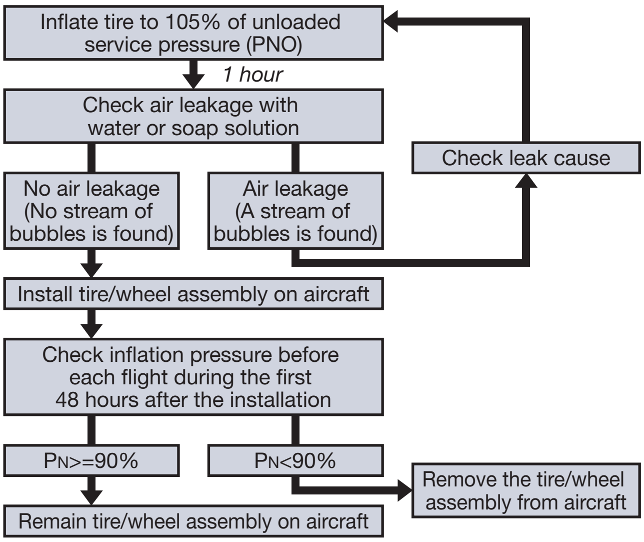
• Normal Procedure



• Alternate Procedure



[Emergency Procedure]



B. Inspection Before Installing Tire on Aircraft

Once tire is stabilized, check for permanent tire deformation or cracking of the tire grooves. Should there be major tire *asymmetry, blisters or bulges, the tire is not usable. Furthermore the tire is not usable if there is damage to the sidewall reaching to the carcass plies.

* When the wheel and rim are not in straight alignment.

Note that undulation of the grooves in a zig-zag pattern which is seen on radial tires is acceptable and does not affect tire performance. (Cut protector pattern.)

Should the reinforcing fabric (bias) or aramid cord protector (radial) be exposed in the groove area, the tire is unusable. However, if the cracks or splits are shallow and neither the reinforcing fabric (bias) nor aramid cord protector (radial) is exposed, the tire may be utilized.

5. Inflation Pressure Control

It is recommended that inflation pressure of each aircraft tire be checked daily, and that the pressure gauge be calibrated regularly. Maintaining correct tire inflation pressure is the most important factor in any preventive maintenance program.

A. Pressure Readjustment After Installing Tire on Aircraft

PNZ (loaded service pressure) shall be used instead of the PNO, if the aircraft is on the ground.
PNZ is specified as add 4% to the PNO, to adjust the target pressure considering increase by small shrink of tire gas chamber due to vertical loading.

- Aircraft on Jacks: Readjustment pressure is PNO
- Aircraft on Wheels: Readjustment pressure is PNZ

1.04×PNO (Unloaded)=PNZ (Loaded)

B. Pressure Control In Service

The pressure check should be done exclusively with "cold tire"; tire temperature is within a rage of ambient temperature.
If the tire is not operated for successive 3 hours or longer, the tire is granted as the "cold tire", unless otherwise exposed to direct sun light for a significant time period.

C. Normal Pressure Loss During Service

Slight pressure loss occurs with aircraft tires due to natural leakage of small amount of gas. Permissible range of the loss is 5% or less within 24 hours.
A small amount of gas diffusion through the "vent holes"*; artificial holes situated at the lower sidewall, is a normal mechanism to bleed off trapped air, preventing internal separation or blistering. However, such air leakage should not be detectable by hand.
If pressure is found to be less than the minimum pressure, refer to Table 3.

* Vent holes

Bridgestone Aircraft Tires have small vent holes in the lower sidewall on both sides to enable any gas or air entrapped in the tire casing structure to vent out during the inflation of the tire. The location of each vent hole is indicated by a series of small circular rings molded in relief on the lower sidewalls and appearing just above the wheel flange area. A green dot can provide an additional identification of the vent hole position. The quantity of vent holes can vary by tire size & design.

All vent holes are inspected during new tire manufacturing for form & function. A minor deviation in the appearance of a vent hole does not have any adverse effect on the functionality of the tire. If in doubt please contact your local Bridgestone Aircraft Tire Technical Services team for further information.

Note: It is normal in some cases for tires to exhibit bubbles at vent holes after inflation if in contact with a soapy liquid such as leak detection fluid. Only the Air Retention test following the recommended inflation procedure shown in section 4A (p41) should be used to judge if a tire is leaking or not.

Table 3: Tire Pressure Verification

Tire Pressure	Verification	Recommended Action
P > PN +5%	Overinflation	Readjust to maximum of normal operating range if tire is at ambient temperature.
PN + 5% > P > PN	Normal Operating Range	No action if within Normal Operating Range (NOR).
PN > P > 95%PN	Allowable Daily Pressure Loss	Reinflate to specified service pressure.
95%PN > P > 90%PN	Moderate Pressure Loss	Reinflate to specified service pressure. Record in aircraft log book. Remove if pressure loss reoccurs within 24 hours.
90%PN > P > 80%PN	**Large Pressure Loss**	**Replace the tire.**
80%PN > P > 0	Extreme Pressure Loss (Underinflation)	Replace tire and its axle mate.
P = 0	Complete pressure loss due to; • Tire perforation • Blown fuse plug	Replace tire and its axle mate.

P: Tire Pressure Reading
PN: Loaded Service Pressure
NOR: Normal Operating Range (Service Pressure)

Important Notice:
*Mark tires with pressure loss clearly as “**TIRE PRESSURE LOSS REMOVAL**” or “**LOW PRESSURE**”, and immediately contact Bridgestone.

⚠ WARNING

IF THE INFLATION PRESSURE LOSS IS MORE THAN 10%, REPLACE THE TIRE.

IF YOU RE-INFLATE AND KEEP USING THE TIRE, THERE IS A RISK OF TIRE BURSTING.

D. Identification of Axle Mate

When a tire is removed for any of the following reasons, the axle mate tire must be identified and the serial number must be provided to the appropriate retreader (Refer to Table 3).

1. Large pressure loss
2. Extreme pressure loss
3. Perforation
4. Blown fuse plugs

E. Adverse Effects of Underinflation

Underinflation will cause high tire deflection and heat build-up, which in turn may lead to ply separation. Low inflation pressure may also cause uneven wearing of the tread and rapid wearing of the shoulder. It may also increase the tire footprint, possibly leading to damage of the tire sidewall during landing.

An example of Casing Break Up (CBU) in a bias tire at the lower sidewall caused by running the tire at pressures below those recommended.

F. Tire Deflection and Durability

Figure 1 shows the relationship between the changes in tire deflection at various inflation pressures and the durability of the tire carcass. With aircraft tires, an increase in deflection during operation greatly weakens the carcass.

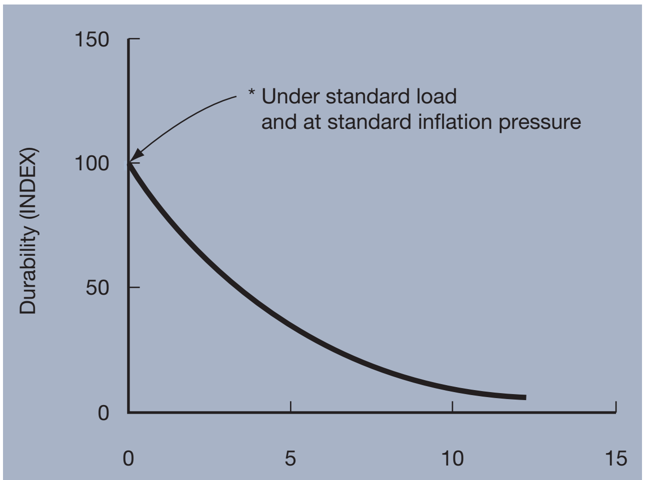


Fig. 1 Increment in tire deflection from nominal (%)

G. Compensation for Climate Change

When a flight is done from a warmer city to a colder city, inflation pressure becomes lower at the destination due to change in ambient temperature. If a significant temperature drop is anticipated, the pressure shall be adjusted prior to take off at the original airport, by using a rule shown below or by following the AMM recommendation. The minimum required inflation pressure must be maintained.

Note: All pressure measurements shall be made on cold or stabilised tire temperatures.

Rule: Tire pressure must be increased by 3.7% for each –10°C difference.

Example:

Temperature of departing airport:	25°C
Temperature of destination:	–10°C

Required pressure adjustment: $\frac{35}{10} \times 3.7 = 13\%$

H. Pressure Control for "Hot Tires"

A "Hot Tire" is a tire which hasn't had sufficient time to cool down to a stabilised temperature after arrival of the aircraft at the gate.
Typically a hot tire pressure measurement will occur if tires pressures are controlled before the minimum elapsed cooling time defined in the AMM for servicing of tire.
Pressure measurements made on hot tires will always be higher than stabilised tire temperatures and may lead to incorrect servicing of tire pressure.

If an abnormal tire pressure is suspected on a hot tire, the following actions should be taken:

- Compare tire pressure for tires of the same gear (nose or main gear). Tire pressure should be in the same range for all tires on the same gear and always greater than PNZ. Tire pressure can be much greater than PNZ+5% after long taxiing or severe braking maneuvers. Leave the tire in service.
- Tire pressure should always be greater than PNZ. If pressure is lower than PNZ, conduct pressure verification after cooling of the tire in accordance with Table 3 (p44).
- If all tire pressures are greater than PNZ, but not all in the same range (unusually large variation), check for brake malfunctions or incorrect pressure adjustment during a previous check.

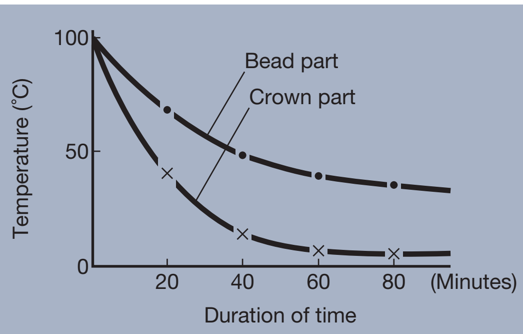


Fig. 2

Reference: Tire cooling curve
The graph above shows a natural cooling curve (as a typical example) from a temperature of 95°C for each the bead and crown section of the tire at a room temperature of 25°C. As compared to the crown section of the tire, the bead section cools slowly. These curves are based on typical examples obtained through bench testing. When other factors such as heat build-up from braking, etc., are taken into consideration, the cooling rate will become slower. Accordingly, the tires must be artificially cooled or else left at rest for a longer period of time.

I. Extraordinary Hot Tire

If the tire temperature is significantly higher than what experienced at normal daily operation, tire pressure investigation shall be done.
Make sure to cool down the tire/rim sufficiently before do this check.

> **⚠ WARNING**
> **NEVER BLEED OFF EXCESS INFLATION PRESSURE FROM A HOT TIRE.**
> **ANY ADJUSTMENTS TO INFLATION PRESSURE SHOULD BE CONDUCTED AFTER TIRES HAVE COOLED TO AMBIENT TEMPERATURES.**

6. Caution in Taxiing

The aircraft tire generates heat in the body much more than car tires. This heat generation is considerably influenced by taxi distance and taxi speed.
If a taxi is done at extraordinary higher speed, or for unexpectedly longer distance, tire temperature becomes extremely high.
Such increases in temperature accelerate deterioration of nylon cords, shorten the serviceability of the carcass, increase wearing of the tread, and lower the adhesion between ply cords.

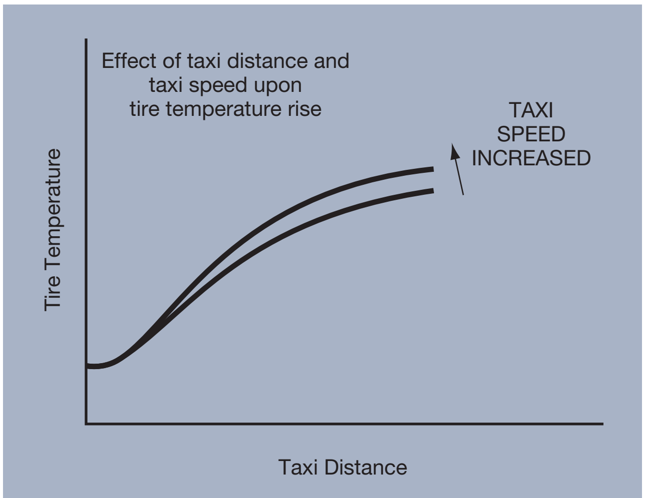


Fig. 3

As shown by Figure 3, tire temperatures continue to rise as taxiing distances increase. Although these values differ depending upon the type of aircraft, the general trend is the same. Increases in taxiing distances cause increased deterioration in aircraft tires. Note that taxiing speeds are also a factor affecting increases in tire temperatures.

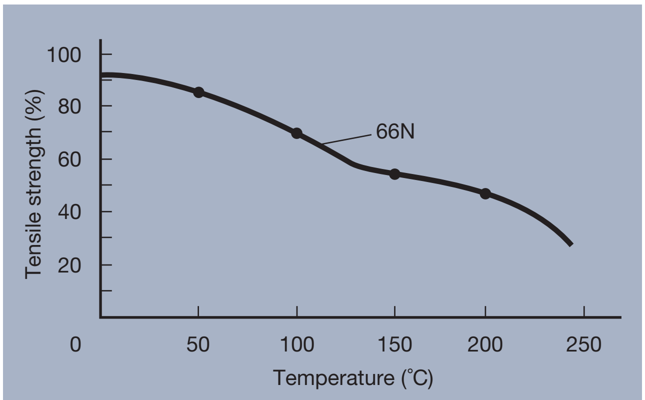


Fig. 4 Tensile Strength of Nylon Cord vs. Temperature Rise

Figure 4 illustrates the trend in the influence that a combination of underinflation and increased deflection will have on internal heat build-up. Operating under such conditions may cause the tire to exceed tire temperature limits. As shown by the graph, nylon cord strength decreases as temperature rises.

7. Inspection After Landing

Aircraft tires should always be inspected for damage after each landing. The inspector must check carefully for evidence of cuts, bulges and blisters, severe cracking, evidence of severe overheating and other types of tire failure. Removal criteria is contained in “Examination and Recommended Action” p55.

8. Normal Wear Removal Criteria

Extreme wearing of the tire may cause wet-skidding or hydroplaning, or may damage the tire. Therefore the tire should be removed at the following condition whichever comes first across the tread;

i) When the wear level reaches the bottom of any groove at one point up to 1/8 of the circumference.
ii) The reinforcing fabric (bias) or aramid cord protector (radial) is exposed.

If it is necessary to continue the tire in service beyond the limit i), the tire should be removed either at the next maintenance base or the limit ii) happens, whichever occurs first.

Important Notice: Specific removal criteria shall be defined by instruction of airframe manufacturers, such as AMM. Such document takes precedence over this manual.

9. Removal due to Abnormal Use

If the tire is used under “abnormal operating condition”, the tire must be removed from service immediately. Typical abnormal operating conditions are as listed below;

- Rejected take off
- Skidding due to break malfunction
- Over loading due to failure of axle mate tire (mate to flat)
- Low inflation pressure due to air leak
- Hard landing
- Over speed take off or landing

If the tire undergoes those conditions, the tire is not serviceable even though there is no specific sign of damage in appearance.
It is strongly recommended for operators to inform Bridgestone of any tire removed for abnormal use, in order for us to take appropriate actions required for subject occurrence.

10.Removal by tire condition other than tread wear

If the following phenomenon are found, or incidents are reported, remove the tire for inspection by Bridgestone.

A. Exposure of reinforcing fabric (bias) or aramid cord protector (radial) resulted by spot wear, tread reversion, groove cracking, rib tearing.
B. Tread cut reaching the depth and length limit.
C. Rib undercutting.
D. Chevron cut exposing the reinforcing fabric (bias) or aramid cord protector (radial) by 5 cm squared or more.
E. Tread separation, peeled rib, open tread splice, impact break, skid burst, bulge/blister, casing break up, heat burst.
F. Cord exposure caused by sidewall cracking, weathering & radial cracking.
G. **Inflation pressure loss by more than 10% at daily check. ***
J. Experienced hard-landing.

*

WARNING

IF THE INFLATION PRESSURE LOSS IS MORE THAN 10%, REPLACE THE TIRE.
IF YOU RE-INFLATE AND KEEP USING THE TIRE, THERE IS A RISK OF TIRE BURSTING.

11.Dismounting Bias Tires

- Inflated gas shall be released completely before removing the tire from the wheel assembly.
- Pay attention to avoid the valve-core being projected at tremendous speed when removing it from the valve.
- Bead-breaking; removing tire bead areas from rim flanges, shall be done by applying pressure evenly at tire surface as close to the rim flanges as possible.
- The bead-breaking-press should have cylindrical brims to contact with the entire sidewall of the tire.
- Once the bead-areas parted from the rim flanges, do not press tire sidewall further more.

12.Dismounting Radial Tires

Procedure is partly different from that for the bias tires. Please refer to Section II, “Instructions Specific to Radial Tires.”

13.Remounting of tires

If a wheel and tire assembly is returned from service due to a finding on the wheel assembly with;

A. A partially worn tire (if the tire was installed on aircraft)
Bridgestone cannot allow the tire to be re-mounted on wheel because the tire may experience operation under extremely severe conditions.
B. A tire has not experienced any service (if the tire was not installed on aircraft)
The tire can be re-mounted on wheel in case no anomalies stated in the chapter “Examination & Recommend Action” can be found on the tire.

14.Tire condition unsuitable for retreading

If the following conditions are detected, the tire is not retreadable.

A. Bias tires with cut penetrating to 40% and more of the actual number of carcass plies.
B. Radial tires with cut penetrating the casing belt plies beyond repair limit.
C. Reinforcing cords are exposed at the sidewall or bead area, due to cut or weathering.
D. Spot-wear exposing the carcass or belt cords more than 10 inches squared.
E. Melted reinforcing-cords at bead-base, due to overheating.
F. Bead wires are exposed or bent.
G. Wrinkles at the surface of innerliner.
H. Axle mate of burst tire. (Both should be scrapped).
I. Casing separation.
J. Removed due to RTO or hard landing.
K. Removed due to over speed take off or landing.

15.Tire Flat-spot

- If an aircraft is grounded for a long period of time, the tire deformation becomes “permanent” and flat spot remains at the tread area even after the vertical load is removed.
- The flat spot tends to occur more easily at lower ambient temperature.
- For most of the case, the distortion disappears during taxi, however, if significant vibration remains detected, the tire should be removed from service.
- To prevent permanent flatspot, it is recommended to place the aircraft on jacks, roll the tire periodically, or move the aircraft when the aircraft is parked for a long period of time.
- To prevent tire flat spot, tire / wheel assemblies which are stored for a long period of time, those should be also rotated periodically.

16.Protection from Contamination

Care should be taken that tires do not come into contact with oil, gasoline, jet fuel, hydraulic fluids or similar hydrocarbons. Such substances have deteriorating effects on rubber. When servicing aircraft, cover tires. Be especially careful not to stand or lay tires on floors that are covered with these contaminants.

17.Maintenance of Airport Surfaces

Airport surfaces require excellent maintenance. If airport surfaces and runways are rough or poorly maintained (holes, cracks, foreign objects) aircraft tires are liable to be damaged. Strict control of hanger, runways, ramps and other field areas is especially important where large, high speed aircraft operate. Bolts, nuts, rivets, tools and other foreign objects will easily cut into aircraft tires.

18.Tires in Other than Aircraft Service

Bridgestone aircraft tires are designed and manufactured for use only on aircraft. Any unauthorized use of Bridgestone aircraft tires for ground use is strictly prohibited.

The items in the photograph were picked up from taxi ramps, service areas and runways.
These objects present a potential danger to tires and to aircraft.

19.Storage of Tires

1. Storage should be kept clean and tidy. Floor and walls shall be free from contaminants; such like oil, chemical, water, and foreign objects; such as metal debris, stones, wood chips etc to avoid tire damage.
   Ensure that no rain leaks through the roof, windows or doors in the storage location.
2. Keep storage area practically dark. If there are windows, curtain or films shall be installed to avoid strong sunlight. If illumination is done by fluorescent tubes, those shall be turned off unless needed.
3. Storage room shall be cool and dry in practical sense. Source of ozone, such as electric motors, electric generators, battery chargers, electric welding equipment and else, shall be kept away from tires. Keep away radiant heat from tires.
4. Preferred position of tires are upright to avoid deformation (narrowing distance between tire beads), and difficulty at assembling with wheels, as a consequence after long storage. Use of tire rack is highly recommended. It is recommended to rotate tires periodically.

Note: There is no time limit for tire storage in case the tire has been stored in the circumstances described above.
If storage conditions are not ideal, please consult with your Bridgestone contact. We may recommend tires to be returned for re-inspection.

20.Handling of tires

Using forklift is not recommended, except in the case where tires are on pallets.
Instead, using clamping system is recommended for handling tire due to lower risk of doing damage to tires during handling.

21.Transportation & Storage of Tire/ Wheel Assemblies

When storing or transporting serviceable tire/wheel assemblies, it is permissible to inflate with nitrogen to full service pressure. Take care to ensure that the valve cap is installed and tightened to the specified torque value.

Worn assemblies and/or those deemed unserviceable for any reason should be shipped and/or stored at low inflation pressure.

22.Precautions during Unloading

Strictly observe the following precautions when unloading tires.

1. Do not throw, sit on or kick tires. Those careless deeds may result in scratches, cracking and permanent deformation.
2. Check the insides of trucks to ascertain there is no oil or water that may contaminate the tires or nails, stones, wood chips etc. that may damage the tires on the truck bed or walls during transportation. Use rugs or other padding to prevent the tires from becoming scratched or soiled.

23.Data Sheet of Tire Failure

In the case that a product claim is initiated, fill out the Data Sheet of Tire Failure shown on the next page, or an authorized alternative form, with the necessary information and mail it to your local Bridgestone Technical Services Team.

By observing the basic procedures mentioned in the foregoing pages, tire life can be maximized and unnecessary damage to tires and to aircraft avoided. External damage can usually be detected, but if internal damage appears evident, the damaged tire should be returned to Bridgestone for inspection.

BRIDGESTONE

DATA SHEET OF TIRE FAILURE

Form no.: DSTF-01, Rev.:1, Rev.Date: Dec'2010

AIRCRAFT DATA				
AIRCRAFT TYPE				
AIRCRAFT NO.				
TAKEOFF WEIGHT (Tons)	OE Max.		At time of failure	
TYPE OF OPERATION (Please tick)	Scheduled		Chartered	
	Passenger		Freighter	
FLIGHT NO.				
DATE OF INCIDENT				
AIRPORT	From		To	
DURING WHEN (Please tick)	Taxing	Takeoff	Landing	
SECOND DAMAGE (Please tick)	YES		NO	
TIRE DATA				
TIRE CASING MANUFACTURER	BRIDGESTONE			
SIZE / PLY RATING / SPEED RATING				
PART NO.	Failure Tire		Mate Tire	
SERIAL NO.				
RETREAD LEVEL				
GEAR POSITION				
LANDING CYCLES AT REMOVAL				
CUMULATIVE LANDING CYCLES OF THE CASING				
CONDITION OF INCIDENT TIRE (i.e. WHOLE / PARTIAL TREAD PEEL-OFF, BURST / DEFLATED)				
WHICH AREA TREAD DEBRIS COLLECTED (Please tick)	Takeoff	Landing	Both	
WHEEL DATA				
MANUFACTURER & SERIAL NO.				
SERVICE PRESSURE				
TIRE PRESSURE AT REMOVAL				
6 DAYS INFLATION PRESSURE RECORD BEFORE THE INCIDENT (PSI)	DAY 1 (/)	DAY 2 (/)	DAY 3 (/)	
	DAY 4 (/)	DAY 5 (/)	DAY 6 (/)	
INFLATION PRESSURE OF OTHER TIRES				
CONDITION OF FUSE PLUG & “O” RING				
CONDITION OF WHEEL HUB (i.e. NDT RECORD)				

NOTE: PLEASE DO YOUR UTMOST TO COLLECT AND SEND US AS MANY TREAD DEBRIS AS POSSIBLE.

II. Instructions specific to radial tires

The care and maintenance of bias and radial tires is for the most part very similar. However, it is necessary to emphasize certain important differences.

1. Radial Tire Mixability

When operated under similar conditions, radial aircraft tires may exhibit different characteristics than those of bias aircraft tires. Bridgestone recommends that the following guidelines be heeded.

a. Aircraft need to be certified for use of radial tires in place of bias or vice versa. Questions arising concerning the certification of a given aircraft must be taken up with the airframe manufacturer.

b. Radial tires should not be mounted on wheels designed for bias ply tires or bias tires on wheels designed for radial tires without first checking with the wheel or airframe manufacturer.

Mixability of Bridgestone radial tires with bias tires is permitted only as expressly stated in the official airframe manufacturer's bulletin or specification. Any other use in unauthorized by Bridgestone Corporation.

2. Radial Tire Dismounting Procedure

A. Deflation

Before dismounting the tire from the wheel, completely release all remaining inflation pressure. Remove the valve core only after all pressure has been relieved.

⚠ WARNING

REMOVAL OF THE WHEEL VALVE CORE ON AN INFLATED TIRE COULD PROJECT THE CORE WITH DANGEROUS SPEED AND FORCE.

B. Recommended Bead-breaker Press Design

The lower sidewalls of radial aircraft tires are significantly more flexible than those of bias tires, and are easily damaged by inappropriate dismounting procedures and/or equipment. For dismounting radial aircraft tires from their wheels, Bridgestone recommends the use of a Dynamic bead roller machine to ease the tire beads away from the wheel flanges. Other alternative procedure is to use a full-circle ring.

B-1 Full-circle Bead Ring Type

With this type of bead-breaker, a bead removal ring sized to fit specific tire size is used to apply pressure as close to the bead as possible on the area directly above the bead (Fig. 5). The space or distance between the removal ring and the wheel flange should be approximately 10mm (Fig. 6). Furthermore, the range of motion of the removal ring towards the tire center should be greater than 150mm, and the removal ring should be constructed to allow observation of the tire bead during dismounting. This may be achieved by designing "windows" in the removal ring (Fig. 7).

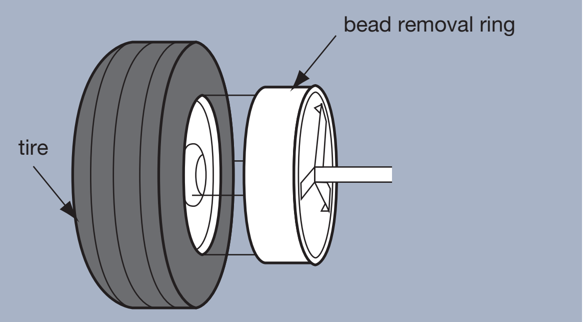


Fig. 5 Bead Removal Ring

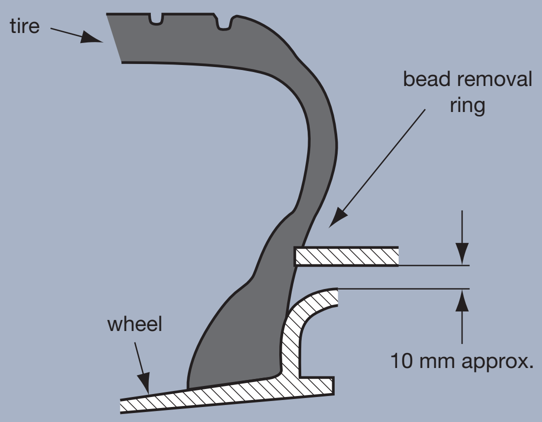


Fig. 6 **Distance between Bead Removal Ring and Wheel Flanges**

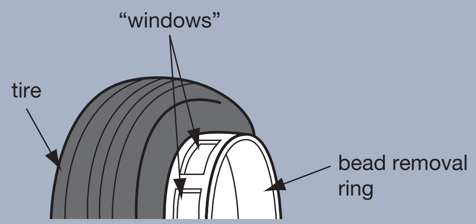


Fig. 7 **"Windows" in Bead Removal Ring**

B-2 Dynamic roller Bead-breaker (Fig. 8)

Bridgestone has found that this type of bead breaker is the most efficient for large radial aircraft tires. The driven conical press wheels are forced against the lower sidewalls which rotate the wheel assembly and at the same time break the beads by gently moving the tire sidewalls inwards.
This technique ensures there is no damage either in the tire bead area or the wheel flange.

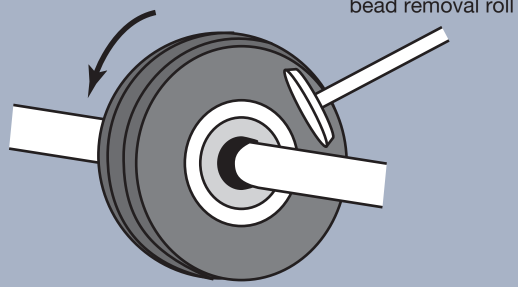


Fig. 8 **Bead Removal Roll**

C. Procedure for Dismounting Using Full-circle Bead Rings

Roll the tire into bead-breaker press and position the removal ring so that it evenly contacts the entire circumference of the bead. More than one technique may be applied to ease the tire bead away from the wheel flange. The preferred method is to reduce the bead-breaker press speed to 5mm/second and press the tire bead continually until the bead is dismounted. Using this method, the bead should separate smoothly from the wheel, often with the first application of force.

In the event that there may be concern about bead "Turn Over" (Fig. 9), an alternative method is recommended. Extend the bead ring laterally against the bead for a distance not exceeding 100mm, hold for two to three seconds, and retract the bead ring. Repeat this procedure until the bead is dismounted. The lateral speed of the bead ring should typically be about 30mm/second using this method.

The latter method should be used when the tire cannot be dismounted using the first method, or when the bead-breaker press cannot be set for low speeds.

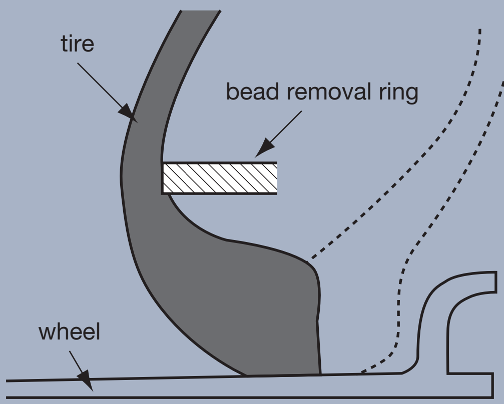


Fig. 9 "Turn Over" of Bead Area

D. Procedure for Dismounting Using a Dynamic roller

Mount the tire/wheel assembly in the bead-breaker press. Position the Dynamic roller against the bead as close as to the top of the wheel flange. While rotating the tire/wheel assembly, slowly apply force against the bead with the roller.

As with the full-circle bead ring method, care must be taken to avoid excessive sidewall deformation that could result in bead "Turn Over". The stroke of the Dynamic roller should not exceed 100mm.

E. Recommended Dismounting Procedure

Loosen the wheel tire bolts only after confirming that the tire beads have been completely released from the wheel. If the wheel tie bolts are loosened before the beads are completely released, the possibility exists that the wheel may be scratched or gouged.

After the tire bead is released from the wheel flange, insert a block of rubber or other material of appropriate size between the tire and the wheel flange to prevent the tire from returning to its original position. Inserting the block will facilitate the dismounting process.

The use of water or a soap solution as a lubricant will facilitate dismounting. Application of the water or soap solution while simultaneously applying pressure with the removal ring increases the effectiveness of the solution.