CONSUMER GUIDE FOR TYRE / TUBE / FLAP

An understanding of tyre, tyre markings and many influential factors which affects the Tyre Performance, Proper Tyre Care & Maintenance can give optimum performance out of your tyre.

Following topics are covered hereunder -

1. General information on tyre / know about your tyre
2. Tyre Marking
3. Tread Pattern Classification
4. Tyre mounting & Demounting
5. Tyre Care & Maintenance
6. Factors influencing tyre performance
7. Tyre inspection and maintenance
8. Tyre wear condition & probable cause
9. Tyre problem / Likely causes / Actions
10. Tyre Selection
11. Care and Storage of Tubes & Flaps
12. Care and maintenance of Rim / Wheel
13. Removal of tyre from service

1. GENERAL INFORMATION ON TYRE / KNOW ABOUT YOUR TYRE

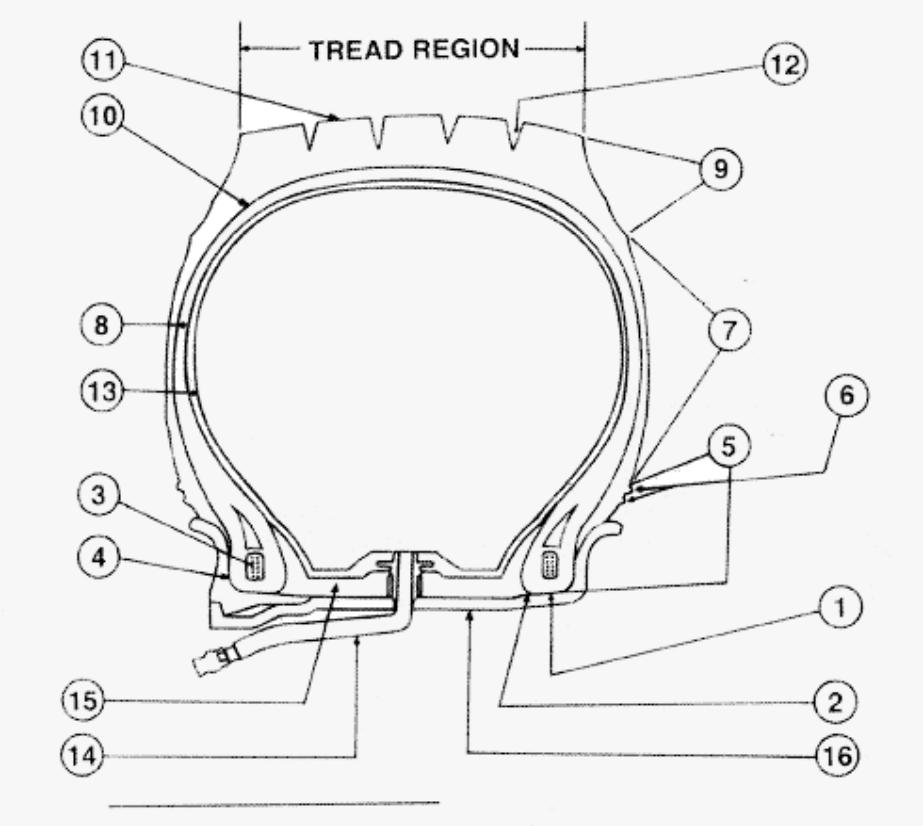
What is a Tyre? –

A Pneumatic Tyre is an annular toroidal shaped inflatable envelope made of an elastic material, natural or synthetic rubber or a blend thereof, reinforced with textile cord ply fabric carcass (or steel for some range of radial ply tyre) enclosing bead rings.

1. Bias Ply Tyre – In a Bias Ply tyre (also called Diagonal Ply), the ply cords are laid at alternate angle substantially less than 90 to the centerline of the tread.

2. Radial Ply Tyre – In a Radial Ply tyre, the ply cords are laid substantially at 90 to the centerline of the tread, the carcass being stabilized by an essentially inextensible circumferential belt.

KNOW YOUR TYRE PARTS



No.	Description	No.	Description
1	Bead Base	9	Shoulder Area
2	Bead Toe	10	Breaker
3	Bead Core	11	Design Rib
4	Bead Heel	12	Design Groove
5	Bead Region	13	Tube
6	Rim Centering Lines	14	Tube Valve
7	Side Wall Region	15	Flap
8	Carcass	16	Rim

DEFINATION & FUNCTIONS OF PARTS OF A TYRE

Bead – The part of the tyre which is so shaped as to fit the rim and hold the tyre on to it. It has cores made of several strands of essentially inextensible steel wire with end of the plies wrapped around the cores for anchorage.
Sidewall – The part of the tyre between the bead and the tread which flexes in service.
Sidewall Rubber – The rubber layer on the sidewall of the tyre and over the carcass which may include protective ribs and fitting lines to assist in centering of tyre on the rim. This protects the tyre from scuffing and damages.
Tread – This is the part of the tyre which comes in contact with the ground and through which the driving, braking and cornering forces are transmitted. It is made of special rubber compound to give good wearing properties and in conjunction with the tread pattern to transmit these forces.
Cord – Textile or non textile strands (threads) used in various components of the tyre carcass, plies, belts, breaker etc.
Ply – A layer of rubber coated fabric cords.
Carcass – The rubber bonded cord structure of a tyre integral with the bead, which provides the requisite strength

2. TYRE MARKINGS

Size Designation – The size markings for the identification of tyres consists of nominal tyre width code and the nominal rim diameter code.
Type of Construction – For tyres of radial construction, the letter "R" replaces the dash which is used for diagonal ply.
Ply Rating – The term Ply Rating is used to identify a given tyre with its maximum recommended load when used in a specific type of service. It is an index of tyre strength and does not necessarily represent the number of cord plies in the tyre.
Maximum permissible load and inflation pressure for Singles and Duals fitments, Manufacturer's Serial Number, Brand name, Country of manufacture.
Carcass Ply Materials – Tyres will be marked "Nylon" only if the tyre is of nylon construction. Marking of Belt material is optional, but Steel belts are usually indicated and desirable.
Tread Wear Indicator (TWI)
Direction of Rotation – An arrow marking on the sidewall of the tyre, to indicate the direction in which the tyre should rotate in service in the case of directional type tyres.

3. Tyre Pattern Classification

Rib Tyre
Steering Wheel Tyre - Can be used on all wheel position highway application.
Lug Tyre
Designed for Drive Wheel Positions. Provides greater traction.
Semi Lug Tyre
Designed for Drive Wheel application. Can also be used as steering wheels.

4. Tyre Mounting & De Mounting

Mounting

- Ensure that the rim is correct for the tyre size being fitted.
- Clean the wheel thoroughly to remove all contamination (dirt, grease, rust, fitting lubricant etc). Inspect the wheel carefully. If it is cracked or deformed, it must be replaced. Check carefully the condition of the valve hole. The edge of the valve hole on the tyre side of the rim must be rounded and smooth, while on the other side the edge must be free from any burrs that can damage the valve stem. In order to avoid damage to the inner tube or flap, ensure that the valve is located correctly in the valve hole. The use of valve extension pieces is advised for those valves to which access is difficult, as in the case of the inner tyre of twin assemblies.
- Lubricate the tyre beads with an approved proprietary tyre lubricant only. This applies especially to tubeless tyres which are mounted on rims with safety humps. If this recommendation is not followed, bead damage or fracture during fitting could occur.
- With the tyre on rim, start the inflation in two steps making certain that the beads are seating correctly on the rim seat. Stop inflating the tyre at 1.5 bar (Ist step) , inspect the tyre & ensure that there are no tyre deformation or blisters. Deformations or blisters implies the demounting of the tyre and examination by a specialist. After inflation ensure that the beads are correctly located against the rim flange. Then place the tyre in vertical position into a safety cage and inflate it to the specified inflation pressure.

  In the case of tyres fitted on multi piece rims, with the tyre on the rim, and the assembly flat on the ground, inflate until the detachable flange is located correctly against the lock rim. Correct location is facilitated by tapping these rims during the preliminary not be inflated above a pressure of one bar before being placed in a safety cage.

  Non compliance with this procedure can result in tyre failure in service.
- Ensure that the air line between the tyre valve and the pressure gauge is long enough to enable the fitter to stand clear of any danger from flying fragments in the event of a tyre or wheel burst.
- For safety reasons always use a new tube when fitting a new tube type tyre and a tube less valve when fitting a new tubeless tyre. Where no tubeless marking appears on the tyre sidewall, tyres are intended for fitment with an appropriate inner tube.
- All tubeless tyres must be fitted on air tight rims. Tubeless radial tyres must be fitted only on rims with profiles.
- As practice varies widely from country to country with regard to the fitting of an inner tube in tubeless tyres, national legislation should be checked, but in all cases the tyre manufacturer must be consulted.

De Mounting

- Before starting to remove a tyre, check that there is no danger of the tyre bursting due to damage (cuts, bulges)
- In the case of rims of multi piece construction, the operation must start by the removal of the lock ring and the detachable rim flange. At all times the operator must avoid standing in front of the wheel in the path of loose flange components which might spring o
- To avoid danger when separating the beads from the rim, unscrew and remove the valve insert before removing the tyre in order to ensure complete deflation.

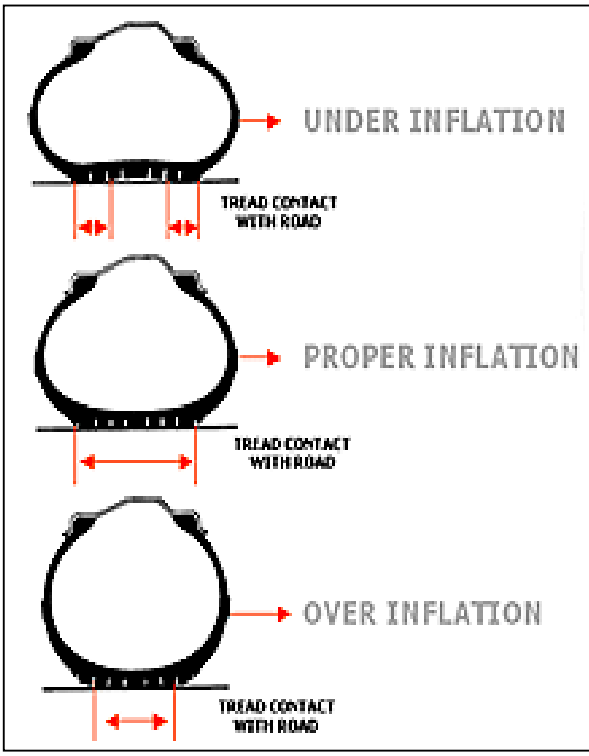
Mounting & De Mounting of tyres must be entrusted only to specialists who should scrupulously follow the instructions given by the tyre and vehicle manufacturers.

5. Tyre Care & Maintenance

Proper Inflation – Tyres are designed to carry loads up to the maximum specified at the inflation pressure for a desired deflection, road contact, tread wear. Any neglect of inflation pressure will result in one or more of serious tyre failures or loss of tyre life potential.

- Over Inflation – Load carrying capacity of a tyre cannot be increased above the maximum rated capacity, merely increasing its inflation pressure. Over inflated tyres do not flex as designed, do not absorb shocks, or impacts, more prone to cuts, concussion, snags and rapid center wear.

- Under Inflation – Under inflation results in excessive flexing of tyres, excessive heat generation, rapid shoulder wear.



Inflation Tips

- Never "bleed" or reduce air pressures when tyres are hot
- Make sure all tyre/tube valves are equipped with valve caps to keep the dirt and moisture away
- Under inflation or overloading creates excessive deflection and hence heat, which can lead to faster tyre wear and premature failures. This could result in vehicle instability causing damage to property, serious injury or death
- Proper inflation optimises tyre life and saves fuel also

Tyre Rotation – To utilize the full potential life built in a tyre, periodic rotation is necessary. Changing the position of tyres at regular intervals is generally favored to compensate for any difference in the working tread pattern wear, or uneven wear due to different working positions, thereby to obtain a longer overall tread pattern life, tyre efficiency, and stability in cornering and braking. Standard pattern of rotation for truck / bus / LCV -

Tyre Rotation Pattern

4x2

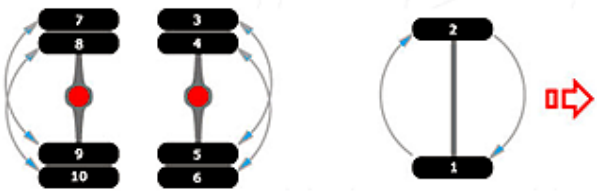
6X2

Direction of rotation is changed along with wheel position

6X4

Direction of rotation is same but wheel position is changed

6x2 or 6x4



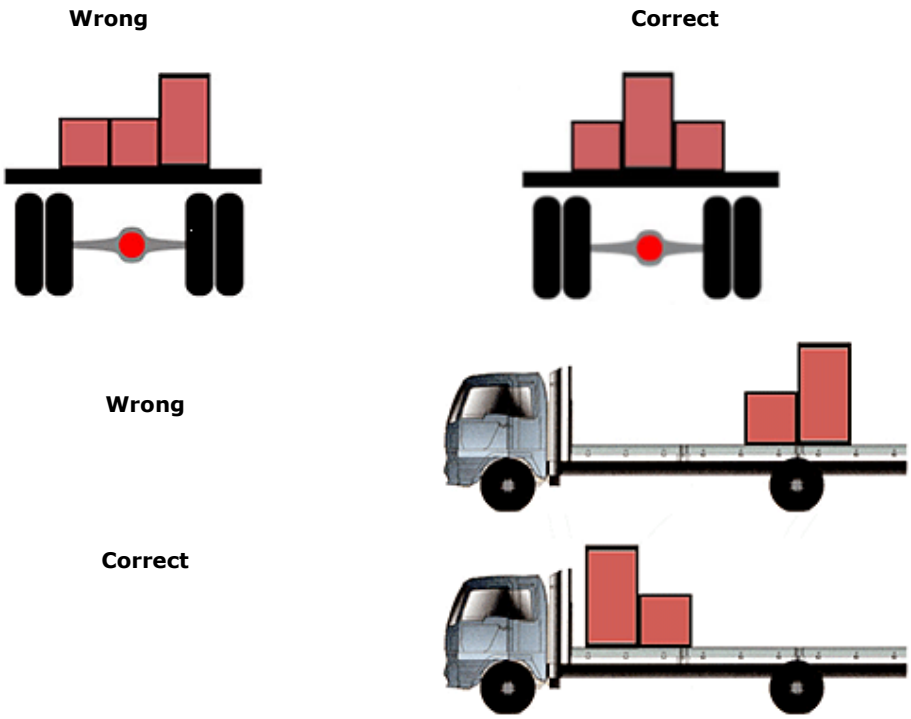
Direction of rotation is same but wheel position is changed, if the tyres are not fitted on the same day in rear axle

Tyre Matching – Mismatching of dual tyres imposes overload on the larger diameter tyre, causing it to over deflect and so get overheated. The smaller diameter tyre, lacking in equitable road contact, wears irregularly and faster than normal.
Tyre Spacing – Proper spacing between duals is necessary to prevent the adjacent tyres getting each other rubbed at the sidewall. Such a contact generates heat & causes thinning of the sidewall rubber and may lead to separation and other premature failures. Use wheel disc of an offset one half of the dual spacing approved or recommended by the tyre industry for the applicable tyre / rim combination, thereby to avoid dual tyres rubbing against each other.
Mixing of Tyres – Do not fit:

- Tyres of different construction on the same axle (applies to trailers and semi trailers also). The best results are obtained by fitting complete sets of diagonal or radial ply tyres.
- For vehicles with multiple axles (bogies), DO NOT FIT tyres of different construction on these axles.
- DO NOT USE radials on steering wheel position and bias at rear wheel position.
- If only four radials are used fit them in rear axle.
- Radials in rear axle & bias on front axle are permitted.

Proper Load Distribution – Improper load distribution shortens tyre life. The tyres on one of the axles are overloaded when the load is not distributed equitably between the axles. If the tyres on one side of the truck, or trailer, are overloaded, then that side is required opposite side. This may affect traction, causes the driving wheels to slip at the lighter side, resulting in fast wear.

Proper Loading Practice



6. Factors Influencing Tyre Performance

- Mechanical Condition of Vehicle
- Road Conditions
- Driving Habits
- Seasonal Effect
- Wheel Unbalance
- Inflation Pressure

7. Tyre Inspection And Maintenance

A few minutes tyre inspection may disclose a damage or a condition which, if neglected, could cause a breakdown

- Ensure that the tyres fitted are correct in size, ply rating and type for the application.
- Ensure that the tyre inflation pressure are strictly adhere to the recommendations for the load and that the maximum cold inflation for the max. load carrying capacity of the tyre is never exceeded.
- Ensure that the valve stem in tube is free from damage and always use a valve cap.
- In case of any abnormal loss of tyre air pressure, investigate and rectify the defect. Check valve core / tube
- Ensure that the rim wheel is in good condition.
- Always fit a new tube and a new flap (wherever recommended) with a new tyre.
- Do not change tyre size / ply rating from the original equipment for the vehicle without prior approval from the tyre and vehicle manufacturer, and the required inflation pressure ascertained.
- Follow recommendation for tyre rotation and tyre matching.
- Ensure timely removal of tyre for repair / retreading.
- Consult tyre manufacturer's specialist whenever in doubt and whenever a significant improvement is not noticeable, even after the corrective actions recommended.

8. Tyre Wear Condition & Probable Causes

To get maximum tread life from tyres and reduce tyres cost/km, it is essential to minimize uneven tread wear and possible casing damage. Look for the following types of Tyre Wear Condition & probable causes that is affecting the tyre mileage.

Tyre Wear Due To Mechanical Irregularities In Vehicle

Form of wear	Major causes	
Tyre wears in multiangle form (particularly conspicuous on shoulders)	▪ Tyre and / or wheel centers are offset or bent ▪ Hub and / or spindle centers are offset or bent ▪ Looseness in wheel bearings and / or kingpins ▪ Imbalances in rotating components	
Approximately half of tyre wears excessively quickly	▪ Imbalances in rotating components ▪ Tyre and / or wheel centers are offset ▪ Hub and / or spindle centers are offset or bent	
One particular place on tyre wears excessively quicky	▪ This is often caused by spot (localized wear) first occurring because of sudden application of the brakes or sudden starting which is aggravated as the vehicle continues to be operated ▪ A patch has been applied inside the tyre	
Shoulder on one side of tyre (generally outside shoulder) wears excessively quickly	▪ Incorrect camber and / or toe-in ▪ Frequently turning sharp corners	
Alternate spots on both shoulders wear	▪ Looseness in wheel bearings and / or kingpins ▪ Tyre and / or wheel centers are offset or bent	
In the case of the rib tyre only one side of the rib wears, and the tread takes on the from of saw teeth	▪ Frequently turning sharp corners ▪ Incorrect camber and or toe-in	
In the case of edge of the lugs wears quickly, so the tread takes on the form of saw teeth	▪ When lug tyres are fitted on the front wheels the only force working on them is the braking force, making this sort of wear liable to occur ▪ This is an inherent characteristic of lug tyres when overloaded or under inflated. When such wear occurs the tyre should be rotated on the same wheel	

9. Tyre Problem / Likely Causes / Action

Problem & Likely Causes

S.N.	PROBLEMS AND CAUSES	ACTIONS
	Cuts, Damages and Separation	
1	Localised cuts affecting tread only (Generally caused by loose and sharp stones)**.**	Remove tyre for repair. Constant care should be taken to ensure that cuts do not extend into casing.
2	Tread Separation – Usually caused by over loading, under inflation and excessive speed which alone or in combination cause over heating and separation. Neglected tread cut may also cause separation.	Remove & replace tyre. Do not over load. Maintain correct pressure. Repair tread cut at an early stage.
3	Damage to Sidewall	Remove stones trapped between twins after every journey. Drive carefully.
4	Rubbing between Dual Tyres.	Fit Wheels of the recommended disc offset. Maintain correct pressure & avoid overloading.
5	Neglected Cuts extending in service, Deep Cuts which affects both tread and plies.	Remove for repair. If not repaired in time, tyre may become unfit and unsafe.
6	Rib / Lug tearing - Severe damage to tread shoulder can be caused by mounting kerbs, broken-up roads or by running over heavy road bumps.	Avoid mounting kerbs at all times, particularly when tyres are hot and more liable to rib tearing.
7	Contamination by Oil/Grease etc.	Wipe away oil, grease, etc. immediately. Use a spirit or a diluted detergent but never paraffin. See that vehicle is not parked on oily floor. Never use oil or grease on tyre.
	Casing Damages	
1	Concussion – Caused by impact against obstacle	Remove & replace tyre. Drive carefully and avoid hitting obstructions. Maintain correct load
2	Rim Crush – Rupture of cords inside the tyre near the bead usually accompanied by a second rupture a little higher up.	Remove and replace tyre. Match twin tyres. Ensure that tyre loading and Inflation pressure are correct
3	Casing Fracture – Usually caused by overload or under inflation, high overload on one of the twins following deflation of its mate.	Remove and replace tyre. Match twin tyres. Ensure that tyre loading and inflation pressure are correct

Bead Damages

1	Wire Exposed	Remove and replace tyre. Avoid under inflation
2	Bead / Rim chaffing and digging.	Check rim/wheel condition and size/type. Rectify any defective component. Remove and replace.
3	Bead Damage by broken flange or by tyre lever.	Remove and replace tyre. Ensure wheel Flanges are sound and tyre levers appropriate.
4	Bead Scorching due to Heat.	Line up ventilation holes diametrically opposite each other, for better brake drum heat dissipation.

Cracking –

Cracks in base of tread pattern, radial cracks in sidewall, and circumferential cracks at buttress may occur during service due to under inflation / over inflation / overloading, ageing or bad storage.	Maintain correct load / inflation. Avoid over-stocking and observe recommended storage practice

10. Tyre Selection

Truck / Bus & Light Truck Tyres

Selection of tyre size & ply rating shall be decided from the highest individual load on tyre on an axle determined by the GVW (Gross Vehicle Weight) distribution. The maximum GVW, which is the loaded weight specified by the manufacture for the completed vehicle

- the kerb weight
- driver and occupant weight for the designated seating capacity,
- accessory weight and extra non standard equipment weight,
- cargo load – For any uneven loading in the cargo area, the maximum cargo load must be reduced to prevent
- field modification to provide additional capacity, reinforcement, etc. made by those other than the original vehicle manufacturer, if permitted.

Farm Service Tyres

Selection of tyre size and ply rating shall be based on the highest individual wheel load on each axle when the vehicle is statically weighed. Maximum load per tyre shall not be greater than the permitted for the size and ply rating.

Drive wheel tyres on agriculture tractors when operating in the field must be so selected as to be able to withstand the maximum pull of the tractor under the operating conditions intended.

Maximum load in field service or haulage is to include:

- Net weight – service with standard equipment, including maximum fuel, oil, coolant capacity and the opera
- Accessory weight, optional equipment weight and special order modifications.

- Tyre ballast, if used
- Field modifications.
- Bin & tank load- include total weight when full
- Tractor Trailer – covers weight carried by the axle for haulage purpose.
- Cyclic loading on agriculture harvesting equipment – i.e. gradual increase in payload to max. allowable load with unloading before off-field transport.

Off The Road Tyres

Proper tyre size and ply rating selection shall be based on Gross Tyre Load and the type of Service Conditions.

Gross tyre load are based on the highest individual wheel load determined by the distribution of the gross vehicle weight (GVW), including weight transfer. The maximum GVW shall include, but not be limited to, the following.

- Net weight
- Accessory Weight
- Payload
- Tyre Ballast
- Construction Activity
- Mining

Service Condition

Earthmover (Haulage)

Loader

Load & Carry

Dozer

Grader

Creep

Drive away

Smooth Floors and Runways

11. Care and Storage of Tubes and Flaps

Tubes

The tube and the flap MUST be of the correct size for the tyre. If in doubt, ascertain from the tyre manufacturer the suitability of a tube for use with radial ply tyre.

Fitment of a new tube and a flap in a new tyre is strongly recommended with out exception. Tube failure in service may cause a tyre to fail with it.

Tubes if too large, or used tubes which have excessively grown in service, may crease or crack inside a tyre with serious risk of tyre deflation and loss of vehicle control. Tubes too small will stretch too much resulting in a quicker loss in its physical properties. Creased, cracked and weak tubes are unsuitable for service and should be replaced with new tubes.

New tube should be left in its original package and taken out only when required for fitment.

In the event of tyre/tube repair, the tube removed from a tyre is segregated and reused in the same tyre after the repair is carried out.

Where tubes are received fitted inside tyres, with or without flaps, the inflation pressure in tubes should be maintained at the minimum required to allow a tube to stay in shape inside the tyre.

Used Tubes

Used tubes should be first deflated, by removing the valve core, then examined and repaired, if necessary, before storage. Any of the following methods of storage should be observed:
Slightly inflate, rub over with dusting chalk and place the tube inside a tyre.

OR

Slightly inflate, rub over with dusting chalk, wrap in an opaque wrapper and stack on a flat board.

OR

Slightly inflate, fold carefully and store in a carton or bag of suitable size.
Care should be taken to avoid used tubes getting exposed to direct sunlight or contaminated by oil, grease, dirt etc.

Flaps

Whenever the use of a flap is specified by the tyre industry and/or a tyre manufacturer, ensure that the correct size/code recommended for the tyre/rim size combination is used with out exception.
Old or damaged flaps must not be reused.

Used Flaps

Used flaps should be lightly rubbed over with dusting chalk and used with out distortion in the same tyre, if possible.

12. Care and Maintenance of Rim / Wheel

1. Whenever a tyre is to be demounted from a wheel or prior to mounting of a tyre, the condition of the rim / wheel should be checked thoroughly, particularly for any distortion of the rim flange or wheel disc. Any rust is to be removed by brushing off with a wire brush.
2. Damaged, cracked or distorted wheels, or wheels having stud hole seating cracked or deformed or showing ovality must not be repaired or put in service.
3. Mounting faces of the hub, ball seats and flat mounting surfaces of wheels should be clean and free from foreign material or excess paint.
4. Threads of studs and nuts should be clean, free from burrs or damage.
5. On disc wheels, the nuts must be tightened in a cross sequence and to the recommended torque.
6. Nuts should always be kept tight.
7. Never permit oil or any lubricant to get into the ball seats of wheels, or on the ball faces of the nuts.
8. In order to avoid tension crack corrosion on the rim wheels, which are likely to damage tyres, an anti corrosive protection on the wheel must be fully ensured, even on the tyre side of the rim and lock rings.
9. Always avoid vehicle or tyre/rim overloading. Do not use a higher inflation pressure than that permissible by the rim / wheel manufacturer for the size / type, to avoid over stressing the wheel. Avoid subjecting the nuts to an over torque.

13. Removal of Tyres from Service

Avoid using worn out tyres. The tread of a tyre is provided with raised pattern, the main purpose of which is to ensure maximum tyre grip, particularly important over wet, smooth or slippery roads, as road surface condition plays a major part in tyre to road adhesion. Wet grip decreases as tyre tread wears down.
When the tyres are worn out, the tread pattern is unable to wipe off the water film fast enough from the road surface in contact with the tread. This leads to complete loss of vehicle control.
Worn out tyres also offer less resistance to cuts and puncture damage to the carcass.
If repair to a tyre is necessary, it must be done as soon as possible after the damage occur, in order to avoid further deterioration of the tyre structure, leading to an unsafe running condition. Neglect of tyre damage also increases the possibility of premature.