

Important Safety Warning

For your safety and protection against serious injury or death, the following safety precaution and maintenance instruction must be observed at all times.

PREFACE

This information is provided to help Hankook Tire Truck & Bus customers achieve safe, economical use of our products and maximize tire life.

The purchase of truck and bus tires should be looked at as an investment to be protected by the thorough maintenance and care in order to produce the best return on your investment and fleet operating efficiency.

Information covered in this manual covers how to perform regular tire inspections, tire servicing and repairs as well as how to safely mount and demount tires.

Careful attention on a regular basis can provide you with added safety and economy.

We hope the information is helpful to all the tire servicemen and fleet operators.

DETERMINING TIRE SIZE

There is a lot of useful information molded into the sidewall of every tire, included are the manufacturer and tire name, section width, aspect ratio, construction, rim diameter, speed rating, load range, treadwear, temperature and traction labeling and other required designations.

CORRESPONDING SIZES FOR TUBE-TYPE AND TUBELESS

To achieve the closest match of load carrying capacity, overall diameter and section width see the following chart.

LOW PROFILE TIRES

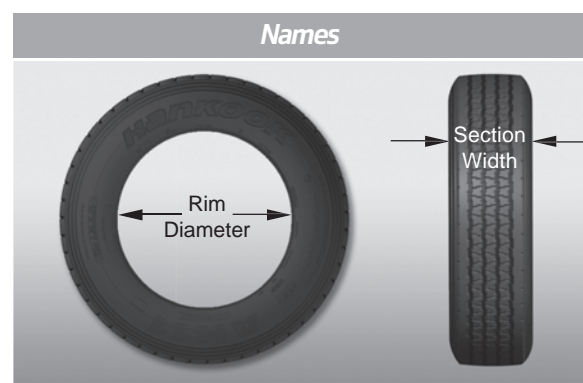
Low profile tires are marked according to ISO standards with additional symbols for load index and maximum speed.

Tube-Type	Tubeless
7.50 R 20	8 R 22.5
8.25 R 15	9 R 17.5
8.25 R 20	9 R 22.5
9.00 R 20	10 R 22.5
10.00 R 20	11 R 22.5
10.00 R 22	11 R 24.5
11.00 R 20	12 R 22.5
12.00 R 20	12 R 22.5

Markings	295/75R22.5
295	Tire section width (mm)
75	Aspect ratio (Section Height / Section width)
R	Radial structure
22.5	Rim diameter (inch)
14	Ply rating
L	Tire Max. driving speed symbol

Low profile tires provide additional benefits such as:

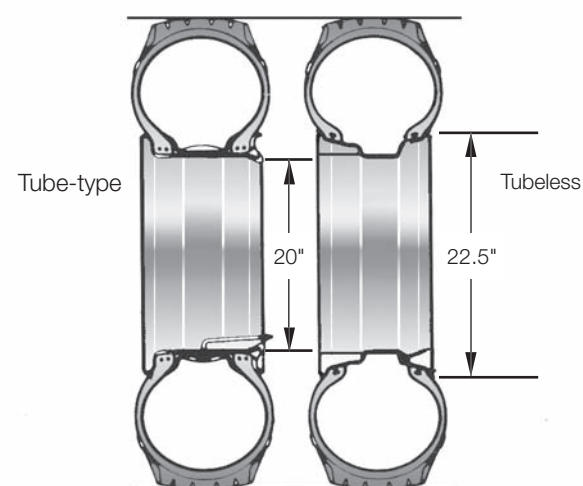
- Fuel savings
- Increased load carrying capacity
- Improved retreadability
- Improved cornering ability
- Braking improvement



Markings: Tube-Type 10.00 R 20
Tubeless 11 R 22.5

Section widths and rim diameters will vary slightly between tubeless and tube-type assemblies. While the measurements seem close, users should be careful not to confuse them.

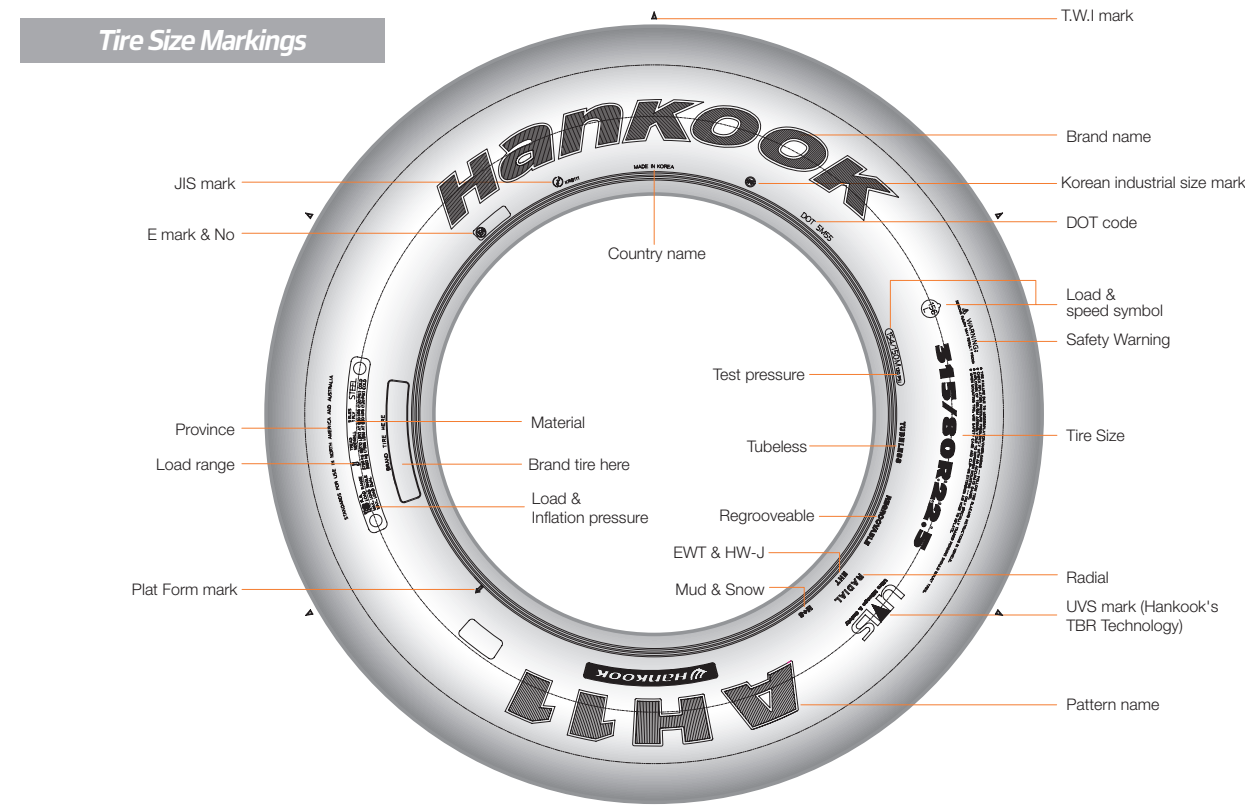
Outside diameter comparison



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TRUCK TIRE MARKINGS

All truck tires are marked representing their structure, construction type, dimensions manufacturer/brand. In addition they should carry the U. S. Department of Transport code and/or ISO symbols. Below is a typical Hankook Tire that illustrates the ISO markings.



SAFETY WARNING

Serious injury may result from:

- Tire failure due to under inflation or overloading - Follow the tire placard instruction on the vehicle and check inflation pressures frequently.
- Due to improper mounting - Only specifically trained persons should mount tires. Follow all safety procedures and inflate using a safety cage and a remote clip-on extension hose.

SPEED & LOAD INDEX

WARNING It is recommended that the replacement tire speed rating be equal to or greater than the OEM tire speed rating. If a lower speed rated tire is selected, then the vehicle top speed becomes limited to that of the lower speed rating selected. The customer must be informed of the new speed restriction & the vehicle's handling may be adversely impacted.

When replacing tires, consult the placard or the owner's manual for correct size and speed rating. The speed rating of the replacement tires must be equal to or greater than the speed rating of the tire being replaced to maintain the speed capability of the vehicle. Speed ratings do not imply that the vehicle can be safely driven at the maximum speeds for which the tire is rated. Serious injury or death may take place if you drive your vehicle in an unsafe or unlawful manner. Hankook's speed symbol designations are verified and comply with regulatory indoor test in accordance with ECE-R30,54 test (Economic council for Europe : Procedure Load / Speed performance test for tires). These symbols are not applicable to repaired tires.

The load carrying capacity of the replacement tire must always equal or exceed the load carrying capacity of the original equipment tire. Tires that are loaded in excess of the allowable maximum load can build up heat and cause sudden air loss.

LOAD RANGE, INFLATION & SPEED ADJUSTMENTS

Load limits are fundamentally the same for tires manufactured according to American TRA, Korean KS European ETRTO and Japanese JIS standards. Load limits are affected by driving speed, the type of construction of the tire and the position of the tire (whether it is used in single wheel or dual wheel application).

For recommendations concerning adjustments to driving speed, inflation pressures and load limit increases or decreases refer to the charts below. Also, never exceed the maximum load and inflation recommended by the rim manufacturer.

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REPLACEMENT TIRES

If mounting tires different from the size originally on the vehicle, consider the following:

LOAD CAPACITY

Tires must always have equal or greater load carrying capacity than the Original Equipment (OE) tires

TRANSMISSION RATIO

Tires with a different radius or circumference than OE tires will affect the transmission of power.

- Smaller tires will improve acceleration but reduce top speed
- Bigger tires will reduce acceleration but increase top speed

RIM DIAMETER

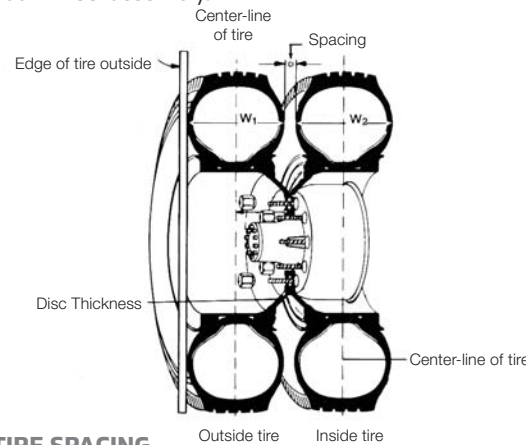
When selecting smaller diameter wheels or rims, check to ensure proper brake drum clearance and sufficient ride height or ground clearance.

RIM WIDTH

The rim width must always fit in the range specified for the section width of the tire. Usually only small increases or decreases in the tire section width is permissible before requiring a change of rim widths to accommodate any change in tire section width.

DUAL-WHEEL SPACING

There is a required minimum spacing required between any dual-wheel assembly.



TIRE SPACING

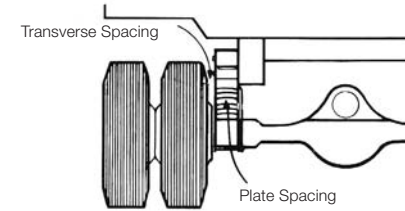
Spacing between the tire(s) should be checked to ensure adequate clearances.

- To avoid coming in contact with any stationary parts of the vehicle such as chassis, body or undercarriage.
- To avoid hitting or contacting movable suspension parts of the vehicle such as springs or shocks.
- Generally acceptable levels of minimum clearance are 15 mm for fixed parts and 25 mm for movable parts.

NOTE: Minimum clearances may change according to vehicle classification.

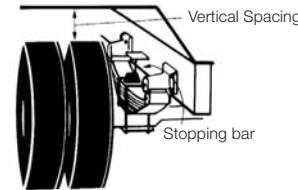
TRANSVERSE SPACING

1. Transverse Clearance



The section width of any replacement tire must also allow sufficient minimum clearance from springs.

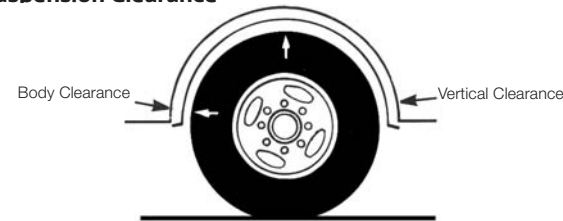
2. Vertical Clearance



The clearance between the tire and the body and chassis must be checked to ensure sufficient clearance to avoid the tire hitting or scraping against any parts either when the suspension is loaded or unloaded.

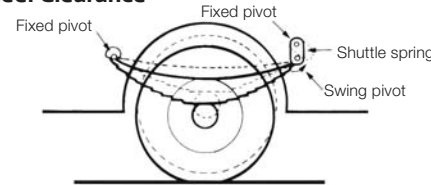
The shock absorber and spring ratings stiffness will also affect these clearances. Clearances must be sufficient so that even under maximum suspension travel or deflection, the tires do not contact either the body panels or vehicle undercarriage.

3. Suspension Clearance

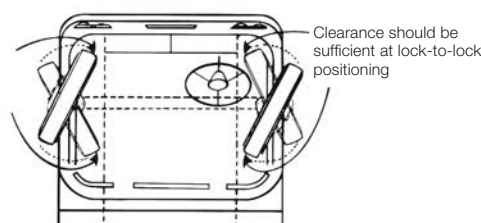


In the case of leaf springs with a swing pivot to allow wheel movement forward and backward, it is important to leave sufficient clearance to allow movement approximately one third that of the distance allowed by the swing action travel.

4. Front-Wheel Clearance



Front-wheel clearance should be checked to ensure sufficient clearance even at lock-to-lock steering positions as well as at the mid-point.



CLEARANCE CHECKS

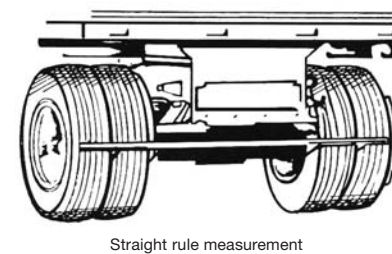
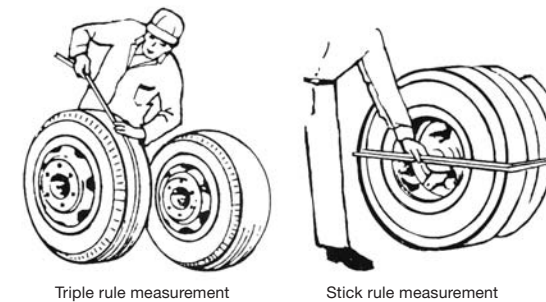
Always check to ensure that mounted wheels allow clearance from brake drums/discs, suspension parts or steering assembly, body and other parts. Nothing should be touching either the tire or the valve and there should be a clearance margin of between 20 and 25 mm.

MATCHING DUAL-WHEEL TIRES

For vehicles using dual wheels it is important that tire circumferences be the same. This is sometimes not the case if tires are not new, of the same tread pattern or have been retreaded. Therefore use a tape measure to match the mounted and inflated tires by circumference prior to installing them on the vehicle.

- Tires must be mounted and inflated to recommended pressures before measuring circumference with a tape measure.
- In situations where they are already mounted as dual-wheels use a square rule to ensure they match in size.
- Ensure uniform sizing on a given dual-wheeled axle by using a long straight rule across the tread of the four tires

Measuring Circumference, diameter of dual-wheel tires

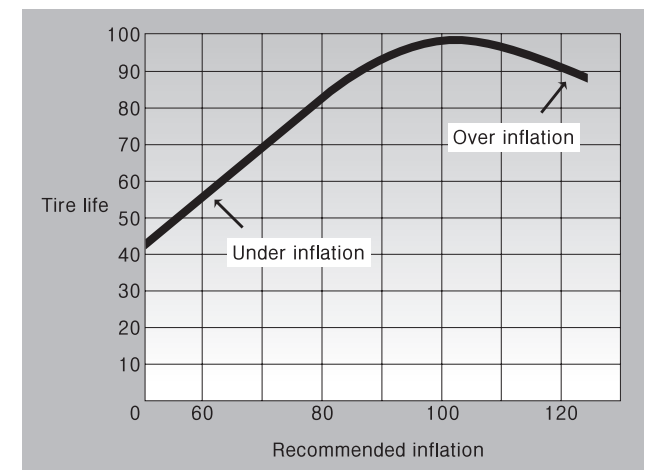


Proper inflation should be maintained and checked on at least a weekly basis and before long distance drives. Pressures should be checked and adjusted if necessary while the tires are cold (before they have been driven on any significant distance). Driving even a moderate distance on tires increases their temperature and the pressure inside, therefore do not decrease the pressure of a "hot" or driven tire as this may result in dangerously inadequate pressure once cooled.

For maximum efficiency it is best to maintain the tires at the recommended and that inflation pressures for both sides should be equal.

It is also advisable to take into account axle load and driving conditions when setting inflations pressures. Compensation for heavier loads can be made by increasing inflation pressures, but do not exceed maximum inflation for the tire or maximum axle load.

Front steering tires may require more inflation when the vehicle is loaded in order to facilitate steering, cornering and wet traction. It is not uncommon that is -20 psi be added in the case of a 11R22.5 14PR tire on the front axle as per the following.



Example 1 If the load on the front axles is 2,245 kgs then 80 psi would be the normal recommended pressure.

However users frequently apply an added 15 to 20 psi which inflates the tires to 95 to 100 psi to assist steering, load carrying and traction while remaining within specific maximum capacity of 2,920 kgs at max. inflation 105psi.

Example 2 If the front axle load is 2,740 kg, 105psi is recommended. A reduction in speed may be necessary along with slight over inflation (not more than 10%) to compensate for max. load conditions. A Hankook Tire serviceman can provide details.

NOTE:

It is important not to exceed the maximum capacities established by the wheel manufacturers. Wheel product specification should be used in determining any recommendations.

TIRE INFLATION

A most important aspect of maintaining tires is proper inflation. Sufficient inflation is needed to carry the load and avoid damage. Driving with proper inflation (particularly grossly under inflated or over inflated tires is dangerous and can cause critical damage or sudden failure of the tire(s).

Important Safety Warning

OVER INFLATED - UNDER INFLATED

Maintaining proper air pressure is the single most important thing drivers can do for their tires. In the span of just one month, a tire can lose 10 pounds of air pressure. It is important to check your air pressure regularly, to make sure your tires are neither under-nor over inflated.

Under-inflation is the worst enemy your tire can have. It causes increased treadwear on the outside edges (or shoulders) of the tire. It also generates excessive heat, which reduces tire durability. Finally, it reduces your fuel economy by increasing rolling resistance - soft tires make your vehicle work harder. Over-inflation is also detrimental to the tire. Too much air pressure causes the center of the tread to bear the majority of the car's weight, which leads to faster deterioration and uneven wear. Any kind of uneven wear will shorten the life span of your tires.

To find the proper air pressure for your tires, look in the vehicles owner's manual, on the driver's side door jamb or in the glove box. And if you buy new tires, be sure to learn the correct pressure from your dealer. Check your pressure at least once a month using a good quality air gauge or stop by your local Hankook dealer and have your pressure checked and corrected.

CHECKING TIRE PRESSURE

It is important to check your vehicle's tire pressure at least once a month for the following reasons:

- Most tires may naturally lose air over time.
- Tires can lose air suddenly if you drive over a pothole, an object, or if you strike the curb while parking.
- With radial tires, it is usually not possible to determine under-inflation by visual inspection

For convenience, purchase a tire pressure gauge to keep in your vehicle. Gauges can be purchased at tire dealerships, auto supply stores, and other retail outlets. The recommended tire inflation pressure that vehicle manufacturers provide reflects the proper psi when a tire is cold. The term cold does not relate to the outside temperature. Rather, a cold tire is one that has been driven on for at least three hours. When you drive, your tires get warmer, causing the air pressure within them to increase. Therefore, to get an accurate tire pressure reading, you must measure tire pressure when the tires are cold or compensate for the extra pressure in warm tires.

TIRE INSPECTION

It is wise to inspect the condition of the tire whenever you check inflation. Look for any problems with the tire swells, cracks, irregularities, damage or penetration of any kind. Also inspect the wheels, valves and valve stems for any possible damage. If found either consult a Hankook Tire serviceman or have it repaired according to recommendations or it damage is too extensive, discard or destroy the damaged tire(s) to avoid danger of accident or injury.

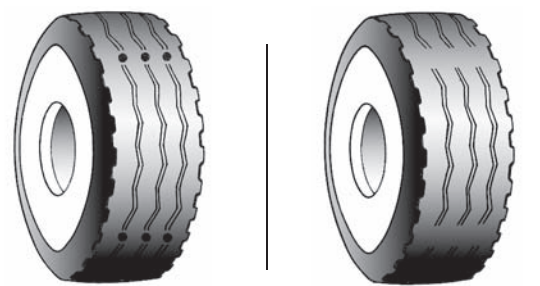
SAFETY

Damage and rapid wear are frequently caused by driving conditions such as over loading, rapid stops and starting, uneven road surfaces or road debris (rocks, stones, obstacles). Slow careful driving on rough uneven roads will help prevent some of this type of damage. In addition, alignment irregularities may result from the above mentioned conditions and these should be corrected prior to naye high speed or long distance driving.

TREAD DEPTH MEASUREMENT

Wear measurements should be taken at 90 degree intervals around the circumference of the tire. If two or more of the places read less than 2/32^{nds} tread deep wear the tire should be replaced. If the wear indicator bars are exposed, the tire should be replaced. It is dangerous to drive with tires that exhibit wear conditions less than the minimum. Some regions and countries have restrictions based on local conditions that require more tread (ie. a 4/32^{nds} minimum). Consult local authorities if you are in doubt.

Wear measurement



Wear measurement position

Wear indicator bars exposed at 1.6mm means the tire is worn out

MAXIMUM LOAD

Do not overload. The loads for truck and bus tires are proportioned to inflation, speed and driving conditions. Proper loading, inflation and moderate speed to suit the road conditions should result in safety. Consult a Hankook Tire serviceman if you are not certain about max load and avoid overloading as it can result in tire damage, broken equipment or injury due to tire failure cause by over heating or excessive load beyond the tire's capabilities.

PROPER SPEED

Hankook Tire marks the maximum recommended speed on the sidewall of radial tires in keeping with the industry standards and practices. If a tire is driven more than the max speed specified, it can create high heat within the tire that can result in tire damage or failure. Therefore it is recommended that drivers stay below the tire's recommended max speed and that they do not exceed posted speed limits. It is important that proper tire inflation is maintained at all times, but particularly in the case of highway driving where higher speeds may result in more rapid heat build up in the tire. Also, impacts with road debris and obstacles hitting the tire are more severe and damaging. Reduce speeds to avoid such hazards and to allow time to maneuver around such obstacles.

TIRE ROTATION

Tires should only be rotated when necessary or when irregular wear is experienced. Vehicle manufacture rotation pattern recommendations should be followed. There is no restriction on cross rotation. Directional tires should be mounted in the direction of rotation. Rotating tires to spin in the opposite direction of original position can be beneficial to combat irregularly worn tires.

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STORAGE

Tires should be stored in a dry, well-ventilated place away from heat, direct sunlight or exposure to fuels, oils, greases or natural gas or electric charges.

It is most important to avoid moisture either outside or inside the tire that can cause deterioration of the tire's casing plies which could result in sudden and dangerous failure of the tire. Cuts or damage to the tire's surface may allow moisture and pollutants access to the tire's casing plies and belts therefore these should be dried, repaired or retreaded prior to storage.

CHAIN USAGE

Many regions, areas, states or provinces have specific regulations governing the use or restriction of tire chains. In addition you should pay particular attention to the following in situations where use of chains is permitted.

1. Chains must be used only when required by weather conditions. In some cases it is required to install a chain when a warning is issued or an area is posted. Speed must be reduced when using chains. High speed and long distance driving with chains on must be avoided because it can cause serious damage to the tires or failure of the chains.
2. Proper size chains should be used according to the tire size.
3. Proper clearance between the chained wheels and the vehicle are required.
4. The chain manufacturer's information should be followed.

TRUCK MAINTENANCE

The two major things that affect tire wear are:

- Inflation Pressure
- Vehicle Alignment

COMPONENTS OF ALIGNMENT

- Toe
- Camber
- Caster
- Ackermann
- Axle Parallelism
 - Thrust Angle
 - Scrub Angle

TOTAL VEHICLE ALIGNMENT

Definition

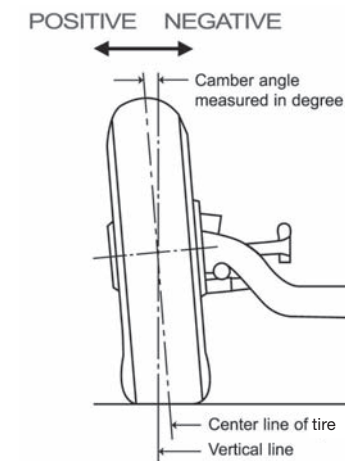
- The process whereby the vehicle and all the tire are traveling in the same direction .
- Steering axle alone is not sufficient.

CAMBER

The angle that the center line of the wheel is inclined from the vertical center line perpendicular to a flat road is called camber angle. If the top of the wheel leans out from the perpendicular than it is positive camber. If the top of the wheel leans in from the perpendicular than it is negative camber.

Camber is meant to compensate for the downward forces of the added load. Correct camber settings help the tire maintain firm even tread contact with the tread while the vehicle is traveling under loaded conditions. Often wear at the outside or inside edge of the tire may indicate incorrect camber setting.

- Camber is the inward or outward tilt of the steering axle tires when viewed from the front.
- Positive camber is at the top of the tie tilted out.
- Camber becomes more negative as the load increases.



TOE

Toe refers to the inclination of the wheels of the vehicle so that the pair of front wheels (viewing from the front as per the illustration below) is close together at the front than at the rear of the wheels.

The opposite is considered to be toe-out.

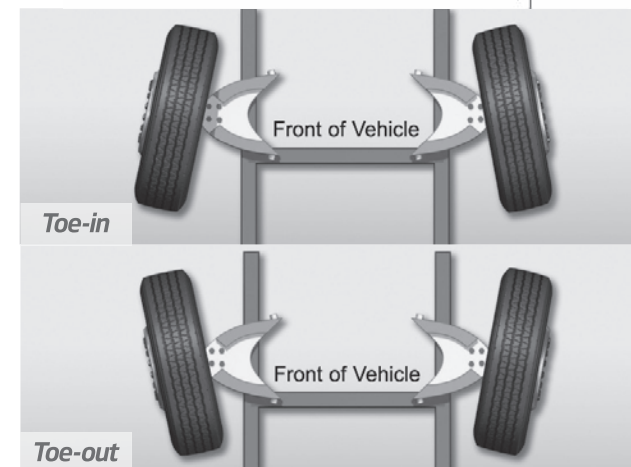
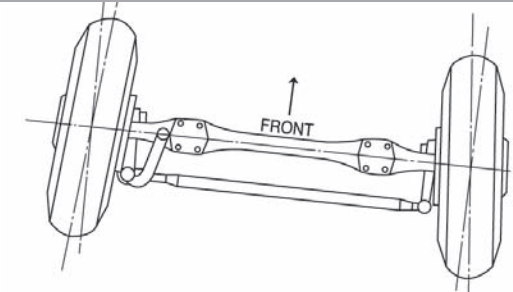
The purpose of tie-in is to relieve or counteract some of the force which pulls wheel outward as they roll along the road. Proper toe-in will ensure that the rotation direction of travel are as similar as possible at driving speed.

Insufficient toe-in settings will result in steering instability.

If toe-in or toe-out is insufficient or excessive the tear wear will be effect and appear as feathering at the edges of tread.

- Toe is the inward and outward pointing of the wheels when viewed from the top of the vehicle.
- The goal is to have zero tow when the vehicle is loaded to its normal operating condition.

Damage due to contact with the vehicle



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CASTER

Caster is the condition where the king pin is inclined with the top of the pin angled rearward similar to front forks of a bicycle. Caster angled is meant to compensate for resistance which the tire(s) encounters as a result of drag forces against the road.

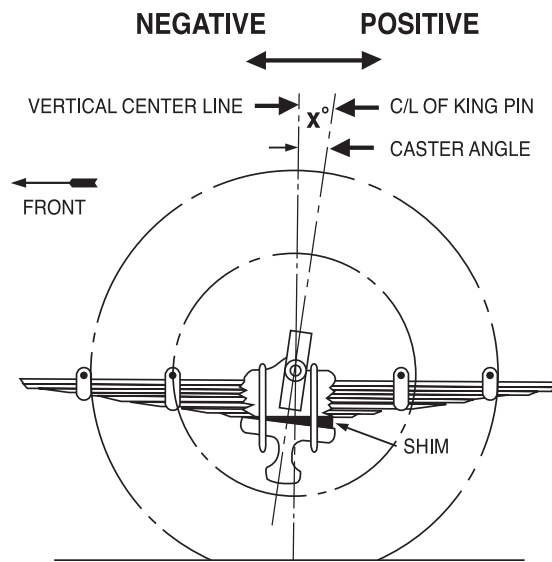
Caster angle should be the same for both wheels on a given axle or the result will be vibration and abnormal wear.

Too much caster will more than compensate for the amount of drag, but will create more difficult steering.

Too little caster and steering becomes light, but unstable and wondrous.

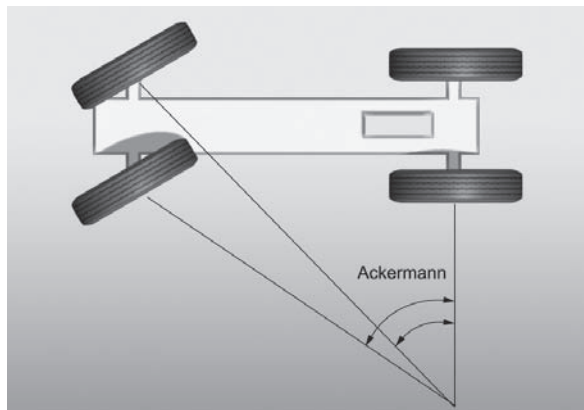
Caster angle should be checked as it can be distorted by impacts on the tire or by driving in rough conditions.

- Caster is the forward or rearward tilt of the king pin of the steering axle when viewed from the side.
- Caster is generally not considered to have a great effect on tire wear.



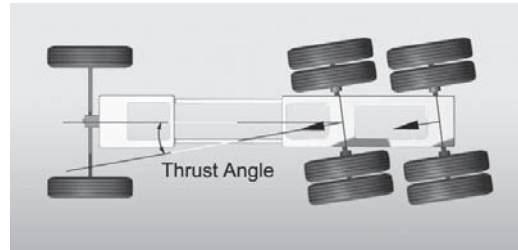
ACKERMANN

- The Ackerman Principle shows that in any turn the inside tire needs a sharper angle than the outside tire.
- The difference in turn angles between the tires is determined by the actual turn angle at the vehicle wheel base.
- Improper Ackermann causes side force, excessive scuffing, and fast or irregular wear.



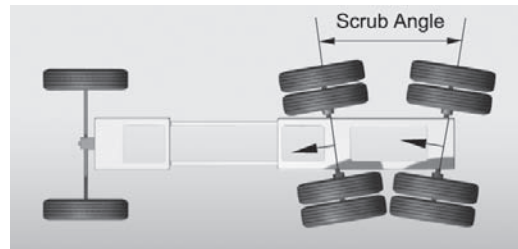
THRUST ANGLE

- Thrust angle is the difference between the line perpendicular to the axle and the vehicle centerline.
- Each drive axle has its own thrust angle.
- The target is to have zero thrust angle.



TANDEM SCRUB

- Tandem scrub is the difference in the thrust angles of the drive axles.
- The target is zero.
- Tandem scrub errors cause constant side force on the steer tires. This leads to irregular wear.



ABNORMAL TREAD WEAR

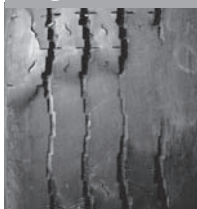
Under inflation and over inflation of tires is the prime cause of tread wear. However there are other conditions that influence tread wear and produce irregular patterns of wear.

- Imbalance of tire or tire and wheel assembly.
- Improper wheel alignment.
- Braking system problems that may cause wheel lock up or flat spotting.
- Bent or round rims.
- Worn or damaged bearings.
- Broken or worn shock absorbers, springs or steering components.

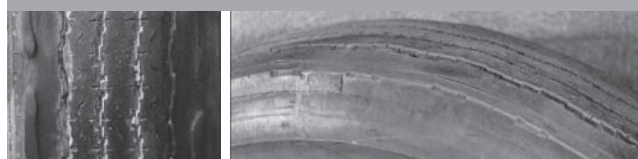
Shoulder wear caused by wrong camber or misalignment



Diagonal Wear



Abnormal Wear



TIRE DAMAGE

With tubeless tires, it is often possible even with a slow air leak to use the tire carefully enough to get to a service center. Small punctures in the tread area, if detected early enough, can usually be repaired so as to avoid air loss and further problems. However sufficient loss of air can cause rapid and damaging heat build up within the tire which may result in the failure or separations between the tread and carcass plies.

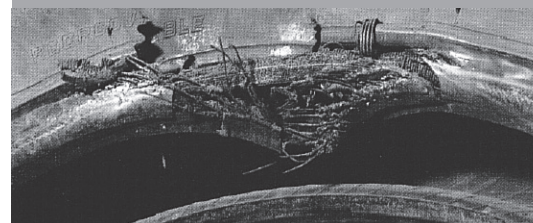
Care should be taken to avoid getting road debris, dirt or moisture penetrating any puncture or trapped inside the tire or between the wheel rim and tire.

Damaged tires should always be repaired or replaced at the nearest possible convenience to avoid further tire damage, possible tire failure, vehicle or personal injury.

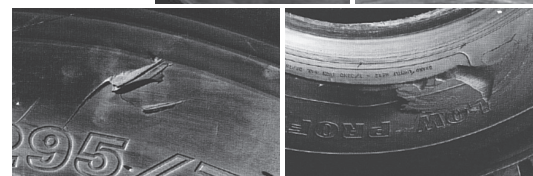
Check for and correct any of the following conditions:

- Improper tire inflation
- Overloading
- Improper vehicle maintenance
- Brake system abnormalities
- Differences of tires sizes or circumferences on the same axle
- Improper mounting of tire or wheel
- Improper, worn or damaged valve
- Improper use of tube or flap

Burned Beads



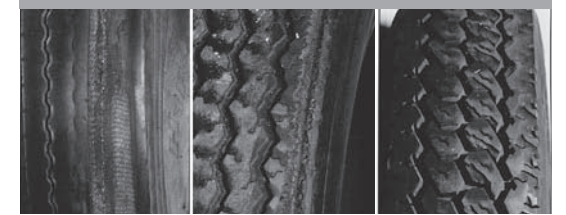
Ripped Sidewalls



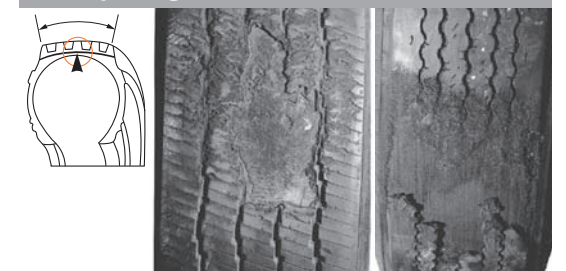
Sidewall damage due to run flat or severe under inflation



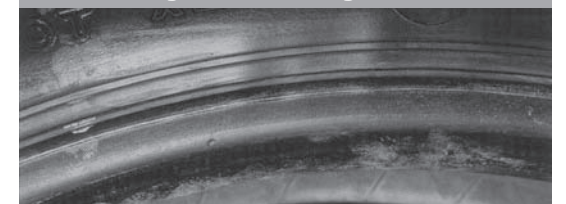
Damage due to contact with the vehicle



Flat spotting due to locked brakes



Bead damage due to curbing



HEAT CAN DAMAGE TIRES

Under inflation, overloading or excessive speed can cause damage because of heat build up. Tire parts such as cord, the bonding between carcass, belts and treads can be easily damaged by excessive heat. Most tire cords lose strength at temperatures above 120 C making the tire more vulnerable to failure. Excessive heat can weaken or damage cords or rubber compounds or cause separation between the plies.

MOISTURE DAMAGE

Moisture inside the tire or penetrating through to the steel belts of a radial tire can cause rust damage to the steel cord or the rim.

Therefore always:

1. Store tires indoors in a dry place.
2. Ensure wheels, flaps, tubes, valves and the inner tire surface are clean and dry before and during mounting.
3. Use the recommended mounting lubricant on rim and tire bead during the mounting process.
4. Maintain inflation and keep the valve stem capped or protected so as not to allow moisture to enter the tire.

PREVENTING TIRE DAMAGE

- Slow if you have to go over a pothole or other object in the road.
- Do not run over curbs or other foreign objects in the roadway, and try not to strike the curb when parking.

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TIRE SAFETY CHECKLIST

Check the tire pressure regularly (at least once a month), including spare.

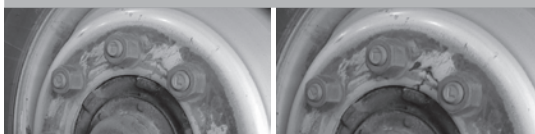
- Inspect tires for uneven wear patterns on the tread, cracks, foreign objects, or other signs of wear or trauma.
- Remove bits of glass and other foreign objects wedged in the tread.
- Make sure your tire valves have valves caps.
- Check tire pressure before going on a road trip.
- Do not overload your vehicle. Check the tire information placard or owner's manual for the maximum recommended load for the vehicle. If you are towing a trailer, remember that some of the weight of the loaded trailer is transferred to the towing vehicle.

MOUNTING & DEMOUNTING

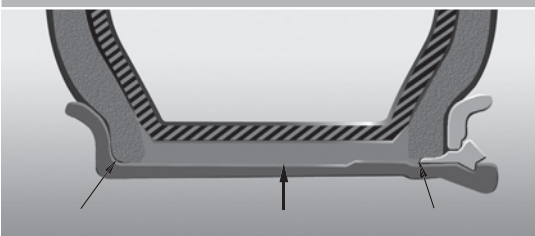
SAFETY INSTRUCTIONS

Do not mount or demount tires without proper training. Wall charts containing mounting and demounting instructions for all highway rims should be available through your normal rim supplier.

Remove all cracked wheels from service



Lubricate areas shown by arrows



Use of GG ring to indicate correct mounting

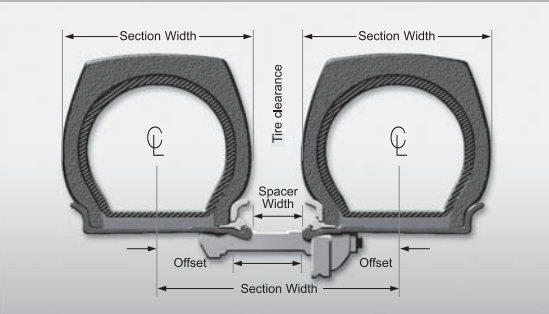


Proper sequence for tightening stud nuts on an 8 stud system

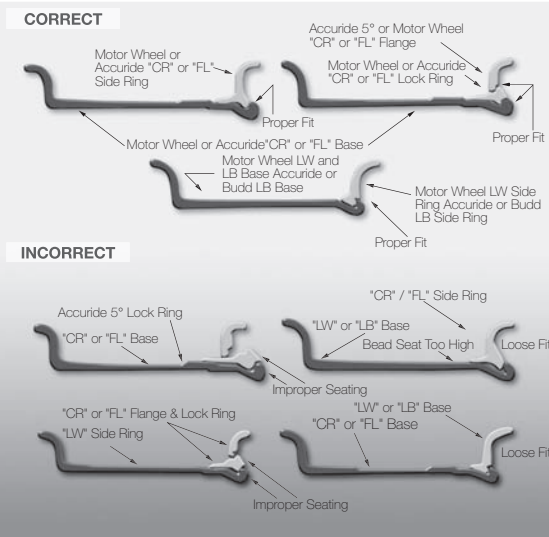


Note: Always use a securely held safety cage and extension hose with clip on air chuck for airing the tire. Rapid air loss can propel the assembly.

Cross section through typical dual installation



Proper Matching of Rim Parts



TUBE-TYPE TIRE MOUNTING

All parts should be clean and free of water or foreign matter. A new tube should be used, because reused or old tubes stretch or increase in size which can lead to problems with the tube folding, cracking or wearing too rapidly. Proper sized radial tubes should be used in radial tires. Radial tubes are designed to handle the radial profiles and flexing requirements.

WHEEL PREPARATION

For safety reasons check the following in regards to mounting and demounting tires and wheels.

- Rim diameter, rim width and flange design must be that recommended for the tire
- Rim profile must be appropriate to the type of tire (tube-type or tubeless) that is being used.
- The angle and position of the tire bead must seat properly to the rim.

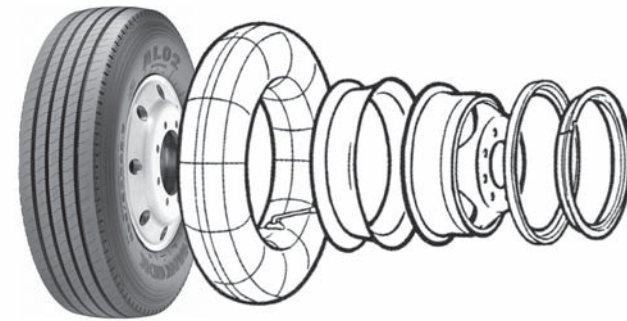
Before mounting, the wheel should be inspected for any cracks, breaks, damage, misplaced parts or deformities or irregularities at the locking ring rim flange, surfaces or valve hole. Any signs of weak welds, dents, rough surfaces or dust should be corrected or a new of more suitable wheel should be used. If corroded, clean the rim with a wire brush, sand it smooth and paint it with anti-rust paint. Any dents and rough surfaces must be smoothed.

Note: Be careful to demount the tire prior to attempting any wheel repair such as hammering, heating or welding of wheels.

PROPER MOUNTING AND DEMOUNTING

Follow all mounting and demounting procedures and equipment safety cautions. Always keep tools and work areas clean and free of oil and grease.

Note: Tire mounting lubricant is necessary for mounting and demounting tires.



Note: Use of any improper design, size or type of tube may cause tube breakage or damage to your Hankook radial tire.

Confirm that the tube is the proper type and size with the correct valve stem type suitably fit the wheel hub and clearances for brake sand wheel parts. The valve stem should screw into the tube with a rubber bushing or washer. This should be a secure, clean attachment to the tube.



VALVE STEM ATTACHMENT

Do not screw the valve stem in the wrong direct or beyond the recommended tightness.

The step by-step mounting procedure should be followed: Insert the new tube in the dry clean tire and inflate it slightly, just until the tire becomes round. The proper sized new flap should be used. Definitely do not use used flaps that are brittle, cracked, broken or stretched.

TUBE-TYPE TIRE MOUNTING

Mount the flap inside the tire being careful not to buckle the flap edges over and under. Center the flap and position it so that the valve hole lines up. Inflate little more so that flap is held close between tire and tube. It will not conform perfectly in shape until later.

- After lubricating the rim flange, tire bead and flap where it will touch the rim.
- Slide the tire/tube/flap assembly onto the rim
- Combining the side ring and lightly rap the locking ring into proper position. Do not use excessive hammering and avoid hitting the tire.

SAFETY CAUTION

Use an accurate air gauge and an air line and a remote operating nozzle long enough to allow you a distance of personal safety from the tire assembly for the remainder of the inflation process.

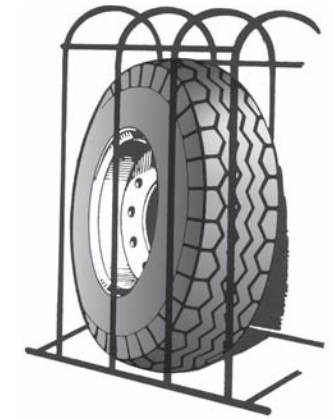
Note: Do not stand in front of any wheel while inflating the tire.

- Inflate slightly and recheck to ensure the assembled parts are in proper position. Inflate slightly more and check to ensure tire bead has seated (slid over to make complete contact with the rim flange). If not, deflate, lubricate and re-try assembly.
- Release any air trapped between the tube, flap and tire by deflating and then reinflate to get proper conforming fit of the flap.

SETTING FINAL INFLATION PRESSURE

Install a new valve core each tire a new tire is mounted. Use a tire safety cage and a remote operating air nozzle. Re-check that the assembly is going together properly at every stage of the process.

Inflate in stages, re-checking that the assembly is going together properly at every stage until the recommended inflating pressure is reached. Then add a valve cap after adjusting to the final recommended pressure.



SAFETY CAGE

Note:

- Use the safety devices at all times. Do not stand in front of the tire or the valve during inflation.
- Before final inflation, check the assembly condition carefully.
- Check if there is any leakage.
- Use only the correct, clean mounting and demounting levers, paying attention that they are not oily or greasy which could cause them to slip.
- Use only the recommended equipment and do not apply excessive force or hammering.

Tire should be deflated before dismounting the wheel assembly from the vehicle. Clear away any foreign matter from the valve stem and area, prior to releasing the valve stem to let the air escape.

DEMOUNTING THREE-PIECE WHEEL ASSEMBLIES

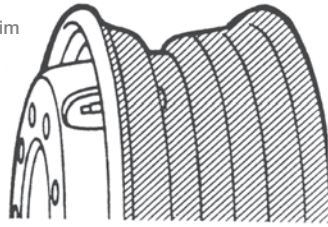
Place the wheel assembly on firm clean ground or floor with the lock-ring side facing upward. Then use the tire demounting lever with a spoon-type tip to pry between the rim flange and the tire bead. Work around the tire operating the lever between the bead and the rim flange. Avoid operating on the same place several times. After the bead and rim separate, put the lever in the groove at the base, separate the lock-ring and remove the side ring.

Important Safety Warning

Disregarding any of the safety precautions and instructions contained in this information sheet may result in tire failure or explosion causing serious personal injury or death.

Base Part of Tubeless Rim

The Tubeless tire rim
Parts marked "///" are to be cleaned and lubricated.



TUBELESS TIRE MOUNTING

RIM PREPARATION

- Rim must not be broken or damaged.
- Remove the rubber bushing from the valve stem hole. Inspect the valve stem for any signs of damage or wear.
- Remove rust, dirt and any foreign materials from the rim. Clean and sand smooth the area marked "///" in the above picture. If rusted, clean and repaint the rim surface to protect it from rusting.
- If required, replace any worn or damaged valve stem.
- Lubricate the inner parts of the rim surface where the tire mounts (marked "///")

TIRE PREPARATION

In the case of new tires, wipe the bead clean, with a dry cloth. Check at the same time that it is not damaged, kinked or broken. Apply the recommended lubricant to the tire bead as per the illustration below.

INSIDE BEAD ASSEMBLY

Lay the wheel on a clean flat surface with the valve facing upward. Work the bead over the rim flange, using your hands and knees as in the illustration below. If it is difficult to fit over the flange, use the proper tire mounting lever as per the illustration.

OUTSIDE BEAD ASSEMBLY

Start the outside bead placement over the outside rim flange by hand. Beginning at the point where the valve stem is located. Once hand placement become difficult use the proper tubeless tire bead mounting lever to complete the job as per the following illustrations. When mounting tires, do not use excessive force and avoid heavy tools or impact such as hammering on the rim.

TUBELESS TIRE INFLATION

Use the inflation gauge, suitable remote air hose nozzle and a safety cage when inflating the new mounting tire. The lubricated bead should seat firmly to the rim flange at about 10 PSI inflation. Do not stand near or in front of tire while inflating. Use the safety cage and a safe distance for your protection. If the bead fails to seat first try, then rotate the tire a few degrees around the rim, ensure the rim and bead flange is lubricated and try again. If for any reason the bead does not appear snugly and evenly seated, do not attempt to inflate further. Repeat the entire assembly process with perhaps more lubricant on the bead and rim areas.

Once it seats, and you are assured the bead and rim flange are a snug even fit all the way around. Then inflate the tire to the recommended inflation pressure to the axle load. Check that the tire or valves are not leaking and tighten on a valve cap.

The tire should be completely deflated before demounting. This is done by loosening and removing the valve stem core, being careful that there is no foreign matter left in the valve and that the valve stem is not cracked or damaged. Do not stand near the valve stem during the deflation process.

BEAD DEMOUNTING

Place the tire assembly on a clean flat surface with the valve facing upward. Use a tire demounting lever

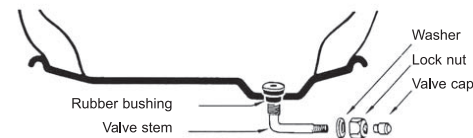
OUTSIDE BEAD DEMOUNTING

Use the tire demounting lever to pry the bead over the rim flange directly in line with the valve stem as per the following illustrations. A second lever is used about 30 cm around the rim from the first to pry the bead over the flange. Repeat the process around the tire until the outside bead is fully demounted.

INSIDE BEAD DEMOUNTING

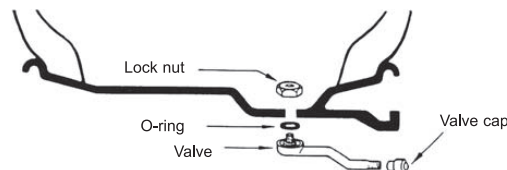
Turn the tire assembly over. Lubricate between the bead and the rim then insert the tip of the tire lever between the tire and rim and apply pressure. Use the second lever about 15 cm around the edge of the rim. Repeat the order until the bead is completely demounted.

TUBELESS RIM VALVE MOUNTING



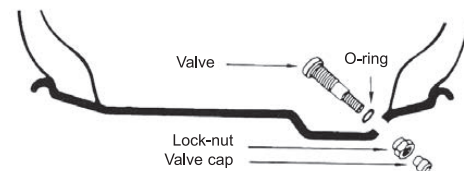
A-TYPE RIM VALVE

The valve hole in the rim must be clean, smooth and not damaged. Apply a recommended lubricant to the rubber bushing of the valve. Insert the valve stem through the rim hole, assembling the washer and lock-nut on the inside and tighten the lock-nut with a wrench so that the valve stem is secured to the rim.



B-TYPE RIM VALVE

The valve hole in the rim must be clean and not damaged. As per the illustration below place a lubricated O-ring on the valve stem, insert the stem into the valve stem hole in the rim so that the valve stem faces perpendicular to the rim. Then tighten the lock nut with a wrench from the opposite side of the rim until the valve stem is secure.



C-TYPE RIM VALVE

The valve hole in the rim must be clean, smooth and not damaged. As per the illustration below, lubricate the O-ring and insert a new valve stem through the O-ring and then through the valve stem hole in the rim from the inside. From the other side, securely hand tighten on the lock nut.

TIRE REPAIRS

Tire repairs normally made by fleet operators and tire service centers are limited to simple punctures such as nail holes. Anything more extensive, such as spot, reinforcement, or section repairs should be referred to an authorized HANKOOK retreading and repair facility. Significant cuts and cracks in the sidewall area should be spot repaired as soon as possible to prevent the need for a major section repair. Frequent tire inspection in service is recommended. This section gives information concerning tire damage, extent, and location, to help determine whether or not section repairs are feasible.

NAIL HOLE REPAIR PROCEDURES

Radial nail hole repairs up to 3/8-inch diameter (9.5 MM) may be in the tread face as long as the nail hole is at least one-inch inside the shoulder. All injuries outside this point should be treated as a section repair.

SECTION REPAIR LIMITS IN SIDEWALL & SHOULDER AREA

Most sidewall injuries will be split-type, caused by snags and punctures. Maximum injury sizes for sidewall and shoulder repairs are shown below.

The number of these section repairs should be limited to 2 per tire for line haul service and 3 for city service, no closer than 1/4 of tire circumference apart.

Spot repairs may be made without limit proving that the body plies are not exposed or damaged. Existing repairs must be reworked if loose or questionable.

