

PUNCTURE REPAIR PROCEDURES FOR PASSENGER AND LIGHT TRUCK TIRES

TIRE SIZES FOR LIGHT VEHICLES INCLUDE ALL PASSENGER CAR TIRES AND SOME LIGHT TRUCK TIRE SIZES (THROUGH LOAD RANGE E). LIGHT VEHICLES ARE MOTOR VEHICLES WITH A GROSS VEHICLE WEIGHT RATING (GVWR) OF 10,000 LBS. OR LESS.

RECOMMENDED PROCEDURES FOR ALL TIRE REPAIR TECHNICIANS AND FACILITIES. IMPORTANT GENERAL INFORMATION

This publication covers puncture repair procedures for passenger and light truck tires (through load range E) in the tread area only! Manufacturers differ on whether repairs to the sidewall may be made. Do not attempt repairs to the sidewall without consulting the tire manufacturer.

Speed rated passenger car tires may be identified by the use of a speed symbol (for example "Q", "S", "T", "U", "H", "V", "W" or "Z") that appears in the tire service description, which can be found after the tire size designation on the tire sidewall or on the vehicle's tire placard. Although a tire may be speed rated, we do not endorse the operation of any vehicle in an unsafe or unlawful manner. A properly repaired speed rated tire can be used for legal highway service, just as a properly repaired non-speed rated tire. **The tire manufacturer must be contacted for its individual repair policy and whether the speed rating is retained after repair (see "NOTE" below).**

PUNCTURE INJURY LIMITS* (IN THE TREAD AREA ONLY):

Passenger and Light Truck tires (through Load Range E) = 1/4" (6mm)



***NOTE:** Repair material manufacturers and new tire manufacturers' recommendations may differ. Specific limits should be based on recommendations of tire manufacturer, repair material manufacturer, and/or type of tire service. Injuries larger than the above injury limits or injuries with exposed fabric or wire must be referred to a full-service repair facility (see below). Injuries larger than these limits should be considered for a section repair. Tire and repair materials manufacturers' recommendations may differ and may affect warranty and service description (load index and speed symbol). Contact tire manufacturer and repair material manufacturer for further information.

Some run flat technology tires cannot be repaired. Consult tire manufacturer for their repair policy and, if applicable, for their recommended repair procedures.

For all tires, repair units cannot overlap. Multiple injuries to the same radial cable should be considered for a section repair. The number of repairs may be limited by application, economics, and/or manufacturers' recommendations.

A "full-service repair facility" is a facility with proper equipment, repair materials, and trained personnel to perform a full range of tire repairs – such as, puncture, spot, reinforcement, and section – off the rim.

NEVER repair tires worn to treadwear indicators (2/32" remaining tread depth).

NEVER substitute an inner tube for a permissible or non-permissible repair.

NEVER invert radial tires. (Avoid excessive spreading of the tire or tire beads.)

It is essential that only a trained person remove any tire from the wheel when it has been damaged or is losing air. A thorough inspection for any internal damage can then be made. See WARNINGS.

NEVER PERFORM A TIRE REPAIR WITHOUT REMOVING THE TIRE FROM THE RIM/WHEEL ASSEMBLY FOR INTERNAL INSPECTION (no outside-in tire repair/on-the-wheel repair). See WARNINGS.

NEVER INSTALL A REPAIR UNIT TO SEAL THE INNER LINER WITHOUT FILLING THE INJURY. The injury must be completely filled with a suitable vulcanizing material or rubber stem, which must fill the injury to keep moisture out. Also the repair unit must seal the inner liner to prevent air loss. The finished repair must seal the inner liner and fill the injury.

Industry recommended repair methods include a combination of a separate stem and repair unit, chemical or heat curing repair units, and one-piece repair/stem units. Use of a separate stem and repair unit is recommended for repair of angled injuries (see Step 2).

WARNING

NEVER PERFORM A TIRE REPAIR WITHOUT REMOVING THE TIRE FROM THE RIM/WHEEL ASSEMBLY FOR INTERNAL INSPECTION (no outside-in tire repair/on-the-wheel repair)



Driving the tire a short distance while it was severely under-inflated caused this dangerous, non-repairable condition shown above. The damage was not visible from the outside. Every tire must be removed from the wheel for inspection and to assess repairability.

WARNING

TIRE CHANGING CAN BE DANGEROUS AND SHOULD BE DONE BY TRAINED PERSONNEL USING PROPER TOOLS AND PROCEDURES. ALWAYS READ AND UNDERSTAND ANY MANUFACTURER'S WARNING CONTAINED IN THEIR CUSTOMERS' LITERATURE OR MOLDED INTO THE TIRE SIDEWALL. Failure to comply with these procedures may result in faulty positioning of the tire and/or rim parts and cause the assembly to burst with explosive force, sufficient to cause serious physical injury or death. Never mount or use damaged tires or rims.

FOR MORE ON TIRE MOUNTING SAFETY AND PROCEDURES refer to the RMA Demounting and Mounting Procedures for Automobile and Light Truck Tires wall chart.

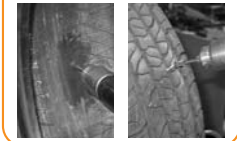
The four basic principles for puncture repairing are: (a) remove the tire from the wheel for inspection and repair, (b) prepare the injured area, (c) fill the injury with a suitable vulcanizing material or rubber stem, which must fill the injury and keep moisture out, and (d) seal the inner liner with a repair unit to prevent air loss. The finished repair must seal the inner liner and fill the injury.

WARNING

Serious eye or ear injuries may result from not wearing adequate eye goggles (or face shields) and ear protection while repairing tires.

4 PREPARE INJURY CHANNEL

All damage must be removed. Use an electric/air powered drill (1,200 rpm max.) with an appropriate size carbide cutter or other suitable tool. Beginning from the inside, ream the puncture channel a minimum of three times – repeat from the outside. Use a probe to check for any splits in the radial plies surrounding the injury. Remove any additional damage found. If the damage exceeds puncture repair limits, a section repair is required. Multiple injuries to the same cable should be considered for a section repair (see "NOTE" at left).



8 CEMENTING

NOTE: DO NOT mix products from different repair material manufacturers.

Apply chemical cement and allow to dry according to repair material manufacturer's procedures. DO NOT use forced air or outside heat source to accelerate drying time. (In cold and/or humid climate conditions, adjust drying time.)

WARNING! DO NOT use flammable cements near fire, flame or any other source of ignition. Explosive force and/or fire from ignition of cement could cause serious injury or death.



CAUTION

RE: Preparing the Inner Liner Surface. 1) Tires that contain any type of aftermarket puncture sealant(s) may have been damaged as a result of being run underinflated and/or overloaded and should be considered accordingly. 2) Tires that are manufactured with puncture sealant require specialized repairing techniques. The tire and/or sealant manufacturer(s) should be contacted for recommendations.

1

EXTERNAL INSPECTION



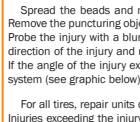
Prior to demounting, check tire surface and the valve for the source of the leak(s) by using water or a soap solution. Mark the injured area and totally deflate the tire. Then remove the tire from the wheel being careful to avoid further damage to the tire, particularly to the bead area. Place on a well-lighted spreader. (Avoid excessive spreading of the tire or tire beads.)

ALWAYS inspect tires internally and externally prior to installation of any repair. A minimum of 200 foot candles of lighting is required – 300 foot candles is recommended – at the surface being inspected. A hand-held inspection light can help ensure that these conditions are met both inside and outside the tire. Consult your equipment supplier for appropriate lighting.

WARNING! Permanent tire damage due to underinflation and/or overloading cannot always be detected. Any tire known or suspected to have been run at 80% or less of normal operating inflation pressure and/or overloaded, could possibly have permanent structural damage (cord fatigue, particularly steel cords). Ply cords weakened by underinflation and/or overloading may break one after another until a rupture, commonly referred to as a "zipper", occurs in the upper sidewall with accompanying instantaneous air loss and explosive force. This can result in serious injury or death. These tires should be inflated by using a restraining device (or safety cage) that complies with OSHA regulations and an air line with a clip-on air chuck.

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INTERNAL INSPECTION



Spread the beads and mark the injury with a tire crayon. Remove the puncturing object noting the angle of penetration. Probe the injury with a blunt awl to determine the extent and direction of the injury and remove any loose foreign material. If the angle of the injury exceeds 25°, use a two-piece repair system (see graphic below).

For all tires, repair units cannot overlap (see "NOTE" at left). Injuries exceeding the injury limit of 1/4" (6mm) must only be repaired in a full-service repair facility. Inspect for any other internal damage. Tires with damage due to significant under inflation and/or overloading must be rejected.



3

PREPARE INNER LINER SURFACE

Clean the area around the puncture thoroughly with an appropriate (pre-buff) inner liner cleaner. Use a clean cloth and/or scraper, according to repair material manufacturers' recommendations. Consult your local repair materials supplier for an appropriate cleaner. This step serves to remove dirt and mold lubricants that can reduce repair unit adhesion and contaminate buffing tools. (See CAUTION below left.)

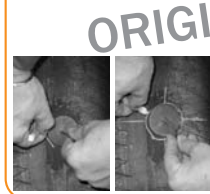


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REPAIR UNIT SELECTION

Select the appropriate size repair unit, based on repair material manufacturer's recommendations.

Center the unit over the injury and outline an area 1/2" (13mm) larger than the repair unit, so buffing will not remove the crayon marks.



6 FILL INJURY

For a two-piece repair, follow instructions below. For a one-piece (combination) repair unit, skip this step.

NOTE: Follow repair material manufacturer recommendations. DO NOT mix products from different repair material manufacturers.

Cement the puncture channel per recommendations (see graphic below left). Fill the injury from the inside of the tire with a suitable vulcanizing material or the appropriate stem/rubber stem. Without stretching the stem cut the material off just above the inside tire surface (see bottom right). It is necessary to fill the injury to provide a backup for the repair unit and to prevent rusting of the steel wires or deterioration of fabric.



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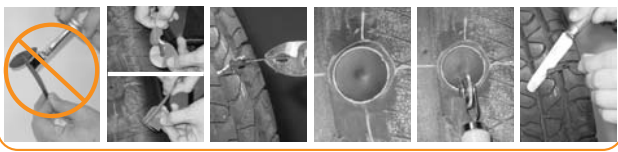
REPAIR UNIT APPLICATION

NOTE: DO NOT mix products from different repair material manufacturers.

The tire must be in a relaxed position when the repair unit is installed. (Do not spread the beads excessively.) Remove and discard protective covering being careful not to touch the bonding material on the repair unit.

If using a two-piece, directionally marked unit, install the unit so that the alignment is correct and centered over the injury. Next, stitch down thoroughly with a stitching tool, working from the center out. If using a combination repair/stem unit (one-piece), DO NOT cement the stem, rather cement the injury channel. Next pull the stem through the injury until the unit slightly dimples, then stitch down thoroughly with a stitching tool, working from the center out.

Remove and discard the top protective covering. Cut the fill material flush with the outer tread surface while being careful not to stretch the stem. NOTE: Follow repair material manufacturer's recommendations for installation instructions.



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FINAL INSPECTION

Inspect all repairs; rework if necessary. After remounting and inflating on the tire/wheel assembly, check for leaks and inspect the tire, beads, the repair, and the valve for other leaks or tire damage. If the tire continues to lose air, it must again be removed from the wheel for complete re-inspection. (For tube-type tires be sure to use a properly repaired or new tube to replace a damaged tube.)



CAUTION: REGARDLESS OF THE TYPE OF REPAIR USED, THE REPAIR MUST SEAL THE INSIDE SURFACE AND FILL THE INJURY.

REFERENCES

- 1 Refer to the RMA Demounting and Mounting Procedures for Automobile and Light Truck Tires wall chart.
- 2 Refer to the RMA TISB No. 33 Inspection Procedures for Identification of Potential "Zipper Ruptures" in Steel Cord Radial Medium and Light Truck Tires and wall chart.
- 3 Refer to information on the product or manufacturer's Material Safety Data Sheet and follow guidelines for handling and disposal.
- 4 Refer to the RMA Shop Bulletin No. 29 RMA Standard Buffing Textures for Retreading and Repairing rubber texture sheet.

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