

HOW TO SPOT AND SECTION REPAIR USING LINCOLN SPOTTERS

Crown, shoulder and sidewall injuries in passenger, truck, agricultural and earthmover tires can be repaired using Lincoln tire vulcanizers. Section repairing with a spotter then reinforcing with a chemical cure repair unit has proven to be the most successful and profitable repair method in use today. Consider the following advantages:

Almost complete elimination of distortion. A less deteriorating effect on the tire because only the skive fill area is heated. Smaller investment in equipment. Big savings in time and effort.

INSPECTION

Thoroughly clean the tire, removing all mud and dirt so cracks, cuts and foreign objects are visible. Inspect the tire inside and out to determine the reparability of the casing.

GOOD LIGHTING IS IMPERATIVE!

You can't repair what you can't see. The use of a spreader may be necessary to truly reveal all tire damage. During the inspection process, remove all foreign objects and mark all injuries on the inside and outside of the tire. To determine the extent of damage, probe the injury using a blunt point awl. Examine all cuts, cracks punctures and breaks. If the tire is tubeless, inspect the inner liner and mark any injuries or weaknesses. Note: tire should not be repaired if any of the following conditions exist:

- Tire shows signs of run flat or under inflation
- Casing separations are beyond repairable limits
- Bead wires are visible, deformed, or broken
- Sidewall or tread is cracked to the cord body
- Weather checking is present which exposed the cord
- Severe sidewall scuffing is present which exposed the cord
- Tires attacked by severe oil or grease deposits
- Multiple injuries that are directly in line with the same radial cord or cords

SPOT REPAIRING

Injuries damaging no more than 25% of the plies can be spot repaired without the reinforcement of a repair unit. The percentage of plies injured is based on ply rating rather than actual plies.

1. Skive injury to a 45 degree angle from the outside to make a V-shaped skive using a lower r.p.m. (max. 5,000) air tool. **ALWAYS WEAR EYE PROTECTION WHEN BUFFING.** Avoid scorching the tire surface. Remove a minimum of material, only enough to remove all loose rubber, foreign matter and frayed cord. In case of a radial tire, inspect for damaged cables. If any broken body cables, loose cables, or rusted cables are found, they must be removed and a section repair is required. See "SECTION REPAIRING" later in this manual for instructions. Round out all corners of the injury when skiving.



2. Final finish buff skived area and about 1-1/2" perimeter around the outer edge of the skive using a fine grit rasp or wheel with a low r.p.m. (max 5,000) air tool. **CAUTION: Avoid scorching the tire surface.**
3. Vacuum the complete areas that have been buffed. Clean the buffed area with a chemical cleaner and allow to dry before applying cement.
4. In Bias (fabric) tires, if cords are bared, they must be cemented immediately after cleaning with a good grade black vulcanizing cement. Because of the absorption of the cord, two coats of cement should be applied to all exposed cords with adequate drying time allowed between coats. Coat the rest of the buffed area with the same cement. Allow to dry completely (20 – 30 minutes) and build up skive fill with repair gum, layer by layer, stitching each layer. Cure with Lincoln Vulcanizer. Repair time required will vary, but allow at least 5 minutes per 1/16" of skive depth.
5. In radial (wire) tires, if wires are bared, burnish them lightly with a wire brush On a low r.p.m. (max. 5,000) air tool. If fret or wrap wire is damaged, the cable must be removed to the extent of the injury. Avoid excessive pressure when buffing, which could cause the wire to unravel or turn blue (overheat). Remove any buffing dust with a vacuum. Immediately cement all exposed wire with a good grade black vulcanizing cement, and coat the rest of the buffed area with the same cement. Allow to dry completely (20-30 minutes) and build up skive fill with repair rubber, layer by layer, stitching each layer. Cure with Lincoln vulcanizer. Repair time required will vary, but allow at least 5 minutes per 1/16" of skive depth.

SECTION REPAIRING

1. Spray the inner liner of tire with a chemical cleaner and scrape to remove Contaminating substances. On the outside of the tire, using a low r.p.m. (max. 5,000) air tool and rotary gouger, remove the rubber around the perimeter of the injury at a 45 degree angle to the tire surface, to a depth just above the steel belts of the tire. **ALWAYS WEAR EYE PROTECTION WHEN BUFFING.**
2. In the case of a crown repair, a "FUNNEL" or "Y" skive is commonly used.



Using a high r.p.m. (min. 20,000) air tool and carbide router, remove the damaged steel at a 90 degree angle through the steel belted area of the tire, as shown. The steel cables need to be cut back into good, solid rubber. Be sure that rusted or loose cables are removed and then dressed using an aluminum oxide stone. Before continuing, check for separation with a blunt point awl. Switching to a low r.p.m. (max. 5,000) air tool, use a skive brush to remove any scorch from the hole and texturize this area of skive.

Continuing to use the same air tool, switch to a rasp and texturize the tire surface (above the steel) to a 45 degree taper. Switching to a 36 grit rasp, final finish buff the skived area and a 1-1/2" perimeter around the outer edge of the skive. Round all corners which are points of stress concentration and may cause skive fill loosening. Proceed to step #4.

3. In case of a sidewall repair, using a low r.p.m. (max 5,000) air tool and wire brush, buff away the remaining surface rubber to expose only the cables believed to be damaged the full length of the injury, Inspect the cables for damage, such as broken fret wires, broken body cables, loose or rusted cables. If any of these are present, then the damaged cable or cables must be removed. The steel cables need to be cut back into good, solid rubber. Using a high r.p.m. (min. 20,000) air tool, remove damaged cables with carbide router. Be sure that all rusted or loose cables are removed and dressed using an aluminum oxide stone. Switching to a low r.p.m. (max. 5,000) air tool, use a pencil skive brush to remove any scorch, and texturize the skive. Switching to a 36 grit rasp, texturize the tire surface above the steel to a 45 degree taper, as shown. Avoid contact with the steel body cables with the buffing wheel. Finish buff skived area and a 1-1/2" perimeter around the outer edge of the skive.

4. Using the low r.p.m. (max. 5000) air tool inside the tire, buff inner liner and a 1-1/2" perimeter around the outer edge of the skive, in preparation of receiving a platform of gum rubber.

MEASURING SKIVE

Each repair unit manufacture has specific recommendations regarding how to correctly measure the injury. Refer to these instructions when determining the length and width of the injury to insure proper repair unit selection.

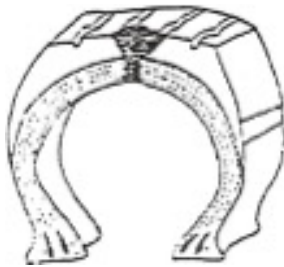
CLEANING

Vacuum the exterior skive area and the inner liner of the tire to remove all buffing debris. Clean the buffed area on the inside and outside of the tire with a chemical cleaner and a clean lint-free cloth. Allow to dry for 3-5 minutes.

CEMENTING

Applying a thin coat of vulcanizing cement to the exterior skive and allow to dry. In applying the cement, use a stipple brush and work it into the buffed areas. Next, apply a thin even coat of the same cement to the inner liner and allow to 3 to 5 minutes drying time. If manufacturer recommends using two coats, allow time to dry between coats. Do not puddle the cement as this will trap solvent and cause gas pockets during cure. Make certain to proceed to the next step "FILLING THE SKIVE" within one hour of cleaning and cementing to prevent oxidation of the tire surface. This will assure maximum adhesion of the repair gum.

FILLING THE SKIVE



1. Beginning on the inside of the tire, cut a platform of repair gum that is slightly larger than the skive opening in the inner liner of the tire. Leave the poly backing on the outside of the gum. Center this platform over the injury, and press down the platform on the poly side of the gum with your thumb. Stitch the platform into place using a stitcher. Remember, never touch the exposed gum! Next, pack the gum layer by layer into the cavity of the repair, from the outside of the tire, with a blunt object. Do not try to fill too large an area at one time as this may trap air pockets in the repair. Also avoid stretching the repair gum when filling skive. Fill the skive one layer at a time and use stitcher to stitch down each layer to eliminate air pockets. Fill cavity until skive is full, plus an approximate over fill of 1/8 inch to 1/4 inch above the surface of the tire at the highest point, in the center of the skive. The purpose of the overfill is to prevent starvation of material during cure. Under pressure, the gum is forced into the cavity and any excess flows to surface of the skive.
2. If a repair is being made on the crown area of a tire, and a tread groove is in contact with the skive, any tread groove (s) must be blocked to prevent the gum from flowing out of the skive during the cure process. If the gum is allowed to escape during the cure, it will result in a loss of pressure and possible cure failure. The blocks can be made of scrap regrooved or other cured rubber.
3. Finally, you may now remove the poly backing from the inside platform of gum rubber created in step #1 above.

MOUNTING THE SPOTTER

1. After the skive fill is completed and before mounting the spotter, place a piece of Holland cloth, foil, mylar or similar material over the skive fill. This will keep the area clean and prevent sticking during the cure.
2. Please refer to the “OPERATING INSTRUCTIONS” supplied with each Lincoln vulcanizer for correct operation of your particular unit. As a brief synopsis, general repair instructions have been listed for your convenience.
3. Select the contour plates that most closely match the tire contour at point of repair. If a Lincoln Air Spotter is used, it is only necessary to select one contour plate. The flexible silicone rubber heat pad will act as the opposing contour plate. Attach plates to the appropriate heat units and mount the vulcanizer making sure the contour plates are centered directly over skive fill. Remember, three elements are required for a successful cure: HEAT PRESSURE and TIME. If anyone of these elements is missing, you will not have a successful repair.
4. Hand tighten spotter and plug both heat units into the stand or wall outlets having the correct voltage. Please refer to your vulcanizer to determine if the unit is 120v or 240v. Protect work area from drafts. On models that are not pressure compensating, non-air or non-spring-loaded, check and retighten hand wheel pressure screw as needed during vulcanization.

CURING THE SKIVE FILL

1. To determine the time required vulcanize a skive fill, you will need to know the curing rate of the gum being used and the depth (thickness) of the skive fill. Lincoln supplies a “Curing Time Guidelines” sheet with each vulcanizer. Please refer to this sheet for curing time guides. As a brief synopsis, general instructions for determining the curing time have been listed below for your convenience.
2. Determine the skive fill thickness. Measure the THICKEST part of the area to be repaired and use this number in your calculations. Multiply the skive fill thickness by the cure rate of the rubber and you have the curing time required.
EXAMPLE: Suppose the skive has a total depth of $\frac{3}{4}$ ” at its thickest part and you are using a rubber that has a cure rate of 5 minutes per every $\frac{1}{16}$ ” thickness at 280 degrees Fahrenheit. To determine the time required for this cure, multiply 5 (5 minutes per $\frac{1}{16}$ ” cure rate) by 12 ($\frac{12}{16}$ ” or $\frac{3}{4}$ ” of an inch thickness) and you arrive at 60, the number of minutes required for cure. To this figure you may also wish to add 10 minutes for heat unit/contour plate warm-up time and you have the total curing time of 70 minutes.

After the cure is completed, unplug and dismount the vulcanizer. After allowing time for the skive fill to cool, inspect the area for bulges, blows, sunken spots and evidence of under cure or other problems and their possible cause.

- A. Porosity (tiny air bubbles, pits or gummy)
 1. Lack of pressure (rubber leaked or no overbuild)
 2. Lack of heat
 3. Not enough cure time
- B. Large air pockets
 1. Skive improperly filled or stitched trapping air
- C. Poor bonding with the surrounding cured skived area
 1. Wet cement (did not allow time to dry)
 2. No cement
 3. Contaminated surface (failure to adequately clean)
 4. Uncured gum rubber defective

DRESSING THE SKIVE FILL

Buff away any soft, gummy rubber that may have flowed out from under the contour plate as a result of the skive fill being over built. Next, buff the newly cured area with a 36 – 46 grit carbide wheel to bring it flush with the contour of the tire. If necessary, groove the skive fill to match the surrounding tread design.

APPLYING THE REPAIR UNIT

1. Draw crayon index lines at right angles from the skive on the inside of the tire to aid in centering the repair unit. Center the predetermined repair unit over the skive fill and mark a perimeter approximately 1" larger than the area the repair unit covers. This will serve as a guide for buffing.
2. Pre-clean area within the marked perimeter with liquid cleaner, while still moist, remove contaminating substances using a scraper. Buff within the clean marked area with a low r.p.m. (max. 5,000) air tool and buffing wheel to achieve an even texture. Remove any vent ribs and/or embossed surfaces for proper adhesion.
3. Break the perforation of the inside poly-backing on the repair unit and peel half way back. **CAUTION:** Avoid touching the raw cushion gum rubber of the repair unit as this can contaminate the repair. Apply a thin even coat of chemical cement to the back of repair unit to assure proper adhesion of the filler rubber to the back of the repair unit. Allow 3-5 minutes drying time.
4. With the tire in a relaxed (not spread) position, center the repair unit over the injury making sure that the repair unit is properly oriented with respect to the bead. Press down the center of the repair unit. Stitch the repair unit into place from the center outward. Exert firm pressure on the stitcher during this process to promote increased adhesion and removal of trapped air. Remove the remaining inside poly backing and finish stitching the repair unit into place.
5. Remove the outside poly protective cover from the repair. If the tire is tubeless, it is recommended that a repair sealer be placed over the edge of the repair unit and extended over any buffed areas beyond the repair to make a positive seal between the repair and the tubeless inner liner.
6. It is generally recommended that a post inflation period be observed to allow time for the chemical vulcanization process to be completed. The tire will then be ready for service.

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