REMA TIP TOP

// ONE BRAND // ONE SOURCE // ONE SYSTEM

1-/2- WAY AS TIRE REPAIR PREMIUM

with vulcanizing materials and machines

Repair instructions

Introduction

- Before starting any repair, always inspect the tire in a professional way according to appropriate criteria, such as the general state of tire, national repair limits, etc. before deciding if the tire is repairable. Check the whole tire for further hidden damage.

- Information given in these repair instructions only refer to the use of original REMA TIP TOP products.

- A proper repair requires not only the use of high quality repair materials and tools but also an appropriate working environment such as:

  - ↗ good illumination of the workplace,
  - ↗ periodical cleaning of the workplace and the tools (maintenance),
  - ↗ protection of the repair area against draught and direct sunlight during the repair process,
  - ↗ storage of all products according to the specifications (on the packs),
  - ↗ well serviced machines and tools,
  - ↗ well trained staff.

- We reserve the right to change our products and processes in order to carry out technical improvements.

- The solvents and adhesives listed in the instructions can be used both in a highly flammable, CKW- and aromatics-free version, as well as for the countries without restrictions in one version with trichlorethylene as solvent. In the EU the use of trichlorethylene and trichlorethylene containing products in accordance with REACH annex XIV defined expiration date since 2016-04-21 is prohibited without authorization. For details please see our RTT microsite http://www.rtt-tri-free.eu/en.

- Always observe the applicable REMA TIP TOP repair charts when selecting the appropriate repair materials.

Contents

Es können nach dieser Reparaturanleitung folgende Pflaster verbaut werden:

- RAD 100 PREMIUM
  Repair patches with rayon cord of high quality for durable repairs to all radial tire sizes and for all applications.
- RAD 500 ARAMID PREMIUM
  The repair patch for professional repairs. Aramidreinforced repair patches ensuring long operating times with a low weight and a high degree of flexibility perfectly suiting to the tire contour as well as the rolling behavior of new-generation tires.
- PN-DIAGONAL PREMIUM
  Repair patches with nylon cord of high quality for durable repairs to all BIAS tire sizes and for all applications.

1. General information

1.1 General safety instructions

Carefully read the operating and application instructions enclosed with the corresponding products/ machines. Always observe the safety instructions.

- Before starting work on large tires, ensure that the tires are secured against turning over, rolling or any other movement. Otherwise, there is a high risk of personal damage with significant injuries.
- When using rotary tools, solvents or any other dangerous tools and substances, always wear safety goggles.
- When working in an environment with a high noise level starting from 85 dB (A) (e.g. near noisy machines or tools), use ear protection according to labour protection regulations. However, an appropriate ear protection is reasonable even at lower figures.
- The use of S1-class safety shoes (toe protection cap, fully closed heel, antistatic and penetration-resistant) is prescribed for the operations described in this manual. These shoes must be equipped with a metal or plastic toe protection cap and a penetration-resistant, antistatic sole.
- When working with sharp-edged tools, aggressive solutions, hot devices or hot materials, always wear suitable safety gloves.
- When skiving out the injury with a rotary tool or during other work with a risk of projection of hot, pointed or sharp-edged drops, chips and sparks, face protection is recommended.

Safety symbols:


Use eye goggles!


Wear ear protection!


Wear safety shoes.!


Wear protective gloves!


Face protection recommended!

When using solvents and vulcanizing cements, observe the safety instructions and symbols on the containers and the Safety Data Sheets.

Safety Data Sheets are available at:
http://www.rema-tiptop.com/products/safety-data-sheets/

Pictogram	Code	Hazard designation
 Exploding bomb	DANGER GHS01	Unstable explosives, mixtures and products containing explosives, self-reactive substances and mixtures, organic peroxides
 Flame	DANGER / ATTENTION GHS02	flammable, self-heating, self-reactive, pyrophoric, water-reactive, organic peroxides
 Flame over circle	DANGER GHS03	oxidizing hazards
 Gas cylinder	ATTENTION GHS04	gases under pressure, compressed, liquefied, frozen, dissolved gases
 Corrosion	DANGER / ATTENTION GHS05	for corrosive damage to metals, as well as skin, eyes
 Skull and Crossbones	DANGER GHS06	acute toxicity
 Exclamation mark	GHS07	div. health hazards
 Health hazard	DANGER / ATTENTION GHS08	div. health hazards
 Environment	ATTENTION / DANGER GHS09	may cause damage to the aquatic environment

Ensure that the concentration of the pollutant is under the occupational limit values. These are country-specific and specified in the safety data sheet, chapter 9 of each country. Not in every country limits have been defined for every chemical substance.
Especially when working with solutions inside the tire it is important to provide adequate ventilations as limit values might be exceeded quickly in closed areas. Flammable solvents can also lead to an explosive atmosphere. Solvent vapors are usually heavier than air and need to be extracted near the floor.

- When using chemicals or solvents, do not eat, drink or smoke.

- Tire repair equipment and tools have to be in good conditions. They must never be left unattended when in use. Damaged or unserviceable safety equipment such as defective safety switches or similar devices expose the staff working near them to high risks.

- Working under bad illumination is dangerous. Good illumination and a clean work place are essential conditions for safe work. Reflective jackets are recommended in areas where vehicles are handled.

- Always keep dangerous tools, solutions, etc. out of the reach of children and unauthorized persons.

- Always observe the specific regulations for prevention of accidents from the employer's liability insurance association and the general safety regulations which apply in the countries concerned. In principle, a risk assessment for all activities in the respective working environment must be carried out before the start and adjusted in case of changes.

1.2 Tire terms

Tread
Plain or grooved rubber composite which ensures the contact with the road surface. It withstands wear and also protects the body plies together with the belts from cuts, punctures or any other damage resulting from running conditions. The tread includes the belts (protection plies and working stabilizer belts).

Shoulder
The edge area of the tread into the sidewall where the stepped belt edges are possibly located. The term describes a critical repair area, as this area is subject to increased temperatures and irregular movements. This area tends to be a possible area to develop separations.

Sidewall
Area between the bead and the tire shoulder. It determines the flexing behaviour of a tire. It contains the body ply including the extended ply turn-up.

Bead area (NRZ)
The part of the tire which is in contact with the rim. This part anchors the body ply, and seals the tire against the rim.
This part of the tire is described as NRZ (non-repairable zone or area). This term refers to the area between the bead toe and the centring rib.

Body ply
The radial body ply is the reinforcement which enables the tire to resist the tire inflations pressure. At the same time, it transmits the carrying force from the rim to the tread and the working belts.
The specification of the structure is specified according to the US standard for new tires under "sidewall".

The belt plies
The belt plies stabilize the tread and improve the distribution of pressure of the tire footprint. It also fulfills a protective function.
The specification of the structure is specified according to the US standard for new tires under "tread".

Inner liner
An air/ gas-tight rubber layer inside the tire. The inner liner usually consists of butyl rubber.

1. General information

1.3 Terms regarding tire repair

Hot/ warm vulcanization
Method of vulcanizing rubber fillings and repair patches on repair areas by means of heat and pressure.

Self- vulcanization
Method of vulcanizing repair patches on injuries at room temperature at least +18°C/ 65°F.

Puncture channel
Hole made by a foreign body penetrating into the tire casing/ belt.

Skive filling
Uncured rubber compound for filling the puncture channel before hot/warm vulcanization.

Pre-cured rubber insert (e.g. REMASTEM)
Pre-cured rubber plug for filling the puncture channel. It can only be used for punctures to the tread.

Combi repair unit (e.g. MINICOMBI)
One-piece repair unit which serves as a repair patch and fills the puncture channel at the same time. It can only be used for punctures to the tread.

Repair patch
Flat repair unit whose size and strength are adapted to the individual tire and injury sizes.

Reinforcement
Textile or steel cord which forms the plies of tire and is also used in repair patches from a specific size on.

Drying time/ Test with the back of the finger
The minimum drying time and the maximum permissible drying time have to be observed during the application of vulcanizing solutions and cements. The right moment for the application of a repair patch is, when the coat feels a little sticky when touched with the back of the finger but does not adhere to the finger or leave a wet residue on the finger; the coat should be dry, but still tacky.
This test is always carried out on the edge of the coated surface area.

LS (Low Speed)
Low speed – low speed rotary tool with
2 500 – 7 500 RPM preferred for machining rubber.

HS (High Speed)
High speed – high speed rotary tool with
16 000 – 30 000 RPM, preferred for machining steel.

RMA = Retreader Manufacturer Association

1.4 General rules for tire inspection and repair

- Before starting any repair, check whether it is technically safe and economically viable to repair the tire. Also check the whole tire for further hidden damage. Always examine the tire taking into account its general state outside the repair area.
- If a small injury is difficult to locate, slowly inflate the tire step by step to the operating pressure, permanently checking the whole tire for any noticeable defects.
- Always demount the tire from the rim in order to check whether repairs are technically safe and economically viable, and to carry out the repair.
- After preparing the injury, select the appropriate repair materials depending on the size and position of the injury.
- The injury area has to be prepared correctly by means of the appropriate tools. Further damage arising from the injury, which may be found during this operation, also has to be included in the evaluation of the tire's reparability.
- Always observe the country-specific regulations on the repair of tires.

1.5 Classification of motor vehicles and trailers (according to ECE total resolution G1)

Class T: tractor on wheels
Class C: tractors on tracks
Tractor: an agricultural or forestry motor vehicle on wheels or caterpillars with at least two axes, whose essential function is the generation of a tensile force and specifically for pull, push, protrude and to drive interchangeable equipment for agricultural and forestry work or for the extraction of agricultural or forestry trailers. Such a tractor can be equipped with passenger seats for the transport of loads.

Class R: trailer
Trailer: a drawn agricultural and forestry vehicle, which is essentially meant to be for carrying loads and to be coupled to a tractor in use intended for agriculture or forestry; this also includes trailers whose cargo is partially towed by the towing vehicle; the term "agricultural or forestry trailer" also includes vehicles, which are equipped with a device, if the ratio between the technically permissible maximum mass and the empty mass of this vehicle is 3.0 tons or more and if the vehicle is not designed to treat materials.

Class S: Trailed interchangeable machines:
A device for use in agriculture or forestry, that is meant to be pulled by a tractor and that changes or extends the function of the tractor; it can also be equipped with a loading platform that was constructed and built for the reception of the equipment required to carry out the work and devices as well as for the temporary storage of materials created or needed at work; under the term "pulled interchangeable engine" also vehicles are listed that are meant to be towed by a tractor and be permanently equipped with a device or are designed for the treatment of materials, if the ratio between the technically permissible total mass and the empty mass of this vehicle is less than 3.0 tons.

1.6 Definition of AS tires (according to ETRTO)

Tractors – drive wheel tires
A tire, primarily designed for equipping drive axles of agricultural tractors (category T vehicles), developed for high traction under constant high torque; it can also be used on self-propelled machines. The tire profile consists of blocks (cleats) for optimal field traction.

Steering wheels for tractors
A tire, designed for the assembly of non-driven axles of agricultural tractors (category T vehicles), combine harvesters, industrial towing tractors or backhoe-loaders. The tire profile generally exists of grooves. Tractor wheels are marked with the addition "front" behind the dimension marking or alternatively with the marking 'F1' or 'F2'.

Volume tires
They are mainly used on powerful tractors and harvesters. They are characterized by a very large air volume and footprint for soil conservation.

Forestry tires
A tire designed for use on machines and equipment in forestry application, suitable for high torque (HT) at low load (e.g. Skidder) or low torque (LT) at high load (e.g. forwarders, timber harvesters or forestry trailers). Forestry tires are marked with the addition 'LS1' or 'LS2' or 'LS3' or 'LS4' behind the dimension label.

Implement tires
A tire primarily designed for agricultural machinery or equipment, towed machines (vehicle category S), agricultural trailers (vehicle category R), motor milling or small tractors (vehicles in category T2 or T3); it can also be mounted on agricultural tractors (vehicle category T), but not for continuous use under high torque. Implement tires are marked with the addition 'Imp' behind the dimension designation or optionally with the marking ‚implement'. Implement tires are not designed for industrial or tractor drive wheel use.

Construction site tires (industrial towing tractor)
A tire designed for use on industrial trucks, backhoe loaders, telehandlers and other vehicles in industrial and construction site services (e.g. wheel loaders, excavator, etc.)
Industrial towing tractors and construction site tires are marked with the suffix "IND" behind the dimension designation or optionally marked with 'R4' or 'F3'.

1.7 Classification of repair material and tire type

Commercial vehicle tires are divided into three sections:
"Normal tire" a tire that is suitable for normal everyday use on the road.

"Special tire" a tire that is used for both on and off road or for special purposes.
These tires are marked MPT (Multi Purpose Tires) and have a reinforced cleat structure. Their design is up for high speeds on the road and a good traction in the field.

"M-and-S tire" a tire whose tread pattern, tread compound or type especially the driving characteristics will be improved in snow compared to a normal tire with regards to its abilities to enable or maintain vehicle movement.

Also appropriate repair material and methods have to be used for the different types of tires. For the tire types radial or diagonal the corresponding patch types need to be selected. Before the rim diameter a 'D' or ,-, is marked for tires in diagonal design. For a belted tire in diagonal design a 'B' must be shown and for radial tires an 'R'.

According to ECE-106 the following tires are not listed for agricultural use. Construction equipment (tires marked 'Industrial', 'IND', 'R4' or 'F3'), earthmoving machinery, industrial vehicles and forklift trucks. Following, these repairs are not documented in this manual.

The chart below is intended to provide guidance for correct assignment. For appropriate selection of tire size, damage size and repair patch please refer to the damage chart.

	"tires in diagnoal construction"	"diagonal construction" and "belted tires in diagonal construction"
tractors - drive wheel tires tractors - steering wheels volume tires forestry tires implement tires	**AS** RAD 100 PREMIUM RAD 500 ARAMID PREMIUM	**AS** PN-Diagonal PREMIUM PN 02X
construction site tires (industry towing tractor)	**OTR** RAD 100 PREMIUM	**OTR** PN-EM PREMIUM series 05X
normal tires special tires (MPT) M-and-S-tires	**truck** RAD 100 PREMIUM RAD 300 STEEL PREMIUM RAD 500 ARAMID PREMIUM M-RCF 400 PREMIUM	**truck** PN-DIAGONAL PREMIUM PN 0X

Concerning forestry tires protective layers will be integrated in the sidewall of radial type tires. These will not be taken into account for the selection of the repair material.

TUBELESS or TUBE type tires will not be differentiated for the selection of repair materials. Special repair patches are available for hoses.

2. Repair of Radial tires

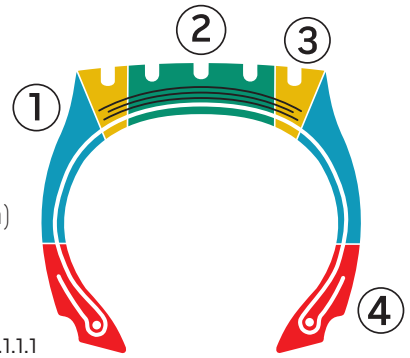
2.1 Preparation
2.1.1 Repair instructions

Classification of tires in zones (fig. 2.1.1.1)
1) sidewall

2) tread

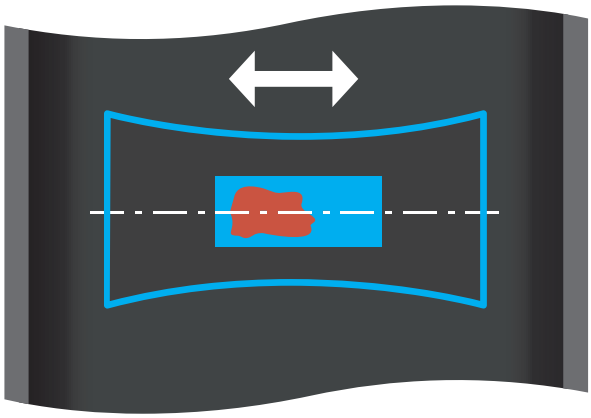
3) shoulder

4) bead area
(non repairable area)



2.1.1.1

Patch center (fig. 2.1.1.2)
Patch center is equal to damage center.
Do not move patch in the axial direction, only in the designated radial area which is shown on the patch template.

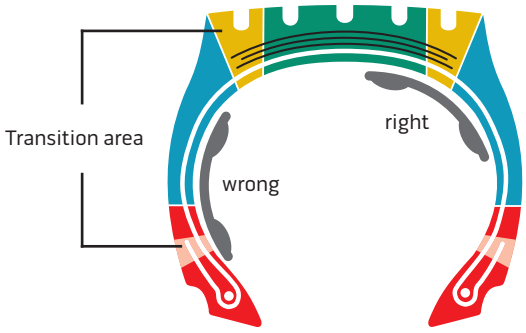


2.1.1.2

Clean and dry tires
In general, AS tires must be thoroughly cleaned prior to repairs. This is especially important for tires, with a water/ calcium filling or similar. Dry tire casings before processing. Here, roughly open the damage and dry in a warm room for at least 24 hours or 12 hours with technical tools (drying hood, hot air blower or TP unit).

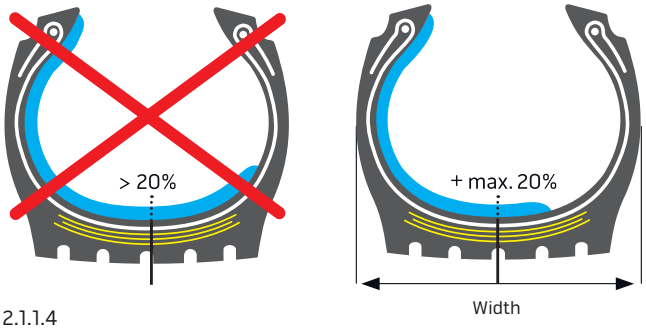
Flexing area (fig. 2.1.1.3)
When applying repair patches to radial tires, make sure that the cord ends of the repair patch are not in the flexing area of the tire. There is a risk of fatigue breakage in the repair patch. If the whole injury is still within the recess of the patch template, the repair patches can be shifted out of the flexing area in the radial direction.

The cord ends are under the raised areas at the ends of the repair patches. The tire flexing areas are at the end of the body ply turn up and in the flexing area between the shoulder and the sidewall. (widest belt layer)



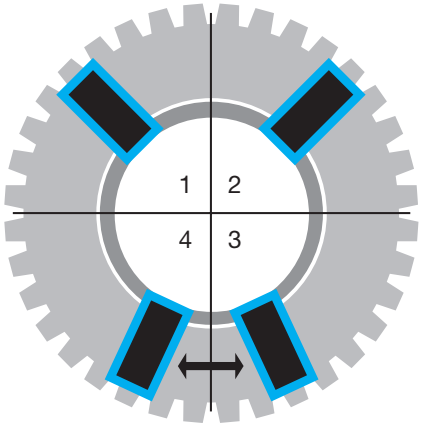
2.1.1.3

Bridge patch (fig. 2.1.1.4)
A patch may extended from the bead, a maximum of 20% across the middle of the tire width.



2.1.1.4

Maximum number of injuries (fig. 2.1.1.5)
Only one repair is allowed for each ply cord.
In a tire divided into four quarters, there has to be only one repair patch in every quarter.



2.1.1.5

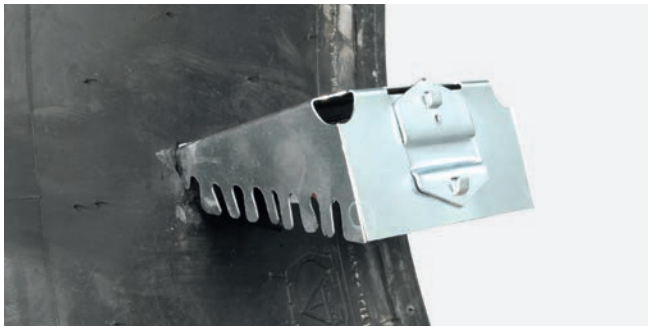
Distance check
The minimum distance between two repair patches is equal to the width of the larger patch.

2.1.2 Prepare injury

Note: Ensure the tire is stable and possible tire spreaders are well-positioned.

- Document all required tire data.
- Locate and mark injured area on the tire.
- Disassemble tires according to instructions.
- Remove foreign bodies without further damage to the tire. (fig. 2.1.2.1)
- Inspect tires inside and outside. Pay attention to any further hidden damage. For example, foreign bodies within the tread. (fig. 2.1.2.2)
- Work or exercise cards make it easier to hold on all information.
- Check general repair option of the tire. Professionally check according to relevant assessment criteria, such as overall condition of the tire, country specific damage limits, etc. Check whole tire for further, hidden damage and repairs already made in the past.
- Clean injury area and environment inside the tire with LIQUID BUFFER. (fig. 2.1.2.3)
- Immediately scrape injury area with a scraper tool.
- Completely remove dirt with dust/ water vacuum. (fig. 2.1.2.4)

Note: The procedure described above completely removes silicone, graphite and other mould release agents from the liner. Scrap an area needed slightly larger than the one for the installation of the patch.



2.1.2.1

2.1.2.2

2.1.2.3

2.1.2.4

2. Repair of Radial tires

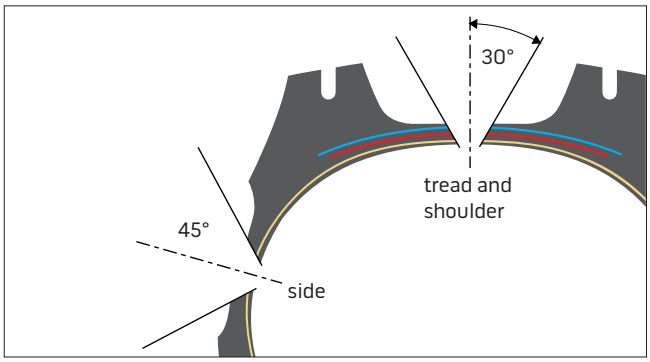
2.1.3 Damage repair

Note: For forestry tires restricted set protective layers are partially installed in the sidewall to the radial casing. Repair procedure equal to Radial tires.

- Use a rotary gouge to cut out the skive (bowl-shaped). Hot and sharp rotary gouges considerably facilitate the cutting process.
  For rubber workings next to the cords use the chip rasp for the preparation of the rubber damage. Wrong handling of the hollow knife can lead to damage of the cords. (fig. 2.1.3.1)

2.1.3.1

- Cut out the major part of the cord damage with a knife and limit splits. Angle the skive using the knife.
  45° for sidewall injuries
  30° for tread and shoulder injury. (fig. 2.1.3.2)



2.1.3.2

- Remove dust with a soft hand brush so that the injury is more visible.

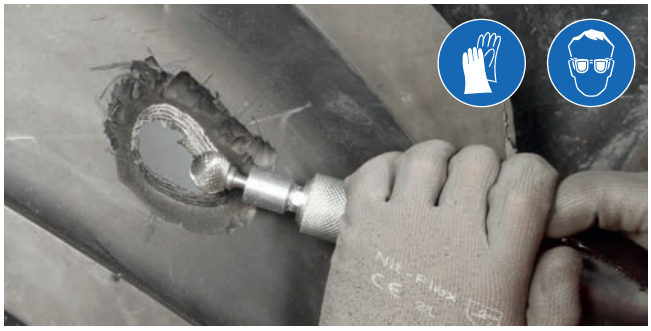
- Buff cord intermediate rubber with cone rasp or pencil rasp. Observe the skive angle. (fig. 2.1.3.3)

2.1.3.3

- Grind the cord layers with a carbide ball or shell stone into the rubber to avoid a reduction of the rubber surface by folding the cords. Fluffy cords have to be avoided due to a reduced connection of the skive filling. For easy dealing with shell stones these have to be grinded to the required shape. (fig. 2.1.3.4)

- Check that all cord layers are firmly anchored in the rubber and have no separations.

Note: Make sure that no splits arise from the injury. Unlimited splits lead to failure of the repair and the tire. Remove any rotted or separated cords. Wet cord must be completely dry before further processing starts.



2.1.3.4

2. Repair of Radial tires

2.1.4 Additional work with steel belt

- Cut across the steel cables to be removed with a 3 mm router at high speed. This operation needs great care so as not to damage other undamaged cables. Do not expose cables or damage spirals. (Abb. 2.1.4.1)

  Remove injured material in treads with a 6 mm router at high speed.

Note: For tread damage: Completely remove broken, rusty or damaged steel layers or separations. Keep the injury area as small as possible to keep the highest possible inherent stability of the tire.

2.1.4.1

- Try to keep the damage outline as round as possible by constant movement of the high speed buffer in circular motion.

- After removing the injury, the steel should be trimmed back completely into the rubber using high speed stones. (fig. 2.1.4.2)

2.1.4.2

- Check that all cord layers are firmly anchored in the rubber and have no separations. (fig. 2.1.4.3)

2.1.4.3

- Buff cord rubber in the damaged edge with puncture channel brush. (fig. 2.1.4.4)

- Clean the injury area with the brass brush and dust/water vacuum cleaner.

Note: Make sure that no splits arise from the injury. Unlimited splits lead to failure of the repair and the tire.

2.1.4.4

Shown on this page are exemplary images of a truck tire.

2. Repair of Radial tires

2.1.5 Preparation of repair area

- Clean the repair area with brass brush and dust/ water vacuum cleaner.
- Carry out an accurate damage analysis.

Note: The skive may also be prepared ahead of the injury area.

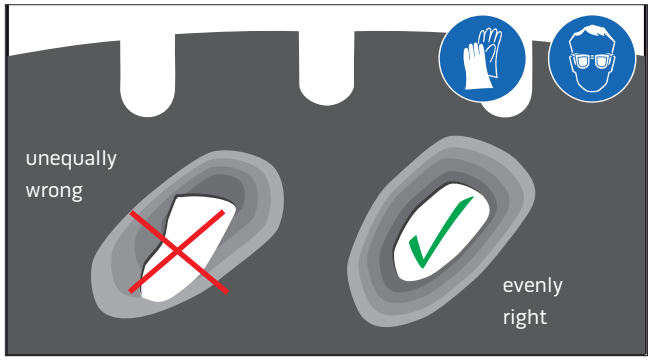
- Use a chip rasp to prepare the injury (bowl-shaped). An even RMA 4-5 texture is recommended for the filling.
  Use a plastic bound wire brush to prepare the rubber close to the cords to avoid damage or exposing of the steel/ textile cord. Working with the rounded side of the rasps; to get the injury area in the right shape.
  Do not leave sharp edges on the buffed rubber surface.
  Another method is to immediately cut out the damage with a knife and then remove the damage in the rubber area. (fig. 2.1.5.1)
- Break the edge of the skive at the outside and inside of the tire by using a wire brush. (fig. 2.1.5.2)
- Clean injury area with a brass brush and dust/ water vacuum cleaner.

Note: Make sure that the edge of the skive has a regular shape. If it is not shaped regularly, the tensions arising may cause the repair to fail. (fig. 2.1.5.3)

- Check for an even concave skive edge in the flexing area between cleats and profile base in the flexing area. High tensions may arise in this area in the tire which may lead to a separation between skive filling and tires. (fig. 2.1.5.4)

2.1.5.1

2.1.5.2



2.1.5.3

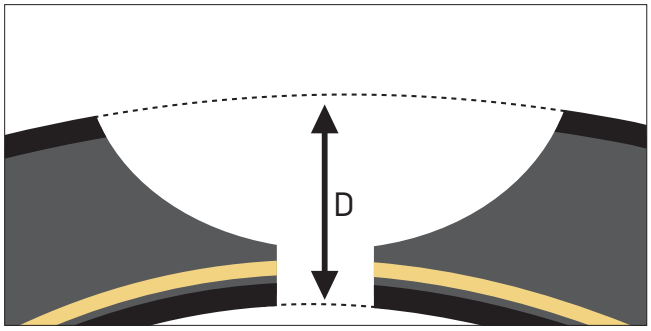
2.1.5.4

2. Repair of Radial tires

2.1.6 Measure size of damage/ choose patch

- Measure size of damage

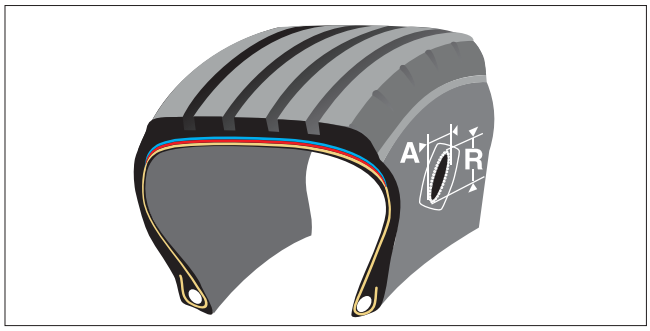
Note: Measure maximum tire thickness in the damage area and note on the tire for heating time calculation. Depending on the vulcanization system and on the installation of the heating elements the tire size with or without tire profile has to be considered. Devise of manufacturers has to be considered. (fig. 2.1.6.1)



2.1.6.1

For sidewall damage:
Measure maximum damage width (A) and length (R). Ropes open fan-shaped towards the tread. The highest dimension of the damage extension is to use.

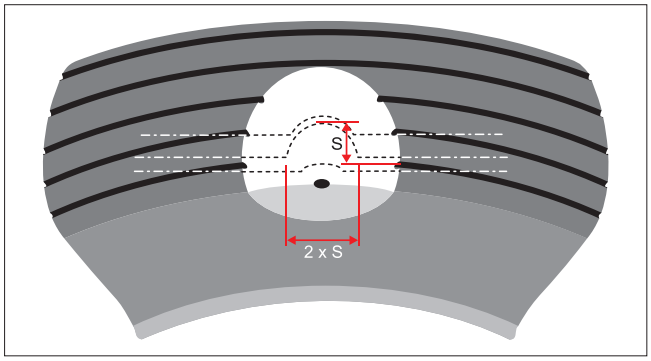
A (axial - transverse to the cord direction of the carcass ply)
R (radial - in the direction of the carcass ply)
(fig. 2.1.6.2)



2.1.6.2

For shoulder injuries:
Shoulder damage is in the area where the stepped belt edges are located. It can be defined, if not to all visible cord ends a matching counterpart is visible.
If there are two or more damaged belt edges (shoulder) a repair patch is necessary. If only one belt layer is damaged, this damage will not be considered in the patch selection.

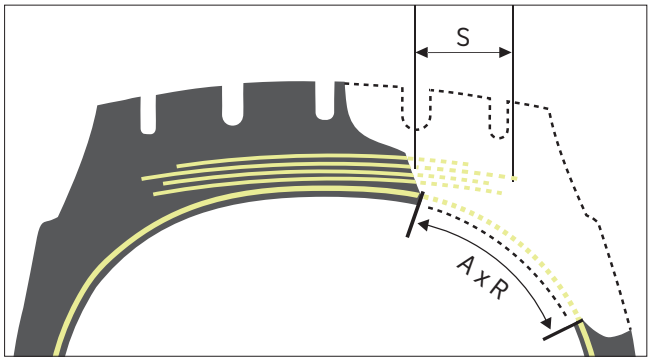
The dimension S will be measured at the second damaged belt layer from outside in the axial and radial directions. S in the radial direction may not exceed the value of the patch size indicated in the chart. (fig. 2.1.6.3)



2.1.6.3

S in the axial direction may not exceed twice the value of S indicated in the chart. If necessary, a larger repair patch is required so that all damage dimensions can be followed.

In addition, the damage to the tire casing A and R has to be measured on the inside of the tire and needs to be considered for patch selection. The patch needs to cover both the dimension S as well as the dimensions A and R. (fig. 2.1.6.4)



2.1.6.4

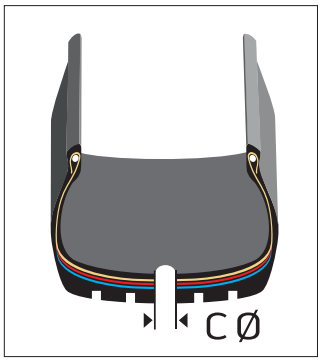
2. Repair of Radial tires

Full penetration tread damage:

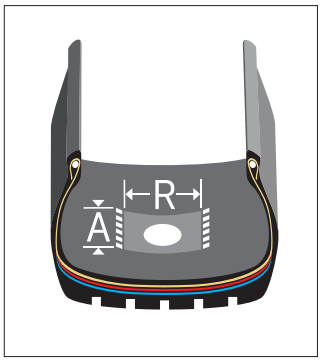
Ø C (tread damage)
(fig. 2.1.6.5)

A (axial)
R (radial)
(fig. 2.1.6.6)

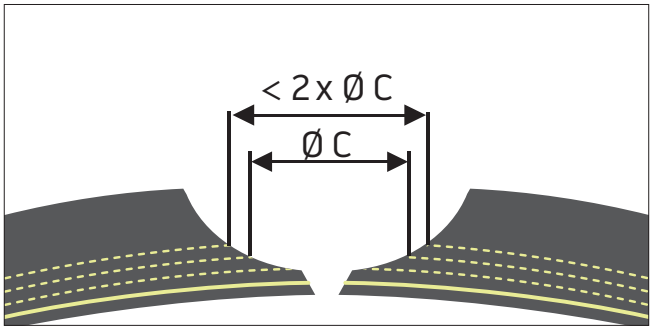
Maximum diameter of the damage at the 2nd belt layer from above. If 2x Ø C is larger in the 1st position than Ø C in the 2nd position, the 1st position has to be divided in halves and gives the determining factor Ø C.
(fig. 2.1.6.7)



2.1.6.5



2.1.6.6

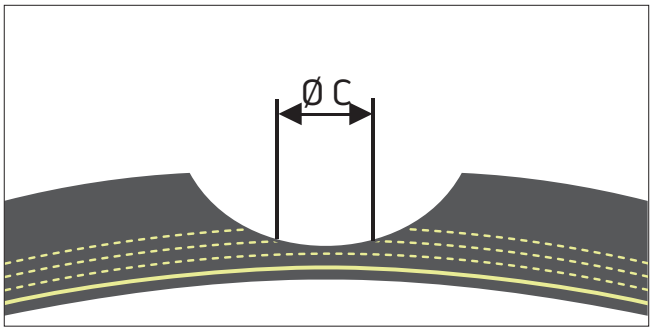


2.1.6.7

Non-penetrating tread damage:
Ø C (tread damage)

From the second damaged belt layer a patch is necessary.

The dimension Ø C will be measured at the 2nd damaged position and a suitable repair patch will be selected.
(fig. 2.1.6.8)



2.1.6.8

- Note damage dimensions on the tire.
- Select suitable repair patch.
- Use REMA TIP TOP RADIAL repair chart.
- Note patch size number on the tire.

Note: It must be ensured that in the injury area both stumps to each visible tire casing are visible to exclude further separations or withdrawn casing parts.

The repair charts represent the relationship between tire size, injury size, injury location and the required repair patch.

2.2 Two-way-system repair

In a two-way-system the filling will be cured prior to the installation of the repair patch. The patch self-vulcanizes at room temperature at minimum +18°C/ 65°F. Vulcanization time of the laminated RAD patch: 48 hours.

2.2.1 Preparation of the injury area

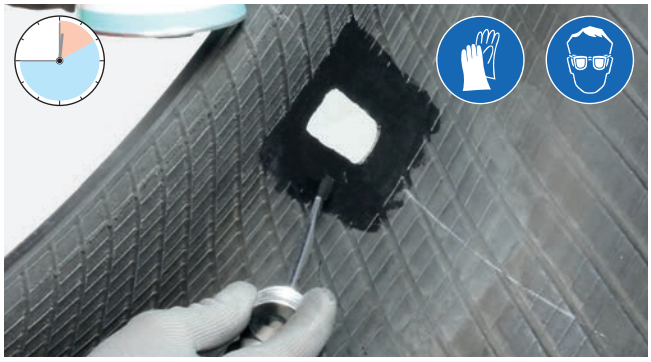
- Buff an about 10mm wide area around the injury, inside the tire. (fig. 2.2.1.1)
- Clean injury area with a brass brush. Completely remove with a dust/ water vacuum cleaner. Immediately coat repair area.
- Check if the skive is clean on the outside of the tire. If not, slightly buff the injury skive with a plastic bound wire brush, then clean with the brass brush to vacuum the remaining dust.
- Evenly apply SOLUTION MTR-2 to the injury area on the outside of the tire and then to the buffed surface inside the tire. (fig. 2.2.1.2 and 2.2.1.3)
- Turn repair area to 3 or 9 o'clock position.
- Note drying time of the SOLUTION MTR-2 before installing the patch.
  Drying time knuckle test (10-45 minutes).

Note: Do not artificially accelerate the drying process of the solution. Before pulling back the injury area make sure that the solution inside of the tire may not be contaminated by falling dust from buffering.

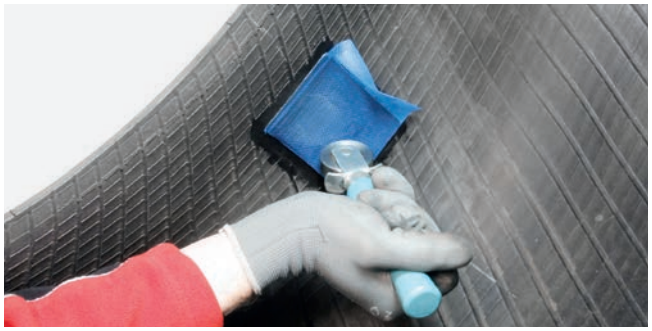
- Cut off RUBBER MTR-UNI and heat up to 80°C [176°F].
- Stitch 2 stripes of RUBBER MTR-UNI to the inside of the tire. (fig. 2.2.1.4)

2.2.1.1

2.2.1.2



2.2.1.3



2.2.1.4

2. Repair of Radial tires

2.2.2 Filling

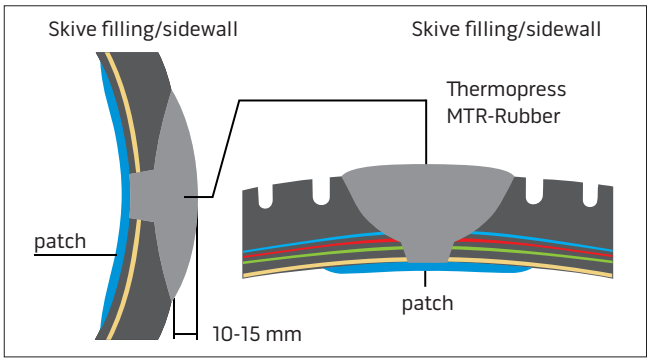
- Extrude RUBBER MTR-EXT into the damaged area in parallel paths. Avoid crossing positions, as these can lead to air traps. (fig. 2.2.2.1)

2.2.2.1

- Stitch RUBBER MTR-EXT on the outside of the tire in layers, starting from the middle to avoid air traps. (fig. 2.2.2.2)

2.2.2.2

- Overfill (10 - 15 mm) to compensate the flow process. In the overfill process the flow into a negative profile has also to be considered. (fig. 2.2.2.3)



2.2.2.3

Alternatively:
Cut RUBBER MTR-UNI, heat up to 80°C [176°F] and stitch on the outside of the tire in layers without creating bubbles.

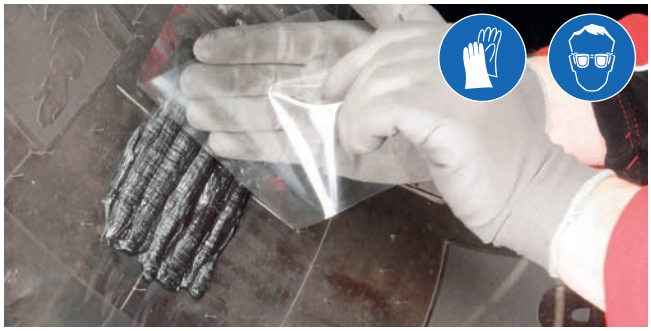
Note: Depending on the vulcanizing machine the profile negative has to be filled with suitable materials if there is damage to the shoulder or tread to prevent the filling from flowing.
For example, plaster casts of existing bars or tailor-made vulcanized rubber pieces can be used. The additional negative filling has to be considered when determining the heating time.
(fig. 2.2.2.4)

2.2.2.4

2.2.3 Curing skive filling

Apply SOLUTION MTR-2 to the surface of the skive filling on the inside and outside. After 2 - 3 minutes cover it with heat-resistant foil to avoid dirt or parts of the equipment on the rubber filling.
(fig. 2.2.3.1 and 2.2.3.2)

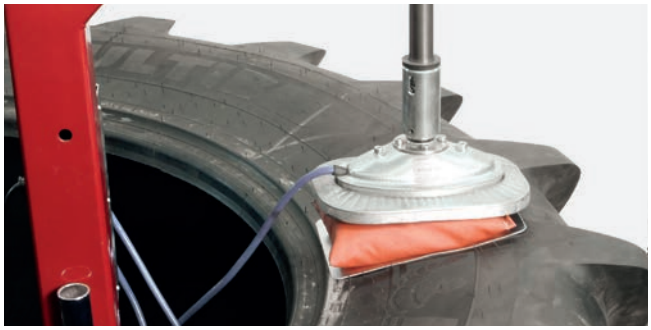
2.2.3.1



2.2.3.2

- Cure with a hot press or other system. (fig. 2.2.3.3)
  Always follow instructions for use of the respective vulcanization equipment manufacturer.
  Hot vulcanization system (from +100°C/ 212°F)

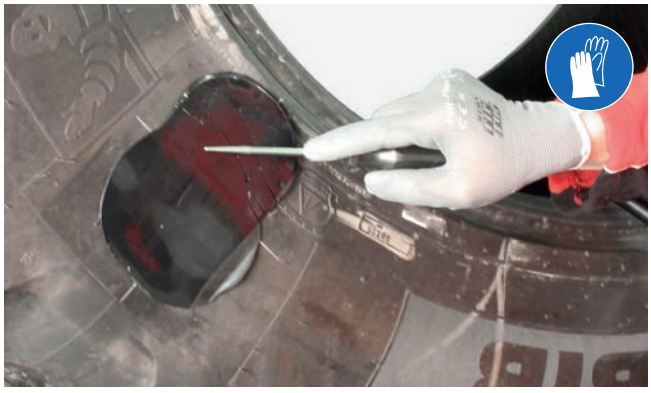
- Adjust the heating elements to the tire shape to receive the original tire contour during curing. The use of pressure pad ensures a force and temperature-sensitive adaptation between heating element and tire contour.



2.2.3.3

- Check the skive filling immediately after removing the tire from the vulcanizing machine. To this end, press the tire probe into the skive filling. If it leaves a durable mark (rubber not fully vulcanized), the whole curing process will have to be repeated and the skive filling has to be refilled. If gas bubbles are found upon inspection, the repair has to be repeated. (fig. 2.2.3.4)

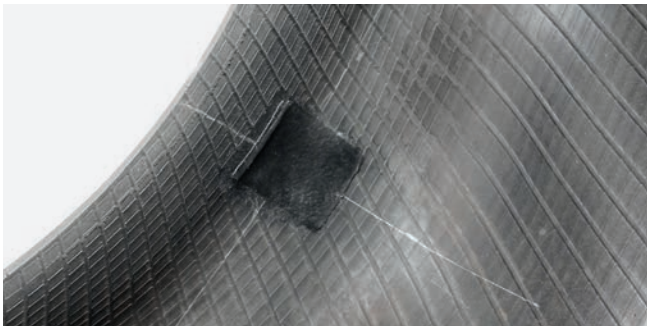
Note: Further processing will take place after complete cooling of the tire to room temperature.



2.2.3.4

2.2.4 Mark the patch

- Draw a cross through the centre of the injury until beyond the edge of the patch installation area. (fig. 2.2.4.1)



2.2.4.1

- Use a tire marking pen or a piece of chalk and template or patch to mark the liner area to be buffed. (fig. 2.2.4.2)

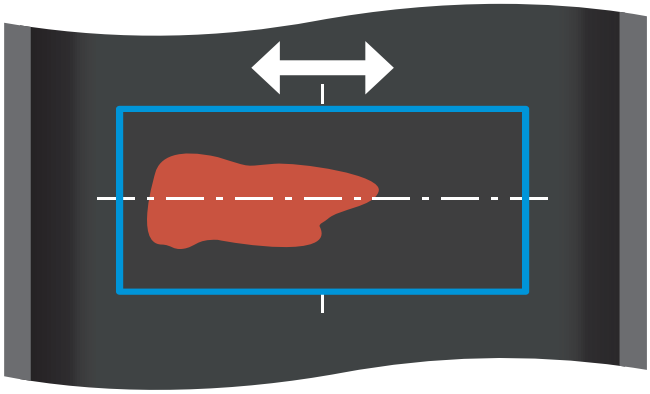
2.2.4.2

- The patch templates are essential for accurate positioning of the patch. They are printed on the respective patch packaging and just must be cut out for use at the marked points. (fig. 2.2.4.3)

2.2.4.3

Note: Patches can be moved in the radial direction to cover the patch cord covers outside the transition areas. The damage must be within the cutout marked on the template. (fig. 2.2.4.4)

The patch may not be moved in the axial direction.



2.2.4.4

Note: If problems with the liner occur (e.g. looseness, soft smearing) completely remove the liner from the patch installation area (chapter 2.4). When the liner is removed the patch has to be laminated. The laminating process, however, is recommended with every repair on the liner.

2.2.5 Buffing the inner liner

- - If additional contaminations have to be removed, this has to be made up now. Mark the patch again in the end. (See point inner liner cleaning)

- Buff the liner with a 36 grit Dome rasp. When buffing the line all vent lines or vent patterns must be removed until the surface is even. Only use light pressure when buffing, and do not allow the tool to remain stationary in one spot. (fig. 2.2.5.1 and 2.2.5.2)

Note: The 36 grit Dome rasp will provide a nice even buffing texture. A velvety RMA 2-3 texture is correct for patch unit application. If during the buffing process, any problem is noted with the liner such as looseness or soft smearing. It is recommended to remove the liner from the patch placement area. (see section removal of the inner liner)
Coat repair area immediately after buffing.

2.2.5.1

2.2.5.2

- Finally clean with brass bristled brush, and remove all dust with vacuum cleaner. Never use compressed air to remove buffing dust. (fig. 2.2.5.3 and 2.2.5.4)

2.2.5.3

2.2.5.4

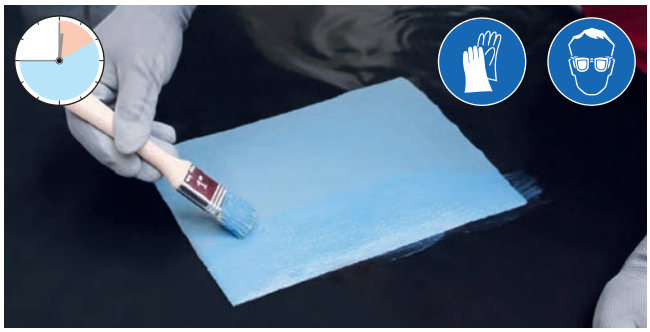
2. Repair of Radial tires

2.2.6 Laminate the patch

For all AS repairs it is recommended to laminate the patch.

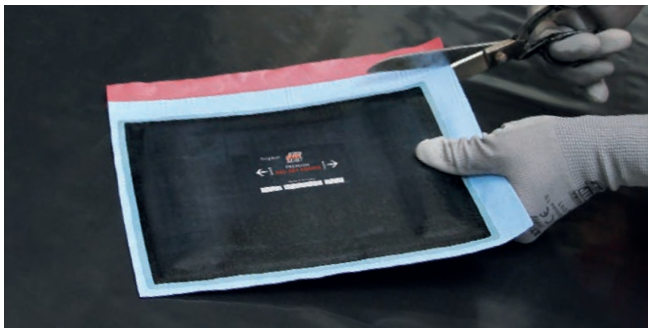
- Completely remove the protective cover of the patch, without touching or polluting the bonding layer. Then put the patch with the front on a clean surface.
- Apply an even and thick coat CEMENT SC-BL to patch bonding layer. **(fig. 2.2.6.1)**
  Drying time knuckle test (10-45 minutes).
- The RUBBER SV-GUM should be a little bit larger than the patch. Trim the gum without polluting the bonding surface to the patch.
- Laminate the patch with RUBBER SV-GUM you have prepared. Stitch the gum on with a wide roller-stitcher, avoiding air entrapment. **(fig. 2.2.6.2)**
- The RUBBER SV-GUM should be 6-8 mm larger than the patch on all sides. **(fig. 2.2.6.3)**
- Score the centre of the protective foil without cutting through the cushion gum.
- Apply an even coat CEMENT SC-BL to buffed surface. **(fig. 2.2.6.4)**
  Drying time knuckle test (10-45 minutes).
- Position injury at 3 or 9 o'clock position.
- Consider drying time before applying the patch.

Note: Do not artificially accelerate the drying process of the solution. Before pulling back the injury area make sure that the solution inside of the tire may not be contaminated by falling dust from buffering. Laminate patch max. 2 hours ahead of applying.



2.2.6.1

2.2.6.2



2.2.6.3

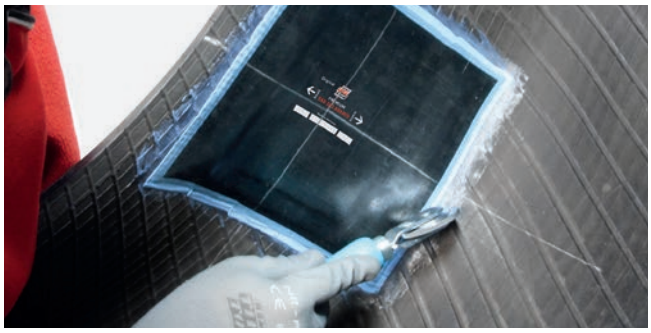
2.2.6.4

2.2.7 Patch unit application

- Relax tire beads before patch installation (do not spread or pressurize).
  Exception: Series 100 tires, which have beads very close to each other, may be slightly spread.
- Turn the damaged area to 6 o'clock position. If no EM repair stand is available, turn the repair area to 5 or 7 o'clock position to avoid deformation.
- Mark a cross on the patch for installation.
- Check the cement for drying. **(knuckle test)**
- Release protective foil on both sides to 2/3 and again hit back to protect the connecting surface. **(fig. 2.2.7.1)**
- Properly place the patch on the marked cross at the damaged area.
- Remove protective film on one side starting from the patch centre, then stitch patch from the centre to the outside.
- Also remove the second part of the protective film from the middle of the patch. Stitch the patch from the centre to the outside. **(fig. 2.2.7.2)**
- Make sure that the entire patch is completely stitched. **(fig. 2.2.7.3)**

2.2.7.1

2.2.7.2



2.2.7.3

Note: After manual stitching a pneumatic patch hammer can be used to affect increased pressure on the surface of the patch. If a cold TP-EM I is available, the patch can firstly be pressed at the centre for 15 minutes and then to the outside 10 minutes each. **(fig. 2.2.7.4)**

- Finally, roll on the edge of the patch.

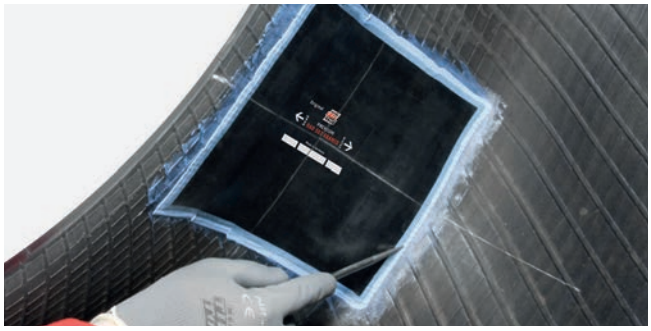
2.2.7.4

2. Repair of Radial tires

2.2.8 Final inspection

- Note all required data with a patch making pen on the patch.
- Check the correct patch installation to avoid voids or bubbles. (fig. 2.2.8.1)

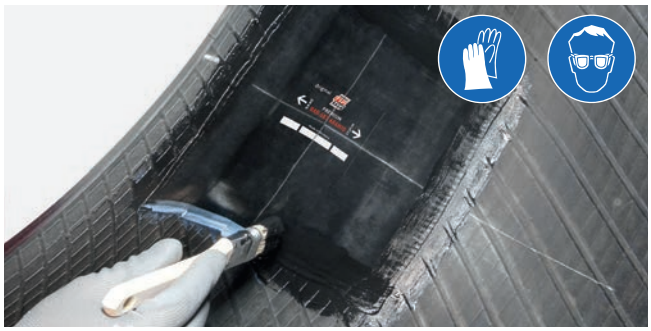
Vulcanization: The self -vulcanizing of the applied patch requires an ambient temperature of at least 18°C (65°F). Patches that are not laminated require a vulcanization time of 24 hours and laminated patches require 48 hours.



2.2.8.1

- Check the whole tire (including the inside and the repair patch).
- Apply INNERLINER SEALER to the patch border area and all buffed areas next to the patch. (fig. 2.2.8.2)

Alternatively, RCF SEALER-PLUS can be used instead of INNERLINER SEALER.



2.2.8.2

- Buff the filling in mounted condition with max. 1 bar; grind filling to match the original contour to adapt to the tire. First, you can use 65 mm contour disc to increase the elevation to grind the filling. For finishing however, the grinding tool ES45 with fine grain size is recommended. (fig. 2.2.8.3)

2.2.8.3

- Tread has to be re-profiled according to the original profile. (fig. 2.2.8.4)

Note: Check the whole tire (including the inside and the repair patch) before returning to normal service.

2.2.8.4

2.3 One-way system repair

In the one-way system patch and filling are simultaneously vulcanized.

2.3.1 Mark the patch

- Mark a little cross through the middle of the repair area until beyond the edge of the patch installation area. (fig. 2.3.1.1)

2.3.1.1

- Use a tire marking pen or a piece of chalk and template or patch to mark the liner area to be buffed. (fig. 2.3.1.2)

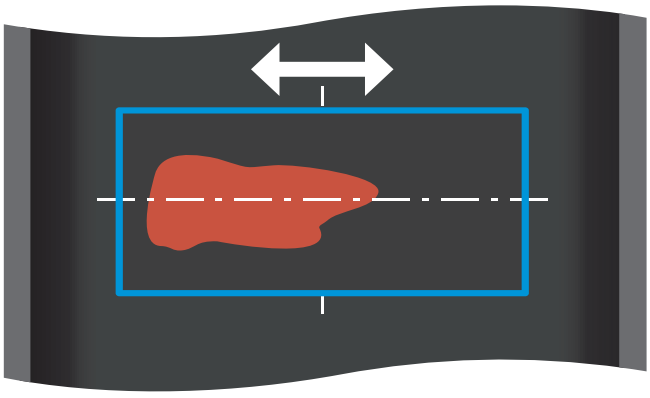
2.3.1.2

- The use of templates is a must to locate the patch unit accurately. The patch templates are printed on the packaging of the patches. Just cut the templates out in the marked areas in order to be able to use them. (fig. 2.3.1.3)

2.3.1.3

Note: Patches can be moved in the radial direction to cover the patch cord covers outside the transition areas. The damage must be within the cut-out marked on the template. (fig. 2.3.1.4)

The patch may not be moved in the axial direction.



2.3.1.4

Note: If problems with the liner occur (e.g. looseness, soft smearing) completely remove the liner from the patch installation area (chapter 2.4). When the liner is removed the patch has to be laminated. The laminating process, however, is recommended with every repair on the liner.

2.3.2 Buffing the inner liner

- If additional contaminations have to be removed, this has to be made up now. Mark the patch again in the end. (See point inner liner cleaning)

- Buff the liner with a 36 grit Dome rasp. When buffing the line all vent lines or vent patterns must be removed until the surface is even. Only use light pressure when buffing, and do not allow the tool to remain stationary in one spot. (fig. 2.2.5.1 and 2.2.5.2)

Note: The 36 grit Dome rasp will provide a nice even buffing texture. A velvety RMA 2-3 texture is correct for patch unit application. If during the buffing process, any problem is noted with the liner such as looseness or soft smearing, it is recommended to remove the liner from the patch placement area. (see section removal of the inner liner)
Coat repair area immediately after buffing.

- Finally clean with brass bristled brush, and remove all dust with vacuum cleaner. Never use compressed air to remove buffing dust. (fig. 2.2.5.3 and 2.2.5.4)

2.3.2.1

2.3.2.2

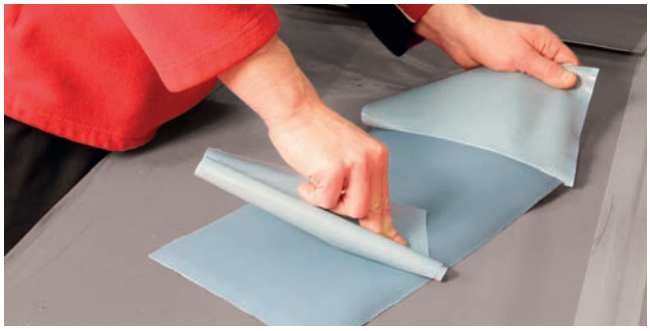
2.3.2.3

2.3.2.4

2.3.3 Laminate patches
It is recommended to laminate the repair patch for all AS repairs.

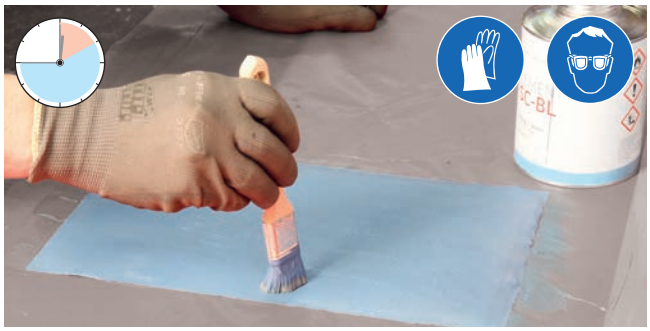
Note: Use RUBBER SV-GUM with CEMENT SC-BL or RUBBER MTR-CUS with SOLUTION MTR-2 in one-way system. RUBBER SV-GUM should not be used in open steam autoclaves.

- Completely remove the protective cover of the patch, without touching the bonding layer or to pollute it. Then put the patch with the front on a clean surface. (fig. 2.3.3.1)



2.3.3.1

- Richly apply an even coat of CEMENT SC-BL on the bonding layer of the patch. (fig. 2.3.3.2)
  Drying time knuckle test (10-45 minutes).

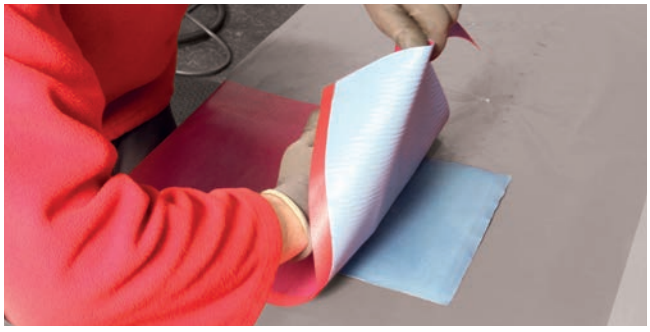


2.3.3.2

- Apply an even coat of CEMENT SC-BL on the buffed surface at the inside of the tire and at the damage filler. (fig. 2.3.3.3)
  Drying time knuckle test (10-45 minutes).
- Turn the repair area to 3 or 9 o'clock position.
- Cut RUBBER SV-GUM slightly larger than the patch and arrange for installation without polluting the bonding surface.

2.3.3.3

- Cover patch with prepared RUBBER SV-GUM and stitch with a wide applicator and avoid bubbles. (fig. 2.3.3.4)



2.3.3.4

2. Repair of Radial tires

- Cut the RUBBER SV-GUM with an area of 6-8 mm larger than the patch on all sides. (fig. 2.3.3.5)

2.3.3.5

- Cut the protective foil in the middle without cutting the laminate rubber. (fig. 2.3.3.6)
- Note the drying time before installing the patch.

Note: Do not artificially accelerate the drying process of the solution. Before pulling back the injury area make sure that the solution inside of the tire may not be contaminated by falling dust from buffering. Laminate patch max. 2 hours ahead of applying..

2.3.3.6

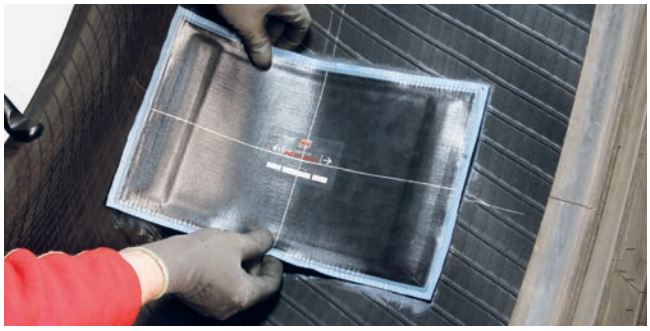
- Relax the tire beads before installing the patch (do not spread or pressurize).
  Exception: Series 100 tires which have beads very close to each other may be slightly spread.
- Turn the damaged area to 6 o'clock position. If no EM repair stand is available, change the repair location to 5 or 7 o'clock position to avoid deformation.
- Mark a cross on the patch for installation. (fig. 2.3.3.7)
- Check the cement for drying. (knuckle test)
- Release protective foil on both sides to 2/3 and again hit back to protect the bonding surface. (fig. 2.3.3.8)

2.3.3.7

2.3.3.8

2.3.4 Patch installation

- Properly place the patch on the marked cross at the damaged area. Remove protective film on one side starting from the patch centre, then stitch patch from the centre to the outside. (fig. 2.3.4.1)

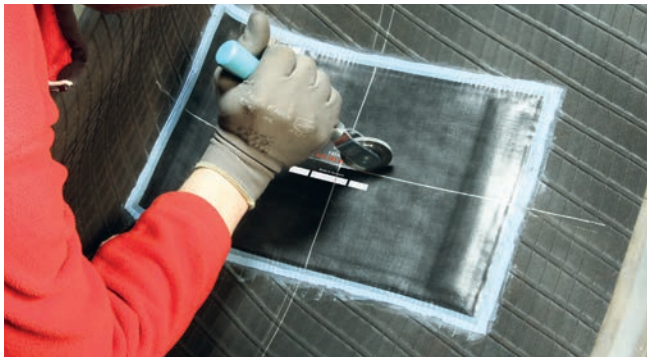


2.3.4.1

- Also remove the second part of the protective film from the middle of the patch. Stitch patch from the centre to the outside. (fig. 2.3.4.2)

2.3.4.2

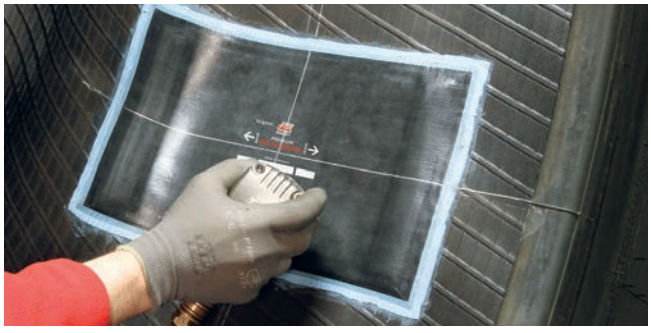
- Make sure that the entire patch is completely stitched. (fig. 2.3.4.3)



2.3.4.3

Note: After manual stitching a pneumatic patch hammer can be used to affect increased pressure on the surface of the patch. If a cold TP-EM I is available, the patch can firstly be pressed at the centre for 15 minutes and then to the outside 10 minutes each. (fig. 2.2.4.4)

- Finally, stitch the edge of the patch. All required data can be noted with patch marking pen on the patch. Apply INNERLINER SEALER to patch edge and all buffed areas next to the patch. This process can also be done after curing during the final inspection.



2.3.4.4

2.3.5 Filling

- Extrude RUBBER MTR-EXT into the damaged area in parallel paths. Avoid crossing layers, as these can lead to air bubbles. (fig. 2.3.5.1)

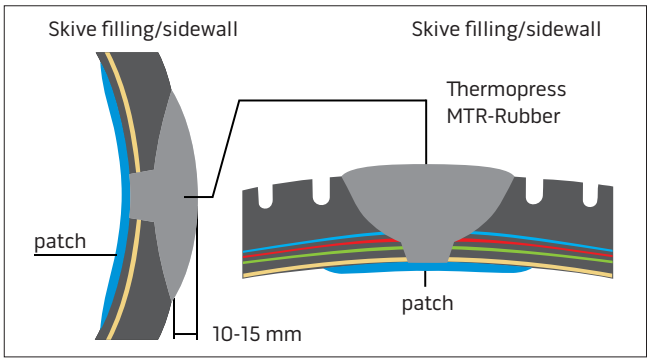
2.3.5.1

- Stitch RUBBER MTR-EXT on the outside of the tire in layers starting from the middle, roll on and avoid air traps. (fig. 2.3.5.2)

2.3.5.2

- Overfill (10 - 15 mm) to compensate the flow process. In the overfill process the flow into a negative profile has also to be considered. (fig. 2.3.5.3)

Alternatively:
Cut off RUBBER MTR-UNI, preheat to 80°C [176°F] and stitch on the outside of the tire in layers without creating bubbles.



2.3.5.3

Note: Depending on the vulcanizing machine, the profile negative has to be filled with suitable materials if there is damage to the shoulder or tread to prevent the filling from flowing.
For example, plaster casts of existing bars or tailor-made vulcanized rubber pieces can be used.
The additional negative filling has to be considered when determining the heating time. (fig. 2.3.5.4)

2.3.5.4

- Apply SOLUTION MTR-2 on the surface of the filling and cover with heat resistant foil after 2 – 3 minutes to prevent adhesion of dirt or to avoid equipment parts on the rubber filling.

2.3.6 Curing

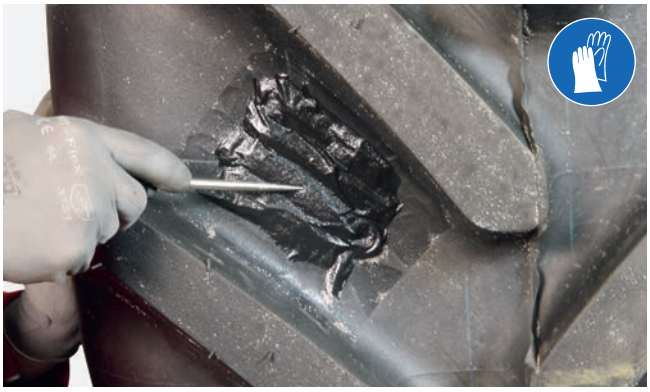
- Cure the repair area within the Vulcstar, autoclave or another vulcanization system according to the one-way method. (fig. 2.3.6.1)
  Always follow instructions of the respective vulcanization equipment manufacturer.

Note: For the one-way system with CEMENT SC-BL the curing should be started within 12 hours.

2.3.6.1

2.3.7 Final inspection

- Check the skive filling immediately after removing the tire from the vulcanizing machine. To this end, press the tire probe into the skive filling. If it leaves a durable mark (rubber not fully vulcanized), the whole curing process will have to be repeated and the skive filling has to be refilled. If gas bubbles are found upon inspection, the repair has to be repeated. (fig. 2.3.7.1)



2.3.7.1

- Check the correct patch installation so that no voids or bubbles are existent.

- Firstly, let tire cool down to ambient temperature. Check the whole tire (including inside and repair patch).

- Apply INNERLINER SEALER to the patch border area and all buffed areas next to the patch. (fig. 2.3.7.2)

2.3.7.2

Alternatively, RCF SEALER-PLUS can be used instead of INNERLINER SEALER.

- Buff the filling in mounted condition with max. 1 bar. Grind filling to match the original contour to adapt to the tire. First, you can use 65 mm contour disc to increase the elevation to grind the filling. For finishing however, the grinding tool ES45 with fine grain size is recommended. (fig. 2.3.7.3)

2.3.7.3

- Tread has to be re-profiled according to the original profile.

Note: Check the whole tire (including inside and repair patch) before return to normal service.

2. Repair of Radial tires

2.4 Additional work - if necessary

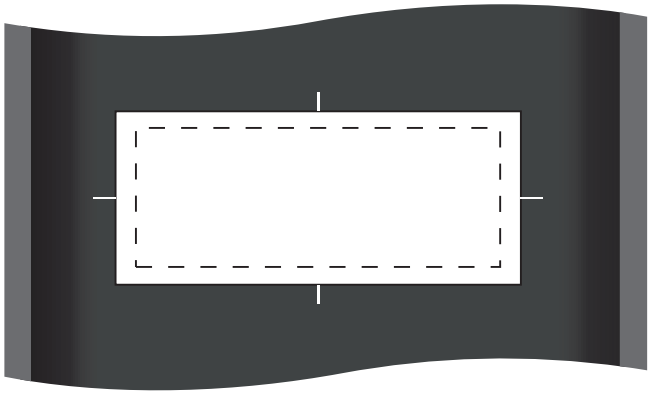
Removal of the liner

- Exactly mark the patch contour on the inner liner. The patch templates are essential for accurate positioning of the patch. (fig. 2.4.1)

2.4.1

- Remove patch again and draw another contour 20 mm inside the marked patch outline. (fig. 2.4.2)

- Carefully remove liner within the inner mark by using the 65 mm contour disc. Make sure that the tire casing layer will not be damaged. After removing the liner, the area should have a RMA3 texture.



2.4.2

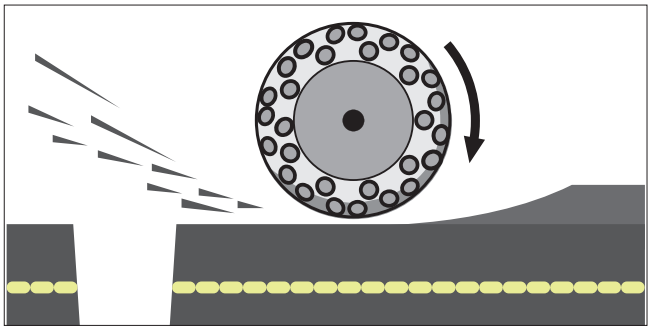
- Buff the remaining 20 mm wide edge. The tool direction of rotation will be important. Do not rotate the buffing tool against the inner liner edge. (fig. 2.4.3 and 2.4.4)

- Clean the buffed surface area using the brass-bristled brush, and remove all buffing dust with the vacuum cleaner for dust/ water. Never remove the buffing dust with compressed air.

2.4.3

Note: Coat repair area immediately after buffing.

- Richly apply an even layer on the buffed surface of the tire. Turn repair area to 3 or 9 o'clock position. Consider drying time before patch installation. Cementing 10 - 45 minutes (knuckle test).



2.4.4

Note: After the end of the drying period a suitable laminated patch has to be ready for installation. If tire casing rubber is visible between liner and patch this has to be covered with a rubber strip. Vulcanize it with the patch.

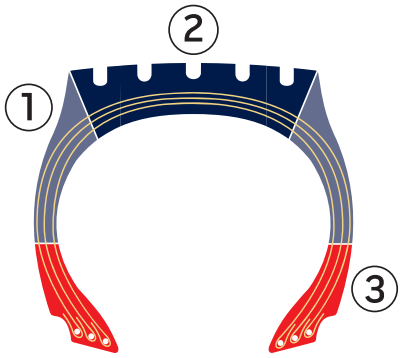
3. Repair of Cross-ply tires

3.1 Preparation
3.1.1 Repair instructions

Classification of tires by zones (fig. 3.1.1.1)
1) Sidewall

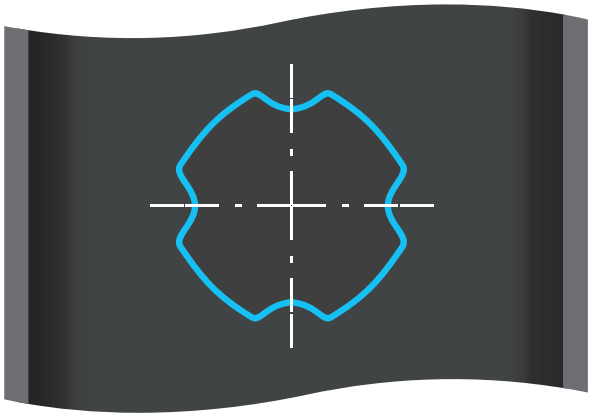
2) Tread

4) Bead (non repairable area)



3.1.1.1

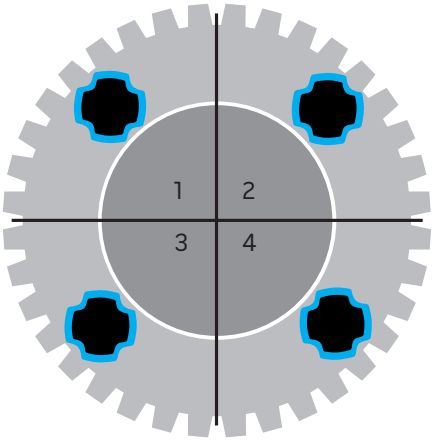
Patch centre (fig. 3.1.1.2)
Patch centre is equal to damage centre.
Patches overlapping the bead zone may be cut off.
(see chapter 3.1.5 - sidewall patch)



3.1.1.2

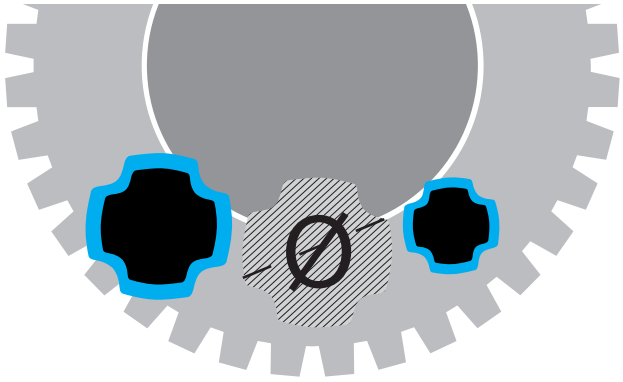
Tires are clean and dry
In general, AS tires must be thoroughly cleaned prior to repairs. This is especially important for tires, with a water/ calcium filling or similar.
Dry tire casings before processing. Here, roughly open the damage and dry in a warm room for at least 24 hours or 12 hours with technical tools (drying hood, hot air blower or TP unit).

Maximum number of injuries (fig. 3.1.1.3)
In a tire divided into four quarters, there has to be only one repair patch in every quarter.



3.1.1.3

Check the damage distance (fig. 3.1.1.4)
The minimum distance between two patches is the diagonal line of the larger patch.



3.1.1.4

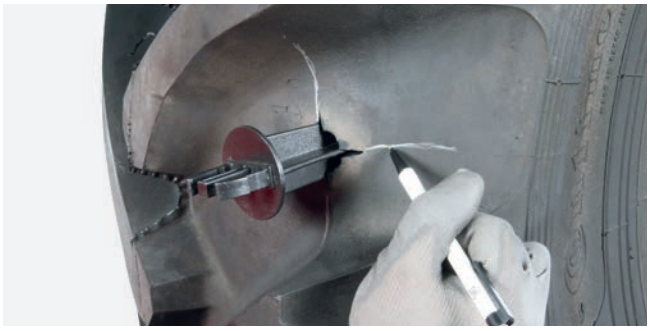
3. Repair of Cross-ply tires

3.1.2 Prepare damaged area

Note: Take care of safe standing of the tire as well exact position of possibly used tire spreader/ spreading supports.

- Note all required tire data.
- Locate and mark damaged area on the tire. (fig. 3.1.2.1)
- Disassemble the tires according to the instructions.
- Remove foreign particles without further damage to the tire. Remove screws from the tire. (fig. 3.1.2.2)
- Inspect tires inside and outside. Pay attention to any further hidden damage. For example, foreign particles in the tread. (fig. 3.1.2.3)
- Work or exercise cards make it easier to hold on all information.
- Check the general repair option of the tire. Professionally check according to relevant assessment criteria, such as overall condition of the tire, country specific damage limits, etc. Check whole tire for further, hidden damage and repairs already made in the past.
- Clean repair area and environment inside the tire with LIQUID BUFFER. (fig. 3.1.2.4)
- Immediately scrape the damage area with the tire scraper.
- Completely remove all dirt with dust/ water with vacuum cleaner.

Note: By following the procedure described above silicone, graphite and other mold release agents will be completely removed from the inner liner. Scrape an area that is slightly larger than the one needed for the installation of the patch.



3.1.2.1

3.1.2.2

3.1.2.3

3.1.2.4

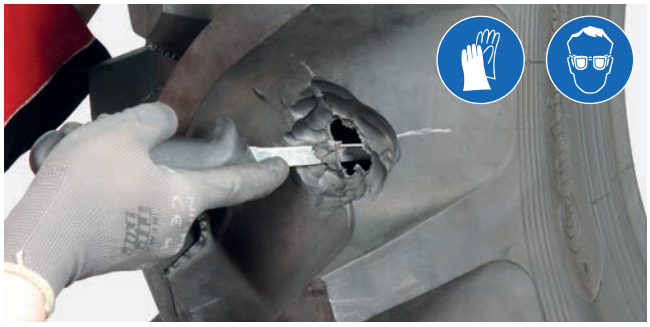
3. Repair of Cross-ply tires

3.1.3 Damage repair

- Remove all loose rubber parts with a knife in advance.
- Use a rotary gouge to cut out the skive (bowl-shaped). (fig. 3.1.3.1)
  Hot and sharp rotary gouges considerably facilitate the cutting process. In case of sidewall damage use the chip rasp for the preparation of the rubber damage. Wrong handling of the hollow knife can lead to damage of the cords.

3.1.3.1

- Cut cord damage with a knife as far as possible. (fig. 3.1.3.2)

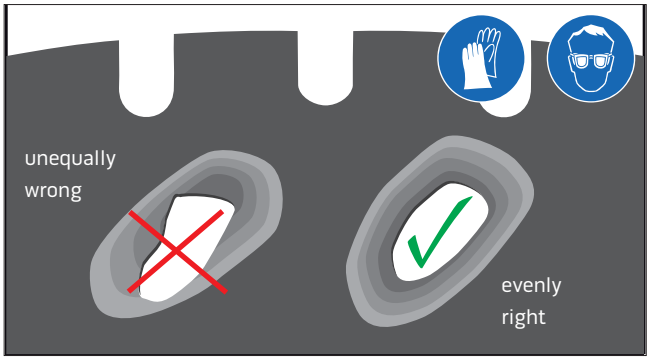


3.1.3.2

- Elaborate damage concave with chip rasp. (fig. 3.1.3.3)

3.1.3.3

- Make sure that the edge of the skive has a regular shape. If it is not shaped regularly, the tensions arising may cause the repair to fail. (fig. 3.1.3.4)
- Remove the dust with a soft hand brush so that the damage can be seen more clearly.

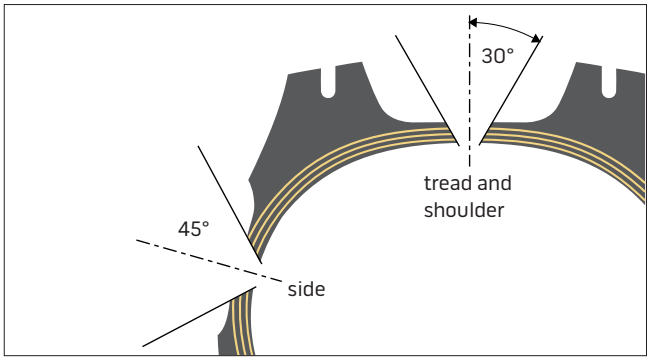


3.1.3.4

Note: Use the rounded side of the buffing tools to bring the damaged area into the right form. Do not leave sharp edges on the buffed rubber surface. Another method is to immediately cut out the damage with a knife and then remove the damage in the rubber area.

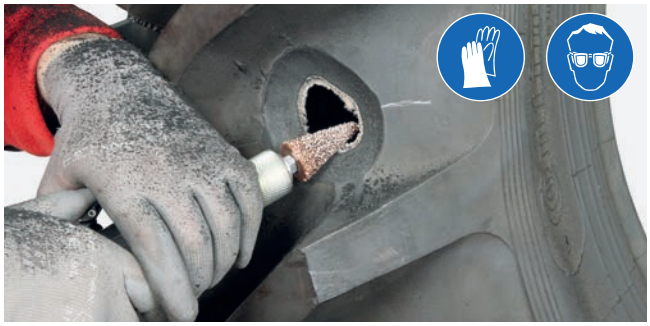
3. Repair of Cross-ply tires

- Carry out an accurate damage analysis.
- Use the knife to remove most of the damaged materials. In doing so, prepare the damage channel.
  45° for sidewall damage
  30° for tread and shoulder damage.
  (fig. 3.1.3.5)
  Remove any rotted or separated cords.



3.1.3.5

- Round off the damaged skive with cone rasp and pencil rasp. Retain the angle of inclination of the skive wall. Pay attention to split limitation. (damage limitation) **(fig. 3.1.3.6)**

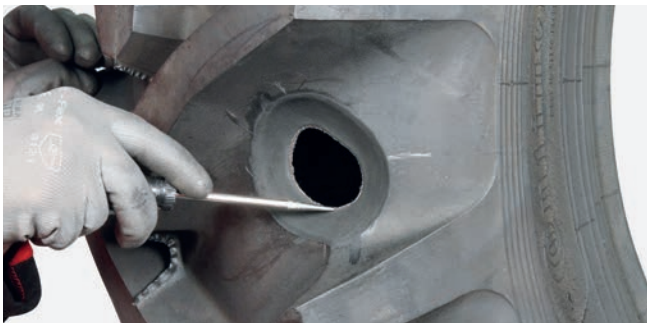


3.1.3.6

- Grind the cord layers with a carbide ball or shell stone into the rubber to avoid a reduction of the rubber surface by folding the cords. Fluffy cords have to be avoided due to a reduced connection of the skive filling. For easy dealing with shell stones these have to be grinded to the required shape. **(fig. 3.1.3.7)**

3.1.3.7

- Check that all cord layers are firmly anchored in the rubber and have no separations. **(fig. 3.1.3.8)**
- Break edge of the skive edge on the outside and inside of the tire with a wire brush.
- Clean injury with brass brush and dust / water vacuum cleaner.

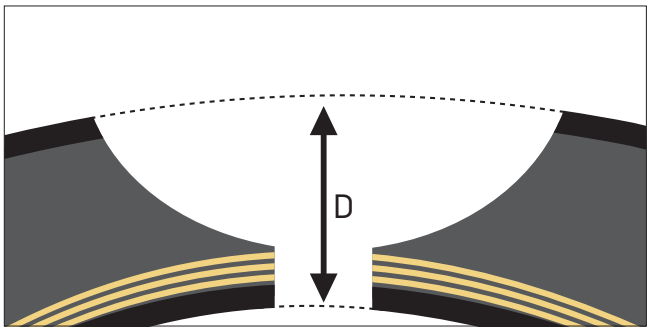


3.1.3.8

Note: Make sure that no splits arise from the injury. Unlimited splits lead to the failure of the repair and the tire. An even RMA 4-5 texture is recommend for the skive filling. Wet cord must be completely dry before further processing starts.

3. Repair of Cross-ply tires

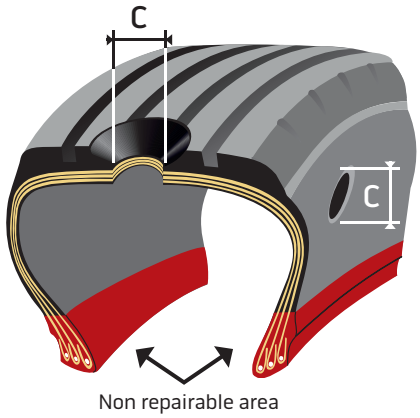
Note: Measure maximum tire thickness in the injury area and note on the tire for heating time calculation. Depending on the vulcanization system and the installation of the heating elements the tire thickness has to be considered with or without tire profile. Manufacturer hints and devices have also to be considered. (fig. 3.1.4.1)



3.1.4.1

3.1.4 Measure injury size/ choose patch

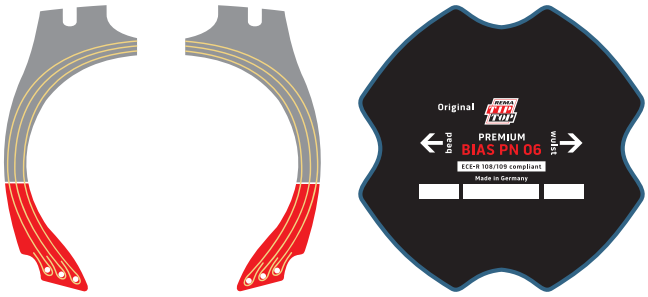
- Measure injury size in the cord area at the widest point. The maximum cord injury must always be measured. (fig. 3.1.4.2 and 3.1.4.3)



Non repairable area

3.1.4.2

- Note injury dimensions on the tire.
- Note the PR number of the tire. If not specified on the tire find out via the tire manufacturer or ETRTO.
- Select suitable repair patch. Use REMA TIP TOP BIAS PN repair chart.



3.1.4.3

- Note patch size number on the tire. (fig. 3.1.4.4)

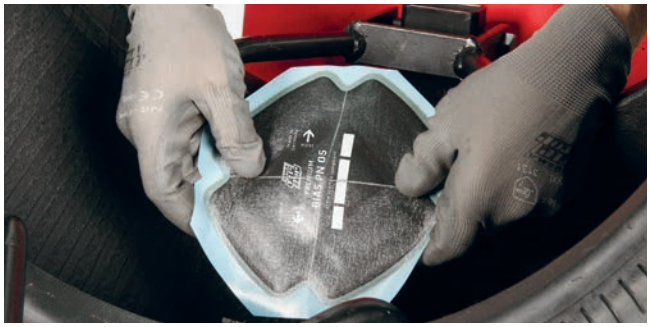
Note: The repair charts represent the relationship between tire size, injury size, injury location and the required repair patch.

3.1.4.4

3. Repair of Cross-ply tires

3.1.5 Trim sidewall patch to the right size

- Diagonal patches may only be trimmed to the right size within the bead area.
- Place the patch centrically on top of the injury. (fig. 3.1.5.1)



3.1.5.1

- Sign the course of the bead toe. (fig. 3.1.5.2)

3.1.5.2

- Sign a further line with 10 – 20 mm towards the center of the patch. (fig. 3.1.5.3)

3.1.5.3

- Cut off the patch at the second line with a knife at an angle of 45°.
  The patch may be cut to a maximum of the area where the first crossing cord layers meet. (fig. 3.1.5.4)

Note: The cut must be even without ruptures and edges to avoid a point where ruptures may arise. Always apply INNERLINER SEALER on the cutting area to avoid moisture in the cord.

3.1.5.4

3. Repair of Cross-ply tires

3.2 Two-way system repairs

In the two-way system, the filling has to be cooled down before the application of the repair patch. The self -vulcanizing of the patch requires room temperature/ **at least +18°C/ 65°F**. Curing time of the patch: **48 hours.**

For repair procedure details in the two-way system see an example of a Radial tire in chapter 2.2.

3.2.1

3.2.2

3.3 One-way system repairs

In the one-way system patch and filling are vulcanized simultaneously.

For repair procedure details in the one-way system see an example of a Radial tire in chapter 2.3.

3.3.1

4. Note for high quality repairs

For a high quality tire repair with long remaining times of the AS tire please note the following:

Cleanliness
Generally, AS tires must be thoroughly cleaned before repairing. This is especially important for tires with a water/calcium filling or similar. An effective and fast cleaning of such tires is possible by using a steam cleaner with safety distance. Cleaning with hot water and TIP TOP hand cleaner is also possible.

Dryness
Outside, the tire casing of damaged AS tires absorbs a lot of moisture, which is a disadvantage for long-lasting repairs. Therefore, AS tires need to be stored in a dry place until the beginning of repair works. If the tire cord has pulled moisture, the injured area has to be completely dry. The tire must be stored in a dry room for at least 24 hours or must be dried with technical equipment for at least 12 hours. This can be done with a hot air blower, a TIP TOP dry hood or by preheating with a vulcanizing machine.

Patch laminating
The laminating of a repair patch is generally recommended for AS repairs also at the inner liner.

Surfaces for patch installation
Evenly buff patch surfaces with contour disc K36 to a RMA 2-3 texture.
If problems with the liner occur (e.g. looseness, soft smearing) completely remove the liner before the patch installation.
Avoid waiting times until coating.

Skive developing
Evenly buff skives with a chip rasp K18 to a RMA 4-5 texture.
For a safe adhering skive filling the skive edge needs to be treated evenly concave (bowl - shaped) to avoid tensions. Do not leave sharp edges or splits on the buffed rubber surface.
Avoid waiting times until coating.

Drying time of coatings
When processing vulcanizing solutions and cements both a minimum and a maximum drying time have to be considered. The optimal time for applying a repair patch is achieved when the coating feels sticky when touched with the back of the finger but does not adhere to the finger. This test is always carried out on the edge of the coated surface area.

Your local contact

//ONE BRAND //ONE SOURCE //ONE SYSTEM

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