REMA TIP TOP

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

MINICOMBI PREMIUM

The permanent plug/patch repair for tread punctures

TÜV SÜD products monitored
- High-Speed Durability
- Endurance
- Low Temperature
- User Manual

tuv-sud.com/ps-cert

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.

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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.

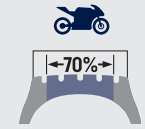
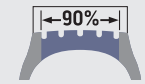
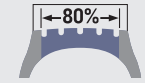
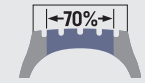
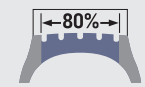
HS (High Speed)
High speed – high speed rotary tool with
16 000 – 30 000 RPM, preferred for machining steel.

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.

2. Puncture repair with REMA TIP TOP MINICOMBI

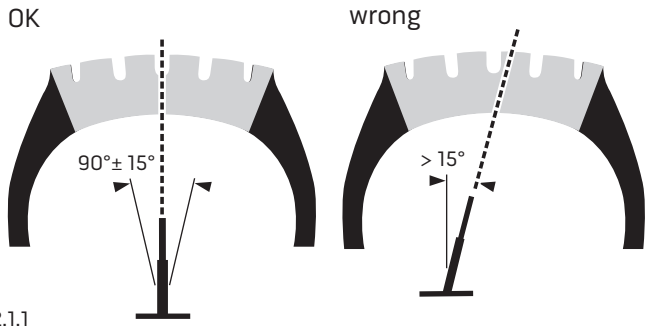
Repairable area in ← % → of the tread width		3	4,5	6	8	10	
		Ø= max. damage size Minicombi					
	Speedindex	A3	A4.5	A6	B8	B10	maximum repairs
	-J	●	●	●			2
	K - T	●	●				1
	H - ZR (W)	●					
 max – 121 LI 	-Y	●	●	●			3
	ZR (Y)	●					
 max – 177 LI 	–	●	●	●	●		
	–	●	●	●	●	●	
 	–	●	●	●	●	●	

↗Note: Maximum number of repairs carried out with Combi repair plugs in one tire. Always check whether repairs already carried out in the tire are defective. Axial distance between repairs: minimum 15 cm/6".

2.1 General Repair Instructions

2.1.1 Check the direction of the puncture channel

Determine the inclination angle of the puncture channel by inserting a tire probe / awl or by checking the inclination angle of the foreign body in the puncture. The inclination angle must not exceed 15° (fig. 2.1.1).



2.1.1

2.1.2 Repairable injuries

Prepare the injury, while keeping it as small as possible. Determine the maximum repairable injury size taking into account the position of the injury and the speed index of the tire. Check the recommended maximum number of repairs using the repair chart. This is enclosed in the packaging. The version that is current at the time of printing is printed on the left. (fig. 2.1.2).

↗ Note: If the inclination angle of the injury exceeds 15°, cord-reinforced repair patches must be used on passenger car tire injuries of over 6 mm or on truck tire injuries of over 10 mm. REMA TIP TOP offers an extensive range of repair patches and vulcanizing machines for repairs to major injuries or injuries located outside the tread area.

2.1.3 Check the distance between the injuries

The distance between two injuries (in the axial direction) must be at least 15 cm/6" (fig. 2.1.2).

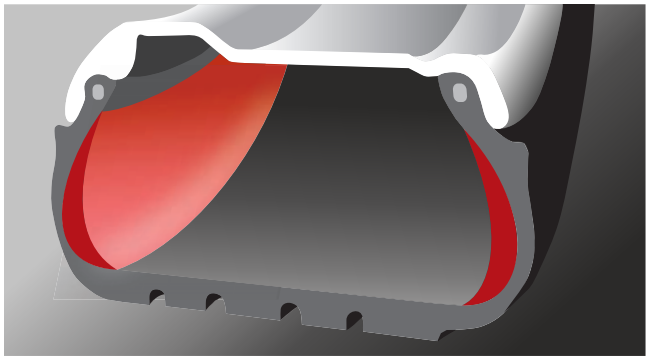
2.1.2

2. Repairing punctures with REMA TIP TOP MINICOMBI on run-flat tires

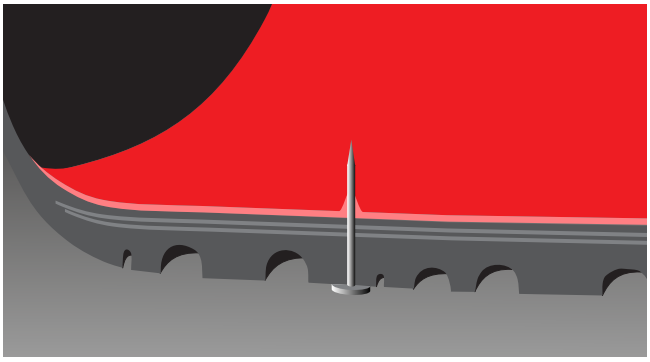
2.2 Differentiating tire systems

Particularly when it comes to passenger car tires, there are optimizations for different requirements. Specifically, these are:

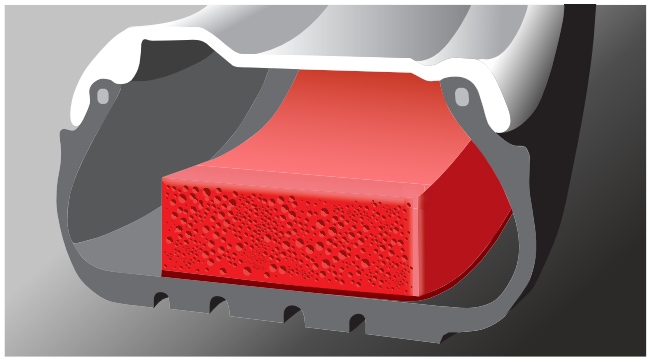
Run-flat (emergency mode systems)
Run-flat tires feature a reinforced sidewall to allow continued travel for a limited distance at limited speeds. In the area of the tread they correspond to standard tires and can be repaired as such. Repairing damage in the sidewall is not possible.
Special requirements must be observed for the assessment of reparability. (Fig. 2.2.1)
See chapter 2.3 Preliminary work for a run-flat (emergency mode systems)


2.2.1

Self-sealing tires
The tires were equipped with a special sealant in the tread area by the tire manufacturer. The repair is carried out depending on the surface stickiness. (Fig. 2.2.2)
See chapter 4 Repairing punctures with REMA TIP TOP MINICOMBI on tires with sealant


2.2.2

Noise-optimized tires
If a puncture remedy has been placed in the tire, it must be completely removed before repair. The repair area must be cleaned thoroughly with REMA TIP TOP LIQUID BUFFER. (Fig. 2.2.3)
See chapter 5 Repairing punctures with REMA TIP TOP MINICOMBI on noise-reduced tires.


2.2.3

Tires with puncture sealant
Many vehicles do not have spare tires, but a sealant with compressor. If the tire has been filled with sealant, it must be completely removed from the tire prior to repairs. In addition, the repair area must be cleaned thoroughly and good adhesion of the Minicombi base must be ensured.
(Fig. 2.2.4)


2.2.4

2. Repairing punctures with REMA TIP TOP MINICOMBI on run-flat tires

2.3 Preparatory work runflat (emergency systems)

- As soon as the customer arrives with his car, check the readings of the tire pressure monitoring system and the remaining air pressure in the damaged tire.
- Ask the driver how far he has driven since he noticed the warning signal of the tire pressure monitoring system.
- Record all data regarding the remaining tire pressure and the driving distance, then compare these data with those specified in the car user´s manual. Also take account of any tire manufacturer information about the repairability of its runflat systems.
- Check whether the maximum driving distance has been exceeded, or the tire has run at a pressure lower than 1.0 bar. In these cases, no repair is possible.
  If the maximum emergency running distance has not been exceeded, and the remaining tire pressure is at least 1.0 bar, tread injuries can be repaired with the TIP TOP MINICOMBI system.
- Demount the tire from the rim as prescribed, then visually inspect the tire with good illumination. Note down the tire size together with the load and speed index. Signs of runflat damage and overload in runflat systems (depending on their construction) are found in different places from where they appear in standard tires. In support ring systems, the inner liner may be worn out in the contact surface of the tire.
  In systems with reinforced sidewalls, cracks and wrinkles may appear on the inner liner, in the shoulder or sidewall areas. (fig. 2.3.1. and 2.3.2.)

  Apart from the puncture itself, no further inner liner damage can be accepted, such as that caused by a long nail chafing on the sidewall

2.3.1 – Wrinkles in the bead

2.3.2 – Cracks in reinforced sidewall

2. Puncture repair with REMA TIP TOP MINICOMBI

↗**Note:** Always observe the current application instructions included in every pack.

2.4 Preparation of the tire

- Locate and mark the damaged spot on the tire.
- Demount the tire correctly.
- Remove the foreign body without causing any further damage to the tire (fig. 2.4.1). Screws should be screwed out of the tire.
- Always check in a professional way according to appropriate criteria, such as the general state of the tire, national repair limits etc. whether the tire can be repaired. Also check the whole tire including existing repairs for further hidden damage.
- Determine the direction of the puncture channel using an awl or a tire probe (fig. 2.4.2). The puncture can be repaired, if it has an angle of inclination of 90° ±15°.
- MINICOMBI repairs may only be carried out in the specified tread area. (See chart.)
- For information about the correspondences between injury sizes and repair areas, refer to the application instructions included in the respective packs.
- Determine the injury size by measuring the removed foreign object and select the appropriate MINICOMBI repair plug (fig. 2.4.3).
- If no foreign object can be found, measure the injury size on the tire inside and outside.
- Select the appropriate mill cutter for the selected MINICOMBI.

2.4.1

2.4.2

2.4.3

2.4.4

3. Puncture repair with REMA TIP TOP MINICOMBI

3.1 Repair preparation

- If no foreign object can be found, measure the injury size on the tire inside and outside.
  Using REMA TIP TOP LIQUID BUFFER, remove mould release agents and dirt from the repair area inside the tire (fig. 3.1.1). Apply LIQUID BUFFER to an area twice as large as that of the MINICOMBI base, then clean this area using the liner scraper.

- Spread the tire using the tire spreader.

3.1.1

- Prepare the puncture channel (fig. 3.1.2).
  Carefully prepare the puncture channel with the appropriate mill cutter, first from the tire inside outwards, then from the outside to the inside of the tire, observing the direction of the puncture channel.

  REPEAT THIS OPERATION ONCE OR TWICE. (fig. 3.1.3)

3.1.2

  Recommended speed of mill cutter: max. 2500 R.P.M.
  Remove any material which may adversely affect the casing/belts (rust etc.). If necessary, repeat this operation using the next larger mill cutter, always observing the maximum injury sizes. Make sure that the right MINICOMBI repair plug is used.

3.1.3

- Mark the contours of the MINICOMBI base on the tire inside (fig. 2.3.4).
  Draw or mark around the MINICOMBI base with the tire marking pen. To this end, you can use an old MINICOMBI repair plug with its inscribed side towards the inside of the tire.

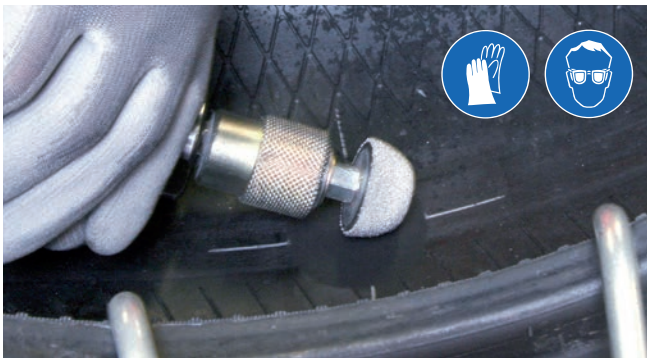
↗**Note:** Replace the HSS mill cutters included in the workshop kits, after approx. 25 repairs- due to wear. Instead, tire repair specialists use REMA TIP TOP HM carbide mill cutters, which last up to 10 times longer than HSS mill cutters.

3.1.4

3. Puncture repair with REMA TIP TOP MINICOMBI

3.2 Prepare the tire inside

- Buff the inner liner with the dome rasp or the wire brush (fig. 3.2.1).
  During this operation, remove all vent lines until you get a completely smooth surface. Then, give the surface an even velvet RMA-2-type buffing texture. Put slight pressure on the buffing tool, keeping it in constant movement. Never let it rest on the same spot.



3.2.1

- Clean the buffed surface using the brass brush, then completely remove the buffing dust with the vacuum (fig. 3.2.2 and 3.2.3).
  Always remove buffing dust with the use of the vacuum and the brass brush. Never use compressed air to this end.

↗**Note:** The buffed surface should be coated immediately after buffing in order to protect it from oxidation.

3.2.2

- Apply FAST DRY CEMENT BL to the correctly prepared repair area. Apply a thick and even coat of FAST DRY CEMENT BL to the repair area inside the tire. Turn the tire so that the repair area is in the 3 or 9 o´clock position. Note drying time before further processing. **Drying time knuckle test (5 - 15 minutes). (fig. 3.2.4)**

3.2.3

↗**Note:** Do not speed up the drying process of the cement by any artificial means. SPECIAL CEMENT BL can be used as an alternative to coat the repair area. The drying time of Special Cement BL is 10-45 minutes.

- Avoid any contamination on the bonding layer or the coat applied.

- Keep ready a cardboard box of suitable MINICOMBI repair plugs. Detach a MINICOMBI repair plug from the other MINICOMBIs in the packaging and keep it ready for application.

3.2.4

3. Puncture repair with REMA TIP TOP MINICOMBI

3.3 Application of MINICOMBI

- Turn the tire so that the injury is in the 7 or 8 o´clock position.

- Squeeze FAST DRY CEMENT BL into the puncture channel, until it is completely filled (fig. 3.3.1).
  Place the tube of FAST DRY CEMENT BL at the opening of the puncture channel inside the tire, and squeeze FAST DRY CEMENT BL into the puncture channel.
  FAST DRY CEMENT BL provides the necessary lubrication for the insertion of the repair plug and bonds it reliably to the tire.

3.3.1

↗Note: Do not moisten the already coated tire inside nore the MINICOMBI stem.

- Immediately install the MINICOMBI repair plug.

- Insert the MINICOMBI (fig. 3.3.2).
  To this end, push the inserting probe through the puncture channel from the tire inside outwards, then remove the protective packing from the MINICOMBI.

3.3.2

- Pull the MINICOMBI through (fig. 3.3.3).
  Seize the inserting probe with universal pliers, and pull the repair plug outwards as far as possible. Take care to pull the repair unit straight in the direction of the puncture channel. Take hold of the MINICOMBI stem, and pull it until the MINICOMBI base is flush with the tire inside.

3.3.3

- Vigorously stitch on the MINICOMBI base (fig. 3.3.4).
  Vigorously stitch on the MINICOMBI base over its whole surface, from the centre outwards in order to force out any trapped air, and to ensure that the MINICOMBI base adheres securely to the buffed surface area.

- After stitching on the centre of the MINICOMBI base, take care to completely stitch on its edge.

↗Note: If MINICOMBI repair plugs without metal pilots are used, insert the MINICOMBI stem during the drying time, approx. 10-15 mm into the eyelet opening of the inserting probe, and secure it there.

3.3.4

3. Puncture repair with REMA TIP TOP MINICOMBI

3.4 Finishing the repair

- Finally, check the repair area for defects. The finished repair should show no peeling or lifting at the edges, and should neatly cover the repair area.
- Seal the edge of the MINICOMBI base and any still exposed buffed surface areas with REMA TIP TOP INNERLINER SEALER (fig. 3.4.1).
- Mount the tire and inflate it to the operating pressure.

3.4.1

- Cut the protruding stem flush, using the offset knife (fig. 3.4.2).
  Do not stretch the stem while cutting it.
- Check the tire for air tightness.
- Balance the wheel.
- Fit the wheel on the vehicle.
- Set the inflation pressures of all tires on the vehicle to the appropriate values.
- After the repair has been completed, the tire can immediately be put back into operation.
  The vulcanization between the MINICOMBI repair plug and the tire is automatically completed under normal running conditions.

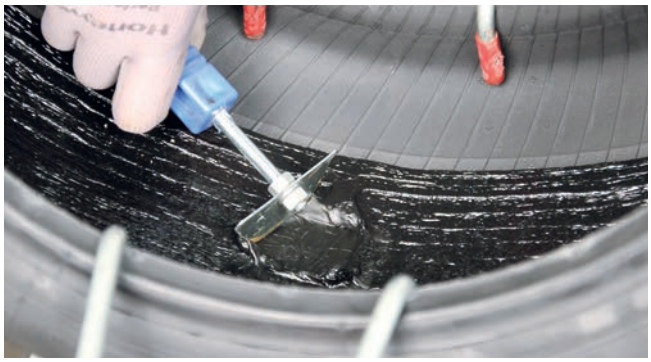
3.4.2

4. Puncture repair with REMA TIP TOP MINICOMBI on tires with sealant

4.1 Repair preparation

4.1.1 With low self-stickiness

- Select the appropriate mill cutter for the selected MINICOMBI plug.
- Spread the tire using the tire spreader.
- Remove the compound over the whole size of a MINICOMBI base by pulling the compound aside ensuring that the compound will not revent. (fig. 4.1.1.1)



4.1.1.1

- Carefully prepare the puncture channel with the appropriate mill cutter, first from the tire inside outwards, then from the outside to the inside of the tire, observing the direction of the puncture channel. (fig. 4.1.1.2, 4.1.1.3 und 4.1.1.4)

4.1.1.2

REPEAT THIS OPERATION ONCE OR TWICE.

Recommended speed of mill cutter: max. 2500 R.P.M. Remove any material which may adversely affect the casing/belts (rust etc.). If necessary, repeat this operation using the next larger mill cutter, always observing the maximum injury sizes.

4.1.1.3

↗ **Note:** Replace the HSS mill cutters included in the workshop kits, after approx. 25 repairsdue to wear. Instead, tire repair specialists use REMA TIP TOP HM carbide mill cutters, which last up to 10 times longer than HSS mill cutters.

4.1.1.4

4. Puncture repair with REMA TIP TOP MINICOMBI on tires with sealant

4.1.2. With strong self-stickiness

- Select the appropriate mill cutter for the selected MINICOMBI plug.
- Spread the tire using the tire spreader.
- Mark the contours of the MINICOMBI base on the tire inside. To this end, you can use an old MINICOMBI repair plug with its inscribed side towards the inside of the tire.
- Carefully prepare the puncture channel with the appropriate mill cutter, first from the tire inside outwards, then from the outside to the inside of the tire, observing the direction of the puncture channel. (fig. 4.1.2.1, 4.1.2.2, 4.1.2.3 und 4.1.2.4)

REPEAT THIS OPERATION ONCE OR TWICE.

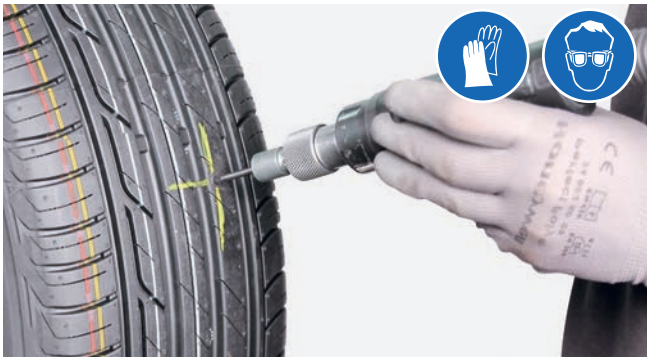
Recommended speed of mill cutter: **max. 2500 R.P.M.** Remove any material which may adversely affect the casing/belts (rust etc.). If necessary, repeat this operation using the next larger mill cutter, always observing the maximum injury sizes.

↗ **Note:** Replace the HSS mill cutters included in the workshop kits, after approx. 25 repairsdue to wear. Instead, tire repair specialists use REMA TIP TOP HM carbide mill cutters, which last up to 10 times longer than HSS mill cutters.

4.1.2.1

4.1.2.2

4.1.2.3



4.1.2.4

4. Puncture repair with REMA TIP TOP MINICOMBI on tires with sealant

4.2 Application of MINICOMBI

- Apply a thick and even coat of CEMENT FD-BL to the repair area inside the tire. (fig. 4.2.1)
- Turn the tire so that the repair area is in the **3 or 9 o´clock position.**
- Note drying time before further processing. **Drying time knuckle test (5 - 15 minutes).**

↗**Note:** Do not speed up the drying process of the cement by any artificial means. CEMENT SC-BL can be used as an alternative to coat the repair area. The drying time of CEMENT SC-BL is **10-45 minutes.**

4.2.1

- Place a tube on the puncture channel on the inside of the tire and rubberize it by pressing in Special CEMENT FD-BL. (Abb. 4.2.2)

↗**Note:** Do not moisten the already coated tire inside nore the MINICOMBI stem.

4.2.2

- Immediately install the MINICOMBI repair plug.
- Insert the MINICOMBI. To this end, push the inserting probe through the puncture channel from the tire inside outwards, then remove the protective packing from the MINICOMBI.
- Pull the MINICOMBI through. Seize the inserting probe with universal pliers, and pull the repair plug outwards as far as possible. Take care to pull the repair unit straight in the direction of the puncture channel. Take hold of the MINICOMBI, and pull it until the MINICOMBI base is flush with the tire inside. (fig. 4.2.3)

4.2.3

- Vigorously stitch on the MINICOMBI base over its whole surface, from the centre outwards. (fig. 4.2.4)

↗**Note:** If MINICOMBI repair plugs without metal pilots are used, insert the MINICOMBI stem during the drying time, **approx. 10-15 mm** into the eyelet opening of the inserting probe, and secure it there.

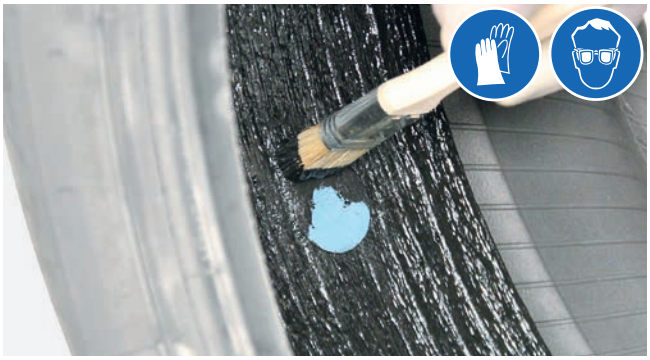
4.2.4

4. Puncture repair with REMA TIP TOP MINICOMBI on tires with sealant

4.3 Finishing the repair

- Seal the edge of the MINICOMBI base and any still exposed buffed surface areas with REMA TIP TOP INNERLINER SEALER or RCF SEALER-PLUS and re-position the BRIDGESTONE B-SEAL compound over the repair area **(fig. 4.3.1 and 4.3.2).**
- Carry out a final check of the repair area.
- Mount the tire and inflate it to the operating pressure.

4.3.1



4.3.2

- Cut the protruding stem flush, using the offset knife **(fig. 4.3.3).** Do not stretch the stem while cutting it.
- Check the tire for air tightness.
- Balance the wheel.
- Fit the wheel on the vehicle.
- Set the inflation pressures of all tires on the vehicle to the appropriate values.
- After the repair has been completed, the tire can immediately be put back into operation.

↗**Note:** The vulcanization between the MINICOMBI repair plug and the tire is automatically completed under normal running conditions.

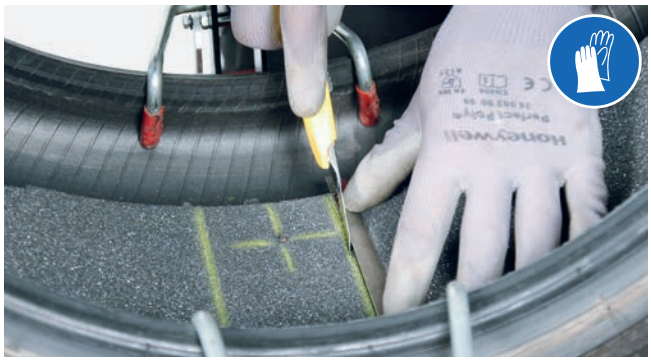
4.3.3

5. Puncture repair with REMA TIP TOP MINICOMBI on silent tires

5.1 Repair preparation

- Remove the foam in the repair area over the whole width with a cutter knife. (fig. 5.1.1)

!Attention: This operation needs great care in order to not damage the inner liner.



5.1.1

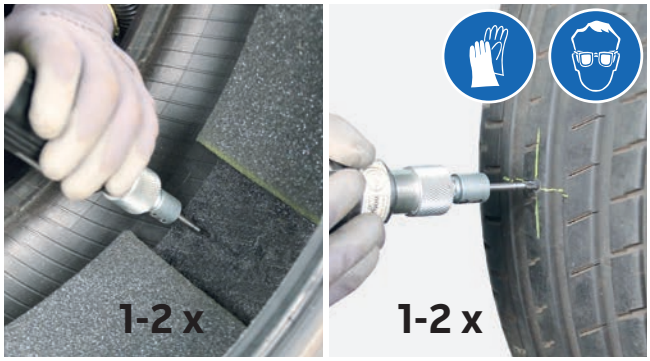
- Pull out the cut foam carefully. (fig. 5.1.2)
- Spread the tire using the tire spreader.

5.1.2

- Carefully prepare the puncture channel with the appropriate mill cutter, first from the tire inside outwards, then from the outside to the inside of the tire, observing the direction of the puncture channel. (fig. 5.1.3)

REPEAT THIS OPERATION ONCE OR TWICE (fig. 5.1.3)

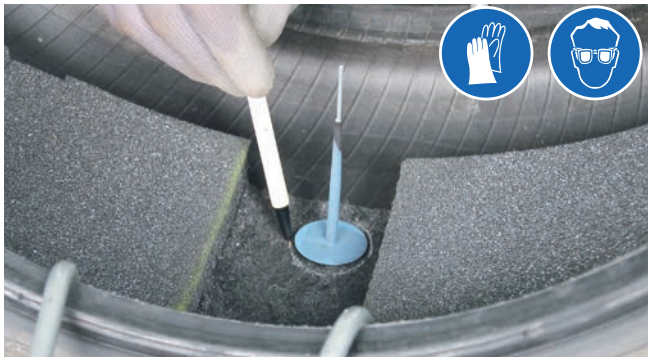
Recommended speed of mill cutter: max. 2500 R.P.M. Remove any material which may adversely affect the casing/belts (rust etc.). If necessary, repeat this operation using the next larger mill cutter, always observing themaximum injury sizes.



5.1.3

↗Note: Replace the HSS mill cutters included in the workshop kits, after approx. 25 repairsdue to wear. Instead, tire repair specialists use REMA TIP TOP HM carbide mill cutters, which last up to 10 times longer than HSS mill cutters.

- Mark the contours of the MINICOMBI base on the tire inside (fig. 5.1.4). Draw or mark around the MINICOMBI base with the tire marking pen. To this end, you can use an old MINICOMBI repair plug with its inscribed side towards the inside of the tire.



5.1.4

5. Puncture repair with REMA TIP TOP MINICOMBI on silent tires

5.2 Prepare the tire inside

- Buff the inner liner with the dome rasp or the wire brush. (fig. 5.2.1)
  During this operation, remove all vent lines until you get a completely smooth surface. Then, give the surface an even velvet RMA-2-type buffing texture. Put slight pressure on the buffing tool, keeping it in constant movement. Never let it rest on the same spot.

5.2.1

- Clean the buffed surface using the brass brush, then completely remove the buffing dust with the vacuum. (fig. 2.4.2 and 2.4.3)
  Always remove buffing dust with the use of the vacuum and the brass brush. Never use compressed air to this end.
-

↗**Note:** The buffed surface should be coated immediately after buffing in order to protect it from oxidation.

5.2.2

5.2.3

- Apply CEMENT FD-BL to the correctly prepared repair area. Apply a thick and even coat of CEMENT FD-BL to the repair area inside the tire. Turn the tire so that the repair area is in the 3 or 9 o´clock position.
  Note drying time before further processing.
  Drying time knuckle test (5 - 15 minutes). (fig. 5.2.4).

↗**Note:** Do not speed up the drying process of the cement by any artificial means. CEMENT SC-BL can be used as an alternative to coat the repair area. The drying time of Special Cement BL is **10-45 minutes.**

- Avoid any contamination on the bonding layer or the coat applied.

- Keep ready a cardboard box of suitable MINICOMBI repair plugs. Detach a MINICOMBI repair plug from the other MINICOMBIs in the packaging and keep it ready for application.

5.2.4

5. Puncture repair with REMA TIP TOP MINICOMBI on silent tires

5.3 Repair

- Turn the tire so that the injury is in the **7 or 8 o´clock position.**

- Squeeze CEMENT FD-BL into the puncture channel, until it is completely filled **(fig.5.3.1).** Place the tube of CEMENT FD-BL at the opening of the puncture channel inside the tire, and squeeze CEMENT FD-BL into the puncture channel. CEMENT FD-BL provides the necessary lubrication for the insertion of the repair plug and bonds it reliably to the tire.

5.3.1

↗**Note:** Do not moisten the already coated tire inside nore the MINICOMBI stem.

- Immediately install the MINICOMBI repair plug.

- Insert the MINICOMBI **(fig. 5.3.2).** To this end, push the inserting probe through the puncture channel from the tire inside outwards, then remove the protective packing from the MINICOMBI.

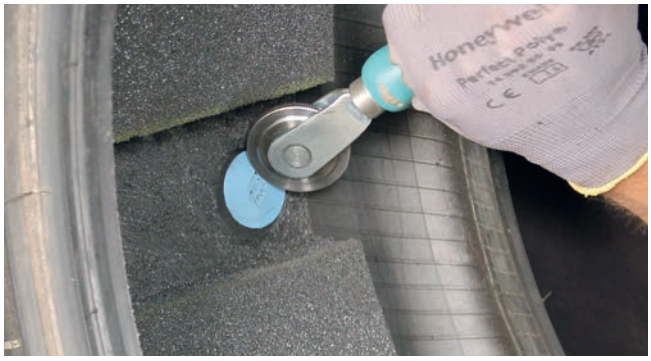
5.3.2

- Pull the MINICOMBI through **(fig. 2.5.3).** Seize the inserting probe with universal pliers, and pull the repair plug outwards as far as possible. Take care to pull the repair unit straight in the direction of the puncture channel. Take hold of the MINICOMBI stem, and pull it until the MINICOMBI base is flush with the tire inside.

5.3.3

- Vigorously stitch on the MINICOMBI base **(fig. 5.3.4).** Vigorously stitch on the MINICOMBI base over its whole surface, from the centre outwards in order to force out any trapped air, and to ensure that the MINICOMBI base adheres securely to the buffed surface area. After stitching on the centre of the MINICOMBI base, take care to completely stitch on its edge.

↗**Note:** If MINICOMBI repair plugs without metal pilots are used, insert the MINICOMBI stem during the drying time, **approx. 10-15 mm** into the eyelet opening of the inserting probe, and secure it there.



5.3.4

5. Puncture repair with REMA TIP TOP MINICOMBI on silent tires

5.4 Finishing the repair

- Seal the edge of the MINICOMBI base and any still exposed buffed surface areas with REMA TIP TOP INNERLINER SEALER or RCF SEALER-PLUS. (fig. 5.4.1)
- Carry out a final check of the repair area.
- Mount the tire and inflate it to the operating pressure.
- Cut the protruding stem flush, using the offset knife. (fig. 5.4.2) Do not stretch the stem while cutting it.
- Check the tire for air tightness.
- Balance the wheel.
- Fit the wheel on the vehicle.
- Set the inflation pressures of all tires on the vehicle to the appropriate values.
- After the repair has been completed, the tire can immediately be put back into operation.

↗**Note:** The vulcanization between the MINICOMBI repair plug and the tire is automatically completed under normal running conditions.

5.4.1

5.4.2

6. Application Minicombi template

The Minicombi repair template shows the maximum repair area for Minicombis for car and truck tires independent on the cross-section specifications. In addition, the maximum permissible angle of inclination is shown.

- Read the tire width on the sidewall. (Fig. 6.1)

6.1

- To determine the position, place the CENTERLINE of the template on the center of the tread. (Fig. 6.2)

6.2

- The tread width indicates the maximum repair area. (Fig. 6.3)

  Car max - LI 121
  Truck min - LI 122

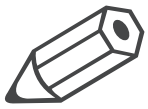
6.3

- To determine the inclination, insert a pricker into the tire following the damage progression. Then place the template on the tire and check the inclination. (Fig. 6.4) A repair is possible at 90° ±15°.

↗**Note:** If the angle of damage exceeds 15°, car tire damage exceeds 6 mm, or truck damage exceeds 10 mm, repairs must be made with cord-stiffened repair patches. REMA TIP TOP offers a comprehensive range of repair patches and vulcanizing units for repairing larger damage or damage outside the tread area.

6.4

Notes



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