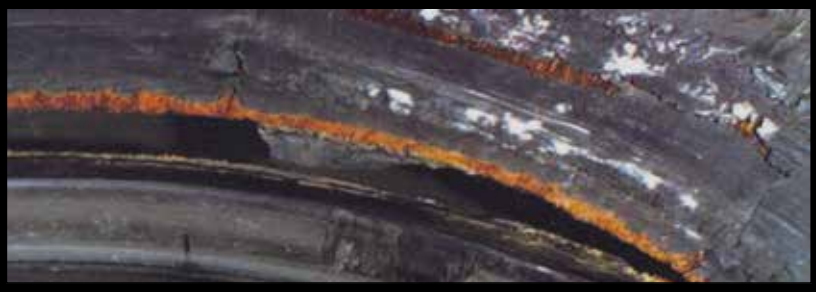
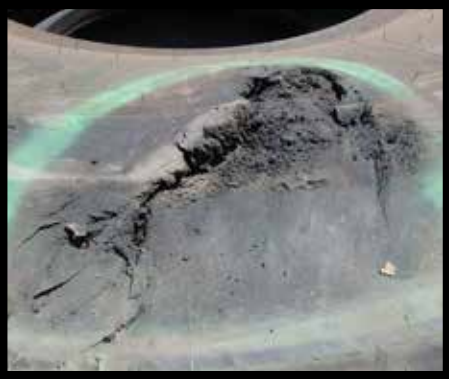
EARTHMOVER

TIRE CONDITIONS ANALYSIS GUIDE





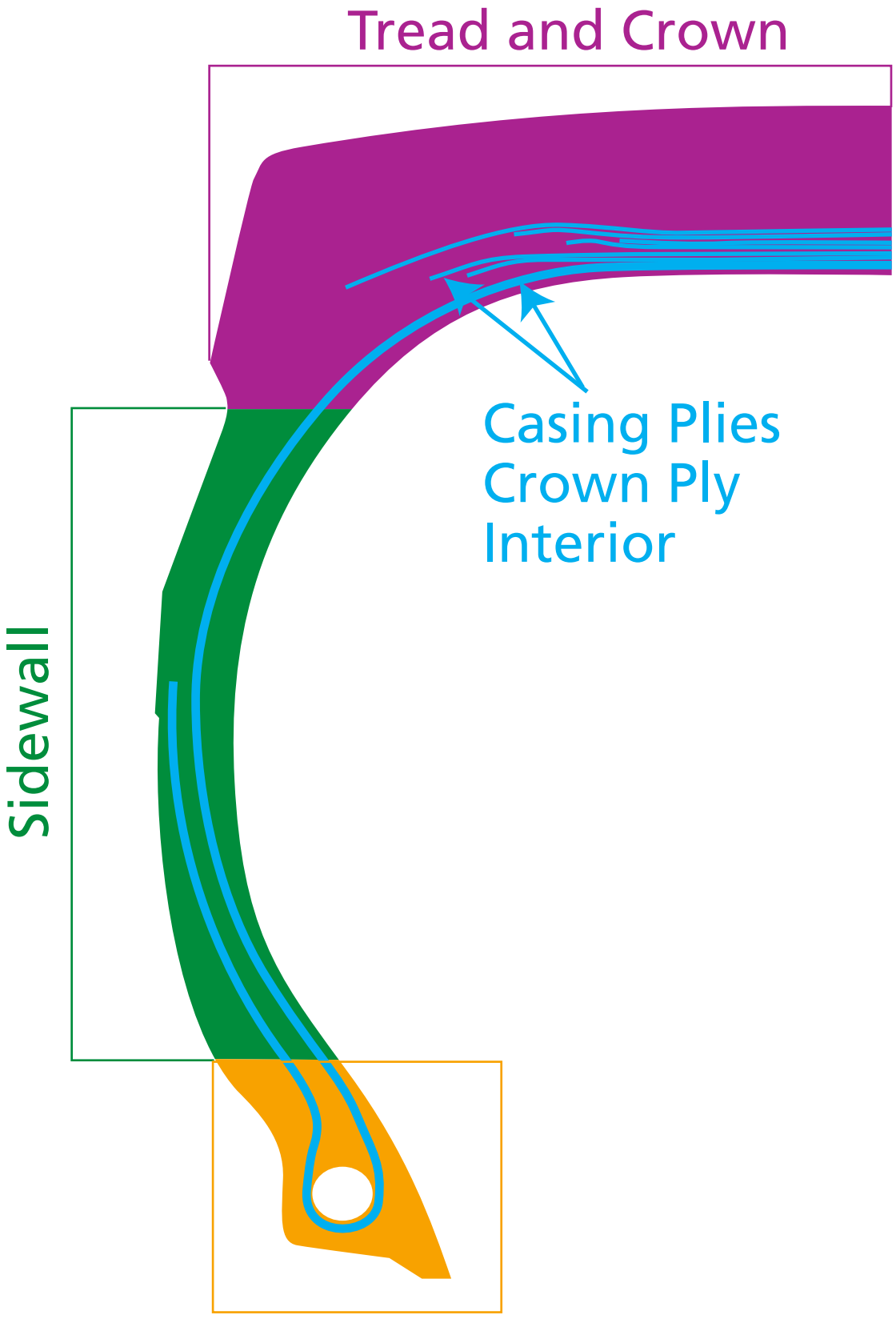
MICHELIN

TABLE OF CONTENTS

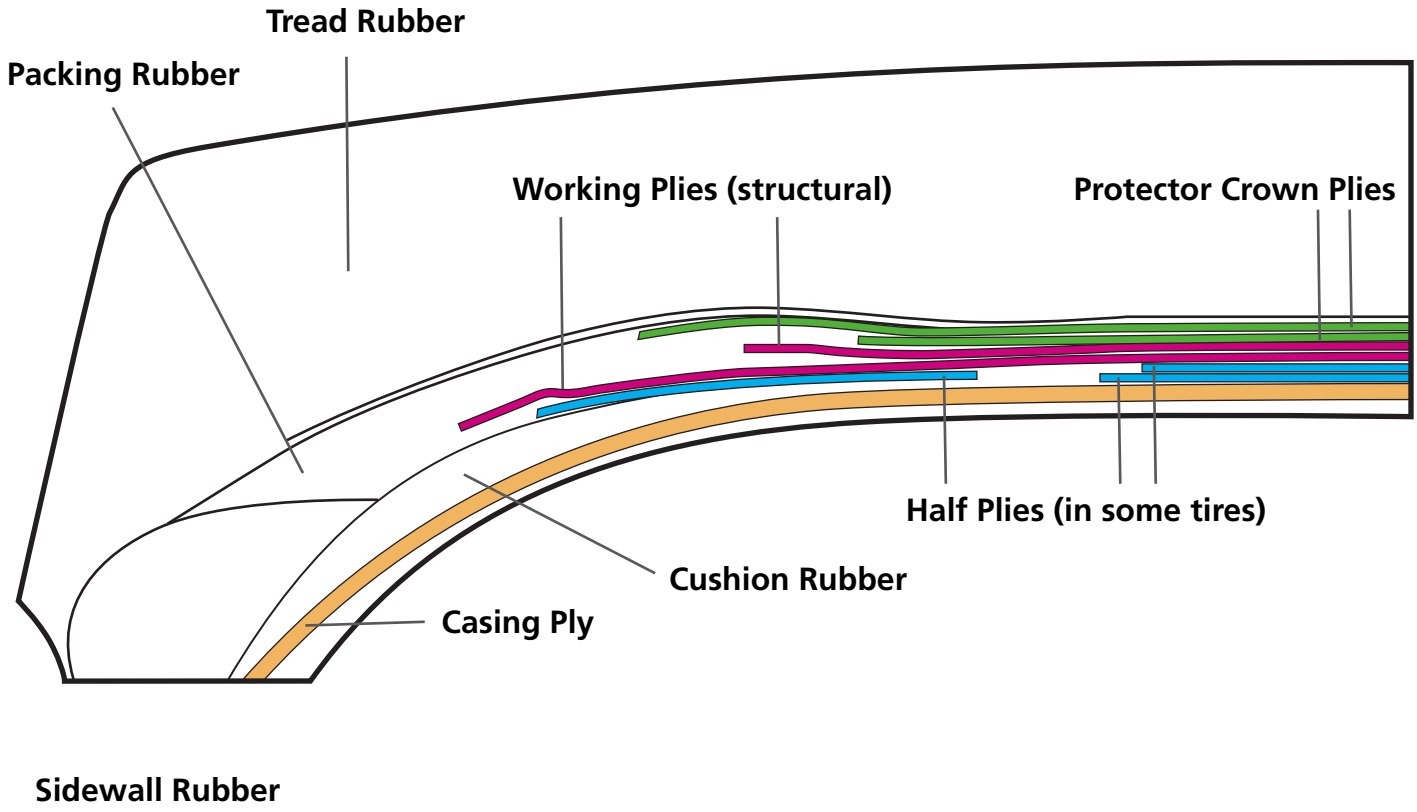
Hot Links: Page numbers on this contents page and in the "DO NOT CONFUSE WITH" section of the example pages are hot links. They can be clicked on to go to the listed page.

This publication is intended to be used as a guide only. Please consult your Michelin representative for a thorough assessment of tire damages and recommended actions.

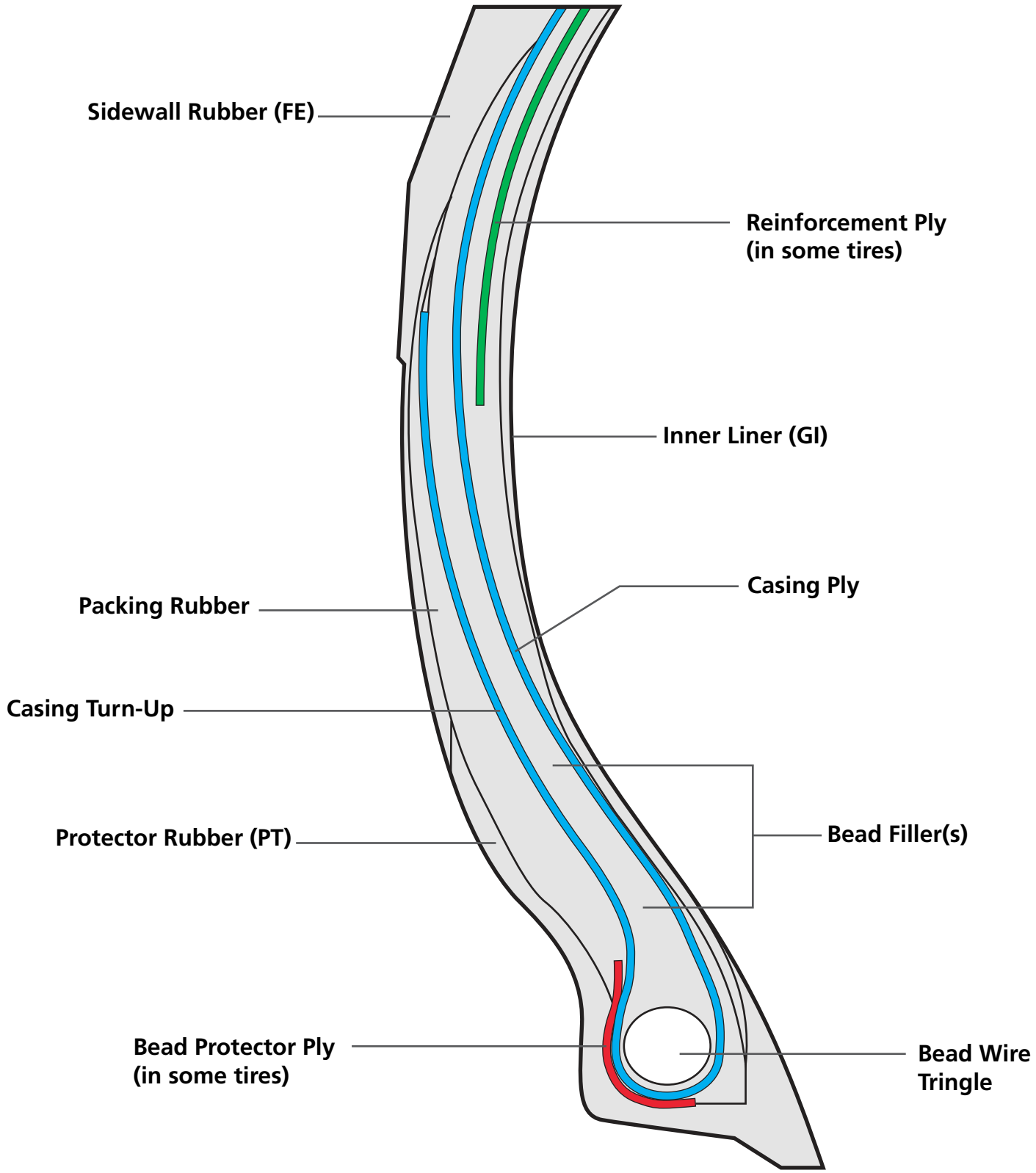
ZONES OF THE TIRE



IDENTIFICATION OF COMMON TIRE COMPONENTS



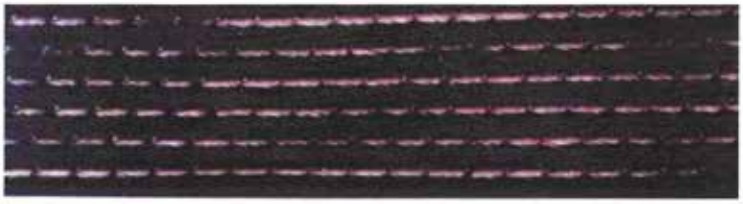
IDENTIFICATION OF COMMON TIRE COMPONENTS



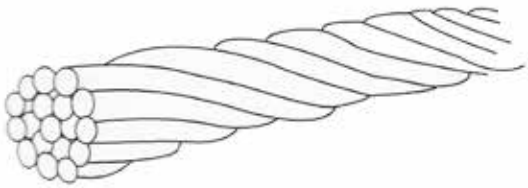
CROWN CONSTRUCTION

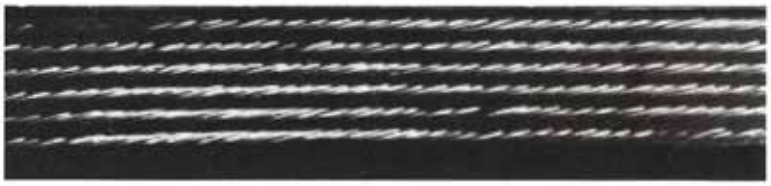
DIFFERENT TYPES OF STEEL CORD

FRETTED (Structural)



NON-FRETTED (Protector)





METHOD OF EXAMINATION

Step 1:
Examine tread area

Step 2:
Examine first sidewall

Step 3:
Examine area from guide rib to bead toe, first sidewall area

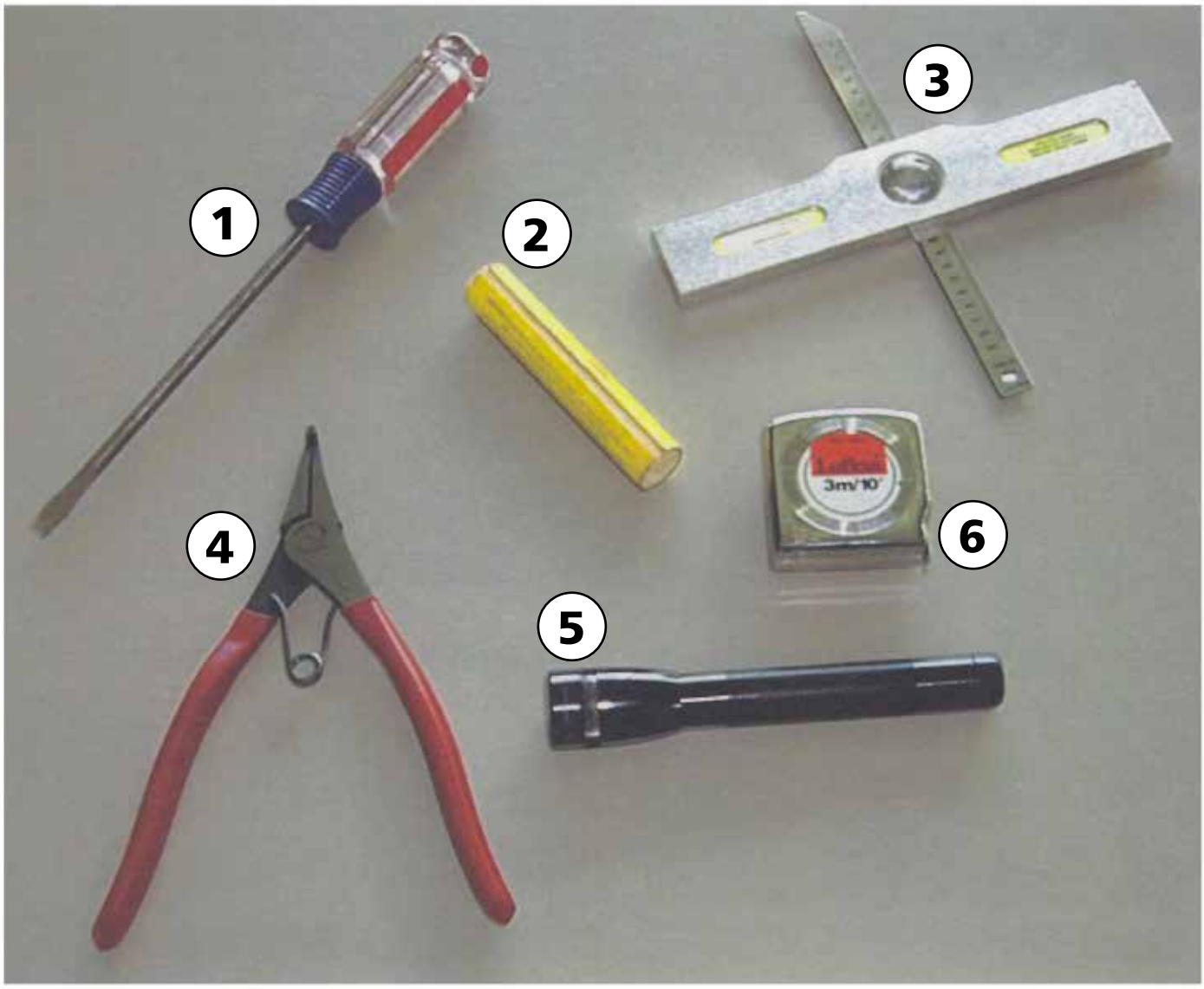
Step 4:
Examine the other sidewall

Step 5:
Examine guide rib to bead toe (as in Step 3)

Step 6:
Examine interior

EXAMINATION TOOLS

KEY TOOLS



1. Large Screwdriver
2. Wax Marker
3. Tread Depth Gauge
4. Separating Tool
5. Flashlight
6. Tape Measure

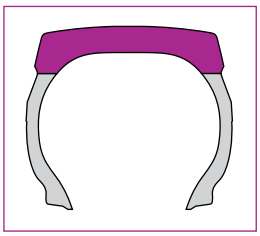
TREAD & CROWN

DESCRIPTION	**Crown perforation penetrating to the interior.**

View from the inside of the tire

Rock

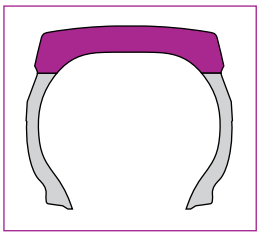
Nail



OBSERVATION	Perforation passing through the crown and all reinforcing/belt layers.
PROBABLE CAUSES(S)	Accidental damage by a sharp object.
EVOLUTION	Underinflation, air infiltration, runflat, rupture of the casing due to underinflated use.
RECOMMENDED ACTION	Repair if the damage is within recommended limits.
PREVENTION	Maintain site roads; keep clean and in good condition using graders or bulldozers. If similar tire damages persist, check to ensure proper operating pressures. Review choice of tire (increase lug-to-void ratio), tougher compound or deeper tread depth.
DO NOT CONFUSE WITH	Pages 68

TREAD & CROWN

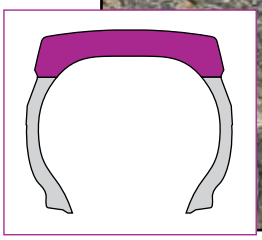
DESCRIPTION	**Localized damage to the crown, but not penetrating.**



OBSERVATION	Crown damage not perforating through to interior, possibly affecting the belts.
PROBABLE CAUSES(S)	Accidental damage by a sharp object. High pressure aggravates the situation.
EVOLUTION	Rust, air infiltration, ultimately perforating to interior.
RECOMMENDED ACTION	Repair if the damage is within recommended limits.
PREVENTION	Keep site roads clean and in good condition; maintain using graders or bulldozers. If similar tire damages persist, check for proper (possibly lower) operating pressures, review choice of tire and rubber compound.
DO NOT CONFUSE WITH	Pages 11, 13

TREAD & CROWN

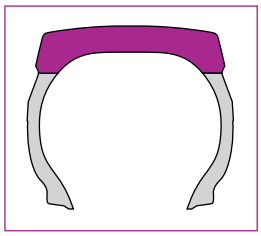
DESCRIPTION	**Numerous cuts around the entire tread.**



OBSERVATION	Widespread cuts on the tread.
PROBABLE CAUSES(S)	Working on aggressive sharp stone surfaces. Damage accentuated by over-inflation or continual running on wet surfaces.
EVOLUTION	Rust, loss of traction, separation in the crown.
RECOMMENDED ACTION	Submit the tire for retreading if the plies are not damaged in several places. If it is not accepted for retreading and there is no need for traction, leave it running until the first ply becomes visible.
PREVENTION	Clean and maintain the site roads using graders or bulldozers. Review the choice of tire and rubber compound. If possible, reduce tire pressures.
DO NOT CONFUSE WITH	Pages 10, 23

TREAD & CROWN

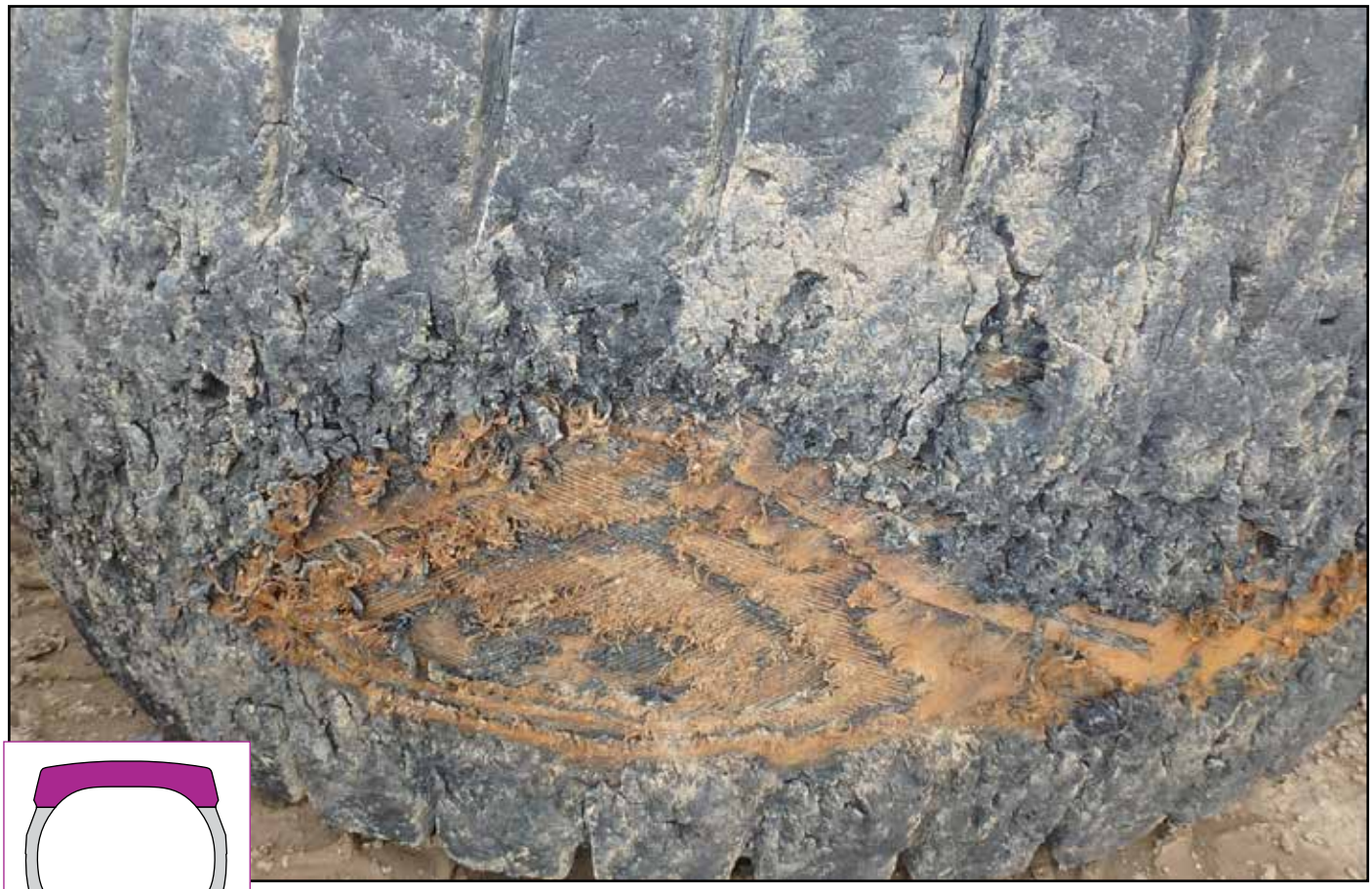
DESCRIPTION	**Stone retention.**

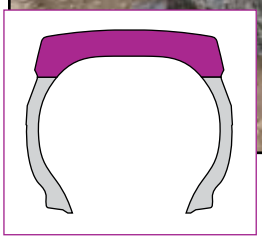


OBSERVATION	Stones trapped in the tread pattern or impact of stones at the bottom of the tread grooves.
PROBABLE CAUSES(S)	Running on roads covered with stones.
EVOLUTION	Penetrations/rock drilling to the belt causing rust, separation and splitting of crown plies.
RECOMMENDED ACTION	Remove stones and leave running. Check operating pressures.
PREVENTION	Clean and maintain the site roads using graders or bulldozers. Assess the possibility of using a different tread pattern and/or rubber compound.
DO NOT CONFUSE WITH	Pages 10, 11

TREAD & CROWN

DESCRIPTION	**Deep localized deterioration of the crown plies due to oxidation.**

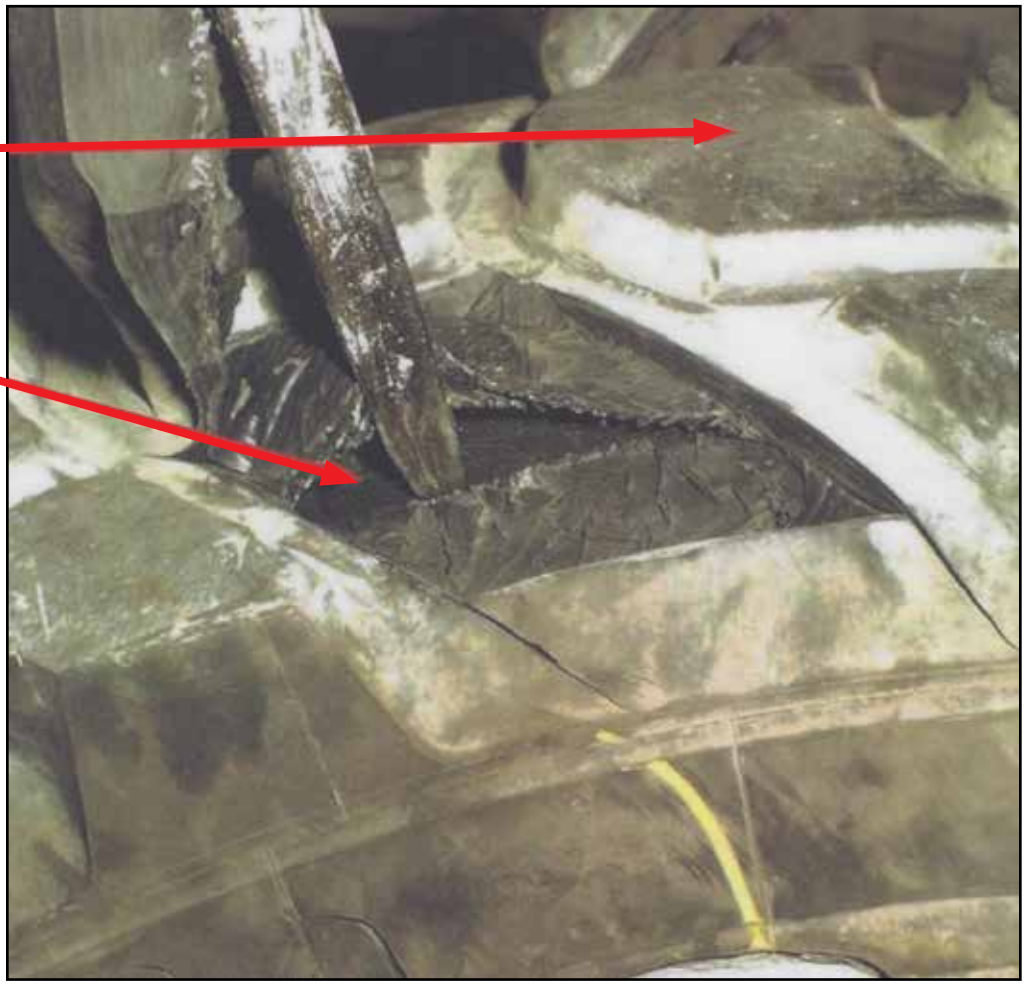


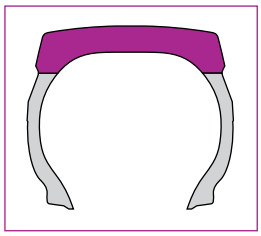


OBSERVATION	Deep localized damage extending to the crown plies, resulting from moisture (rust).
PROBABLE CAUSES(S)	Penetration of moisture resulting from a cut, abrasion, brake skid, or the effects of stone retention. Damage might be accentuated by a high tire operating pressure.
EVOLUTION	Running flat, loss of more tread rubber, generalized separation between the tread band and crown plies, eventually resulting in rapid deflation.
RECOMMENDED ACTION	Scrap.
PREVENTION	Review the choice of tire. Clean and maintain the site roads using graders or bull-dozers. Assess the possibility of using a different tread pattern and/or rubber com-pound. Do not overinflate.
DO NOT CONFUSE WITH	Page 14

TREAD & CROWN

DESCRIPTION	**Separation between crown plies.**





OBSERVATION	Split in the circumferential direction in the shoulder zone and/or bulges and/or deformation of the tread.
PROBABLE CAUSES(S)	For Thermal Separation: Overheating produced by long and numerous cycles with the tire's nominal load being exceeded, exhibited by the appearance of sticky rubber. Large slip angle on front tires (tight turns at high speed), excessive TMPH/TKPH. For Mechanical Separation: Severe lateral scrub recognizable as rubber is not sticky. Insufficient pressure/overload. Mechanical misalignment.
EVOLUTION	Rupture of the casing ply.
RECOMMENDED ACTION	Scrap.
PREVENTION	Study the conditions of use, layout of roads, load and pressures. Make sure that the TMPH/TKPH of the tire is greater than that of the site.
DO NOT CONFUSE WITH	Pages 13, 16, 18, 58

TREAD & CROWN

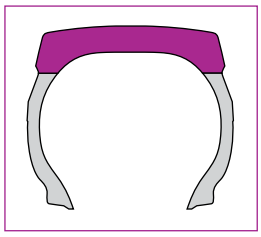
DESCRIPTION	**Separation in the rubber under the edge of the crown plies.**

OBSERVATION	The separation starts at the edge of the first crown ply and can be localized or extensive. The rubber can have a sticky or blistered aspect.
PROBABLE CAUSES(S)	Overload, underinflation. Prolonged running at high speed.
EVOLUTION	Tearing between the casing ply and the sidewall. Rupture of the casing ply under the crown block or the flexion zone. Infiltration. Runflat.
RECOMMENDED ACTION	Scrap.
PREVENTION	Respect the guidelines concerning load and pressure. Study the conditions of use, layout and maintenance of roads. Check whether machines reach high speeds on fast roads. Make sure the TMPH/TKPH of the tire is greater than that of the site.
DO NOT CONFUSE WITH	Pages 14, 16, 17

TREAD & CROWN

DESCRIPTION	**Deterioration of the rubber product(s) between the tread and the crown plies.**

Tread deformation

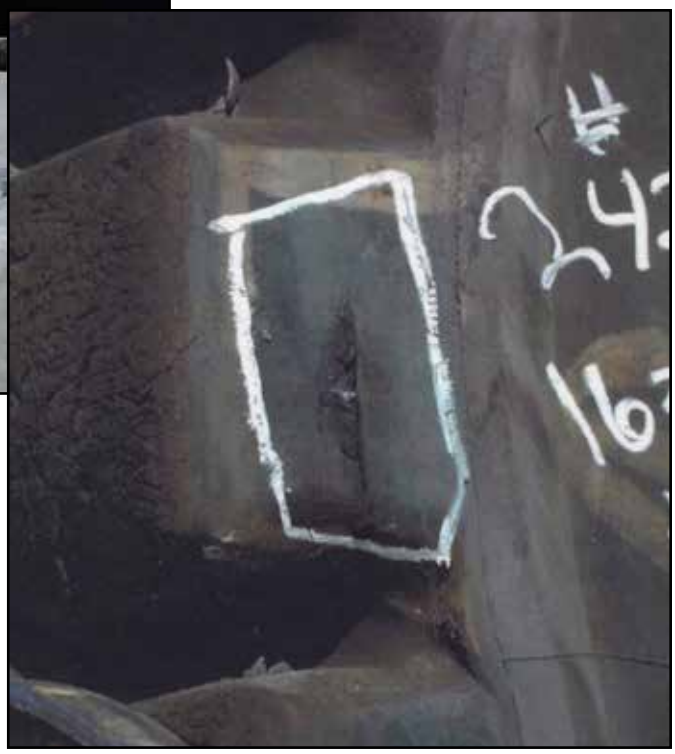


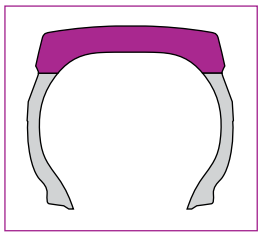
Rubber generally sticky under the tread

OBSERVATION	Localized deformation or wear of the tread or splits in rubber at the bottom of the tread grooves. Rubber generally sticky between crown ply and tread.
PROBABLE CAUSES(S)	Build-up of heat resulting from under-inflation or overload (tire's nominal load exceeded), associated with numerous, lengthy cycles. High speed travel over surfaces made up of large stones (hammering). Damage amplified by incorrect setting of toe or camber on machine.
EVOLUTION	Partial tread rubber detachment and splitting.
RECOMMENDED ACTION	Scrap.
PREVENTION	Study the conditions of use, layout and maintenance of roads; check whether machines do reach high speeds on fast roads; make sure that the tire usage is within the site TMPH/TKPH. Be aware of indicators: localized wear, splits in rubber at the bottom of the tread grooves.
DO NOT CONFUSE WITH	Page 14

TREAD & CROWN

DESCRIPTION	**Split in the rubber products at the edge of the crown plies.**

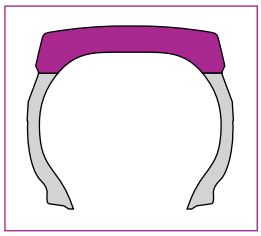




OBSERVATION	Open splits in the shoulder area.
PROBABLE CAUSES(S)	Tire's nominal TMPH/TKPH exceeded, hammering.
EVOLUTION	Separation of the tread lugs.
RECOMMENDED ACTION	Scrap.
PREVENTION	If possible, weigh the machine and apply tire pressures accordingly. Check whether there is any hammering. Check haul road maintenance. Be aware of the indicators such as localized deformation on the shoulder.
DO NOT CONFUSE WITH	Pages 14, 16

TREAD & CROWN

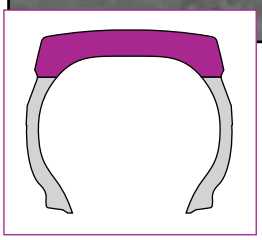
DESCRIPTION	**Generalized separation between the tread band and the crown plies.**



OBSERVATION	Generalized separation between the tread band and crown plies without trace of heat.
PROBABLE CAUSES(S)	Repeated aggressions to the tread band. Stone retention. Tread damage.
EVOLUTION	Continued detachment of tread rubber from the crown plies.
RECOMMENDED ACTION	Scrap.
PREVENTION	If possible, weigh the machine and adjust tire pressures accordingly. Check whether there is any hammering. Check haul road maintenance. Consider indicators such as localized deformation or wear on the tread.
DO NOT CONFUSE WITH	Pages 13, 79

TREAD & CROWN

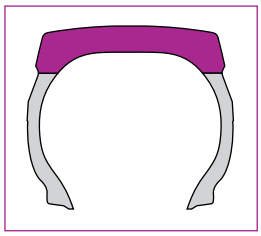
DESCRIPTION	**Splits at the base of the tread blocks with or without rubber tearing out.**



OBSERVATION	Splits in rubber at the bottom of tread grooves (between lugs), with or without torn rubber.
PROBABLE CAUSES(S)	If the splits are localized: Running over an obstacle (block, wedge, etc.) creating a lever effect on the edge of the shoulder blocks. If splits are widespread: High torque, or nature of the road (hammering). Misapplication of the tire.
EVOLUTION	Chunking of tread block(s).
RECOMMENDED ACTION	Keep running. If the tire is accepted for retreading, consider removal before the splits reach the structural plies; otherwise scrap.
PREVENTION	If possible, take corrective action on the haul roads to improve surface conditions. Determine if traction is required; if not, re-evaluate tread selection.
DO NOT CONFUSE WITH	Page 20

TREAD & CROWN

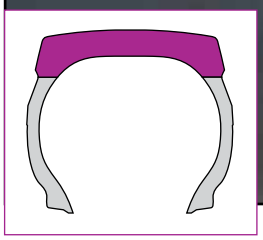
DESCRIPTION	**Splits at the bottom or the edge of the tread blocks in the shoulder area.**



OBSERVATION	Splits in rubber at the bottom or edge of tread grooves in the shoulder.
PROBABLE CAUSES(S)	Initial cuts in rubber made larger. Over-flexing due to high torque, or to under-inflation or overload, and accentuated by frequent scrubbing.
EVOLUTION	Deterioration of crown plies.
RECOMMENDED ACTION	If wear is advanced and the tire cannot be retreaded, keep running until splits reach the protective ply. Retread, if it is accepted, before the splits have reached the plies at several points; otherwise scrap. On a transport machine, if wear is minimal and ply structure is visible, have the tire repaired if possible.
PREVENTION	Inspect cuts regularly on transport machines. If wear is slight, make a spot repair before the plies become visible. Otherwise, leave running and monitor.
DO NOT CONFUSE WITH	Pages 19, 21, 24

TREAD & CROWN

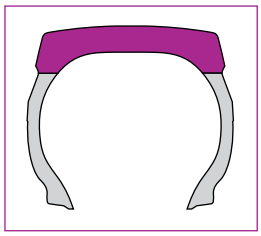
DESCRIPTION	**Splits at the base/edge of the sculpture in the sidewall.**



OBSERVATION	Splits in rubber at the bottom or edge of tread grooves in the sidewall.
PROBABLE CAUSES(S)	Cuts in rubber propagating due to over-flexing under high torque, under-inflation or overload and accentuated by frequent scrubbing.
EVOLUTION	Deterioration of the casing ply with or without going through the inner liner.
RECOMMENDED ACTION	Keep running if wear is advanced and the tire cannot be retreaded. On transport machines, if wear is slight and casing ply is visible using the separating tool, have the tire repaired (if possible).
PREVENTION	Monitor cuts on transport machines. If wear is slight, make a spot repair before the plies become visible. Otherwise, leave running and monitor developments.
DO NOT CONFUSE WITH	Pages 20, 42

TREAD & CROWN

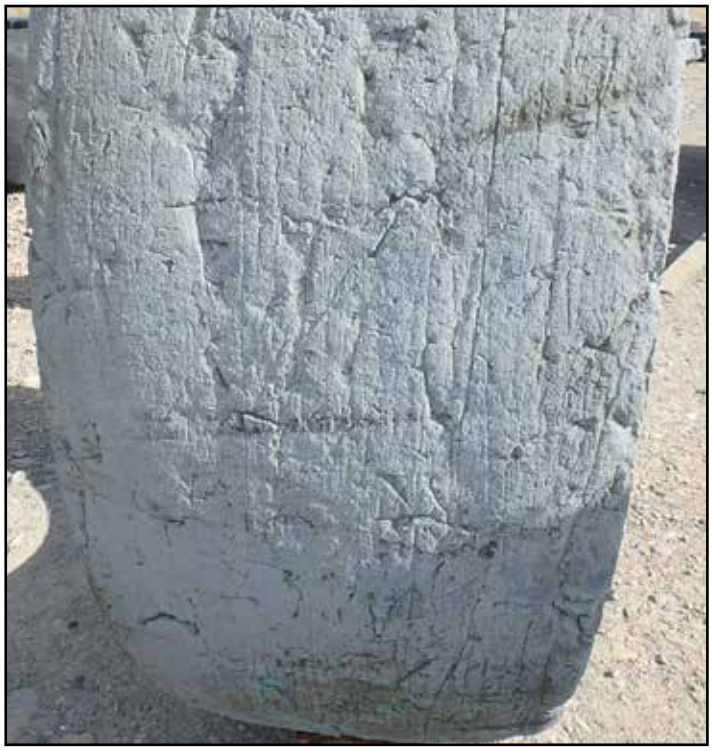
DESCRIPTION	**Crazing of the tread rubber in the grooves.**

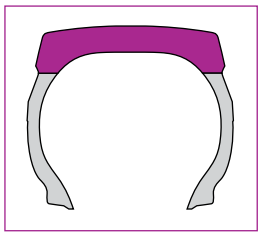


OBSERVATION	Rubber ozone cracking at the base or on the edge of the tread, which may develop into splits.
PROBABLE CAUSES(S)	Normal phenomenon, accentuated by ozone concentration.
EVOLUTION	Cracks should not affect tire's ultimate life.
RECOMMENDED ACTION	If the tire is not accepted for retreading, continue in service on site until the first ply is visible. To avoid loss of the casing for retreading, remove before the tread pattern wears off. If the machine is subject to traffic regulations (e.g. cranes), comply with the legislation in force in that country.
PREVENTION	Avoid exposing the tires, even momentarily, near to ozone emissions (e.g. arc welding). Ensure proper storage conditions of new machines and tire equipment.
DO NOT CONFUSE WITH	Page 19

TREAD & CROWN

DESCRIPTION	**Repeated circumferential cuts/scratches to the tread.**

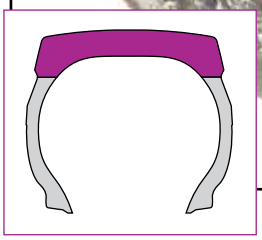




OBSERVATION	Circumferential cuts and scratches on the tread.
PROBABLE CAUSES(S)	Tire spinning over very rough surfaces; could have contact with the vehicle.
EVOLUTION	Tearing of tread rubber, crown oxidation.
RECOMMENDED ACTION	If wear is advanced and the tire cannot be retreaded, keep running until the protective ply appears. If the tire is accepted for retreading, send it in before the cuts reach the plies at several points.
PREVENTION	Look for the causes of spinning (going uphill empty, loose or soft surface, high torque). Clean and maintain the site roads using graders or bulldozers. Review the balance between load and pressure and reduce pressure if possible. Review the choice of tread pattern and/or type of rubber compound.
DO NOT CONFUSE WITH	Page 24

TREAD & CROWN

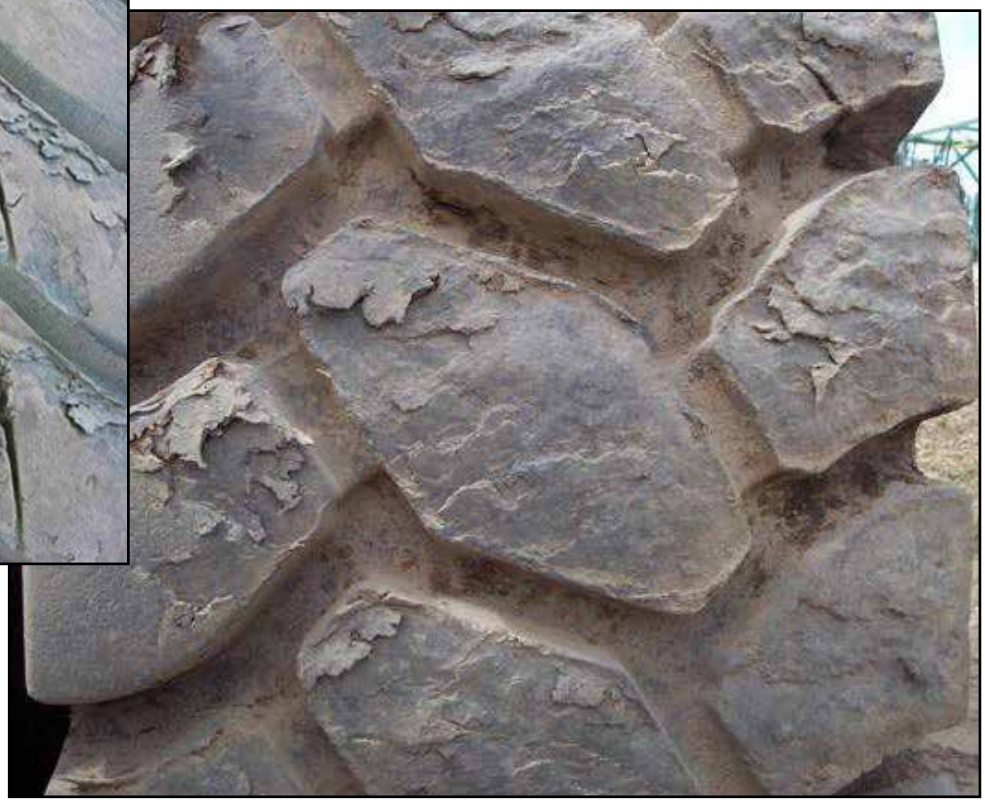
DESCRIPTION	**Tread elements tearing out (chunking) due to repeated aggressions.**

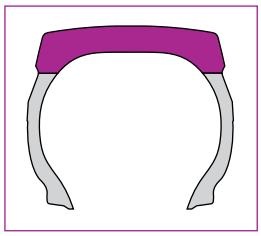


OBSERVATION	Tread elements torn (chunking).
PROBABLE CAUSES(S)	Numerous cuts due to running on rough surfaces.
EVOLUTION	Deterioration of crown plies reaching the casing, rapid wear, lack of traction.
RECOMMENDED ACTION	If wear is advanced and the tire cannot be retreaded, leave running until the protective ply appears. If the tire is accepted for retreading, send it in before the tears reach the plies at several points.
PREVENTION	Look for the causes of spinning (going uphill empty, loose or soft surface, high torque). Clean and maintain the site roads using graders or bulldozers. Review the balance between load and pressure and reduce pressure if possible. Review the choice of tread pattern and/or (harder) type of rubber compound.
DO NOT CONFUSE WITH	Pages 23, 25 or (at end of life) 27

TREAD & CROWN

DESCRIPTION	**Scaling, or flaking away, of the tread rubber.**

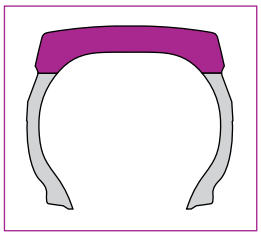




OBSERVATION	Multiple tears in the rubber on the tread, giving a scaly, flaky appearance.
PROBABLE CAUSES(S)	Type of rubber not suited to the surface and conditions of use. More frequent when running on hard tracks covered with very small particles (pebbles, glass, etc.). Accentuated by over-inflation, or by repeatedly changing the direction of travel, and/or by running at high torque, associated with a high average speed.
EVOLUTION	Tearing, deterioration of crown plies and rapid wear.
RECOMMENDED ACTION	If wear is advanced and the tire cannot be retreaded, leave running until the protective ply appears. If the tire is accepted for retreading, send it in before the tears reach the plies at several points.
PREVENTION	Review the balance between load and pressure. Observe the type and diversity of surfaces covered by the machines and redefine the choice of (a harder) rubber compound.
DO NOT CONFUSE WITH	Page 24

TREAD & CROWN

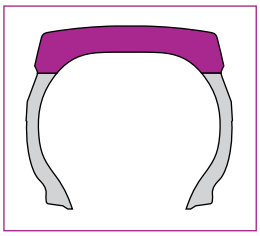
DESCRIPTION	**Cavities in the tread band generally in the center.**



OBSERVATION	Cavities in the tread band generally in the center. Aspect of the rubber can be blistered, soft, sticky, with or without tearing out. The damage can be localized or appear in several areas.
PROBABLE CAUSES(S)	Excessive speeds on hard surfaces with large lug pattern. Hammering.
EVOLUTION	Lug, partial or full tread detachment.
RECOMMENDED ACTION	Scrap
PREVENTION	Do not exceed tire TMPH/TKPH or maximum distance in one hour. Large lug pattern should not run on hard surface.
DO NOT CONFUSE WITH	Pages 16, 17, 18, 79, 82

TREAD & CROWN

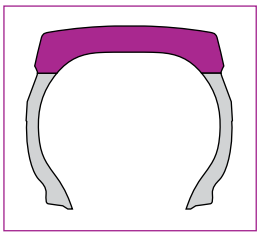
DESCRIPTION	**Excessive wear reaching the crown plies.**



OBSERVATION	Excessive wear reaching the crown plies.
PROBABLE CAUSES(S)	NA
EVOLUTION	Wear of protector and working plies.
RECOMMENDED ACTION	Remove from service and scrap according to end user's removal policy.
PREVENTION	Comply with the legislation in force if the machine is subject to traffic regulations (e.g. cranes). If the tire is accepted for retreading, withdraw it from use as soon as the tread pattern disappears.
DO NOT CONFUSE WITH	Page 28

TREAD & CROWN

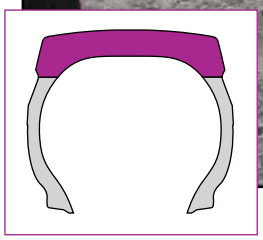
DESCRIPTION	**Normal wear.**



OBSERVATION	Tire normally worn out and withdrawn from service with no sign of abnormal wear.
PROBABLE CAUSES(S)	NA
EVOLUTION	NA
RECOMMENDED ACTION	None.
PREVENTION	Comply with the legislation of your local country if the machine is subject to traffic regulations (e.g. cranes). If the tire is accepted for retreading, and to avoid losing the possibility of retreading it, withdraw the tires from use as soon as the tread pattern disappears.
DO NOT CONFUSE WITH	Page 27

TREAD & CROWN

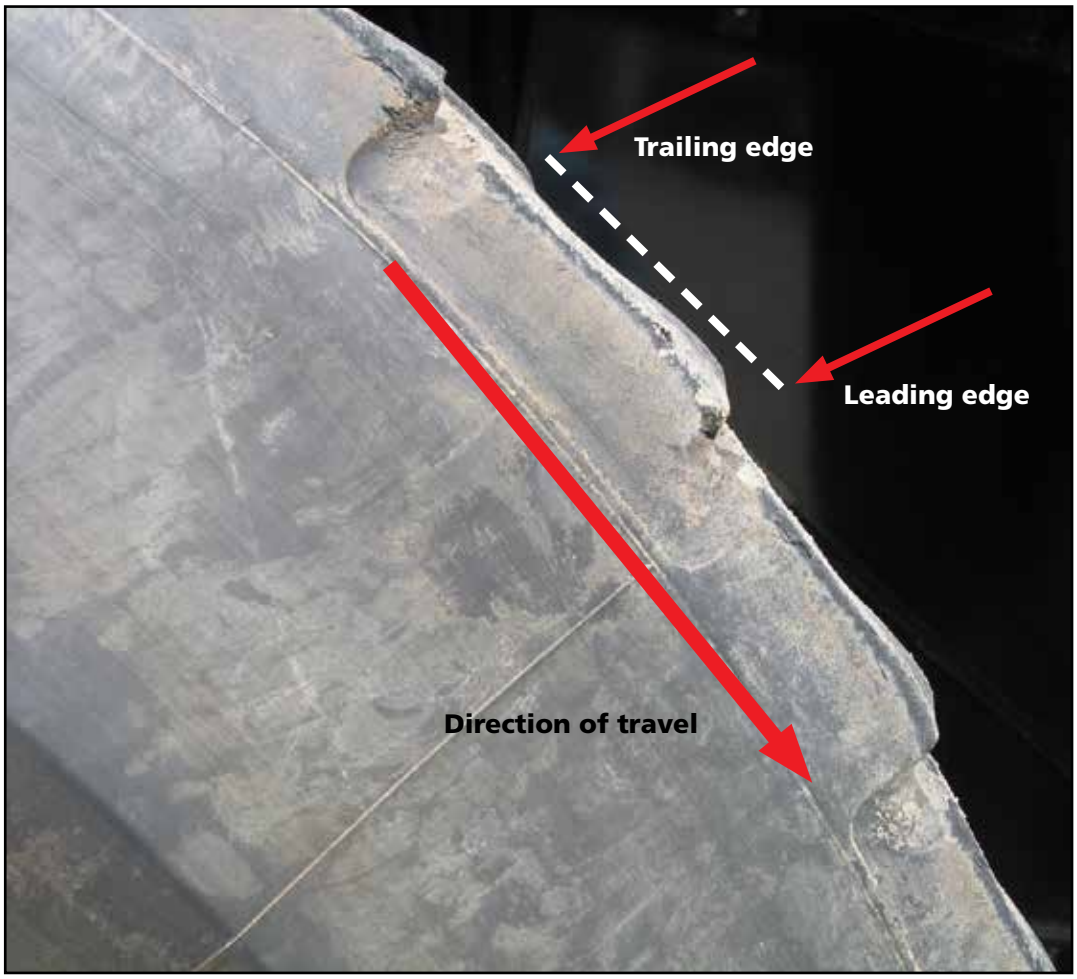
DESCRIPTION	**Sloped wear.**

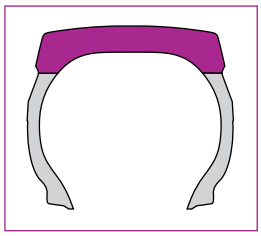


OBSERVATION	Wear increasing from one shoulder to the other, but the tread blocks have no trailing edges transverse to the direction of travel.
PROBABLE CAUSES(S)	Because of the nature of the application, the tire, when travelling, is inclined in relation to the vertical (positive or negative camber).
EVOLUTION	Crown plies exposed, loss of life and retreadable casing.
RECOMMENDED ACTION	Switch to a position where the forms of wear are less of a problem and regroove if the tire is branded "Regroovable". To be retreaded if the tread pattern has disappeared and the size is accepted.
PREVENTION	Do not wait until the tire is half-worn before rotating.
DO NOT CONFUSE WITH	Any other wear patterns.

TREAD & CROWN

DESCRIPTION	**Heel and toe wear.**

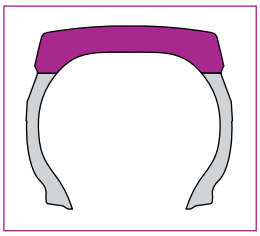




OBSERVATION	Heel and toe wear (wear on trailing edges of blocks).
PROBABLE CAUSES(S)	Association of slow wear, hard roads, large slip angle: for example, on trailing axle (trailing edge worn). Or rapid wear, hard road, high braking or incorrect dual matching (new tire with worn): leading edge worn. These two effects are combined when going downhill loaded.
EVOLUTION	Continuous irregular wear, increase in vibrations and operator discomfort.
RECOMMENDED ACTION	Rotate tires as soon as the effect becomes visible.
PREVENTION	In the case of rigid dumpers, if the tread design is directional, switch tread direction on the front axle; switch the tires around before wear is too pronounced. Review the choice of tread pattern and/or the type of rubber.
DO NOT CONFUSE WITH	Any other wear patterns.

TREAD & CROWN

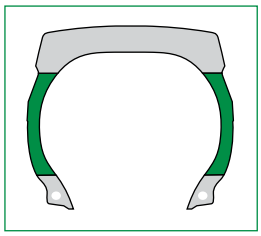
DESCRIPTION	**Wear on the shoulders giving rounded profile.**



OBSERVATION	Greater wear on the shoulders.
PROBABLE CAUSES(S)	Frequent occurrence on single-fitment axle when lots of bends are taken at high speed (for example, the front axle of rigid dumpers and the front/rear axles of articulated dumpers). Prolonged under-inflation or overload.
EVOLUTION	Crown plies exposed, loss of tire life and retreadable casing.
RECOMMENDED ACTION	Leave running but correct pressure.
PREVENTION	If possible, weigh the machine by axle to determine optimum pressure. Investigate causes of low pressure.
DO NOT CONFUSE WITH	Any other wear patterns.

SIDEWALL

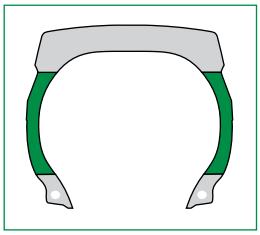
DESCRIPTION	**Sidewall perforation penetrating through to the interior.**



OBSERVATION	Perforation or cut extending through the sidewall.
PROBABLE CAUSES(S)	Accidental cut or perforation, contact with rock ejectors.
EVOLUTION	Runflat with or without rapid air loss.
RECOMMENDED ACTION	If the damage is within the recommended limits, submit for repair (depending on the tire's residual value).
PREVENTION	Review the inflation pressure if perforations are frequent. Improve the working environment. Improve the condition of the haul roads.
DO NOT CONFUSE WITH	Page 65

SIDEWALL

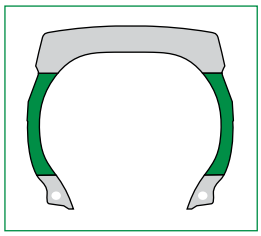
DESCRIPTION	**Localized sidewall damage affecting the casing ply but not extending to the interior of the tire.**



OBSERVATION	Localized sidewall damage not extending to the interior but affecting the casing ply or its turn-up.
PROBABLE CAUSES(S)	Accidental sidewall cut, shock or impact.
EVOLUTION	Splitting open radially or rupture.
RECOMMENDED ACTION	Repair, depending on the tire's residual value. Assess the extent of the damage to ensure that it is within the recommended limits.
PREVENTION	Review tire pressure if damage is frequent. Identify areas where damage is likely to occur. Improve the condition of the haul roads and work conditions.
DO NOT CONFUSE WITH	Pages 21, 42

SIDEWALL

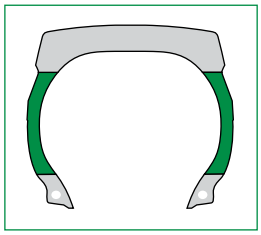
DESCRIPTION	**Rupture of the turn-up in the bead area.**



OBSERVATION	Rupture of the casing ply turn-up in the bead-bearing area behind the flange.
PROBABLE CAUSES(S)	Tire's nominal load capacity exceeded. Under-inflation. Improper mounting or incorrect flange height. Often seen on industrial and underground tires.
EVOLUTION	Casing ply rupture, rapid deflation.
RECOMMENDED ACTION	If cords have lost their frette or are broken, scrap.
PREVENTION	If possible, weigh the machine by axle to determine optimum pressures. When fitting, ensure that the tire is correctly centered on the rim and seated per Michelin's bead seating pressure guidance. Verify that the wheel and flange parts are correct.
DO NOT CONFUSE WITH	Pages 37, 53, 64

SIDEWALL

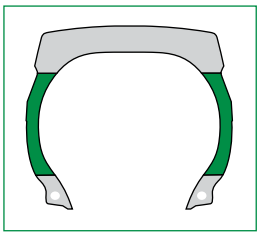
DESCRIPTION	**Local separation along the casing ply in the sidewall.**



OBSERVATION	Generally circumferential bulges in the lower part of the sidewall, hard to the touch. Visible on the exterior and interior of the tire.
PROBABLE CAUSES(S)	Tire's nominal load capacity exceeded. Under-inflation. Improper mounting.
EVOLUTION	Continued separation of the bead elements leading to a rupture of the casing.
RECOMMENDED ACTION	Scrap.
PREVENTION	If possible, weigh the machine by axle to determine optimum pressures. Review and adapt the advised pressure. Make tire fitters aware of the need to follow the proper fitting/seating procedures.
DO NOT CONFUSE WITH	Pages 37, 38, 39

SIDEWALL

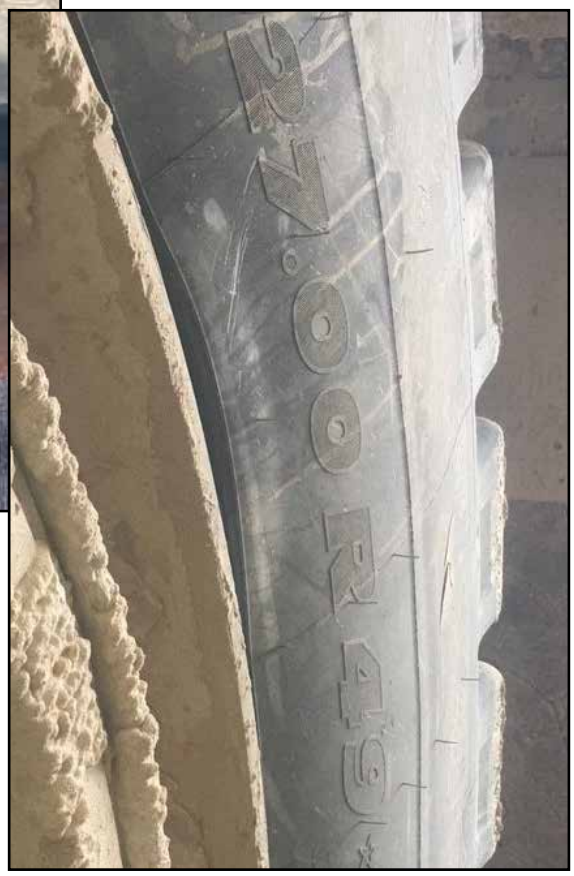
DESCRIPTION	**Separation at the extremity of the casing ply turn-up in the bead area (low turn-up height).**

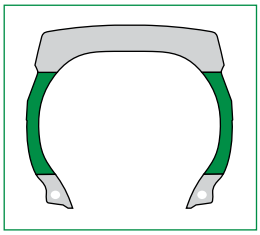


OBSERVATION	Circumferential separation at the top/end of the turn-up in the bead area.
PROBABLE CAUSES(S)	Tire's nominal load capacity exceeded. Under-inflation. Improper mounting.
EVOLUTION	Continued separation of the bead elements leading to a rupture of the casing.
RECOMMENDED ACTION	Scrap.
PREVENTION	If possible, weigh the machine by axle to determine optimum pressures. Review and adapt the advised pressure. Make tire fitter aware of the need to follow the proper fitting/seating procedures.
DO NOT CONFUSE WITH	Pages 38, 64, 76

SIDEWALL

DESCRIPTION	**Lumps from the reinforcements in the bead area.**

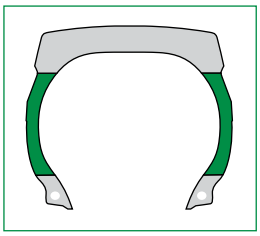




OBSERVATION	Numerous semi-spherical lumps and/or splits in the guide rib area. Hard bulges in bead area reinforcement zone. Separation at the edge of the bead protector ply.
PROBABLE CAUSES(S)	Over-deflection due to the tire's nominal load capacity being exceeded. Under-inflation. Improper mounting. Incorrect flange or rim width. Heat.
EVOLUTION	Bulges can propagate in circumferential direction.
RECOMMENDED ACTION	Rotate tire to a less demanding position on the machine (if possible). Monitor development: if it opens revealing ply material, scrap.
PREVENTION	If possible, weigh the machine by axle to determine optimum pressures. Make sure tire fitters are aware of correct mounting and seating pressures.
DO NOT CONFUSE WITH	Pages 35, 39

SIDEWALL

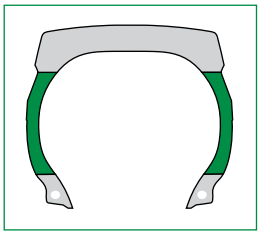
DESCRIPTION	**Separation at the end of the inner reinforcing plies or casing ply turn-up in the sidewall (mid-height turn-up).**



OBSERVATION	Separation at the end of the high casing ply turn-up (mid-height turn-up) or reinforcement on the sidewall
PROBABLE CAUSES(S)	Tire's nominal load capacity exceeded, under-inflation. Improper mounting.
EVOLUTION	Opening will continue to spread; once completely open the tire could rupture.
RECOMMENDED ACTION	To be examined by the Manufacturer to decide if tire should keep running. If not, scrap.
PREVENTION	If possible, weigh the machine by axle to determine optimum pressures. When mounting is done on the machine, make sure tire fitters are aware of correct mounting and seating pressures.
DO NOT CONFUSE WITH	Page 36

SIDEWALL

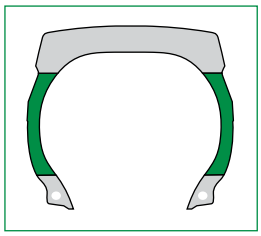
DESCRIPTION	**Separation between the packing rubber (BJ) and the bead zone reinforcements.**



OBSERVATION	Separation between the packing rubber (BJ) and the bead zone reinforcements.
PROBABLE CAUSES(S)	Excessive stress in the bead zone. Tire's nominal load exceeded. Underinflation. Flanges in poor condition.
EVOLUTION	Bulges will continue to grow; once open 360 degrees, the tire could rupture.
RECOMMENDED ACTION	Leave in service (after inspection) and if necessary, replace worn or distorted wheel components. Vent by Michelin-qualified personnel per Michelin procedures. Increase pressure to decrease deflection.
PREVENTION	Check service conditions. If possible, weigh the machine by axle to determine optimum pressures.
DO NOT CONFUSE WITH	Pages 35, 37

SIDEWALL

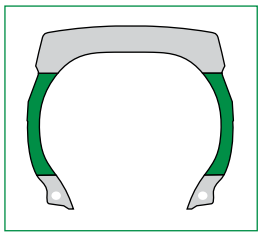
DESCRIPTION	**Crazing of the black sidewall rubber.**



OBSERVATION	Ozone cracking in flexing zone on the tire sidewall.
PROBABLE CAUSES(S)	Normal phenomenon of rubber, linked to storage conditions. Accentuated by a concentration of ozone.
EVOLUTION	Cracks will continue to progress very slowly.
RECOMMENDED ACTION	Leave in service or scrap if the casing ply is damaged.
PREVENTION	Avoid exposing tires, even momentarily, to ozone emissions (i.e. arc welding). Ensure proper storage of new machines and tires.
DO NOT CONFUSE WITH	NA

SIDEWALL

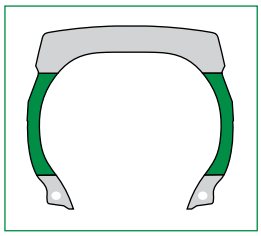
DESCRIPTION	**Crazing of the rubber in the area of the guide rib.**



OBSERVATION	Ozone cracking in bead area, on sidewall.
PROBABLE CAUSES(S)	Normal phenomenon of rubber, accentuated by a concentration of ozone.
EVOLUTION	Cracks will continue to progress very slowly.
RECOMMENDED ACTION	Leave running (unless the casing ply turn-up is visible, then scrap).
PREVENTION	Avoid exposing tires, even momentarily, to ozone emissions (arc welding set). Ensure proper storage of new machines and tire equipment.
DO NOT CONFUSE WITH	Pages 36, 37

SIDEWALL

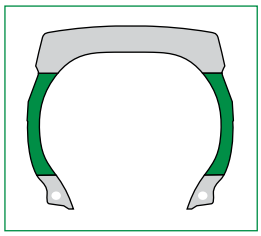
DESCRIPTION	**Oblique splits in the sidewall rubber.**



OBSERVATION	Oblique splits on the sidewall.
PROBABLE CAUSES(S)	Development of damage by excessive flexing initiated by cut(s).
EVOLUTION	Air loss following propagation of the split to the interior of the split, without rupture.
RECOMMENDED ACTION	In the case of little wear, make a preventive repair before any ply becomes visible. If wear is advanced and plies are damaged with sidewall deformation, scrap. If wear is advanced, but there is no sidewall deformation and the tire is not accepted for retreading, leave running. If there are a lot of oblique splits, do not advise retreading.
PREVENTION	Keep an eye on cuts on transport machines. Look for places where there is a possibility of impact. Improve condition of haul roads.
DO NOT CONFUSE WITH	Pages 21, 32, 33

SIDEWALL

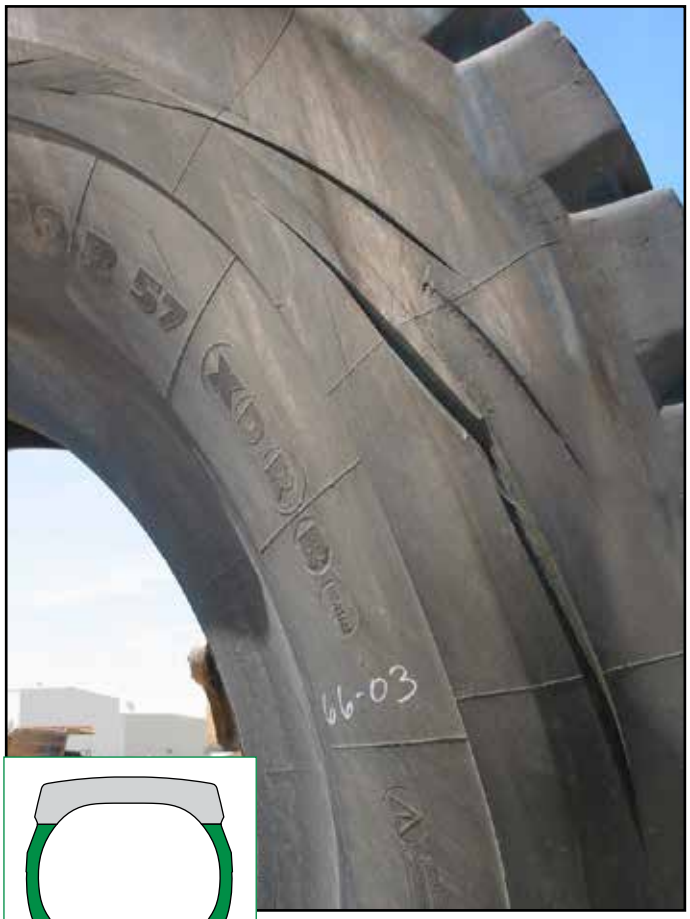
DESCRIPTION	**Rubber splits in the sidewall/shoulder area without separation between the plies.**

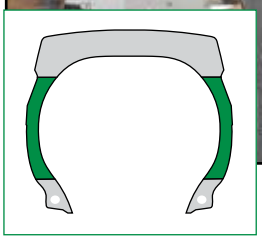


OBSERVATION	Rubber splits in the sidewall/shoulder area without separation between the plies.
PROBABLE CAUSES(S)	Severe scrubbing. Sidewall cut. Localized stress during passage over an obstacle.
EVOLUTION	Tearing out of the tread band rubber in the shoulder. Rupture of the casing ply at the edge of the crown block.
RECOMMENDED ACTION	In the case of little wear and: • The split is not deep <2 to 3mm: make a simple buffing • > 2 to 3mm: make preventive repair before any ply becomes visible. If wear is advanced and plies are damaged with sidewall deformation, scrap. If wear is advanced, but there is no sidewall deformation and the tire is not accepted for retreading, leave running. If there are many circumferential splits, do not advise retreading.
PREVENTION	Keep an eye on cuts on transport machines. Look for places where there is a possibility of impact. Improve condition of haul roads.
DO NOT CONFUSE WITH	Pages 36, 38

SIDEWALL

DESCRIPTION	**Repeated circumferential cuts/scratches to the sidewall.**

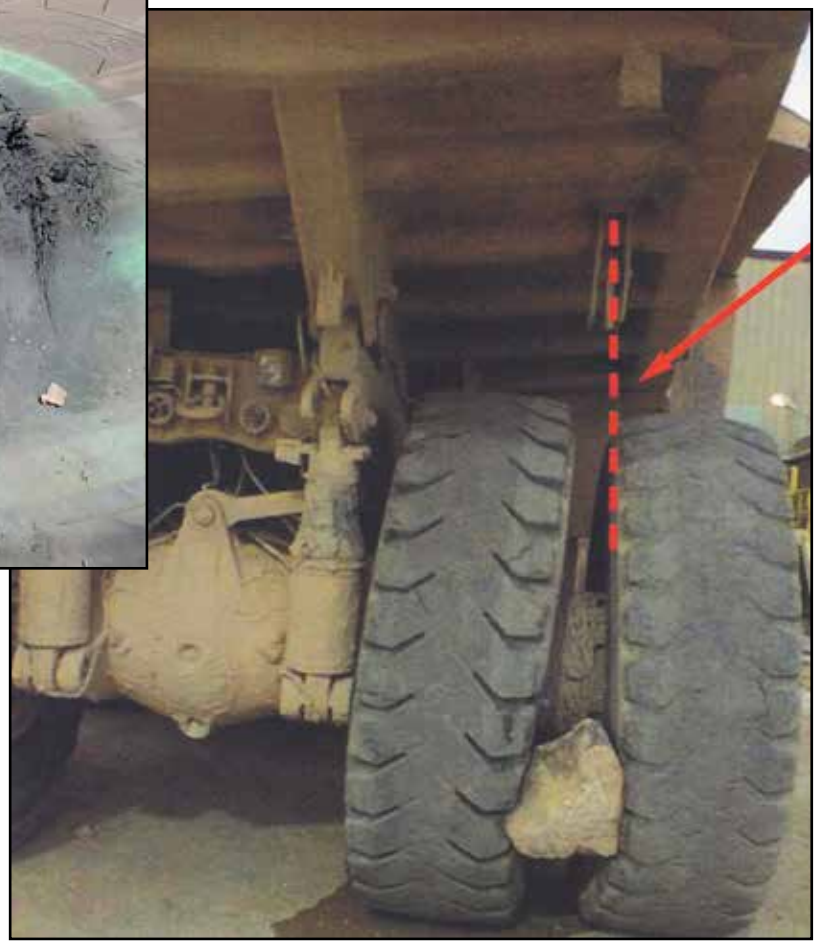


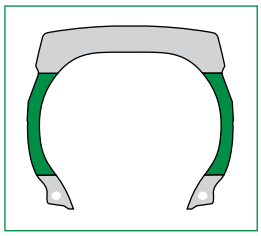


OBSERVATION	Repeated circumferential cuts/scratches to the sidewall.
PROBABLE CAUSES(S)	Sidewall rubbing repeatedly against part of the vehicle or an obstacle.
EVOLUTION	Continued wear leading to possible rupture of the casing ply.
RECOMMENDED ACTION	Comply with the legislation in force in the country if the machine is subject to traffic regulations (e.g. cranes). If wear is advanced and the tire is not accepted for retreading, leave running on site only.
PREVENTION	Look for the offending part. Check the general condition of the rock ejectors, spacers, wings, etc. Examine the site conditions in which the machine is operating.
DO NOT CONFUSE WITH	Page 46

SIDEWALL

DESCRIPTION	**Sidewall damage due to an object trapped between dual tires.**

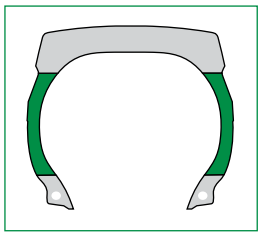




OBSERVATION	Sidewall damaged by object trapped between duals.
PROBABLE CAUSES(S)	Object trapped between duals.
EVOLUTION	Damage could lead to rapid deflation of one or both tires.
RECOMMENDED ACTION	Step 1: Deflate both tires before removing wheel bolts. Step 2: Remove for internal examination of both tires, depending on the size of the object or impact. Step 3: Measure the damage and repair in accordance with the recommended limits. If wear is advanced and the size can be retreaded, retread. Otherwise, scrap.
PREVENTION	Make sure that rock ejectors are fitted (preventing objects from becoming trapped between duals). Improve condition of haul roads.
DO NOT CONFUSE WITH	Page 62

SIDEWALL

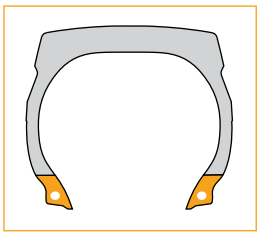
DESCRIPTION	**Dual tire kissing.**



OBSERVATION	Friction between duals because of kissing. Damage to the sidewall by dual tires kissing (with/without casing ply rupture).
PROBABLE CAUSES(S)	Insufficient pressure or tire's nominal load capacity exceeded. Travelling laden up a very steep slope. Incorrect wheel offsets (dual spacing).
EVOLUTION	Damage could lead to rapid deflation of one or both tires.
RECOMMENDED ACTION	Remove and examine the interior of the tires. If the size is accepted for retreading, remove the tire before the first ply becomes visible. If the size is not accepted for retreading, leave running on site until the ply becomes visible. Comply with the legislation in force in the country if the machine is subject to traffic regulations (e.g. cranes).
PREVENTION	Adapt the pressure to the load. Check pressures regularly. Study the conditions of use and reduce gradients if possible. Check for correct dual spacing.
DO NOT CONFUSE WITH	NA

BEAD AREA

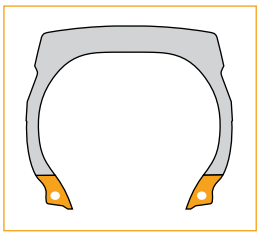
DESCRIPTION	Deformation/compression of rubber at the bead heel.



OBSERVATION	Deformation/compression of rubber at the bead heel.
PROBABLE CAUSES(S)	Linked to an excessive gap between flange and rim, not a fitting problem. Very high pressures push the material under that gap.
EVOLUTION	Tire may begin indexing due to the high pressures stretching the bead wire.
RECOMMENDED ACTION	Put back into use. To make it easier to seat the bead when inflating, trim off the excess rubber (use a hemispherical rasp with a hand grinder with a maximum speed of 3000 r.p.m.).
PREVENTION	If possible, weigh the machine by axle to determine optimum pressures for the load.
DO NOT CONFUSE WITH	NA

BEAD AREA

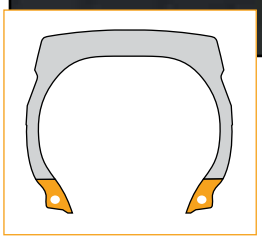
DESCRIPTION	Bead damage due to gravel, rust, etc.



OBSERVATION	Bead damaged by gravel or rust.
PROBABLE CAUSES(S)	Gravel penetrating between the tire and the flange as a result of pressures being too low in relation to the use and frequent scrub. Accentuated by flanges which are rusty or worn.
EVOLUTION	Damage to casing cables.
RECOMMENDED ACTION	Clean the beads and wheel components.
PREVENTION	Check weights and define the recommended pressure. Clean and paint the wheel and its components. If the components are rusty, replace them.
DO NOT CONFUSE WITH	Page 49

BEAD AREA

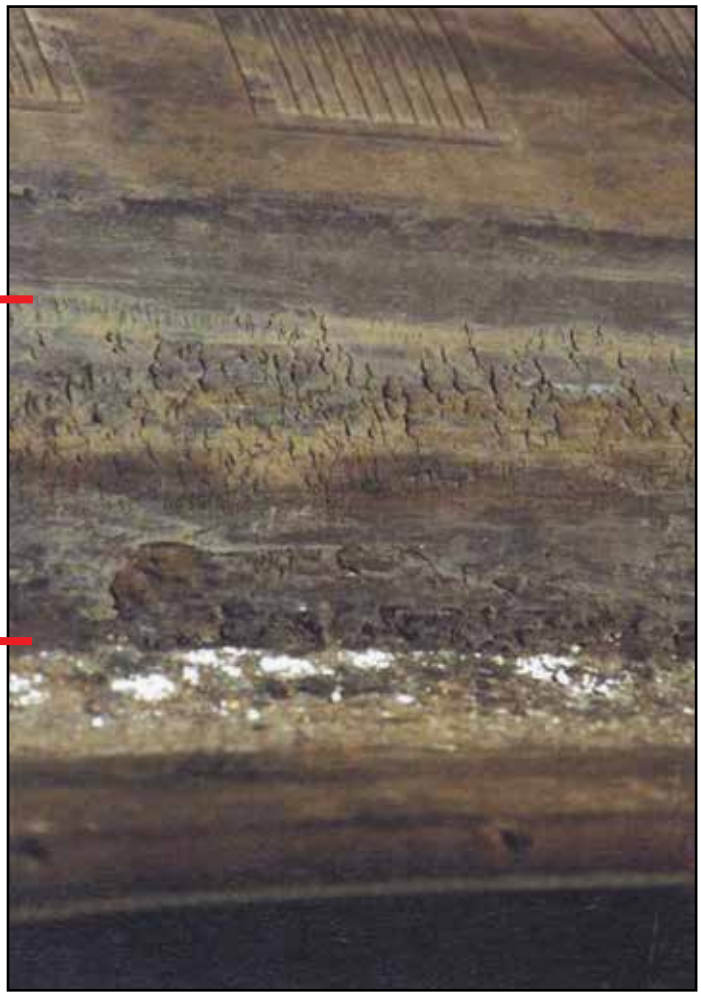
DESCRIPTION	**Bead damage caused during mounting or demounting (from a tire lever or mounting machine).**

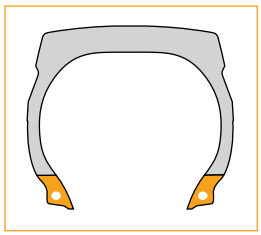


OBSERVATION	Damage to the rubber or a ply in the bead.
PROBABLE CAUSES(S)	Damage caused by mounting or handling tools. Fitting tools in poor condition or improperly used.
EVOLUTION	Deformation of the bead wire, rupture of the casing, broken bead.
RECOMMENDED ACTION	To be examined by Michelin or repair expert to determine if repairable. If not, scrap.
PREVENTION	Verify the condition of the fitting and handling equipment and the method used.
DO NOT CONFUSE WITH	Pages 48, 51

BEAD AREA

DESCRIPTION	**Scaling of the rubber in the bead bearing area.**

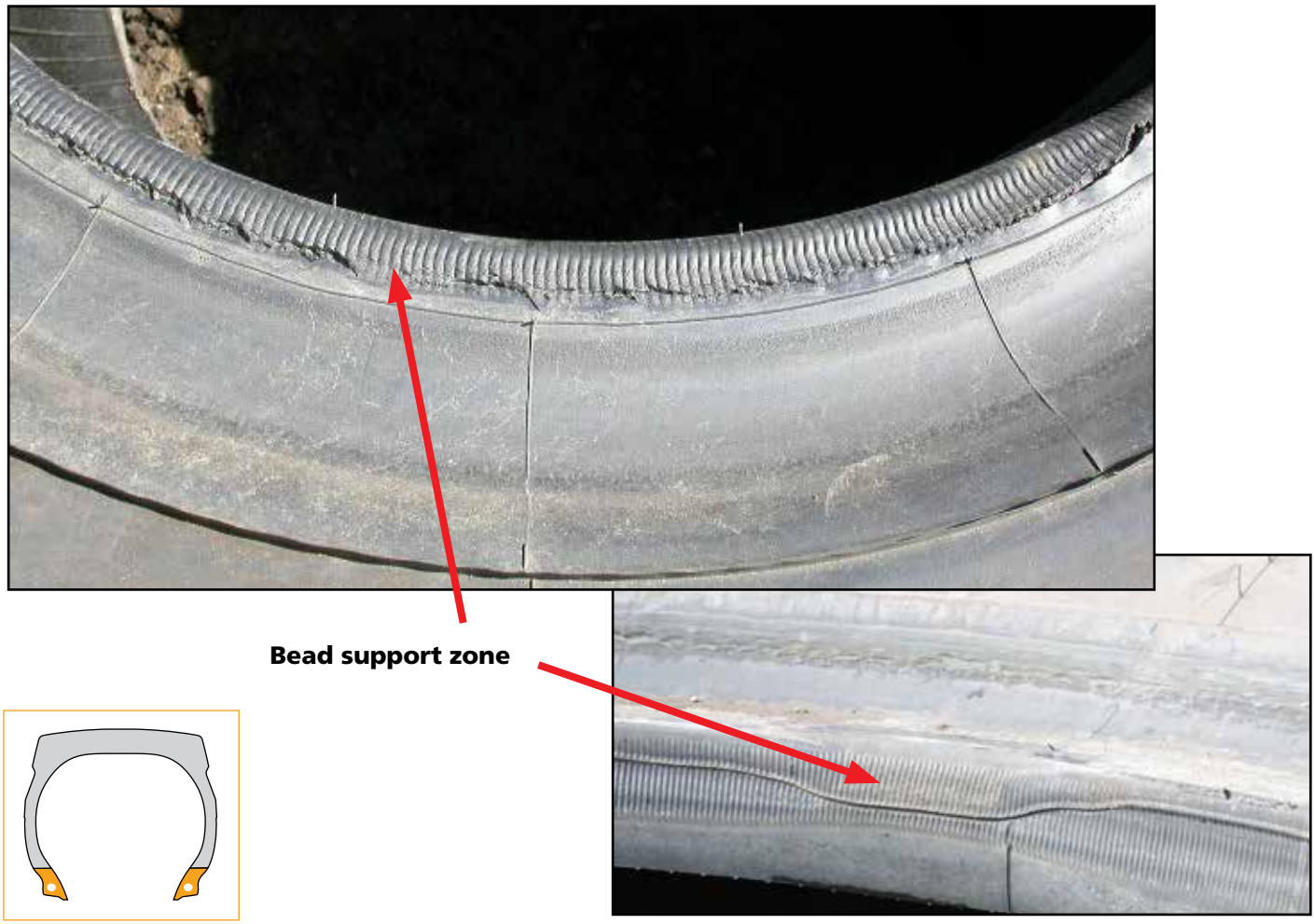




OBSERVATION	Small tears in rubber in the bead support zone.
PROBABLE CAUSES(S)	High torque. Heat build-up in bead zone resulting from intensive braking or faulty braking system.
EVOLUTION	Tears could reach casing ply turn-up, exposing steel cords to oxidation.
RECOMMENDED ACTION	Leave running. Scrap tire if turn-up becomes exposed.
PREVENTION	Monitor development.
DO NOT CONFUSE WITH	Pages 53, 54

BEAD AREA

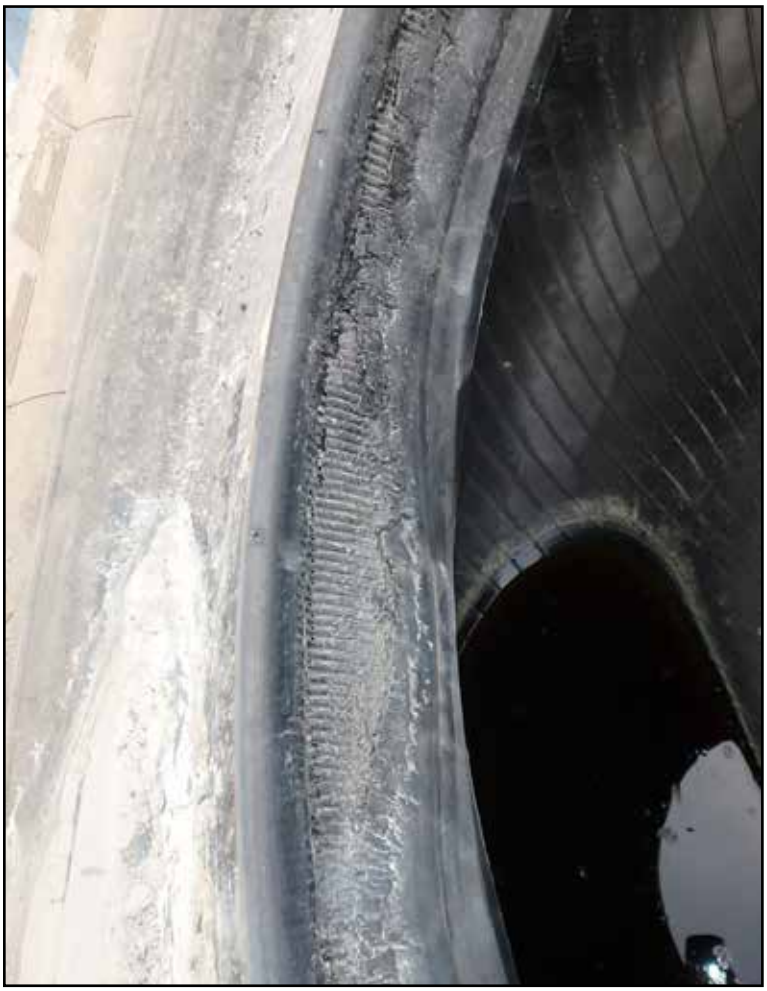
DESCRIPTION	**Damage or deformation of the bead due to poor seating on the rim (mismount).**

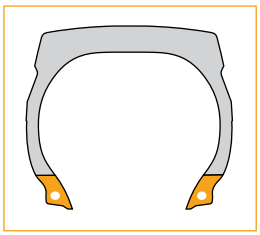


OBSERVATION	Knurling marks from rim base of bead seat band on bead heel and/or lower bead support zone and not on the bead sole. On rims without knurling, deformation of the bead.
PROBABLE CAUSES(S)	Insufficient lubrication, seating pressure or incorrect centering of the tire when fitting.
EVOLUTION	Split may eventually develop at top of turn-up. Remove when the split opens 180° or if cables are visible in the bead area.
RECOMMENDED ACTION	Leave running if the plies are not affected and if inflation seating is possible.
PREVENTION	Verify the condition of the fitting and handling equipment and the method used.
DO NOT CONFUSE WITH	Page 49

BEAD AREA

DESCRIPTION	**Wear on the bead sole.**

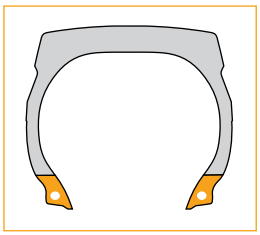




OBSERVATION	Wear at the base of the beads.
PROBABLE CAUSES(S)	Nominal load capacity of the tire exceeded, creating a transverse movement of the bead. Wheel dirty or in poor condition. Indexing on rim, furthered by the absence of proper mounting/seating pressure.
EVOLUTION	Casing cords and bead strength will be damaged and weakened.
RECOMMENDED ACTION	Scrap.
PREVENTION	Weigh the machine; adjust the inflation pressures. Before refitting, clean all wheel components. Verify the condition of the fitting and handling equipment and the method used. If locking keys are absent, suggest their use (between rim and taper and/or between rim and loose flanges). Verify rim dimension in conjunction with the rim manufacturer to ensure that it meets the specification.
DO NOT CONFUSE WITH	Page 77

BEAD AREA

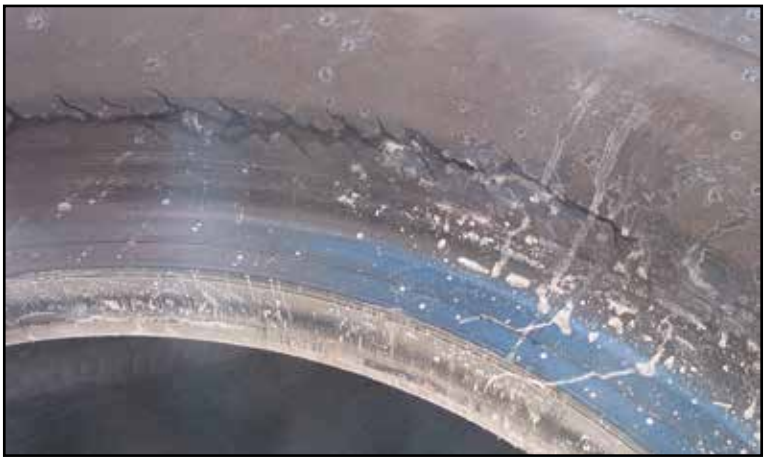
DESCRIPTION	**Wear in the bead bearing area.**

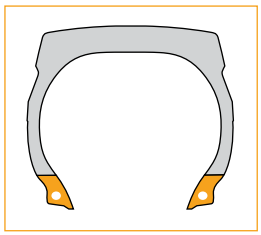


OBSERVATION	Circumferential wear of the rubber in the bead support zone.
PROBABLE CAUSES(S)	Tire's nominal load capacity exceeded. Under-inflation. Tire not suitable for application or poor condition of the flange. High torque. Abrasive materials caught between flange and bead (e.g. sand or coal).
EVOLUTION	This wear will reach but not damage the casing ply.
RECOMMENDED ACTION	Leave running, except where plies are visible, then scrap.
PREVENTION	Verify the recommended pressure; increase if possible. Check whether a change of flange is necessary.
DO NOT CONFUSE WITH	Pages 34, 37, 50

BEAD AREA

DESCRIPTION	**Oblique cracks/splits located in the bearing area.**

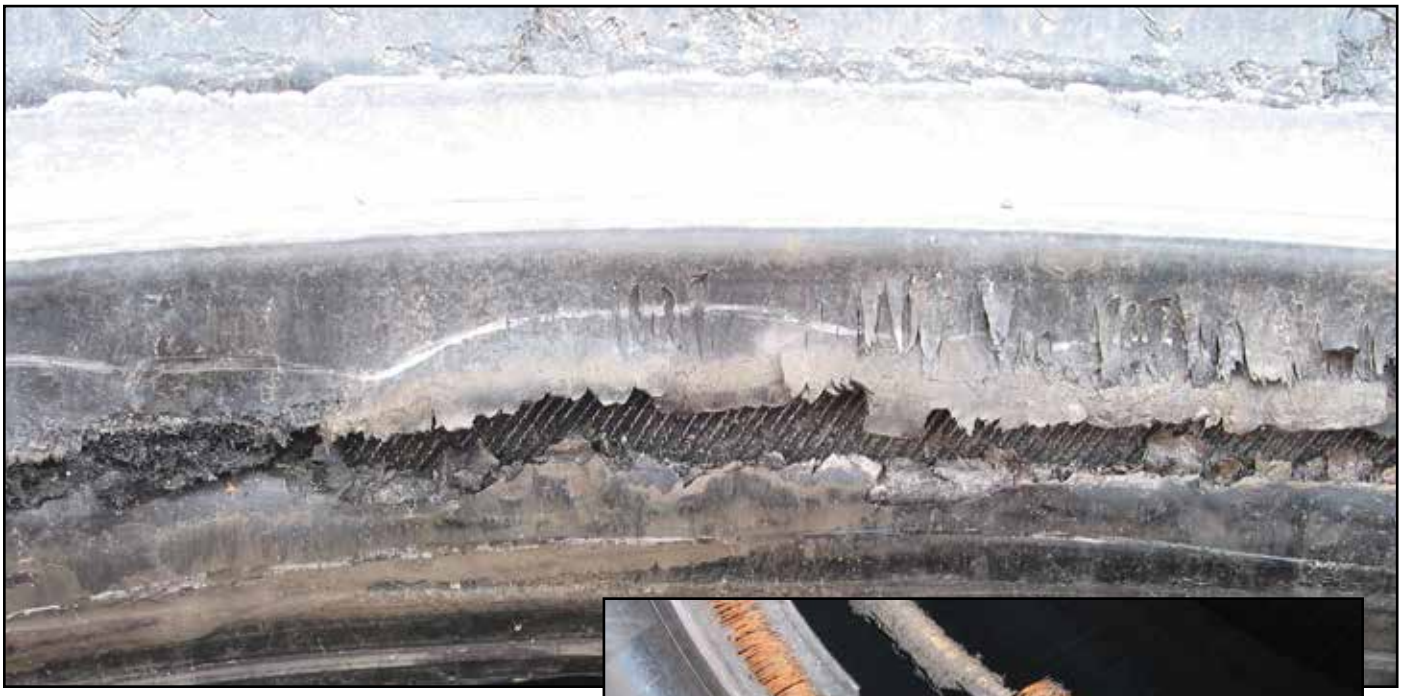


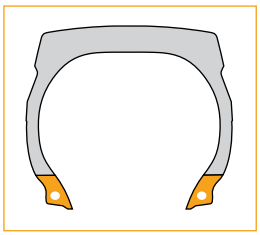


OBSERVATION	Oblique splits in the bead support zone.
PROBABLE CAUSES(S)	Over-deflection, tire's nominal load capacity exceeded, under-inflation. High torque.
EVOLUTION	Splits may grow into the turn-up or bead reinforcing ply.
RECOMMENDED ACTION	Leave running, except where plies are visible, then scrap.
PREVENTION	If possible, weigh the machine by axle to determine optimum pressures. Do not exceed the economic nominal tire load.
DO NOT CONFUSE WITH	Pages 37, 50, 64, 78

BEAD AREA

DESCRIPTION	Longitudinal split on the bead sole.

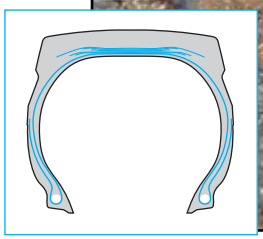




OBSERVATION	Circumferential split at the base of the bead.
PROBABLE CAUSES(S)	High torque and/or tire's nominal load capacity exceeded and/or rotation on rim, aggravated by high rim temperature.
EVOLUTION	Rupture of the casing ply or bead wire.
RECOMMENDED ACTION	Scrap.
PREVENTION	If possible, weigh the machine by axle to determine optimum pressures. Verify the presence of locking keys (between rim and taper and/or between rim and loose flange). Measure the circumference of the rim to ensure that it is within specification.
DO NOT CONFUSE WITH	Pages 49, 52

CASING PLY, CROWN PLIES

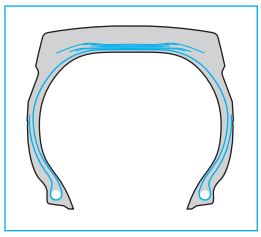
DESCRIPTION	**Extensive deterioration of the crown plies by oxidation.**

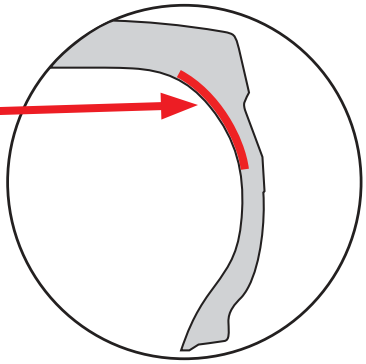


OBSERVATION	Extensive deterioration of the crown plies by oxidation.
PROBABLE CAUSES(S)	Numerous cuts in the tread rubber or stone trapping in the base of the tread grooves drilling into the tire and allowing moisture to penetrate and oxidation to develop.
EVOLUTION	Casing rupture, leak.
RECOMMENDED ACTION	Scrap.
PREVENTION	Improve condition of haul roads. Avoid excess water exposure when spraying haul roads. Remove stones from tread grooves. Review the choice of tire type.
DO NOT CONFUSE WITH	Pages 13, 18

CASING PLY, CROWN PLIES

DESCRIPTION	**Separation of the internal sidewall reinforcing ply.**

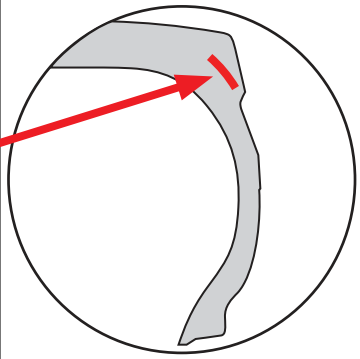


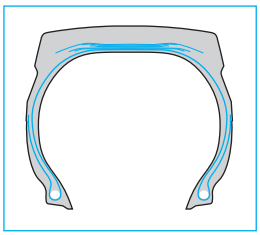


OBSERVATION	Splitting at the end of interior reinforcement products.
PROBABLE CAUSES(S)	Over-deflection, not enough pressure for the load and/or high torque.
EVOLUTION	Runflat.
RECOMMENDED ACTION	Scrap.
PREVENTION	Verify recommended inflation pressure.
DO NOT CONFUSE WITH	Pages 59, 61, 66

CASING PLY, CROWN PLIES

DESCRIPTION	**Pocket of separation between the casing ply and the crown block.**

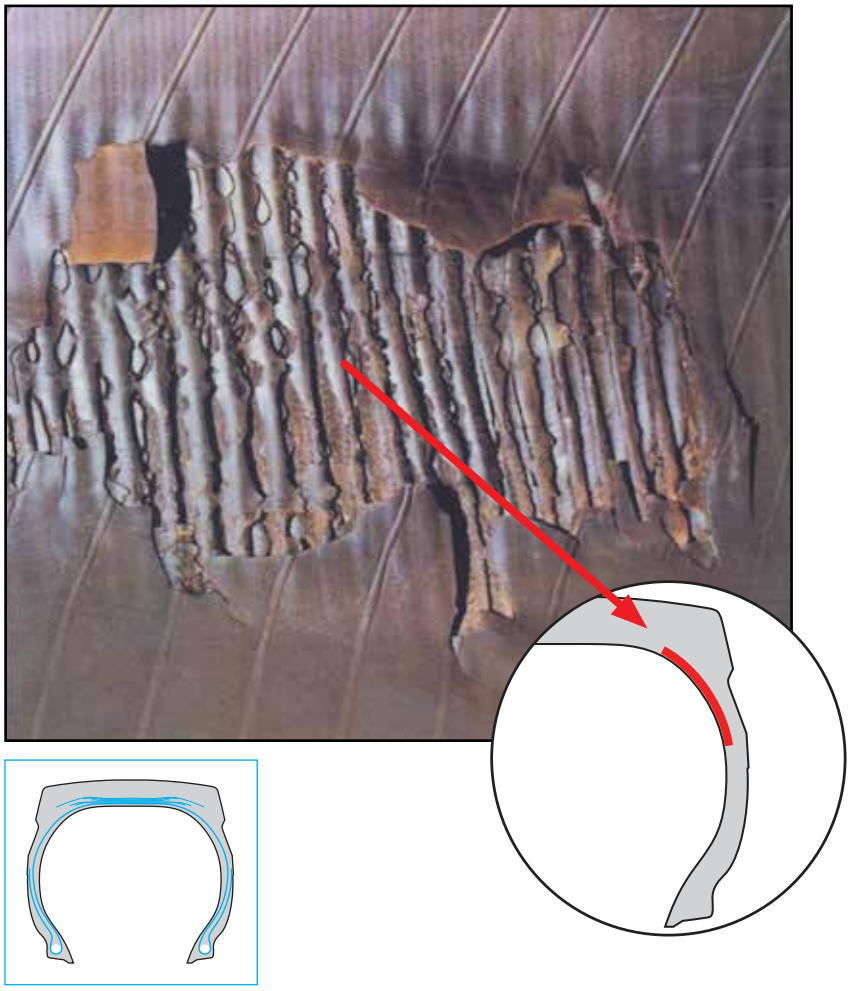




OBSERVATION	Pocket of separation between the casing ply and the crown block.
PROBABLE CAUSES(S)	Shock, high speeds, mis-alignment of front wheels.
EVOLUTION	Rapid deflation.
RECOMMENDED ACTION	Scrap.
PREVENTION	Verify TMPH/TKPH. Review tire pressure if damage is frequent. Improve the condition of the haul roads and work conditions
DO NOT CONFUSE WITH	Pages 14, 17

CASING PLY, CROWN PLIES

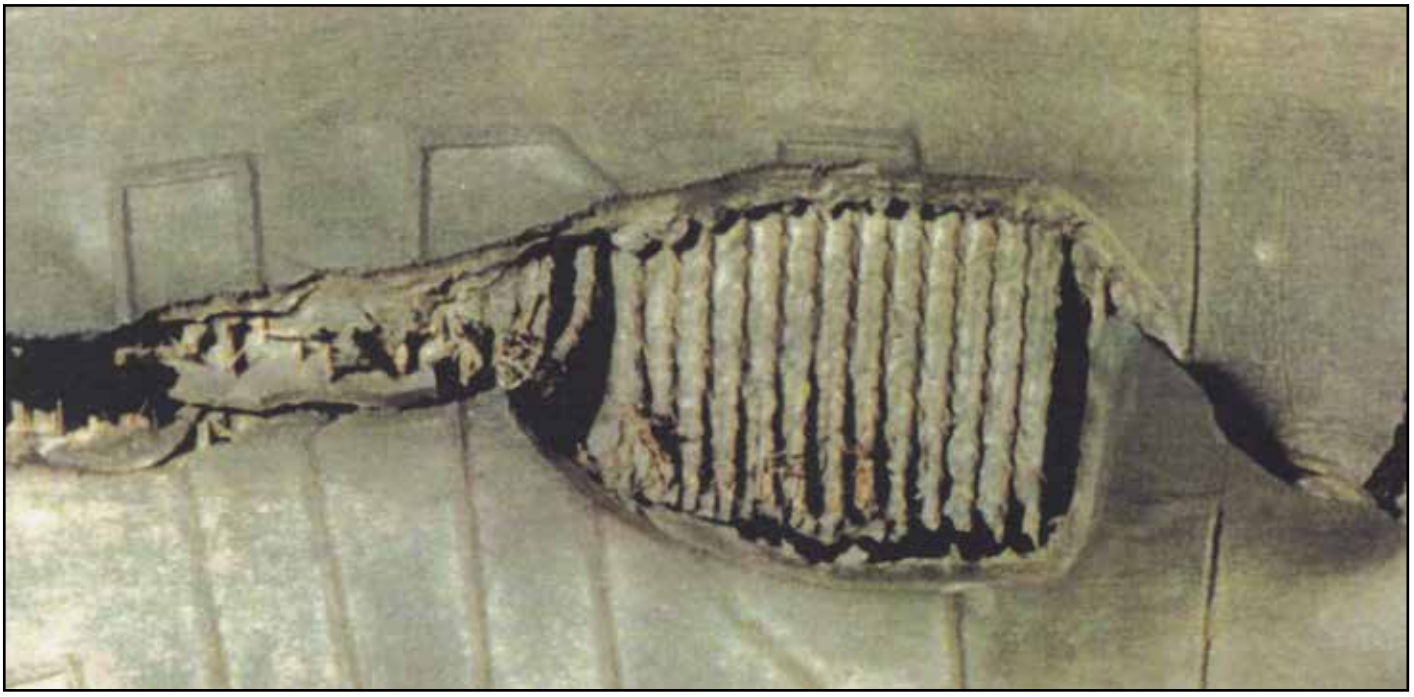
DESCRIPTION	**Raised, exposed, or detached casing cables in the interior shoulder area.**

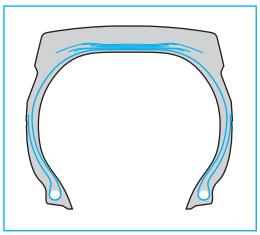


OBSERVATION	Raised or exposed casing cables in the interior shoulder area. Detachment of cables/ rubber.
PROBABLE CAUSES(S)	Overload or underinflation, aggravated by hard cornering. Heat and/or fatigue, result from thermo-oxidation of casing rubber. May be aggravated by split in the inner liner. Repair using patch without Butyl liner.
EVOLUTION	Air infiltration, tire fire (torch effect), external bubble on high sidewall or rapid deflation.
RECOMMENDED ACTION	Scrap.
PREVENTION	Verify TMPH/TKPH, recommend nitrogen inflation. Verify load and pressures.
DO NOT CONFUSE WITH	Page 61

CASING PLY, CROWN PLIES

DESCRIPTION	**Rupture on a casing ply crease in the sidewall due to shock.**

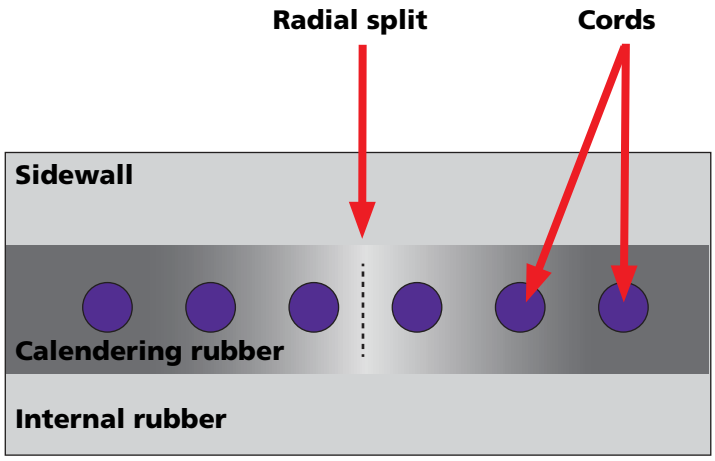


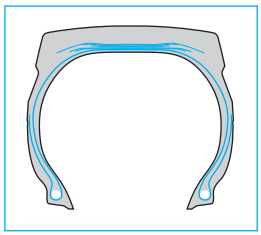


OBSERVATION	Break in the casing ply at the sidewall resulting from an impact.
PROBABLE CAUSES(S)	Impact
EVOLUTION	Air infiltration; runflat.
RECOMMENDED ACTION	Scrap.
PREVENTION	Examine haul road, look for the causes of repeated impact against protruding objects. Improve working environment.
DO NOT CONFUSE WITH	Page 65

CASING PLY, CROWN PLIES

DESCRIPTION	**Radial split in calendering rubber of casing ply resulting from an impact.**



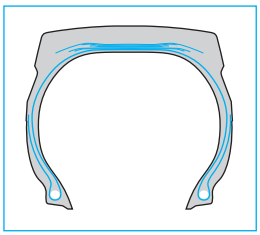


Internal rubber

OBSERVATION	Radial split in calendering rubber of the casing ply resulting from an impact.
PROBABLE CAUSES(S)	Impact or dynamic overload.
EVOLUTION	Air infiltration, sidewall separation or rapid deflation.
RECOMMENDED ACTION	Repair if in accordance with recommendations (see Michelin Earthmover Tires Use and Maintenance Guide), otherwise scrap.
PREVENTION	Look for the places where there is a possibility of impact. Improve condition of haul roads.
DO NOT CONFUSE WITH	Page 59

CASING PLY, CROWN PLIES

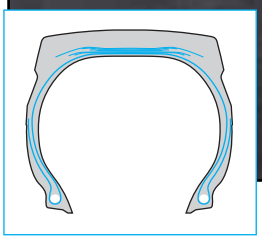
DESCRIPTION	**Damage to the sidewall due to a pinch shock.**



OBSERVATION	Damage to the sidewall due to a pinch shock.
PROBABLE CAUSES(S)	Impact between two rigid components, accentuated by low pressure.
EVOLUTION	Cut may grow inwards toward the casing. Deformation. Rupture of the casing.
RECOMMENDED ACTION	To be submitted for repair (depending on the tire's residual value) after the damage has been measured and compared with the recommended limits. Scrap if not repairable.
PREVENTION	Look for places where there is a possibility of impact. Improve condition of haul roads.
DO NOT CONFUSE WITH	NA

CASING PLY, CROWN PLIES

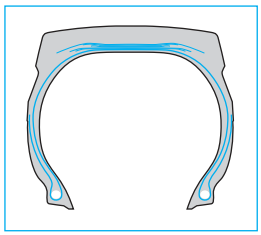
DESCRIPTION	**Rupture of the casing ply in the bead area above the bead wire (tringle).**



OBSERVATION	Rupture of the casing ply in the bead zone, above the bead core.
PROBABLE CAUSES(S)	Separation or heat build-up in the bead zone. Tire's nominal load capacity exceeded. Damage to the bead when fitting. Improper mounting on rim.
EVOLUTION	NA
RECOMMENDED ACTION	Scrap.
PREVENTION	Look for indicators, deformation in the bead zone. Have the machine braking system checked. Adapt pressures to the tire load. Verify the ends of the tire levers are in good condition. Make fitters aware: lubricate, center the tire on the rim, inflate per Michelin's bead seating pressure guidance, adjust to the recommended pressure.
DO NOT CONFUSE WITH	NA

CASING PLY, CROWN PLIES

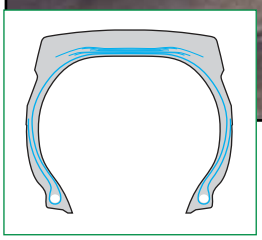
DESCRIPTION	**Rupture of the casing ply turn-up in the sidewall.**



OBSERVATION	Rupture of the casing ply turn-up on lower part of the sidewall.
PROBABLE CAUSES(S)	Casing ply fatigue, resulting from the tire's nominal load capacity being exceeded. Low pressure. Fitting not done in accordance with recommendations.
EVOLUTION	Rupture of the casing.
RECOMMENDED ACTION	Scrap.
PREVENTION	Adapt the pressure to the load. Make tire fitters aware: lubricate, center the tire on the rim, inflate per Michelin's bead seating pressure guidance, adjust to the recommended pressure.
DO NOT CONFUSE WITH	Page 54

CASING PLY, CROWN PLIES

DESCRIPTION	**Regular circumferential rupture of the casing ply in the sidewall.**



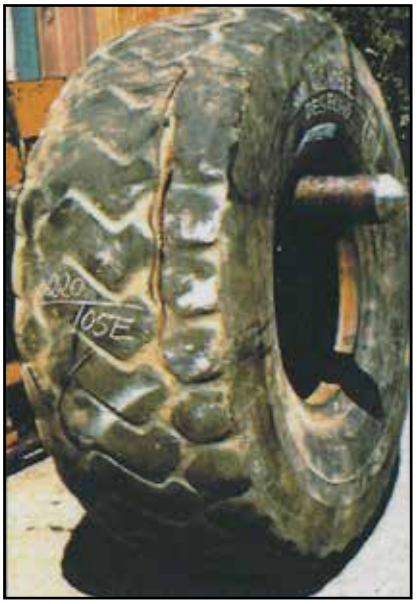
OBSERVATION	Clean circumferential break in the casing ply cords at the sidewall.
PROBABLE CAUSES(S)	Casing ply fatigue resulting from the tire's nominal load capacity being exceeded. Running at very low pressure. Casing's hourly potential exceeded. Puncture.
EVOLUTION	NA
RECOMMENDED ACTION	Scrap.
PREVENTION	Adapt inflation pressures to suit the load.
DO NOT CONFUSE WITH	Page 60

CASING PLY, CROWN PLIES

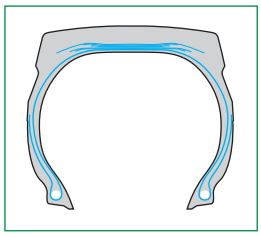
DESCRIPTION	**Circumferential rupture of the casing ply in the crown.**

Casing ply

Internal rubber of the tire



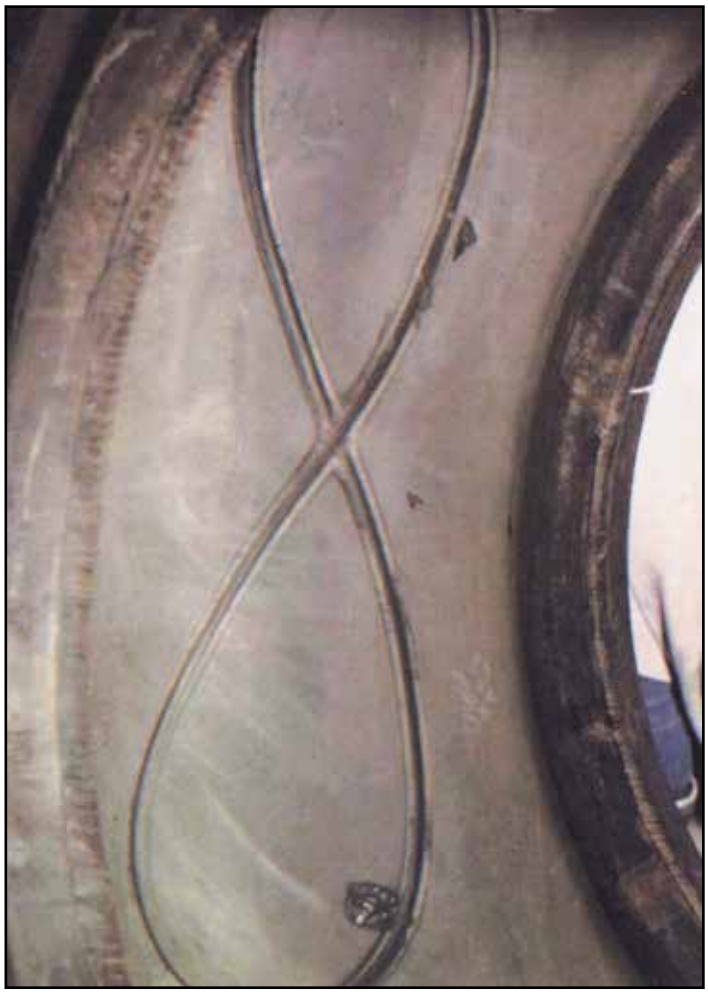
Crown

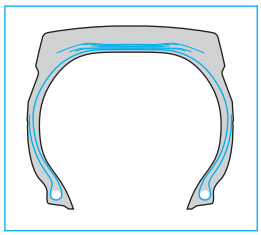


OBSERVATION	Circumferential rupture of the casing ply under the crown, without traces of shock.
PROBABLE CAUSES(S)	Crown fatigue resulting from exceeding the tire's nominal load capacity, accompanied by excessive flexing and lateral scrubbing. Use of wide tire at low pressure on hard surface.
EVOLUTION	May lead to tire leaking.
RECOMMENDED ACTION	Scrap.
PREVENTION	Adapt the pressures to the load. If possible, increase the radius of bends on haul roads.
DO NOT CONFUSE WITH	NA

CASING PLY, CROWN PLIES

DESCRIPTION	**Damage from material or object left in the tire.**

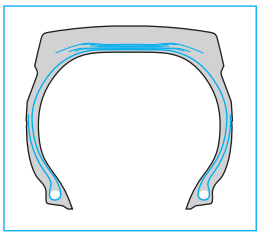




OBSERVATION	Damage by object (screwdriver, piece of wood, O-ring, etc.) accidentally left in the tire.
PROBABLE CAUSES(S)	Poor service condition.
EVOLUTION	May cause damage to the inner liner and lead to air infiltration.
RECOMMENDED ACTION	To be repaired if damage is within recommended limits.
PREVENTION	Check the inside of the tire; remove any debris before fitting on the rim.
DO NOT CONFUSE WITH	NA

CASING PLY, CROWN PLIES

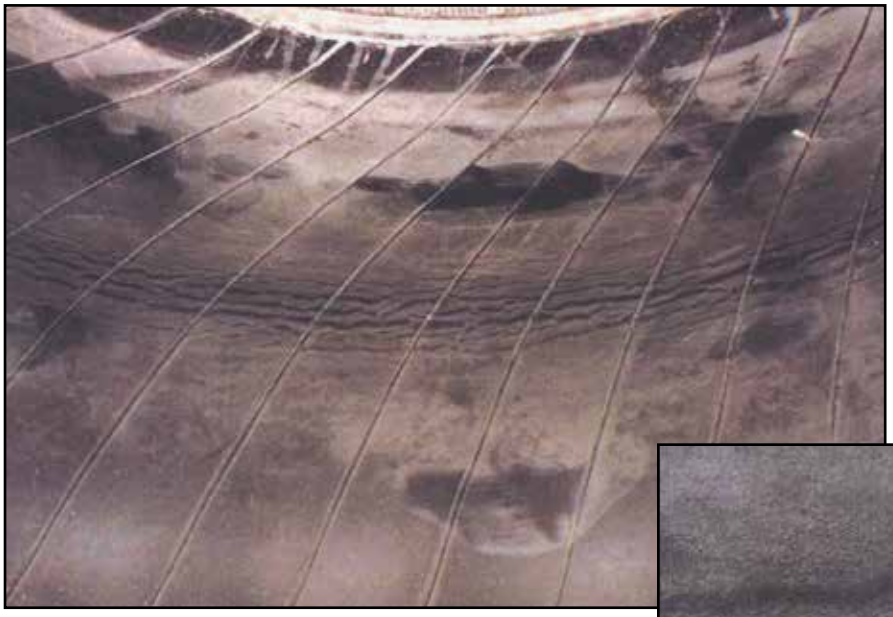
DESCRIPTION	**Shock rupture of the crown plies and of the casing ply in the crown area.**

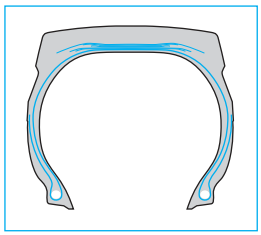


OBSERVATION	Shock rupture of the casing and crown plies.
PROBABLE CAUSES(S)	High pressure, high speed and lack of haul road maintenance and operator training.
EVOLUTION	NA
RECOMMENDED ACTION	Scrap.
PREVENTION	Clean and maintain the site roads. Train machine operators to avoid hitting objects; review and adapt pressure if necessary.
DO NOT CONFUSE WITH	NA

CASING PLY, CROWN PLIES

DESCRIPTION	**Marbling/creasing of interior rubber due to over-deflation (runflat).**

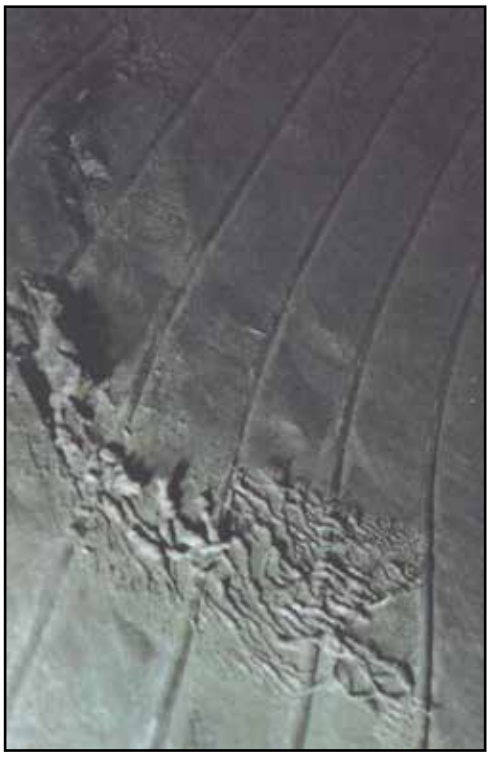




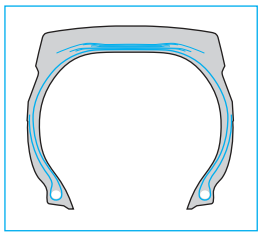
OBSERVATION	The marbling is located in the flex zone. In the region of the marbling, the internal rubber is darkened in a wide band.
PROBABLE CAUSES(S)	Running continually under-inflated or continually exceeding the tire's nominal load or both. Perforation. All damages leading to a loss of pressure.
EVOLUTION	Cracking of the inner liner leading to air infiltration.
RECOMMENDED ACTION	If cracks are deep, scrap.
PREVENTION	Look for the cause of under-inflation (puncture, valve seal, valve extension, cracked rim). Adapt the pressures to the load. Check pressures regularly.
DO NOT CONFUSE WITH	NA

CASING PLY, CROWN PLIES

DESCRIPTION	**Scrubbing/abrasion of interior rubber due to runflat.**



First stage



Second stage

OBSERVATION	Chafing of the internal rubber as a result of excessive deflection in the sidewalls.
PROBABLE CAUSES(S)	Running flat.
EVOLUTION	Rupture of the casing.
RECOMMENDED ACTION	Scrap.
PREVENTION	Check pressures regularly to detect a source of leakage (puncture, valve seal, valve extension, cracked rim). Do not run on flat tire. Adapt pressures to the load.
DO NOT CONFUSE WITH	NA

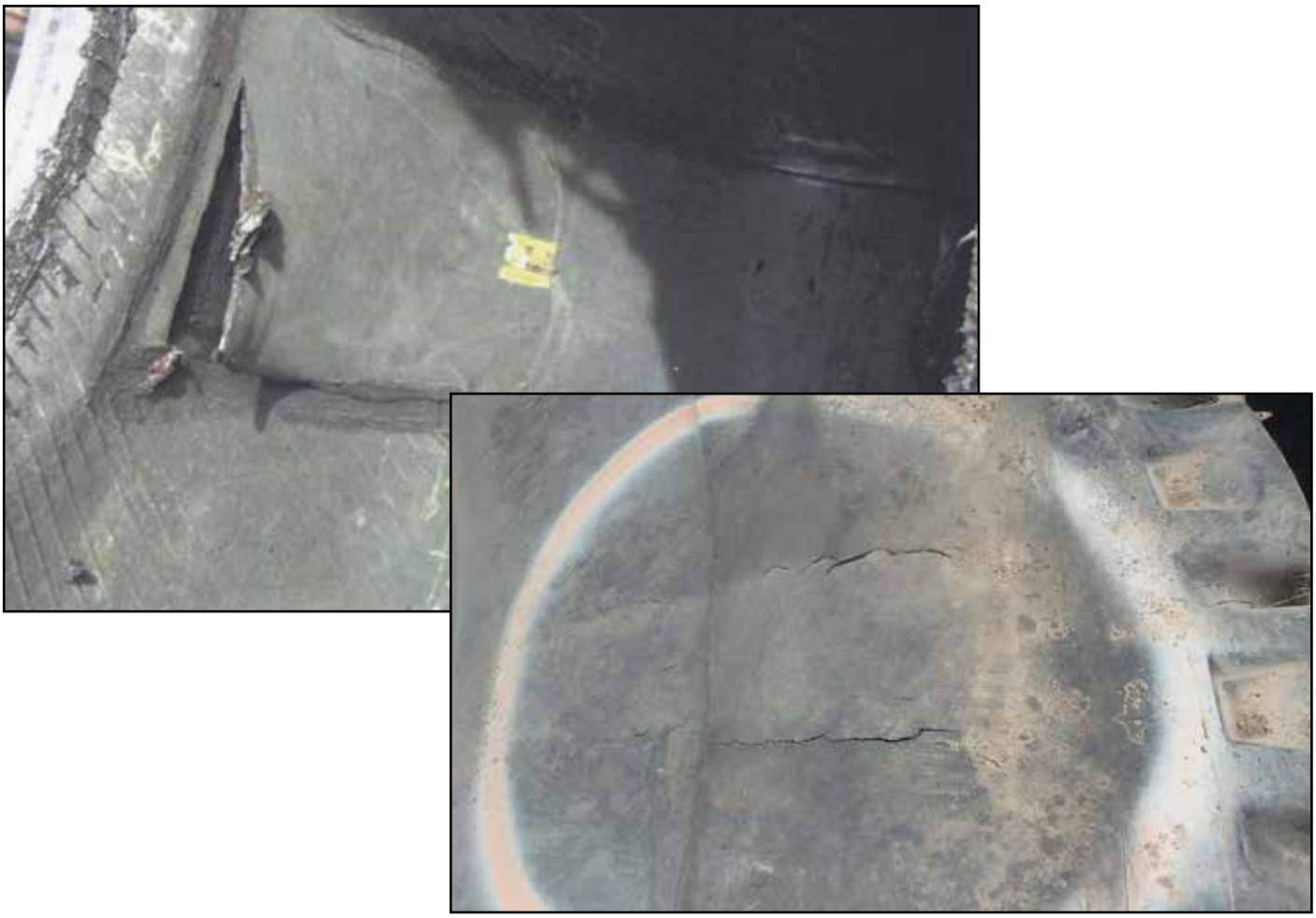
REPAIR

DESCRIPTION	**Non-Michelin crown repair in poor condition.**

OBSERVATION	Non-Michelin repair in the crown in poor condition.
PROBABLE CAUSES(S)	Defective repair or repair out of recommended limits.
EVOLUTION	Leak.
RECOMMENDED ACTION	Scrap.
PREVENTION	Present Michelin recommendation and propose training.
DO NOT CONFUSE WITH	NA

REPAIR

DESCRIPTION	**Non-Michelin sidewall repair in poor condition.**



OBSERVATION	Non-Michelin repair in the sidewall in poor condition.
PROBABLE CAUSES(S)	Defective repair or repair out of recommended limits.
EVOLUTION	Leak.
RECOMMENDED ACTION	Scrap.
PREVENTION	Present Michelin recommendation and propose training.
DO NOT CONFUSE WITH	NA

MISCELLANEOUS

DESCRIPTION	**Burned tire.**

OBSERVATION	Burnt tire.
PROBABLE CAUSES(S)	Fire resulting from an electric arc or other source.
EVOLUTION	Sidewall separation, casing rupture.
RECOMMENDED ACTION	Scrap.
PREVENTION	Keep tires away from all stocks of flammable materials, solvents in particular.
DO NOT CONFUSE WITH	NA

MISCELLANEOUS

DESCRIPTION	**Deterioration by hydrocarbons.**
	
OBSERVATION	Damage by hydrocarbons (oil, grease, diesel fuel, etc.).
PROBABLE CAUSES(S)	Prolonged contact of rubber with a hydrocarbon-based product (diesel oil is worse than ordinary oil). Compactor tires primarily.
EVOLUTION	Sidewall separation, casing rupture.
RECOMMENDED ACTION	Scrap.
PREVENTION	Clean the machine servicing areas. Act quickly to fix any leaks on hydraulic connections or on hubs. If the tire is not deeply soiled, clean it immediately with a pressure washer. For compactors, choose hydrocarbon-free anti-stick products. Keep tires well away from all stocks of hydrocarbons.
DO NOT CONFUSE WITH	Page 58

MISCELLANEOUS

DESCRIPTION	**Electrical discharge.**

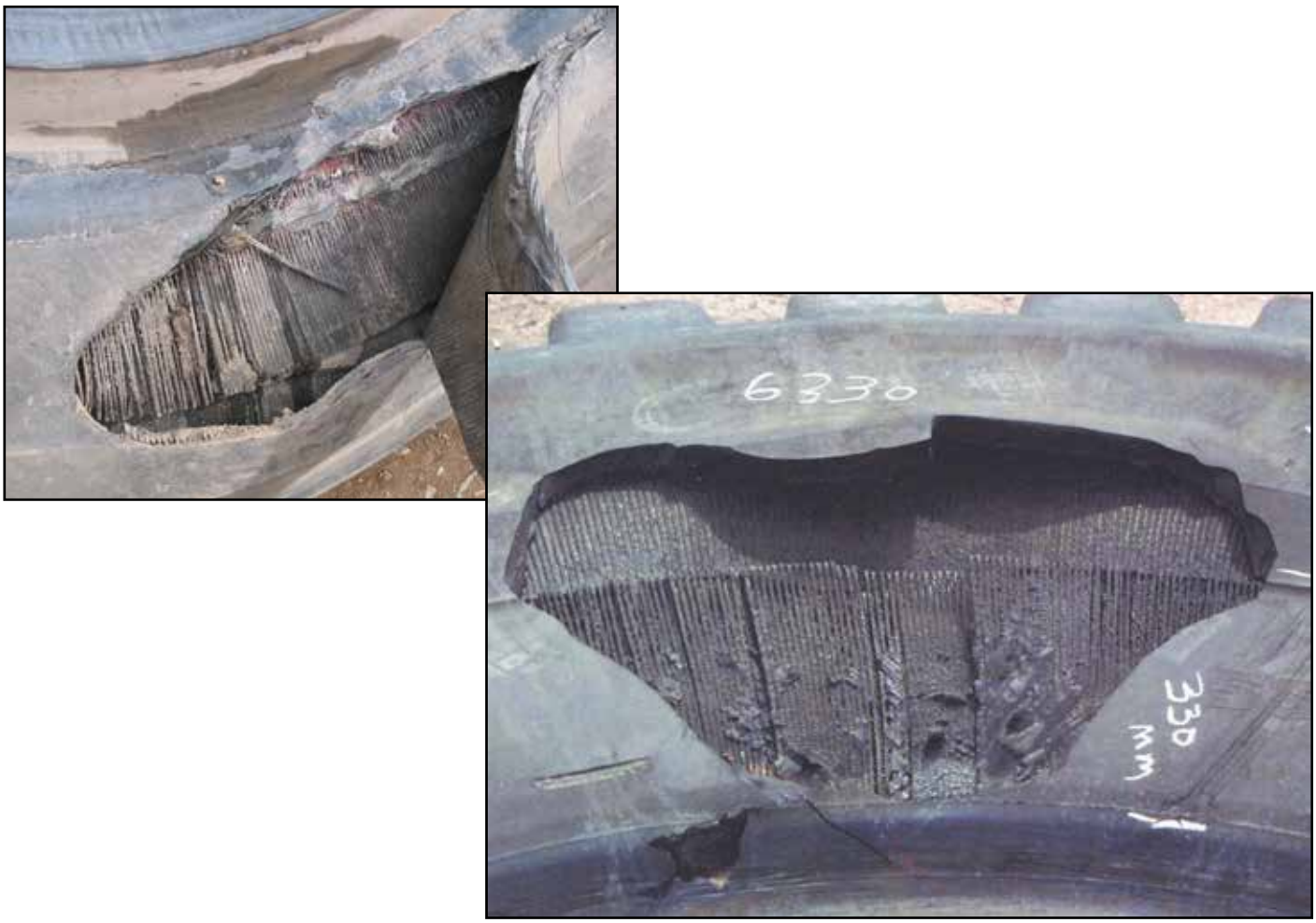
Bead

Tread

OBSERVATION	Damage due to electrical discharge.
PROBABLE CAUSES(S)	Electrical discharge caused by lighting or by a high-tension line.
EVOLUTION	Internal combustion, rupture of casing and/or rapid deflation.
RECOMMENDED ACTION	Scrap.
PREVENTION	If there are high tension lines nearby, make machine operators aware of the need to keep all parts of the machine a safe distance away from them; an electric arc can form without the machine touching the line.
DO NOT CONFUSE WITH	NA

MISCELLANEOUS

DESCRIPTION	**Separation in the sidewall due to infiltration of air without separation between crown plies.**



OBSERVATION	Separation in the sidewall as a result of air infiltration without separation between crown plies.
PROBABLE CAUSES(S)	Perforation of inner liner. Damage by tire lever at the bead when fitting the tire on the rim or when handling tires of large sizes. Repair in poor condition. Damage during transport or handling.
EVOLUTION	First stage sidewall bulge, followed by split in the turn-up area.
RECOMMENDED ACTION	Scrap.
PREVENTION	Look for the cause to prevent the condition recurring on other tires. Verify handling and mounting condition.
DO NOT CONFUSE WITH	Page 38

MISCELLANEOUS

DESCRIPTION	**Tire indexing on rim.**

OBSERVATION	Tire indexing, turning, rotating on rim.
PROBABLE CAUSES(S)	Accentuated by exceeding the tire's nominal load or under-inflation, with a high torque on a surface with good grip. Excess fitting lubricant. Rim not to manufacturer's specification.
EVOLUTION	Wear of the bead sole leading to a longitudinal split and air leakage or a separation in the sidewall due to infiltration of air.
RECOMMENDED ACTION	Refit after cleaning the beads of the tire. Scrap if plies visible.
PREVENTION	Lubricate moderately when fitting. Use vegetable lubricant only, not mechanical grease. Inflate per Michelin's bead seating pressure guidance before deflating to the recommended operating pressure. Verify that the operating pressure has been adapted for the load. Ensure the presence of locking keys. Dull paint work. Verify that the knurling on the wheel is projecting and not sunken. Measure the circumference of the rim to ensure that it is to specification. As a last resort, use bead seals (L-ring).
DO NOT CONFUSE WITH	NA

LOSS OF ADHESION BETWEEN TIRE COMPONENTS

DESCRIPTION	**Loss of adhesion of the bead protector joint in the bead area.**

OBSERVATION	Loss of adhesion of the bead protector joint.
PROBABLE CAUSES(S)	High pressure between bead area and flange.
EVOLUTION	No evolution.
RECOMMENDED ACTION	None.
PREVENTION	None.
DO NOT CONFUSE WITH	Page 54

LOSS OF ADHESION BETWEEN TIRE COMPONENTS

DESCRIPTION	**Unsticking of tread rubber.**

OBSERVATION	Loss of adhesion in the tread or between tread and undertread rubber.
PROBABLE CAUSES(S)	Hammering, excessive speeds on hard surfaces, heat.
EVOLUTION	Lug, partial or full tread detachment.
RECOMMENDED ACTION	Scrap.
PREVENTION	Verify TMPH/TKPH and consider using more heat-resistant tread compound. Decrease inflation pressure if possible.
DO NOT CONFUSE WITH	Pages 16, 18

LOSS OF ADHESION BETWEEN TIRE COMPONENTS

DESCRIPTION	**Loss of adhesion of the FE/PT.**

OBSERVATION	Unsticking between sidewall rubber and the bead protector rubber.
PROBABLE CAUSES(S)	Weakness of the bond.
EVOLUTION	The separation will grow circumferentially and down to the point in contact with the rim.
RECOMMENDED ACTION	Leave running.
PREVENTION	None.
DO NOT CONFUSE WITH	Pages 36, 54

LOSS OF ADHESION BETWEEN TIRE COMPONENTS

DESCRIPTION	**Loss of adhesion between PT & GI.**

OBSERVATION	Loss of adhesion between the inside upper part of the bead protector and the inner liner. Frequently seen at end of life.
PROBABLE CAUSES(S)	Too much flexing of the bead area.
EVOLUTION	Ultimately may lead to a slow leak if the split is very deep.
RECOMMENDED ACTION	Leave running.
PREVENTION	None.
DO NOT CONFUSE WITH	NA

LOSS OF ADHESION BETWEEN TIRE COMPONENTS

DESCRIPTION	**Tread rubber delamination.**

OBSERVATION	Loss of adhesion between tread layers. Separation between different parts of the same rubber in the tread or smooth separation between different part of the tread.
PROBABLE CAUSES(S)	Hammering, excessive speeds on hard surfaces, heat.
EVOLUTION	Lug, partial or full tread detachment.
RECOMMENDED ACTION	Scrap.
PREVENTION	Verify TMPH/TKPH, decrease inflation pressure if possible.
DO NOT CONFUSE WITH	Pages 25, 79

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