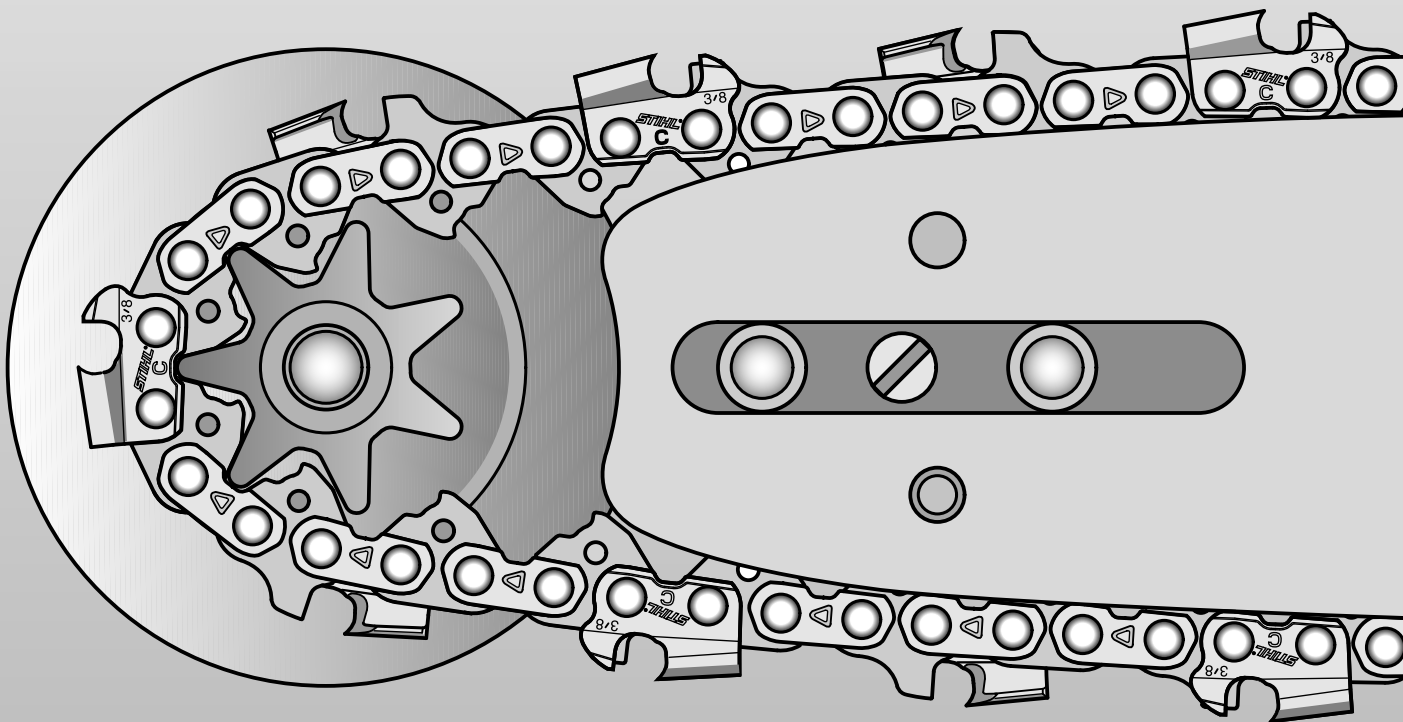


Chain and Bar Manual

2011-04



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1. ANSI B 175.1-2000

STIHL offers chain saw cutting attachments that comply with the performance, design, labeling and information requirements of the ANSI kickback standard. STIHL has also made it easy for you to understand and to comply with that standard.

ANSI is the abbreviation for the American National Standards Institute. The first ANSI standard for chain saws was developed in 1979, and the kickback requirements were first added to the standard in 1985. Although the standard is voluntary in theory, it must be considered as mandatory in practice. If a dealer sells a non-complying product or fails to adequately warn the customer while purchasing non-complying products, the dealer may increase the risk of kickback injury to his customer.

1.1 B 175.1-2000 REQUIREMENTS

ANSI Performance and Design Requirements

Section 5.11 of the ANSI B 175.1-2000 standard establishes certain performance and design criteria related to chain saw kickback.

To comply with section 5.11 of ANSI B 175.1-2000:

- a. saws with a displacement of less than 3.8 cubic inches
- must, in their original condition, meet a 45 degree computer-derived kickback angle
- and must be equipped with at least two devices to reduce the risk of a kickback injury, such as a chain brake, low-kickback chain, reduced kickback bar, etc.

- b. saws with a displacement of 3.8 cubic inches and above.

- must be equipped with at least one device designed to reduce the risk of kickback injury, such as a chain brake, low-kickback chain, reduced kickback bar, etc.

The October 14, 1994 edition of the UL 1662 standard establishes similar performance and design criteria for electric chain saws.

1.2 ANSI LABELING AND INFORMATION REQUIREMENTS

In addition to the performance and design requirements, the standard also includes detailed requirements for labeling powerheads and replacement chains.

The standard requires that you, the dealer, give to the customer information on how to achieve compliance. It also directs that specific warnings be included in the owner's manual.

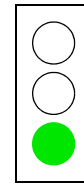
1.3 HOW STIHL HELPS YOU COMPLY WITH THE STANDARD

STIHL's Color Code System

STIHL has developed a color code system to help make it easy for you to:

- comply with the ANSI B 175.1-2000 chain saw kickback standard;
- know the difference between powerheads with a displacement of less than 3.8 cubic inches and powerheads with a displacement of 3.8 cubic inches and above;
- identify the STIHL bars and STIHL chains with kickback reduction characteristics.

This color code system uses the colors green and yellow.



Green marks the products ("green family") which are designed to reduce the risk of kickback injury and to comply with the ANSI B 175.1 kickback standard. These products are recommended for both experienced and inexperienced chain saw users.



Products marked **yellow** indicate an increased risk of kickback injury and are for use only by persons with extraordinary cutting needs and experience and specialized training for dealing with kickback.

The STIHL color code system includes powerheads, replacement chains and guide bars.

Powerheads

- STIHL powerheads with a displacement of less than 3.8 cubic inches are marked with a green warning label on the inside of the front hand guard.
- STIHL powerheads with a displacement of 3.8 cubic inches and above are marked with a green and yellow warning label on the inside of the front hand guard.

Saw chains

Saw chains are classified in the standard into three basic categories:

- a. low-kickback chain,
- b. reduced kickback chain, and
- c. saw chain not meeting specific criteria.

STIHL, however, divides its chains into only two categories:

- low-kickback chains and
- chains other than low-kickback chains.

"Low-kickback chain" is a chain which has met the kickback performance requirements of § 5.11.2.4 of ANSI B 175.1-2000 when tested on a specified sample of chain saws below 3.8 cubic inch displacement.

Warning !

There are potential powerhead and bar combinations with which low-kickback saw chains can be used which have not been specifically certified to comply with the 45° computer-derived kickback angle of § 5.11 of ANSI B 175.1-2000. Some low-kickback chains have not been tested with all powerhead and bar combinations.

STIHL low-kickback chains are marked with a green color code. All other STIHL chains are coded yellow.

The chain loop boxes and the reel chain cores are color coded on the label. The chain loops incorporate a color-coded tie strap.

Green color-coded STIHL chains are (as of December 2010) only the following:

- 61 PMMC3, 63 PMC3, 63 PS3 for 3/8" extended pitch
- 23 RMC3, 25 RMC3, 26 RMC3, 23 RD3, 25 RD3, 26 RD3 for .325" pitch
- 33 RSC3, 36 RSC3; 33 RMC3, 36 RMC3 for 3/8" pitch

STIHL offers a variety of bars and chains. STIHL low-kickback chains are designed to reduce the risk of kickback injury. Other chains are designed to obtain higher cutting efficiency or sharpening ease but may result in higher kickback tendency.

Chains Other Than Low-kickback Chains

Warning !

This chain is capable of severe kickback which may cause serious or fatal injury. Only for users with extraordinary cutting needs and experience and specialized training for dealing with kickback. STIHL chains with reduced kickback potential are available. In order to comply with section § 5.11.2.1 of ANSI B 175.1-2000, powerheads below 3.8 cubic inch must be equipped with green labeled STIHL low-kickback chain or other available complying low-kickback chain or other available complying low-kickback components. STIHL recommends its low-kickback (green labeled) chains for use on all powerheads.

Warning !

This chain should only be used with kickback reducing devices such as a properly functioning chain brake.

Guide bars:

STIHL reduced kickback bars are designed to reduce the risk of kickback injury when used with STIHL green labeled low-kickback chains. They are marked with a green color code. All other STIHL bars are coded yellow.

This marking includes a color-coded warning label on the packaging of the bar and a colored dot on the bar itself near the bar mounting area.

Warning !

When used with other, more aggressive chains, green labeled reduced kickback bars may be less effective in reducing kickback.

Warning !

Do not mount a bow guide on any STIHL chain saw. Any chain saw equipped with a bow guide is potentially very dangerous. The risk of kickback is increased with a bow guide because of the increased kickback contact area. Low-kickback chain will not significantly reduce the risk of kickback injury when used on a bow guide.

1.4 STIHL'S METHOD OF COMPLIANCE WITH PERFORMANCE AND DESIGN REQUIREMENTS

1.4.1 Chain saws with a displacement of less than 3.8 cubic inches

STIHL chain saw powerheads below 3.8 cubic inches are equipped with a STIHL Quickstop® chain brake and have a green warning label. STIHL offers and recommends green labeled reduced kickback bars and low-kickback chains for use on these powerheads.

Compliance with the ANSI requirements is achieved if STIHL chain saw powerheads below 3.8 cubic inches are used together with the STIHL green labeled reduced kickback bars and low-kickback chains as listed in this catalog and in the "STIHL Bar and Chain Information" leaflet. Such compliance may also be achieved by use of other chains designated "low-kickback saw chain" or other replacement bar and chain combinations marked in accordance with the standard for use on the powerhead.

1.4.2 Chain saws with a displacement of 3.8 cubic inches and above

STIHL chain saw powerheads of 3.8 cubic inches and above are equipped with a STIHL Quickstop® chain brake and are labeled green and yellow. These powerheads are only for users with extraordinary cutting needs and experience and specialized training for dealing with kickback. STIHL reduced kickback bars and STIHL low-kickback chains are offered and recommended for use on these powerheads.

Compliance with the ANSI performance and design requirements of § 5.11.2.2 is achieved through the STIHL Quickstop® chain brake alone.

The green half of the warning label signifies that for these powerheads, STIHL also recommends that the customer use STIHL green labeled reduced kickback bars and low-kickback chains as listed in this catalog and in the "STIHL Bar and Chain Information" leaflet.

The yellow half of the warning label on the powerhead shows that these units can be matched with yellow labeled bars and chains, when the user has extraordinary cutting needs, experience and specialized training for dealing with kickback.

1.5 STIHL'S WAY TO COMPLY WITH LABELING AND INFORMATION REQUIREMENTS

1.5.1 The Powerheads

STIHL complies with the labeling requirements for powerheads as follows:

- a. Powerheads of less than 3.8 cubic inches (green labels contain the required information and warnings)
- b. Powerheads of 3.8 cubic inches and above (green and yellow labels contain the required information and warnings)

1.5.2 The Chains

Labeling of Chains

Labeling of chains includes printed warnings on chain loop boxes with instructions on the back side, clam shells with instruction sheets inside, and labels on chain reel boxes and chain reel cores.

Chain Marking

With all reel boxes you will receive chain parts to produce your chain loops. The tie straps included will be color coded to support the color code system.

When you receive reels of "low-kickback chain", the tie straps for making chain loop will be green colored.

For all other chains the tie straps contained in the reel box for making chain loops will be yellow.

1.5.3 The Guide Bars

The marking of the guide bars in their original condition includes a color marking on the bar and the label on the bar packaging.

STIHL green labeled reduced kickback bars are designed to reduce the risk of kickback injury when used with STIHL green labeled low-kickback chains.

1.6 STIHL'S INFORMATION AND INSTRUCTION SYSTEM ON ANSI B 175.1-2000

- a. A detailed "STIHL Bar and Chain Information" leaflet included in reel or loop boxes (Part No.: 0457-531-3023) gives you the information and instructions for compliance with the standard.
- b. "STIHL Dealer Instructions" sheet (Part No.: 0457-532-3023) enclosed in every reel box gives you detailed instructions how to proceed with the packaging of chain loops. On the instruction sheet you receive a disclaimer form recommended for use whenever you sell yellow coded chain to any customer for use on any STIHL or any other brand of chain saw.

- c. **"STIHL Bar and Chain Catalog with ANSI Information"** (Part No. 0461-005-0000) gives you a picture of the whole system and helps you to comply with the ANSI B 175.1-2000 chain saw kickback standard.

1.7 WHAT THE STIHL DEALER HAS TO DO TO COMPLY WITH THE STANDARD

1.7.1 Sale or Rental of STIHL Powerheads

When selling or renting a STIHL chain saw powerhead:

- a. Make sure that the powerhead has the proper original label (see part 1.5.1) or replacement label (see part 1.9) and that the person purchasing or renting the saw has read and understood the label.
- b. Make sure that the appropriate owner's manual is given to a purchaser and that the appropriate owner's manual or safety manual is provided with each rental (see part 1.6).

1.7.2 Labeling and Sale (or Rental) of STIHL Chains and Bars

As previously described, STIHL has developed a color-coded system to help you to handle the ANSI kickback standard requirements.

To ensure that saw chain sold in reels receives the proper warnings and instructions, STIHL will provide you with the following:

Every color-coded (green or yellow) reel box contains a reel of chain and

- a sufficient number of color-coded (green or yellow) chain loop boxes,
- the same number of **"STIHL Bar and Chain Information"** leaflets,
- a sufficient number of colored (green or yellow) tie straps, and
- one copy of the **"STIHL Dealer Instructions"** sheet.

Green color-coded STIHL chains are (as of December 2005) only the following:

- 61 PMMC3, 63 PMC3, 63 PS3 for 3/8" extended pitch
- 23 RMC3, 25 RMC3, 26 RMC3, 23 RD3, 25 RD3, 26 RD3 for .325" pitch
- 33 RSC3, 36 RSC3; 33 RMC3, 36 RMC3 for 3/8" pitch

All other chains are color-coded yellow.

Warning !

Do not mix green chain reel boxes, green chain loop boxes and green tie straps with chain that has an increased risk of kickback (yellow labeled chain). If you do so, you will not comply with the standard and you will increase the risk of kickback injury to your customer.

In order to comply with ANSI B 175.1-2000 chain saw kickback standard:

1. Put the chain loop into the appropriate green or yellow loop box.
2. Add to every loop of chain a **"STIHL Bar and Chain Information"** leaflet.
3. Clearly mark the top of the closed loop box with the chain type and length to show exactly what chain it contains.
4. To meet the computed kickback angle and reduced kickback device requirements of the ANSI standard (see part 1.1), sell (and rent) only green labeled reduced kickback bars and low-kickback chains for powerheads of less than 3.8 cubic inch displacement. In addition, make sure the chain brake is functioning properly.

Warning !

If you install a chain on your customer's powerhead, it is important that you hand them the "STIHL Bar and Chain Information" leaflet and the appropriate warning on the chain box or clam shell and that you instruct them to read and follow the contained information, instructions and warnings. Otherwise, your customer may not be sufficiently informed about the risk of kickback injury associated with saw chain.

New bar/chain combinations may be developed after publication of this literature which will, in combination with certain powerheads, comply with 5.11.2 of ANSI B 175.1-2000. Check the most recent "STIHL Bar and Chain Information" leaflet.

STIHL RECOMMENDS THAT YOU SELL GREEN LABELED REDUCED KICKBACK BARS AND LOW-KICKBACK CHAINS FOR ALL POWERHEADS.



Warning !

Use of other bar/chain combinations may increase kickback forces and the risk of kickback injury.

IMPORTANT INFORMATION

The standard recognizes that there may be a limited group of users whose extraordinary needs may not be satisfied by bar and chain combinations that comply with the computed 45 degree acceptance criteria of the standard. These customers may require yellow labeled chains or bars.

If a customer insists on buying a non-complying cutting attachment for a powerhead of below 3.8 cubic inch displacement, it must be a conscious and informed choice by the customer. You must inform him of the fact that this combination does not comply with the standard and that complying combinations with a reduced risk of kickback injury are available for his powerhead.

1.8 OTHER BUSINESS PRACTICES THAT STIHL RECOMMENDS TO ALL SALES AND SERVICE DEALERS AND RENTAL DEALERS FOLLOW

It is the dealer's responsibility to advise the customer concerning chain saw safety and available safety equipment. You should adhere to the following business practices in marketing, servicing or renting STIHL products.

1.8.1 When selling or renting a saw

When selling or renting a saw, you should provide the following services to your customer:

1. Properly assemble and adjust the saw.
2. Familiarize the customer with the owner's manual and the safety instructions and the warnings contained in it. Discuss kickback, push-back and pull-in with the customer. Describe the causes of these reactive forces and how to try to avoid them. Discuss the availability of reduced kickback bars and low-kickback chain and the advantages of these items with your customer.
3. Point out and discuss the safety features on the saw.
4. Demonstrate the correct way of starting the saw.
5. Demonstrate the proper cutting techniques.

1.8.2 Additional recommendations when selling a new saw

When you sell a new saw, you should provide the following services to your customer in addition to those listed in part 1.8.1:

1. Follow the ANSI kickback standard requirements mentioned in part 1.7.2 of this catalog when selling bars and chains
2. Explain the limited warranty. Register the product. Review, complete, have the customer sign and send in the Product Registration card or complete the

registration electronically on STIHL eService.

1.8.3 Additional recommendations when selling a used saw

When you sell a used saw of any brand, you should perform the following services for your customer in addition to those listed in part 1.8.1:

1. Affix warning labels, if absent. STIHL warning labels are available at no charge from your STIHL distributor.
2. Follow the ANSI kickback standard requirements mentioned in part 1.7.2 of this brochure when selling powerheads, bars and chain.
3. Give the customer a STIHL chain saw safety manual (available at no charge). Let him know that owner's manuals, even for many older models, are available at www.stihlusa.com.
4. Make pertinent comments on the condition of the saw and the warnings given on the bill of sale and have the customer sign it. Keep a copy for your records

1.8.4 Additional recommendations when renting a saw

The STIHL rental dealers serve a specific market for which STIHL makes available the appropriate tools.

When you rent a saw, you should provide the following services to your customer in addition to those listed in part 1.8.1:

1. STIHL recommends that you rent all your saws only with green labeled cutting attachments. These reduced kickback bars and low-kickback chains are recommended for all users and especially for inexperienced users.
- 2. For the 08S, 088 and MS 880 this means that you should rent this saw only with a 3/8" pitch sprocket with a 17" or 21" green labeled STIHL ROLLOMATIC® S reduced kickback bar and a low-kickback chain (36 RSC3 or 36 RMC3 for 3/8" pitch).
3. Give the customer an owner's manual or safety manual with each rental. Safety manuals are available from your STIHL distributor or STIHL Incorporated at no charge. Owner's manuals, even for many older models, are available at www.stihlusa.com.
4. Ensure that all saws have the proper labeling. Affix warning labels, if absent. Note that warning labels are available from your STIHL distributor or STIHL Incorporated at no charge.
5. Ensure that the chain is sharpened properly. Failure to maintain a properly sharpened chain can result in increased risk of kickback injury.

1.9 Recommended business practices when repairing any saw

When you repair a saw of any brand, you should do the following

1. Affix warning labels, if absent. When replacing parts which should carry a warning sticker, such as a hand guard, make sure that the proper warning sticker is put on the new part. STIHL warning labels are available from your STIHL distributor.

Warning label Part No. 0000-967-3613

Improper use can cause serious or fatal injury. Read and follow all safety precautions in current Owner's or Safety Manual. This saw may be capable of severe kickback. To reduce risk of kickback injury use green labeled STIHL reduced kickback bar and low-kickback chain and Quickstop chain brake, if compatible. Avoid contact of bar tip with any object. This can cause the bar to kick suddenly up and back which may result in serious or fatal injury. Always use two hands to operate the saw.

Warning !

2. Advise the customer of any technical problems or damage, such as a broken hand guard or nonfunctioning chain brake.

3. Offer to give the customer a STIHL chain saw safety manual and mention that many owner's manuals are available at www.stihlusa.com.
4. Make pertinent comments on the condition of the saw and the warnings given on the bill of sale and have the customer sign it. Keep a copy for your records.

If you need further information, please contact your STIHL distributor.

1.10 ADDITIONAL INFORMATION FOR LOGGING COMPANIES

It is important for logging companies to follow all safety precautions for chain saw use.

STIHL recommends the use of its green labeled reduced kickback bars, green labeled low-kickback chains and STIHL Quickstop chain braking system even for the logging companies' experienced chain saw users.

It is important that logging companies follow the maintenance and repair instructions in the relevant sections of the appropriate owner's manual, especially those in the chapters entitled "Guide Bar, Chain and Sprocket", "Sharpening and Maintenance of Saw Chain," and "Chain Brake."

The starting throttle lock, throttle interlock, hand guard, chain brake and other safety features should **never** be removed or made inoperable.

1.11 Kickback and Devices for Reducing Kickback Injury



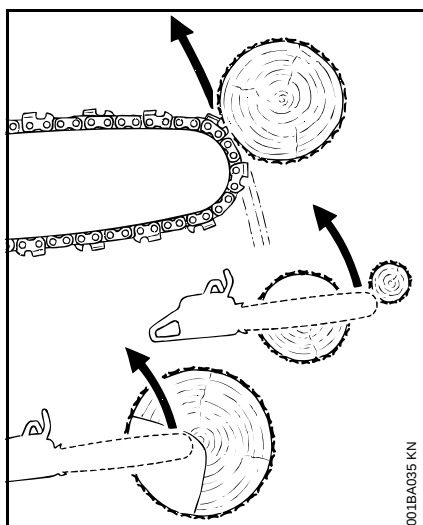
Warning !

Because a chain saw is a high-speed wood-cutting tool, some special safety precautions must be observed as with any other power saw to reduce the risk of personal injury. Careless or improper use may cause serious or even fatal injury.



Warning !

Kickback occurs when the moving saw chain near the upper quadrant of the bar nose contacts a solid object or is pinched. The reaction of the cutting force of the chain causes a rotational force on the chain saw in the direction opposite to the chain movement. This may fling the bar up and back in an uncontrolled arc mainly in the plane of the bar. Under some cutting circumstances the bar moves towards the operator, who may suffer severe or fatal injury. Kickback may occur when the nose of the guide bar is pinched unexpectedly, unintentionally contacts solid material in the wood or is incorrectly used to begin a plunge or boring cut. It may also occur during limbing. The greater the force of the kickback reaction, the more difficult it becomes for the operator to control the saw. Many factors influence the occurrence and force of the kickback reaction. These include chain speed, the speed at which the bar and chain contact the object, the angle of contact, the condition of the chain and other factors.



Devices for reducing the risk of kickback injury

STIHL recommends the use of the STIHL Quickstop chain brake on the powerhead with green labeled reduced kickback bars and low-kickback chains.

STIHL Quickstop chain brake

STIHL has developed a chain stopping system designed to reduce the risk of injury in certain kickback situations. It is called a STIHL Quickstop chain brake. When a kickback occurs, the guide bar may rotate around the front handle. If the cutting position is such that the operator's left hand is gripping the front handle behind the hand guard, and if the left hand rotates around the front handle, contacts and pushes forward the front hand guard, which is the STIHL Quickstop activating lever, this movement of the handguard is designed to activate the STIHL Quickstop. The chain brake on new model STIHL chain saws can also be activated by inertia. See the chapter entitled "Chain Brake" in the Owner's Manual.

STIHL QS System

STIHL has developed an additional brake system called QS that is available on certain models. This is identified on newer saws by a "Q" in the model designation. As is true on other STIHL saws, the Quickstop chain brake system on the Q models can be activated manually via the front hand guard or by inertia in certain kickback situations and is designed to bring the chain to a stop within fractions of a second. A second chain brake system can be activated with the interlock lever by removing the right hand completely from the rear handle - offering additional control in certain circumstances. This second system is designed to stop the chain in less than one second.

! Warning !

A chain saw should never be operated without a front hand guard. In a kickback situation this guard helps protect the left hand or other parts of the body. In addition, removal of the hand guard on a saw equipped with a chain brake will deactivate the chain brake.

! Warning !

No STIHL Quickstop or other chain brake device prevents kickback. These devices are designed to reduce the risk of kickback injury, if activated, in certain kickback situations. In order for the STIHL Quickstop to reduce the risk of kickback injury, it must be properly maintained and in good working order. See the chapter entitled "Chain Brake" in the Owner's Manual. In addition, there must be enough distance between the bar and the operator to ensure that the STIHL Quickstop has sufficient time to activate and stop the chain before potential contact with the operator.

! Warning !

An improperly maintained chain brake may increase the time needed to stop the chain after activation, or may not activate at all.

Reduced kickback bar

STIHL green labeled reduced kickback bars are designed to reduce the risk of kickback injury when used with STIHL green labeled low-kickback chains.

! Warning !

When used with other, more aggressive chains, these bars may be less effective in reducing kickback.

Low-kickback chain

Some types of saw chain have specially designed components to reduce the force of nose contact kickback. STIHL has developed low-kickback chain for most STIHL powerheads.

⚠ Warning !

A dull or improperly sharpened chain may reduce or negate the effects of the design features intended to reduce kickback energy. Improper lowering or shaping of the depth gauges or improper sharpening of the cutters may increase the chance and the potential energy of a kickback. The operator must always cut with a properly sharpened chain.

⚠ Warning !

Reduced kickback bars and low-kickback chains do not prevent kickback, but they are designed to reduce the risk of kickback injury. They are available from STIHL dealers. A low-kickback chain will not significantly reduce the risk of kickback injury when used on a bow guide.

⚠ Warning !

Even if a saw is equipped with a STIHL Quickstop[®], a reduced kickback bar and/or low-kickback chain, this does not eliminate the risk of injury by kickback. Therefore, the operator must always observe all safety precautions to avoid kickback situations.

To avoid kickback

The best defense against personal injury from kickback is to avoid kickback situations:

1. Hold the chain saw firmly with both hands and maintain a secure grip.
2. Be aware of the location of the guide bar nose at all times.
3. Never let the nose of the guide bar contact any object. Do not cut limbs with the nose of the guide bar. Be especially careful when cutting small, tough limbs, small size brush and saplings which may easily catch the chain.
4. Don't overreach.
5. Don't cut above shoulder height.
6. Begin cutting and continue at full throttle.
7. Cut only one log at a time.
8. Use extreme caution when re-entering a previous cut.
9. Do not attempt to plunge cut if you are not experienced with this cutting technique.
10. Be alert for shifting of the log or other forces that may cause the cut to close and pinch the chain.
11. Maintain saw chain properly. Cut with a correctly sharpened, properly tensioned chain at all times.
12. Stand to the side of the cutting path of the chain saw.

2. Cutting Attachment

This handbook is intended as a guide to selecting the correct cutting attachment for a specific application as well as to its proper use and maintenance.

It is important that you read, fully understand and observe the instructions in the chainsaw manual. Non-observance of the instruction manual may result in serious or fatal injury.

- Special safety precautions must be observed to reduce the risk of personal injury when working with a chainsaw because of the very high chain speed and very sharp cutters.

The cutting results obtained with a chainsaw basically depend on three factors:

- Design and power of the chainsaw.
- Type and condition of the saw chain, guide bar and chain sprocket.
- Cutting technique used by the saw operator.

The saw chain is the part which does the actual cutting work and is therefore the part which has the greatest influence on the results achieved.

The cutting attachment consists of the saw chain, guide bar and chain sprocket.

Correct use, maintenance and repair of the cutting attachment are therefore of critical importance.

3. OILOMATIC® Saw Chain

3.1 Introduction

STIHL is the only manufacturer to produce its own chainsaws, guide bars, saw chains and chain sprockets.

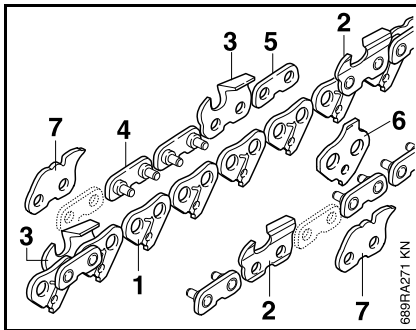
STIHL offers the right saw chain for every species of wood and for chainsaws of all brands and engine size. The STIHL line of chains is tailor-made for almost every application.

All STIHL chains incorporate the patented, life-prolonging STIHL OILOMATIC® system of lubrication. Every saw chain produced by STIHL is an "OILOMATIC® chain".

3.2 Construction

STIHL OILOMATIC® saw chains are three-link chains and always assembled in the same basic pattern. They differ merely in the shape or the cutters and the dimensions of the individual links.

The illustration below shows the component parts of an OILOMATIC® chain.



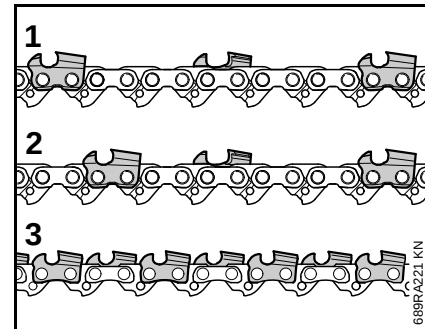
Drive link (1), left hand cutter (2), right hand cutter (3), preset tie strap (4), tie strap (5), humped drive link (6), triple-hump tie strap (7).

The center row is made up entirely of drive links (1). Engine power is transmitted via the chain sprocket to the drive link tangs to rotate the chain around the guide bar. The drive link tangs run in the bar groove and stabilize the chain in the lateral direction.

The forward edge of the drive link tang is a rounded hook which acts as a groove raker or cleaner.

The two outer rows of links are made up of alternating cutters (2, 3) and tie straps (4, 5). The cutters (2, 3) are the actual working parts of the chain. The design and condition of their cutting edges have a significant influence on cutting results. Tie straps (4, 5) are fitted opposite the cutters and on both sides of the chain to fill the gaps between the cutters. The bottoms of the tie straps and cutters form a sliding face on which the chain glides along the guide bar. On low kickback saw chains a humped drive link (6) is fitted in front of each cutter in place of the normal tie strap. On the RAPID™ Duro R for rescue saws a special triple-hump tie strap is fitted on the other side of the chain in place of the normal tie strap.

STIHL saw chains are assembled in such a way that every second drive link is followed by a cutter, right hand and left hand cutters being fitted alternately.



In the case of the full-skip (1) and semi-skip (2) versions, the spaces between the cutters are correspondingly greater or variable. On the full house chain (3), right and left hand cutters are assembled alternately directly behind one another.

All chain links are held together by the rivets, the center row of links (drive links) acting as a hinge for the two outer rows (cutters and tie straps). Each link of the chain is subject to a certain stress. Rivets and drive links have to transmit the full torque of the engine when cutting resistance is high. The force of this torque is spread equally between the cutters and tie straps.

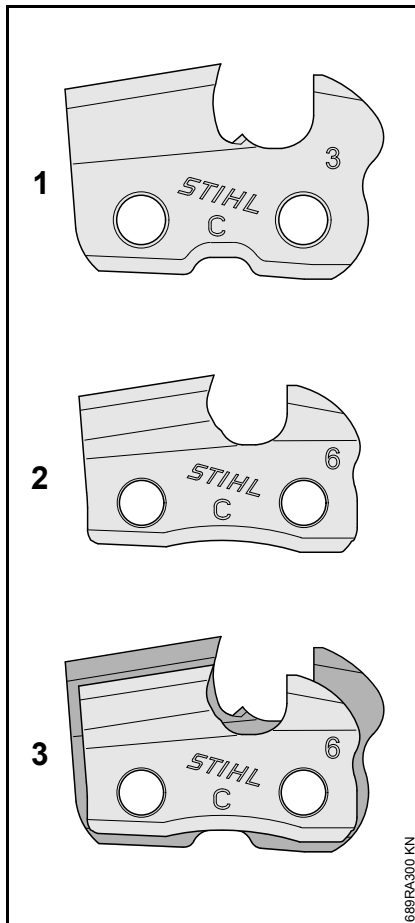
3.3 Chain Types

The STIHL line of saw chains comprises two basic types in up to four versions as well as a number of special versions for specific applications.

3.3.1 Basic Types

Conventional chipper-tooth chains with a standard height cutter are referred to as OILOMATIC® "RAPID™".

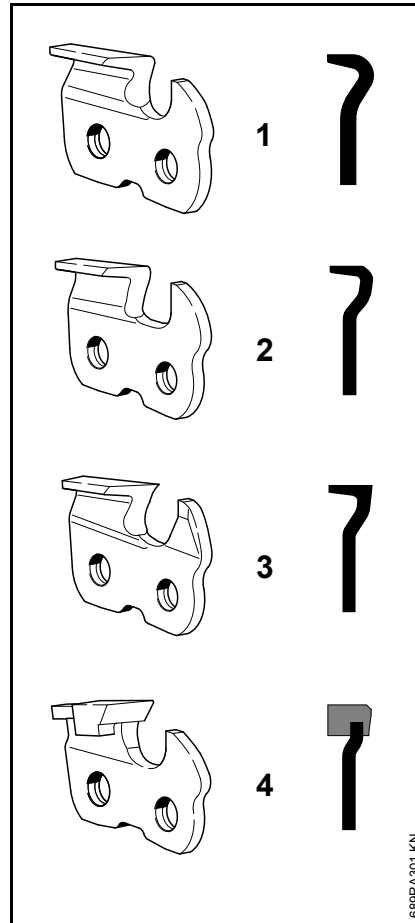
Chipper-tooth chains with a low-profile cutter are called OILOMATIC® "PICCO™".



- 1 RAPID™
- 2 PICCO™
- 3 Comparison of RAPID™/PICCO™

3.3.2 Versions

The different chain versions are defined according to the shape of their cutters:



	Cutter shape	Designation
1	Rounded cutter	Standard
2	Semi-chisel cutter	Micro
3	Full chisel cutter	Super
4	Carbide-tipped cutter	Duro

Standard chain with rounded cutter:

Original shape of chipper-tooth chain. Robust saw chain with rounded cutter. These chains are only available in a pitch of .404".

Micro semi-chisel chain:

Straight-sided cutter. Further development of the RAPID™ Standard.

Robust universal chain that combines high cutting capacity, convenience, long edge life and simple maintenance.

Meets demands of full-time professionals in agriculture, construction and forestry industry but also suitable for occasional users.

Good service life even in lightly soiled wood.

Super full chisel chain:

Razor-edged, square shaped cutters.

Combines excellent cutting capacity and convenience. Meets highest performance requirements of professional users in forestry industry. Reduced service life in lightly soiled wood.

Duro carbide-tipped chain:

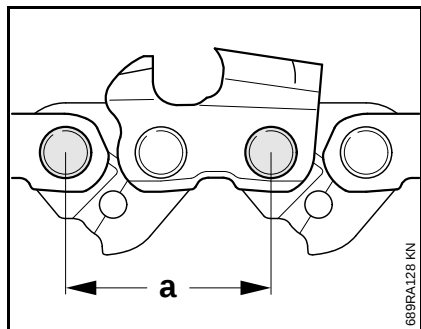
Cutters with carbide tipping. The Duro chain combines exceptional service life, convenience and good cutting performance. It is not affected by dirty wood or brief contact with the ground. Remains sharp up to four times longer than a standard semi-chisel chain. Carbide-tipped chains must be resharpened with a special diamond grinding wheel.

3.4 Criteria for Selection

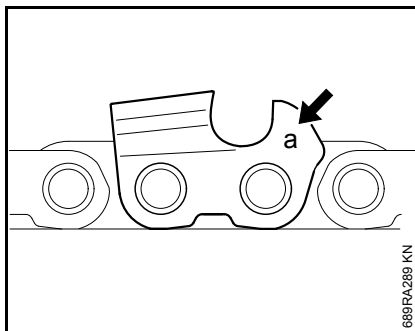
The following characteristics define a saw chain:

- Chain pitch
- Drive link gauge
- Chain length
- Shape of cutter (profile)

3.5 Chain Pitch



The pitch is determined by measuring the distance from the center of one rivet to the center of the next but one and dividing the measurement by two. The result is the pitch in inches or millimeters. The chain pitch is generally quoted in inches (e.g. $3/8"$ = 9.52 mm). It is necessary to measure across three rivets because the rivet center distances may be different on drive links and cutters or tie straps.

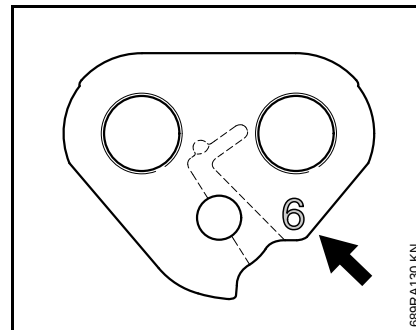


The pitch size (a) is marked on each cutter in the area of the depth gauge.

Chain Pitch	Designation	
$1/4"$	$1/4$ or	1
$.325"$	$.325$ or	2
$3/8"$	$3/8$ or	3
$.404"$	$.404$ or	4
$3/8"$ P	P, PM or	6
$1/4"$ P		7

3.6 Drive Link Gauge

The drive link gauge is the measurement which allocates the saw chain to particular guide bars (groove width). It must match the groove width of the guide bar so that the chain fits the bar exactly. The drive link gauge is quoted in millimeters.



The last digit (arrow) of this measurement is stamped on every drive link (e.g. 6 = 1.6 mm).

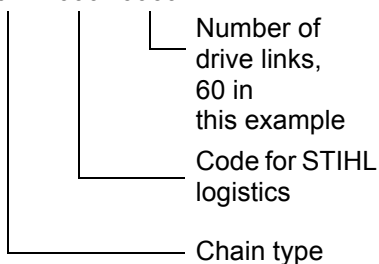
3.7 Part Number and Marketing Number

The part number consists of three groups with 4, 3 and 4 digits.

- First group of digits (xxxx) Code for chain type
- Second group of digits (.... xxx) Code for STIHL logistics
- Third group of digits (.... ... xxxx) Number of drive links (chain length)

Example:

3621 000 0060



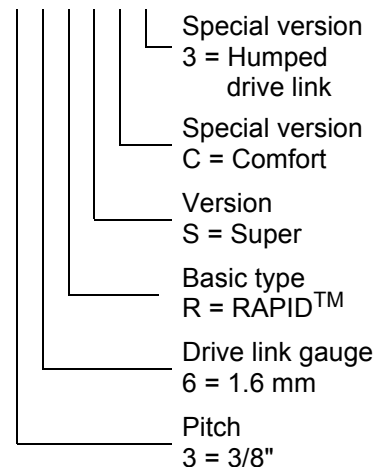
Marketing Number

A system of special abbreviated designations has been introduced in addition to the part number for easy identification of STIHL saw chains and their technical data. In this alphanumeric system each letter or digit stands for a specific term or technical feature. The result is a relatively short but informative designation.

System of Marketing Numbers

Example:

3 6 R S C 3



Meaning of digits and letters Pitch

1	1/4"	6.35 mm
2	.325"	8.25 mm
3	3/8"	9.32 mm
4	.404"	10.26 mm
5	1/2"	12.70 mm
6	3/8" PICCO™	9.32 mm
7	1/4" PICCO™	6.35 mm

Drive Link Gauge

1	1.1 mm	.043"
3	1.3 mm	.050"
5	1.5 mm	.058"
6	1.6 mm	.063"
0	2.0 mm	.080"

Basic Type

R	RAPID™
P	PICCO™

Version (cutter shape)

C	Chipper (standard)
M	Micro
S	Super
D	Duro

Special Versions

Low kickback chain	
3	Humped drive link
Other special versions	
C	Comfort
F	Full-Skip
H	Semi-Skip
K	Klassik
L	Square ground
LH	Square ground semi-skip
M	Mini
S	Spezial
X	Ripping chain
Y	Full house chain
R	Rescue
H	Harvester

Examples:

Chain type 3610:
STIHL OILOMATIC® **61 PMMC3**

- Pitch: 3/8" PICCO™
- Drive link gauge: 1,1 mm
- Basic type: PICCO™
- Version: Micro
- Special version: Mini
- Special version: Comfort
- Special version: Humped drive link

Chain type 3628:
STIHL OILOMATIC® **25 RMC**

- Pitch: .325"
- Drive link gauge: 1.5 mm
- Basic type: RAPID™
- Version: Micro
- Special version: Comfort

Chain type 3661:
STIHL OILOMATIC® **13 RMS**

- Pitch: 1/4"
- Drive link gauge: 1.3 mm
- Basic type: RAPID™
- Version: Micro
- Special version: Spezial (Carving)

3.8 Saw Chain Applications

OILOMATIC® chain	Cutting firewood/ landscape maintenance	Agriculture and horticulture	Forestry	Tree surgery	Carving	Chain pitch
PICCO™ Micro™ 3 (PM3)	++	-	-	++	o	1/4" PICCO™
PICCO™ Micro™ Mini Comfort 3 (PMMC3)	++	-	-	++	o	3/8" PICCO™
PICCO™ Micro™ Comfort 3 (PMC3)	++	-	-	++	o	3/8" PICCO™
PICCO™ Super 3 (PS3)	+	+	++	++	-	3/8" PICCO™
PICCO™ Duro (PD3)	++	++	o	+	-	3/8" PICCO™
RAPID™ Micro™ Spezial (RMS)	-	++*	-	-	+++*	1/4"
RAPID™ Micro™ (RM)	-	-	+	-	-	.404"
RAPID™ Micro™ Comfort (RMC)	-	++	++	-	-	1/4" .325" 3/8"
RAPID™ Micro™ Comfort 3 (RMC3)	o	++	++	-	-	.325" 3/8"
RAPID™ Super (RS)	-	-	++	-	-	.404"
RAPID™ Super Comfort (RSC)	o	+	++	-	-	.325" 3/8"
RAPID™ Super Comfort 3 (RSC3)	-	++	++	-	-	3/8"
RAPID™ Duro 3 (RD3)	-	+	+	-	-	.325"
RAPID™ Duro (RD)	-	+	+	-	-	3/8"

o suitable

+ recommended

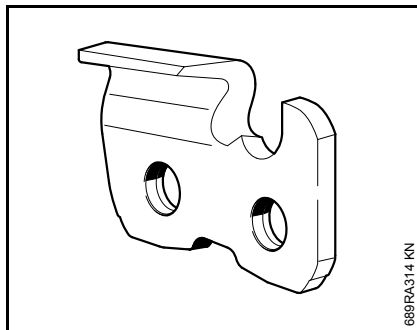
- less suitable

++ highly recommended

* The STIHL 1/4" RAPID™ Micro™ Spezial (RMS) chain may be used on tree service saws only in combination with the STIHL Carving bar

3.9 RAPID™ Chain

3.9.1 RAPID™ Standard K (RCK)



Chipper chain

Cutter
Rounded

Depth gauge
Steep and slim depth gauge.

Applications
Felling, bucking and limbing

Maintenance
Resharpening is accomplished with a round file with file holder, a filing tool or electric chain grinder.

Color code
yellow

Chain type

	.325"	3/8"	3/8"P	.404"
.063"				3812

Key to table:
Chain type

	Chain pitch
Drive link gauge	Chain type

3.9.2 RAPID™ Standard X (RCX) RAPID™ Standard XK (RCXK)

Ripping chain with rounded cutter

Cutter
as RAPID™ Standard, with special top plate angle (filing angle).

Depth gauge
RXCK: as RAPID™ Standard K.
RXC: Forward projecting depth gauge reduces kickback and makes this a smooth running chain.

Applications
Cutting logs longitudinally – primarily for use with portable or mobile board mills.

Maintenance
as RAPID™ Standard K

Color code
yellow

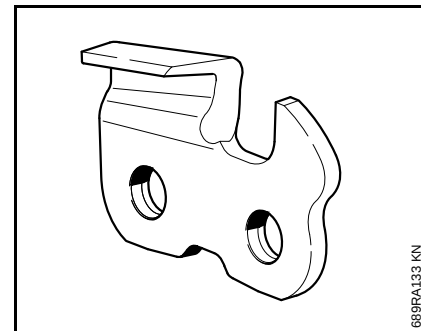
Chain type
a) RCX

	3/8"P	.325"	3/8"	.404"
.063"				3958

b) RCXK

	3/8"P	.325"	3/8"	.404"
.063"				3895

3.9.3 RAPID™ Micro™ (RM)



Semi-chisel chain

Cutter
Straight-sided cutter – further development of RAPID™ Standard.

Depth gauge
Forward projecting depth gauge reduces kickback and makes this a smooth running chain.

Applications
Felling, bucking and limbing, all-round chain for high demands of full-time professionals in agriculture, construction and forestry industry but also for occasional users.

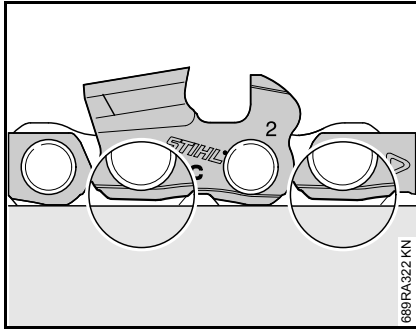
Maintenance
Resharpening is accomplished with a round file with file holder, a filing tool or electric chain grinder.

Color code
yellow

Chain type

	.325"	.3/8"	3/8"P	.404"
.063"				3668

3.9.4 RAPID™ Micro™ C (RMC)



Low vibration semi-chisel chain

Cutter
as RAPID™ Micro™

Depth gauge
as RAPID™ Micro™

Function
The bottoms of the cutters and tie straps slope upwards to the rear – this clearance allows the cutters to rock back slightly and thus produce a shock absorbing effect – very low vibrations and high cutting capacity.

Applications
as RAPID™ Micro™

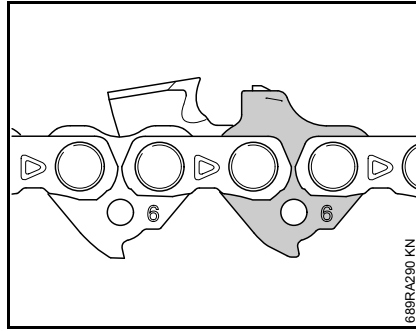
Maintenance
as RAPID™ Micro™

Color code
yellow

Chain type

	1/4"	.325"	3/8"	3/8"P
.050"	3660	3627	3650	
.058"		3628	3651	
.063"		3629	3652	

3.9.5 RAPID™ Micro™ C3 (RMC3)



Reduced kickback, low vibration semi-chisel chain

Cutter
as RAPID™ Micro™

Depth gauge
as RAPID™ Micro™

Function/Construction
Reduced vibrations as with RAPID™ Micro™ C. Additional humped drive link in front of every cutter. The humped drive link guides the cutter into the wood more smoothly for a particularly low kickback tendency.

Applications
Felling, bucking and limbing as well as all cutting work in agriculture, building and forestry industries; also for occasional users.

Maintenance
as RAPID™ Micro™

Color code
green

Chain type

	.325"	3/8"	3/8"P	.404"
.050"	3632	3662		
.058"	3633			
.063"	3634	3664		

3.9.6 RAPID™ Micro™ X (RMX)

Semi-chisel ripping chain

Cutter
as RAPID™ Micro™, with special top plate angle (filing angle).

Depth gauge
as RAPID™ Micro™

Applications
Cutting logs longitudinally – primarily for use with portable or mobile board mills.

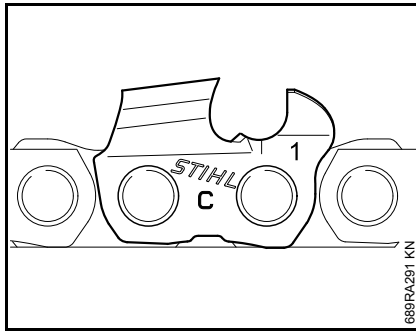
Maintenance
as RAPID™ Micro™

Color code
yellow

Chain type

	.325"	3/8"	3/8"P	.404"
.063"		3653		3838

3.9.7 RAPID™ Micro™ Spezial (RMS)



Low vibration semi-chisel chain

Cutter

Features a shortened top plate and a forward sloping tail. Feed effort is greatly reduced when boring and cutting because the cutting edge is not pushed out of the cut.

Function

Reduced vibrations as with RAPID™ Micro™ C.

Depth gauge
as RAPID™ Micro™

Applications

Exclusively for use in combination with STIHL Carving bars for cutting work where frequent use is made of the bar nose. Special saw chain for wood carvers and arborists.

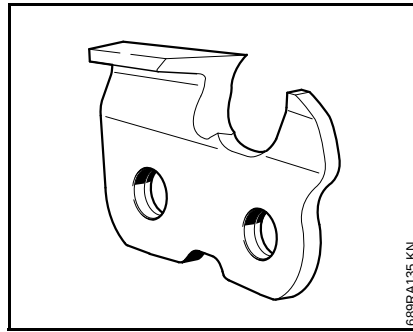
Maintenance
as RAPID™ Micro™

Color code
yellow

Chain type

	1/4"	.325"	3/8"	3/8"P
.050"	3661			

3.9.8 RAPID™ Super (RS)



Full chisel chain

Cutter

Razor-edged, square shape – high performance chain.

Depth gauge

Forward projecting depth gauge reduces kickback and makes this a smooth running chain.

Applications

Forestry industry, for felling, bucking and limbing in medium to big stands on medium to high powered machines.

Maintenance

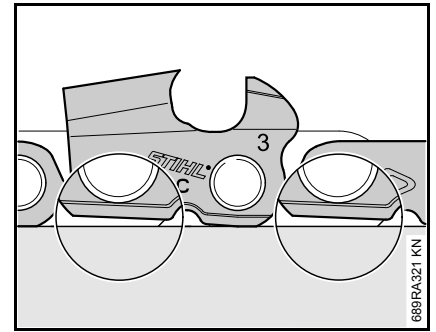
Resharpening is accomplished with a round file with file holder, a filing tool or electric chain grinder.

Color code
yellow

Chain type

	.325"	3/8"	3/8"P	.404"
.063"				3946

3.9.9 RAPID™ Super C (RSC)



Low vibration full chisel chain

Cutter

Razor-edged, square shape – high performance chain.

Depth gauge

Forward projecting depth gauge reduces kickback and makes this a smooth running chain.

Function

The bottoms of the cutters and tie straps slope upwards to the rear – this clearance allows the cutters to rock back slightly and thus produce a shock absorbing effect – very low vibrations and high cutting capacity.

Applications

Combines excellent cutting capacity and convenience. Meets highest performance requirements of professional users in forestry industry.

Felling, bucking and limbing in medium to big stands on medium to high powered machines.

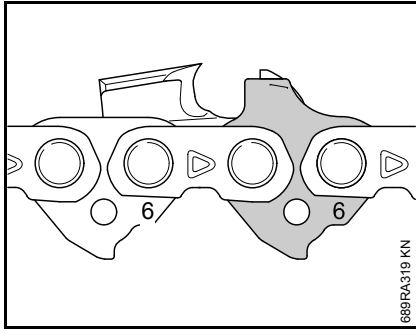
Maintenance
as RAPID™ Super

Color code
yellow

Chain type

	.325"	3/8"	3/8"P	.404"
.050"	3637	3623		
.058"	3638	3622		
.063"	3639	3621		

3.9.10 RAPID™ Super C3 (RSC3)



Reduced kickback, low vibration full chisel chain

Cutter
as RAPID™ Super

Depth gauge
as RAPID™ Super

Function/Construction
Reduced vibrations as with RAPID™ Super C. Additional humped drive link in front of every cutter. The humped drive link guides the cutter into the wood more smoothly for a particularly low kickback tendency.

Applications
as RAPID™ Super C

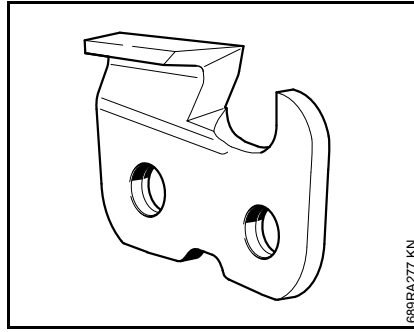
Maintenance
as RAPID™ Super

Color code
green

Chain type

	.325"	3/8"	3/8"P	.404"
.050"		3624		
.058"				
.063"		3626		

3.9.11 RAPID™ Super LK (RSLK)



Full chisel square-ground chain for special applications (special versions)

Cutter
as RAPID™ Super with square-ground, L-shaped cutting edge.

Depth gauge
Straight

Applications
as RAPID™ Super

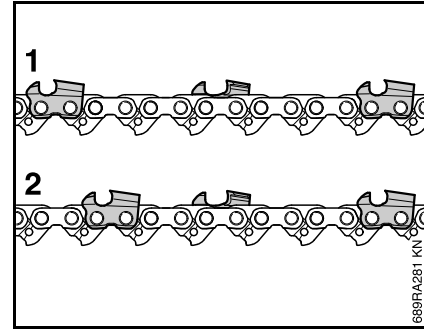
Maintenance
Special files or sharpening tools required.

Color code
yellow

Chain type

	.325"	3/8"	3/8"P	.404"
.050"		3640		
.058"				
.063"		3641		

3.9.12 Full-Skip and Semi-Skip Chains



Full-Skip chains (1)

Distance between cutters is double that of standard chain.

Versions:

- RAPID™ Micro™ Full-Skip (RMF) semi-chisel chain
- RAPID™ Super Full-Skip (RSF) full chisel chain
- RAPID Super L Full-Skip Klassik (RSLFK) square ground full chisel chain, straight, depth gauge.

Semi-Skip chains (2)

Distance between cutters alternates between normal to double that of standard chain.

Version:

- RAPID™ Super L Semi-Skip Klassik (RSLHK) Square ground full chisel chain, straight, narrow and steep depth gauge.

Color code
yellow

Chain type
Full-Skip and Semi-Skip Chains

Chain type RMF

	.325"	3/8"	3/8"P	.404"
.050"		3654		
.058"				
.063"				3671

Chain type RSF

	.325"	3/8"	3/8"P	.404"
.050"		3953		
.058"		3913		3924
.063"		3979		3911

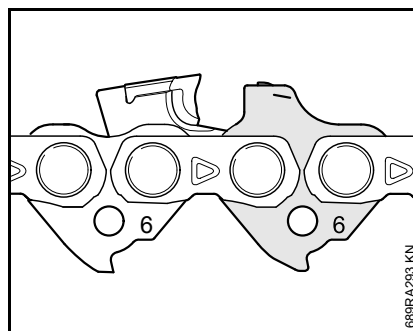
Chain type RSLFK

	.325"	3/8"	3/8"P	.404"
.050"		3643		
.058"				
.063"		3644		

Chain type RSLHK

	.325"	3/8"	3/8"P	.404"
.050"		3645		
.058"				
.063"		3646		

3.9.13 RAPID™ Duro 3 (RD3)



Reduced kickback
carbide-tipped chain

Cutter

Cutters with carbide tipping.

Depth gauge

Forward projecting.

Function/Construction
as RAPID™ Micro™ C3 (RMC3)

Applications

as RAPID™ Micro™ C
RAPID™ Duro 3 stays sharp up to four times longer than standard chain, especially in extreme operating conditions, e.g. cutting abrasive materials or making brief contact with the ground.

Maintenance

Resharpener of the extremely hard carbide tips requires a special diamond grinding wheel and the STIHL USG electric sharpener.

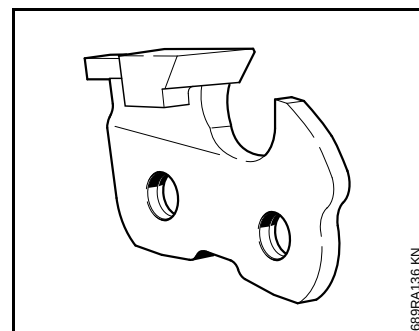
Color code

green

Chain type

	.325"	3/8"	3/8"P	.404"
.050"	3665			
.058"	3666			
.063"	3667			

3.9.14 RAPID™ Duro (RD)



Carbide-tipped chain

Cutter

Cutters with carbide tipping.

Depth gauge

Forward projecting.

Applications

Designed primarily for special applications in demolition companies, fire and emergency services etc., e.g. for cutting dirtied wood that occurs in skidding and rafting, blowdown areas, sandy areas and street trees as well as disaster areas or in building demolition. The RAPID™ Duro is particularly suitable for cutting hard, dirty wood.

Maintenance

Resharpener of the extremely hard carbide tips requires a special diamond grinding wheel and the STIHL USG electric sharpener.

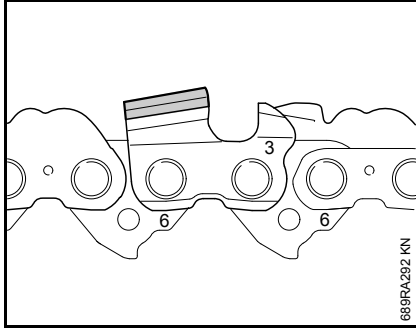
Color code

yellow

Chain type

	.325"	3/8"	3/8"P	.404"
.050"		3948		
.058"				
.063"		3943		

3.9.15 RAPID™ Duro R (RDR)



Carbide-tipped chain

Cutter

Cutters are tipped with carbide. Large-area brazing of carbide tipping to top plate increases strength.

Depth gauge

Forward projecting.

Construction of chain

A triple-humped tie strap installed on the opposite side of the chain in front of each cutter. It reduces the tendency of the cutter to sit up and snag.

Applications

Primarily for special applications (rescue services, fire and emergency services, etc.).

Maintenance

Resharpening of the extremely hard carbide tips requires a special diamond grinding wheel and the STIHL USG electric sharpener.

Color code

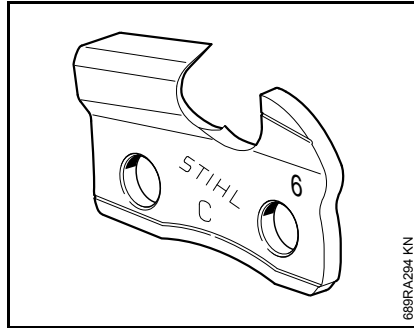
yellow

Chain type

	.325"	3/8"	3/8"P	.404"
.063"		3944		

3.10 PICCO™ Chain

3.10.1 PICCO™ Micro™ C (PMC)



Low vibration, low profile semi-chisel chain

Cutter

Slim, straight-sided, low profile cutter for reduced kickback tendency.

Depth gauge

Forward projecting depth gauge reduces kickback tendency.

Function

The bottoms of the cutters and tie straps slope upwards to the rear – this clearance allows the cutters to rock back slightly and thus produce a shock absorbing effect – very low vibrations and high cutting capacity.

Applications

Agriculture and building industry, as well as occasional users; limbing in small stands on lightweight saws.

Maintenance

Resharpening is accomplished with a round file with file holder, a filing tool or electric chain grinder.

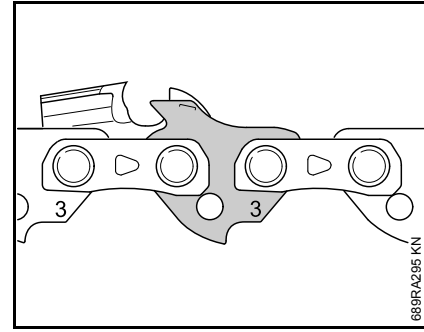
Color code

yellow

Chain type

	.325"	3/8"	3/8"P	.404"
.050"			3613	

3.10.2 PICCO™ Micro™ C3 (PMC3)



Reduced kickback, low vibration, low profile semi-chisel chain

Cutter and depth gauge
as PICCO™ Micro™ C

Function/Construction

Reduced vibrations as with PICCO™ Micro™ C. Additional humped drive link in front of every cutter. The humped drive link guides the cutter into the wood more smoothly for a particularly low kickback tendency.

Applications and maintenance
as PICCO™ Micro™ C

Color code

green

Chain type

	.325"	3/8"	3/8"P	.404"
.050"			3636	

3.10.3 PICCO™ Micro™ X (PMX)

Low vibration, low profile semi-chisel ripping chain

Cutter
as PICCO™ Micro™ C, with special top plate angle (filing angle).

Depth gauge
as PICCO™ Micro™ C

Applications
Cutting logs longitudinally – primarily for use with portable or mobile board mills.

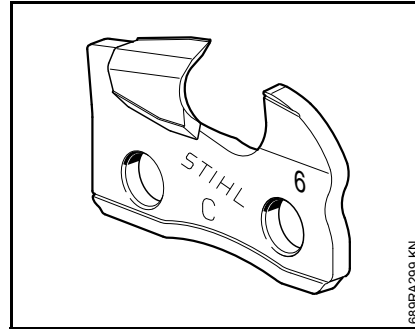
Maintenance
as PICCO™ Micro™ C

Color code
yellow

Chain type

	.325"	3/8"	3/8"P	.404"
.050"			3614	

3.10.4 PICCO™ Duro (PD3)



Reduced kickback, low vibration, low profile carbide-tipped chain

Cutter
Cutters with carbide tipping.

Depth gauge
Forward projecting.

Function/Construction
as PMC3

Applications
as PICCO™ Micro™ C – PICCO™ Duro stays sharp up to four times longer than standard chain, especially in extreme operating conditions, e.g. cutting abrasive materials or making brief contact with the ground.

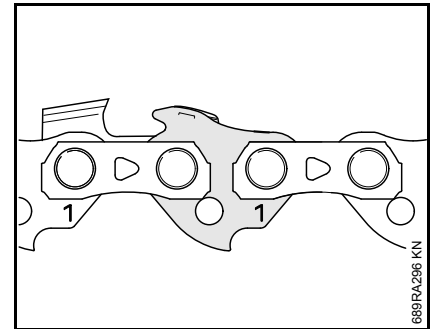
Maintenance
Resharpener of the extremely hard carbide tips requires a special diamond grinding wheel and the STIHL USG electric sharpener.

Color code
green

Chain type

	.325"	3/8"	3/8"P	.404"
.050"			3612	

3.10.5 PICCO™ Micro™ Mini C3 (PMMC3)



Reduced kickback, low vibration, low profile semi-chisel chain

Cutter
Slim, straight-sided cutter for narrower kerf – this reduces the power required to drive the chain.

Depth gauge
Forward projecting.

Applications
Special chain for chainsaws and pole saws in power range up to about 1.5 kW.

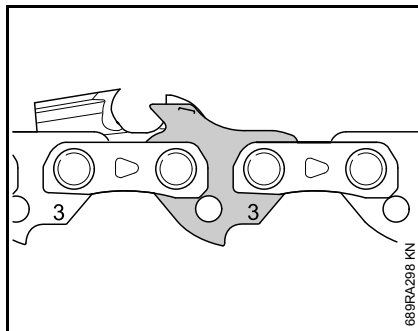
Maintenance
as PICCO™ Micro™ C

Color code
green

Chain type

	.325"	3/8"	3/8"P	.404"
.043"			3610	

3.10.6 PICCO™ Super 3 (PS3)



Reduced kickback, low vibration,
low profile full chisel chain

Cutter

Razor-edged, square shape –
high performance chain.

Depth gauge

Forward projecting.

Applications

Combines excellent cutting capacity
and convenience. Meets highest
performance requirements of
professional users in forestry
industry.

For felling and limbing in medium
stands, tending stands and tree
service.

Maintenance

as PICCO™ Micro™ C

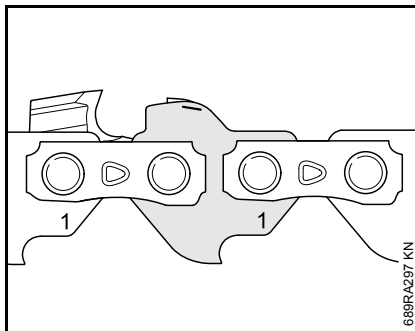
Color code

green

Chain type

	.325"	3/8"	3/8"P	.404"
.050"		3616		

3.10.7 PICCO™ Micro™ 3 (PM3)



Reduced kickback, low vibration,
low profile semi-chisel chain

Cutter

Particularly flat and slim for very
narrow kerf – minimizes power
required to drive the chain.

Depth gauge

Forward projecting.

Function/Construction

1/4" PICCO™ pitch and
3/8" PICCO™ pitch.

Additional humped drive link as on
PMC3.

Reduced vibrations as with
PICCO™ Micro™ C.

Applications

Special chain for chainsaws up to
about 1.0 kW and pole saws up to
about 1.5 kW.

Maintenance

Resharpening is accomplished with
a round file with file holder or
electric chain grinder.

Color code

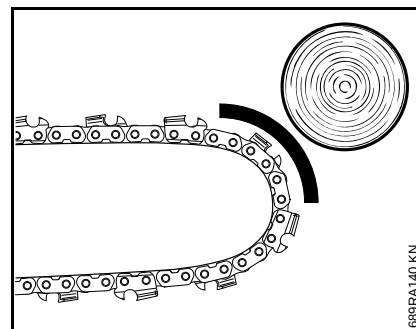
green

Chain type

	1/4" P	.325"	3/8"	3/8"P
.043"	3670			

3.11 Reduced Kickback Chains

One of the most dangerous
situations during cutting with a
chainsaw is kickback.



Kickback occurs when the chain at
the upper quadrant of the bar nose
contacts wood or other solid object,
e.g. another branch during limbing
or when the chain at the bar nose is
briefly pinched in the cut.

Particularly low kickback saw
chains with humped drive links have
been developed to minimize this
danger. These features go beyond
the kickback reducing measures
found on 'normal' saw chains.

The humped drive link is installed in
front of each cutter in place of a
conventional drive link.

This chain guides the cutter more
smoothly into the wood. Low
kickback chains should be used for
applications in which cutting is
performed primarily with the bar
nose (e.g. tree surgery). The use of
low kickback chains can help
reduce the risk of kickback injury for
inexperienced and occasional
chainsaw users in particular.

Saw chains with a particularly low
kickback tendency have the digit 3
in their designation, e.g. 36 RSC3,
26 RMC3, 63 PMC3, 63 PS3.

3.12 How the OILOMATIC® Chain Operates

The method of operation of every OILOMATIC® chain can be compared to that of a portable woodworking plane.

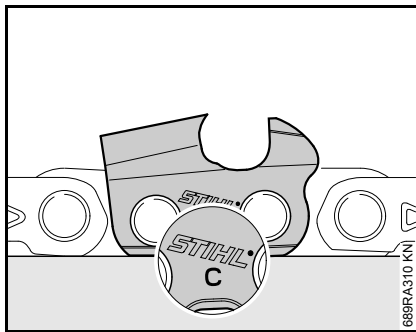
The top plate of the cutter being the plane iron and the depth gauge performing the function of the plane's sole.

The efficiency of the saw chain depends on:

- The driving power and torque of the saw engine.
- The feed force applied by the saw operator.
- The shape, condition and number of cutters, including depth gauges.

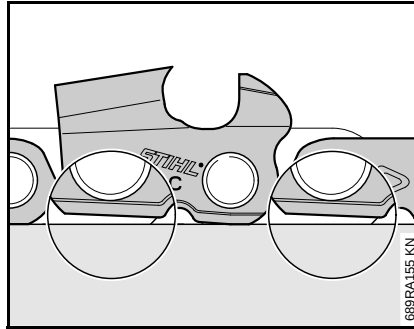
The cutters are the parts of the chain which do the actual work, their shape and condition having a decisive influence on cutting performance.

3.13 Comfort Saw Chains



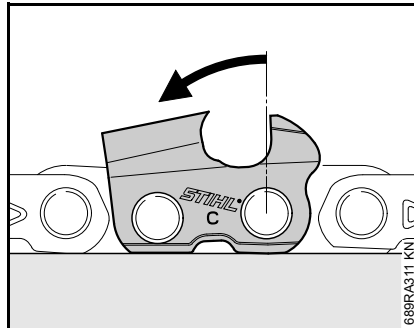
These chains can be identified by the letter "C" marked on every cutter.

Construction



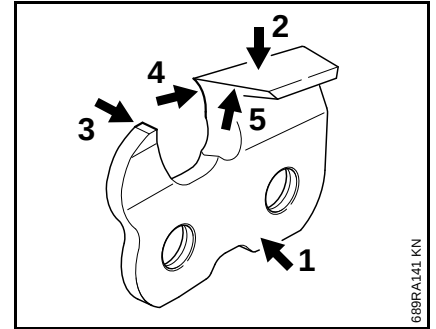
The bottoms of the cutters and tie straps slope upwards to the rear – this clearance between the cutters and guide bar allow the cutters to rock back slightly and thus produce a shock absorbing effect.

Function



When the cutting edge makes contact with wood, the cutter tips back and the chain absorbs most of the impact energy. The vibrations during cutting are reduced by up to 70% – irrespective of the chainsaw used.

3.14 Geometry of the Cutter



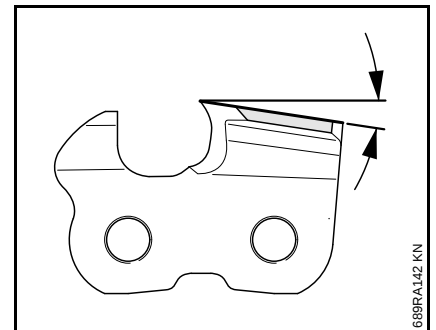
The cutter consists of

- Basic tooth body (1)
- Top plate (2)
- Depth gauge (3)

The side plate cutting edge (4) is vertical while the top plate cutting edge (5) is horizontal and slopes to the rear.

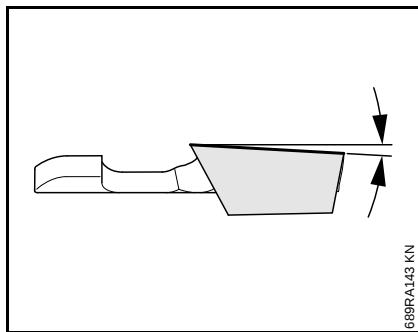
The top plate and the cutting edges have certain angles in order to achieve optimum cutting performance.

3.14.1 Clearance Angle of the Top Plate



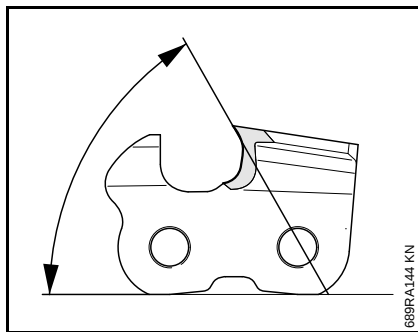
The top plate is inclined to the rear to form the clearance angle that is essential for the top plate cutting edge to feed into the wood.

3.14.2 Clearance Angle of the Side Plate



The top plate is tapered to the rear to form the clearance angle for the side plate cutting edge. This angle is necessary to separate the side of the chip from the wall of the cut.

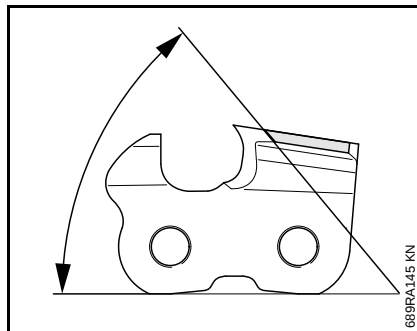
3.14.3 Side Plate Angle



The side plate angle denotes the angle between the side plate cutting edge and the horizontal line formed by the cutter toe and heel. This angle varies on the individual chain types.

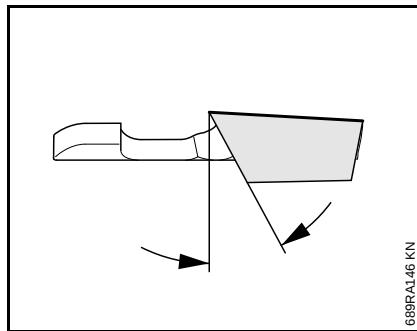
RAPID™ Standard	75°
RAPID™ Micro™	75°
RAPID™ Super™	60°
RAPID™ Duro	65°
PICCO™ Micro™	75°
PICCO™ Super	60°
PICCO™ Duro	80°
RCX, RMX, PMX (ripping chains)	75°

3.14.4 Top Plate Cutting Angle



The top plate cutting angle is the forward slope of the top plate cutting edge relative to the bottom of the cutter. Depending on the chain type, it is 50° to 60°. The top plate cutting edge is the main cutting edge on the cutter and its angle is therefore the most important of all. The top plate cutting angle is obtained automatically if the other specified angles are observed.

3.14.5 Filing Angle



The filing angle is measured from a line at right angles to the guide bar to the top plate cutting edge.

The filing angle differs on some types of chain:

RAPID™ Standard	30°
RAPID™ Micro™	30°
RAPID™ Super	30°
RAPID™ Duro	25°
PICCO™ Micro™	30°
PICCO™ Super	30°
PICCO™ Duro	30°
RCX, RMX, PMX (ripping chains)	10°

Different filing angles may be used to suit specific applications.

Rule of thumb:

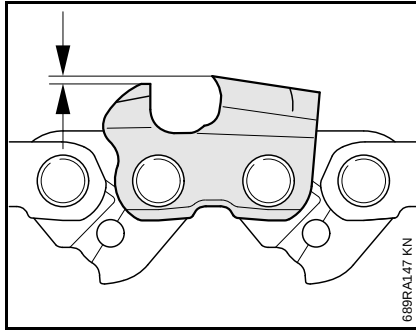
Wider filing angles increase cutting performance in softwood at summer temperatures.

Narrower filing angles ensure a smoother running chain and less vibrations in hardwood and frozen timber.

Filing angles of more than 35° or less than 25° must be avoided (except on ripping chains). Such angles would shorten service life, cause the chain to run roughly and reduce cutting capacity.

The side plate angle, filing angle and top plate cutting angle can vary during the reshaping process. As these angles have a significant influence on the chain's cutting ability, it is essential to maintain the specified values.

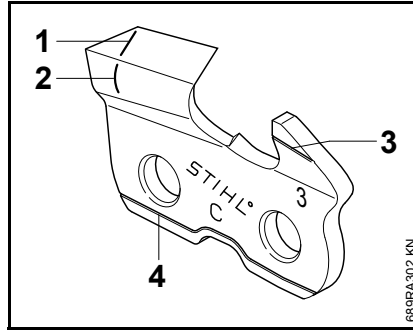
3.14.6 Depth Gauge Setting



The depth gauge is the small projection just in front of the gullet and cutting edge.

The difference in height between the top of the depth gauge and the leading edge of the top plate is known as the **depth gauge setting**. It determines the height at which the cutter enters the wood (chip thickness) and therefore has an influence on chain cutting capacity. The chain version determines the shape of the depth gauge. The depth gauge setting depends on the chain pitch and the chain version. As the top plate slopes downwards to the rear (clearance angle), the depth gauge setting is reduced as the cutter gets shorter. The depth gauge then has to be lowered to the specified setting.

3.15 Service Markings



Filing angle (1)

Marking for correct filing angle of top plate cutting edge and the minimum cutter length. Chain must be replaced if this marking is reached during resharpener.

Side plate angle (2)

Marking for correct angle between side plate cutting edge and bottom of cutter.

Depth gauge (3)

Marking for correct angle of depth gauge. Contour of depth gauge must be filed parallel to this marking.

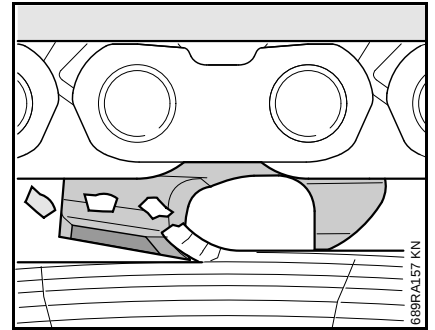
Toe and heel wear (4)

Reference marking for wear on bottom of cutter (running faces). Uniform wear parallel to marking indicates normal chain wear. The running faces are normally worn as far as the rivets when the cutter has been filed back to the service marking.

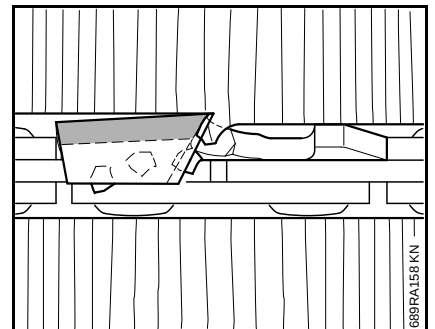
Uniform chain wear results in the service markings being reached at the same time.

3.16 Chip Removal

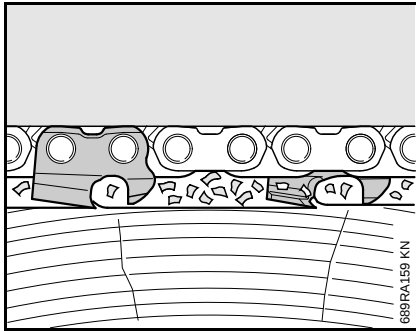
The following description of the chip removing process refers to the action of a single random cutter. The guide bar is parallel to the bottom of the kerf. The feed force is transmitted via the guide bar and toe and heel of the cutter to push the top plate cutting edge into the bottom of the kerf.



As a result of the top plate clearance angle and the acute angle of the cutting edge, the cutter plunges into the wood as the chain moves forwards. The cutting edge levels out and continues running parallel to the bottom of the cut. It is at this point that chip removal takes place. The depth gauge setting determines the thickness of the chip removed.



The side plate cutting edge separates the chip from the wall of the cut.



The chip removed in this way passes through the chip channel, under the top plate, and into the chip space between the cutters where it remains until the cutters emerge from the kerf. The chip is then ejected.

3.17 Use of Saw Chain

3.17.1 Mounting the Saw Chain

Installation of the chain is similar on all STIHL chainsaws and is described in the instruction manual supplied with the saw.

There are a few important points which should be noted:

- The chain length (number of drive links) must match the length of the guide bar.
- The chain pitch must match the pitch of the chain sprocket and, in case of Rollomatic guide bars, also match the pitch of the nose sprocket.
- The drive link gauge must match the width of the guide bar groove.
- The guide bar tail must fit the powerhead.

As a chain sprocket normally has a wear life equivalent to two saw chains, it is advisable to use two chains in rotation with one sprocket. In this way the sprocket and chain bed in with each other and wear out together. If a new chain is installed on a half-worn sprocket, its drive links will wear very quickly.

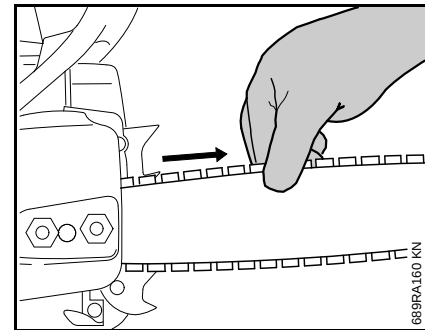
The following rule of thumb is a good guide for economic operation of a chainsaw: Always use

- one guide bar
 - two chain sprockets
 - four chains
- in rotation.

3.17.2 Chain Tension

Correct tension, lubrication and maintenance of the saw chain are of great importance to the service life of the chain, guide bar and chain sprocket. They also have a major effect on the wear life of engine components.

The procedure for properly tensioning the chain is described in the instruction manual supplied with every STIHL chainsaw. The cold tensioned chain should fit snugly against the underside of the guide bar so that it can still be pulled along the bar by hand.



Always wear suitable protective gloves to reduce the risk of direct contact with the sharp cutters.

During cutting the chain warms up as a result of friction and expands. This causes the chain to slacken and eventually sag on the underside of the bar.

If the saw is being used at extremely low outside temperatures, the chain will sag so much when it reaches normal operating temperature that it will have to be retensioned. The chain must always be slackened off again during long work breaks.

If this is not done the chain would be over-tensioned as it cools down to ambient temperature and finally break and damage the crankshaft and bearings in the process,

3.17.3 Breaking In the Saw Chain

Every assembly of moving parts, including a chain, requires a certain initial period after startup for the individual components to bed in. This period is known as "break-in". Although the manufacturing process is very meticulous, every surface and hole has microscopic irregularities which are smoothed during break-in. Only a few minutes are needed to break in a new saw chain.

During this period the running and sliding faces on the cutters, tie straps and drive links are smoothed. Almost all STIHL saw chains are "prestretched" at the factory. This process shortens the running-in time and helps reduce chain stretching.

3.17.4 Chain Lubrication

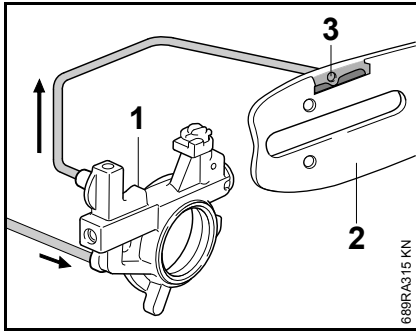
Apart from chain tension and regular care and maintenance, lubrication has the greatest influence on the life of the entire cutting attachment.

Frictional heat is generated in the chain joints, between the sliding faces of the chain links and the guide bar as the chain travels over the guide bar.

It is therefore necessary to introduce an oil film between the sliding faces and joints in order to reduce friction to a minimum.

A certain amount of lubricating oil is thrown off the cutting attachment as the chain rotates around the bar. In addition, lubricating oil is wiped off the chain in the kerf. It is, therefore, necessary to provide an ample and continuous flow of oil to the bar and chain as long as the chain is running.

This is ensured by a fully automatic speed-controlled oil pump on STIHL chainsaws.

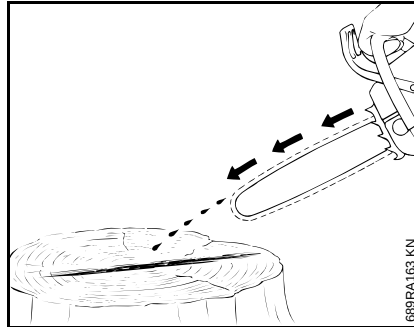


The oil pump (1) supplies the necessary quantity of oil to the bar tail (2) and from there through the oil inlet hole (3) to the guide bar groove. The drive link tangs distribute the lubricating oil over the whole length of the guide bar groove.

The Ematic and OILOMATIC® systems (see 4.4) as well as the Ematic ramp in the guide bar help improve the efficiency of this distribution process. In conjunction with a variable-flow or reduced-flow oil pump this system can greatly reduce oil consumption. However, the chain oiling system can only function correctly if the oil tank is filled (with approved lubricant), the oil pump is in proper working order and the oil channels, oil inlet hole and the bar groove are free from dirt.

3.17.5 Checking Chain Lubrication

Chain lubrication must be checked before starting work and at regular intervals during cutting.



Hold the bar nose over a light background (tree stump, sawdust, etc.) with the chain running. Chain lubrication is in order if an increasing trace of oil can be seen against this background. The oil flow rate is adequate if the sides of the saw chain are always coated with an unbroken oil film.

Different oil flow requirements

The amount of chain oil required differs according to the application. Long guide bars, large trunk diameters, hard and dry woods as well as thick barks need more chain lubricating oil, while short guide bars, soft and damp woods need less. In order to meet these different requirements, STIHL medium-duty and heavy-duty saws are equipped with a variable-flow oil pump.

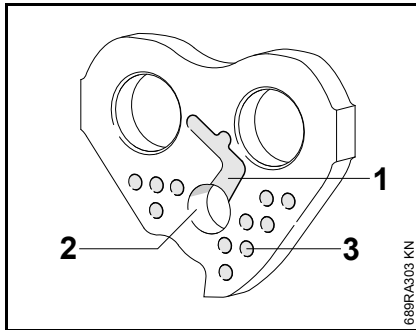
Smoking in cut

If the cutting attachment begins to smoke in the cut and/or the chain snags in the bar groove, the reason is overheating. This may be caused by inadequate lubrication. Other possible causes are a dull or incorrectly sharpened chain or, on Duromatic bars, an over-tensioned chain. All three possibilities must be investigated and corrected as necessary.

3.17.6 STIHL OILOMATIC® Principle

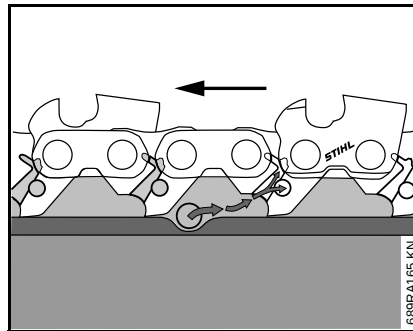
Chain lubrication has the greatest influence on the service life of a chain.

The patented OILOMATIC® principle of chain lubrication extends the useful life of the saw chain.



Unlike conventional chains, each drive link of STIHL OILOMATIC® saw chain incorporates an oil channel (1) which slopes upwards from the center of the drive link tang. The inertial and centrifugal forces created as the chain travels around the bar cause the lubricating oil in the bar groove to be forced up through the oil channel. It is conveyed outwards to those places where lubrication is needed most. The oil reservoir (2) integrated in the drive link improves lubrication at the bar nose and the bottom of the bar in particular.

Lubricating oil collects in the dimples (3) on both sides of the drive link. This minimizes sliding friction, optimizes lubrication and reduces wear.



STIHL OILOMATIC® chain offers the following advantages:

- Service life of the chain is considerably increased – this has been verified in the laboratory and in field trials
- Optimum lubrication
- Less wear
- Service life of the bar and sprocket is also extended.

The STIHL Ematic system (see 4.4) consists of an OILOMATIC® chain, a STIHL Ematic guide bar and a variable-flow or reduced-flow oil pump.

It is designed to better utilize and help reduce the consumption of chain lubricating oil by up to 50%. The Ematic system is yet another STIHL contribution to a cleaner environment.

In conventional lubricating systems the sliding faces on the chain and guide bar normally receive sufficient lubrication, but too little oil reaches the chain joints. This causes excessive wear in the chain joints. The result is premature wear of the chain, sprocket and roller nose.

3.17.7 Bar and Chain Oil

The ability of the film of lubricant to reduce friction is dependent to a large extent on the chemical composition and consistency of the lubricant used. The quality of the lubricating oil is therefore vitally important for the efficiency of chain lubrication and thus the life of the entire cutting attachment.

In addition to good lubricating properties a chain oil must possess the following characteristics:

- Good adhesive properties to ensure that as little oil as possible is thrown off the cutting attachment by centrifugal force.
- A low setting point to ensure that it still flows at extremely low temperatures.
- A high flash point to ensure that it cannot be ignited by the heat generated during cutting.
- Wear protection to ensure that the wear on the chain and guide bar is reduced to an absolute minimum.
- Antioxidant additive (in biological oils) to provide long-term protection of lubricated components against resinification of the oil when it comes into contact with oxygen.

STIHL high-grade chain lubricants meet all these specifications. They achieved excellent results in terms of the wear life of the cutting attachment.

We recommend the use of STIHL chain lubricating oils.

Those owners who wish to minimize environmental impact should use STIHL Bioplus. Unlike STIHL Bioplus, unalloyed biological chain oil offers inadequate resistance to oxidation.

Once air is admitted this can relatively quickly result in serious gumming up and encrustations which can damage the saw's oil pump and the chain beyond repair.

Never use waste oil.

Waste oil does not have the required lubricating properties and is unsuitable for chain lubrication. Prolonged and repeated contact with waste oil can cause skin cancer, and also pollutes the environment.

3.18 Sharpening the Saw Chain

Every cutting tool, including the saw chain, is subject to wear and tear. The cutting edges become dull. As dullness increases so does the effort required for cutting. The cutters have to be resharpened. Less material has to be removed if the cutters are always sharpened before they get dull and this in turn increases saw chain life.

But when does the chain need sharpening?

The determining factor is the feed effort.

A properly sharpened chain pulls itself into the cut when only slight pressure is applied. But if the chain has to be forced into the cut by applying excessive pressure, the cutters are dull or have been damaged by foreign matter.

Another clear indication of a dull chain is fine sawdust being pulled from the cut instead of coarse, thick chips. It is essential to sharpen the chain at this stage.

Working with a dull or damaged chain requires more physical effort, exposes the user to higher vibration levels, produces unsatisfactory cutting results and increases wear. Furthermore, it results in a high fuel consumption and a higher rate of wear on the guide bar, chain, chain sprocket and engine.

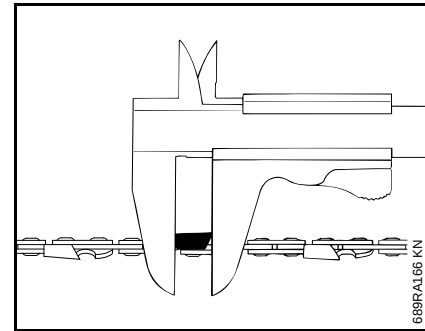
A saw chain can be resharpened in several ways, i.e. with a file and file holder, a filing tool or an electric sharpener.

Depending on the method used, the chain is either left on the bar or removed from the bar.

The sharpening procedure is the same for all chains but different filing angles and settings are necessary for each type of chain.

3.18.1 Preparing the Saw Chain

Thoroughly clean the chain, e.g. with STIHL resin solvent. This ensures an optimum material removal rate of the sharpening tool used and avoids grinding dust sticking to the chain. Examine the chain for cracks and damaged rivets. Replace any damaged or worn parts and file the new parts back to match the shape and wear of the other parts.



Determine the master cutter – use a slide caliper to find the cutter with the shortest top plate and mark it with chalk.

Use it as the master for sharpening all other cutters.

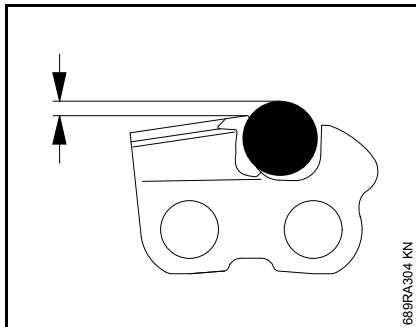
All cutters must be the same length after sharpening. Owing to the rearward slope of the top plate the cutter heights will be uneven if the cutter lengths are different. If the cutters are not the same height the chain will run roughly and eventually break.

When sharpening is completed the saw chain should again be cleaned thoroughly. Remove filings or grinding dust and then lubricate the chain thoroughly. Clean and lubricate the chain before prolonged out-of-service periods.

If the chain is resharpened at the cutting site with a file, run the engine briefly off load at full throttle so that the filings are thrown off the cutting attachment along with the chain oil. Chain lubrication can be checked at the same time.

3.18.2 File and File Holder

Different chain pitches necessitate different file diameters.



Sharpening with a file is performed in such a way that the file is set with 1/10 of its diameter protruding above the top plate.

The use of a file holder ensures that the file is kept at the correct height relative to the tooth. There are different file holders for the various chain pitches.

The correct choice of file holder and file diameter therefore guarantees that the file projects 1/10 of its diameter above the top plate.

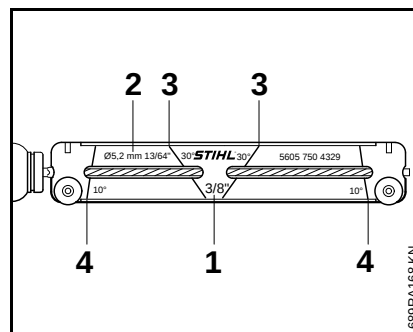
Use only special saw chain sharpening files; the shape and cut of standard files makes them unsuitable for sharpening saw chain.

The following file diameters and file holders are recommended for each chain pitch – irrespective of the tooth length or type:

Chain pitch inch / (mm)	File dia. mm / (inch)	Sharpening kit 1) Part No.
1/4 (6.35)	4.0 (5/32)	5605 007 1027
3/8 P (9.32)	4.0 (5/32)	5605 007 1027
.325 (8.25)	4.8 (3/16)	5605 007 1028
3/8 (9.32)	5.2 (13/64)	5605 007 1029
.404 (10.26)	5.5 (7/32)	5605 007 1030

1) consisting of file holder with round file, flat file and filing gauge

STIHL file holder

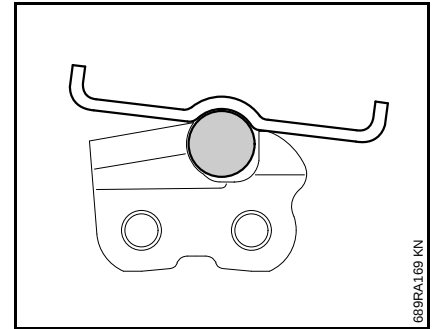


- 1 Chain pitch
- 2 File diameter
- 3 Reference line for filing angle of 30°
- 4 Reference line for filing angle of 10°

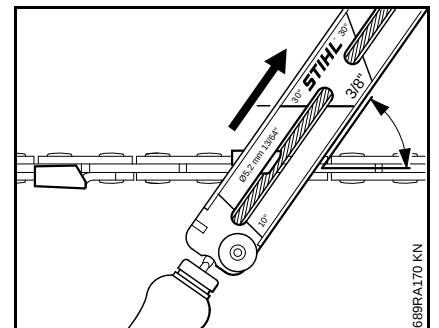
Select sharpening tools according to the chain pitch.

Clamp the guide bar in position, e.g. use a bench vise or the STIHL bar vise.

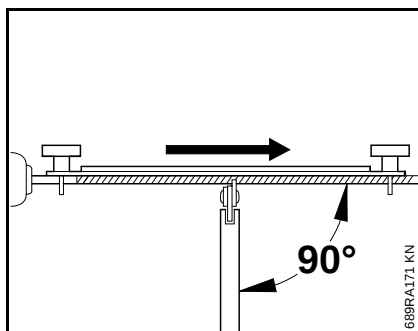
Lock the chain – engage the chain brake.



Rest the file holder on the top plate and depth gauge. The side plate and top plate cutting angles will be automatically correct if the right file holder is used.



Guide the file holder so that the reference marks (filing angle 30° or 10°) are parallel to the guide bar.



Always hold the file holder and file horizontally at right angles to the sides of the chain links and guide bar. Two or three firm strokes of the file are usually enough for each cutter.

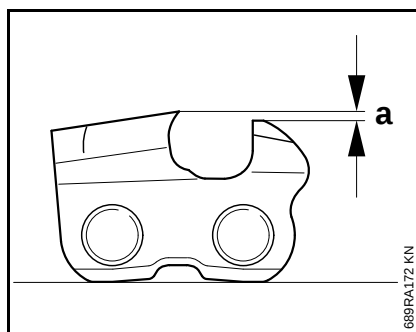
Avoid touching the tie straps and drive links with the file. Always file from the inside to the outside of the cutter, i.e. file the row of cutters away from your body; lift the file off the cutter on the backstroke. File evenly and steadily to obtain a sharp and smooth cutting edge. Rotate the file a little at regular intervals while filing to avoid one-sided wear.

File all the cutters in one row and then file the second row of cutters. Use the same number of file strokes and the same pressure on each cutter to obtain cutters of identical length. All cutters must be the same length. Uneven cutter lengths make the chain run roughly, cause the bottoms of the cutters to wear at a high rate, cause wandering in the cut and can result in the chain breaking. File all cutters back to the length of the shortest cutter.

The risk of incorrect angles and different cutter lengths cannot be excluded when a chain is sharpened with a file and file holder. Less experienced users are therefore advised to have the chain resharpened accurately on an electric sharpener after it has been filed about five times.

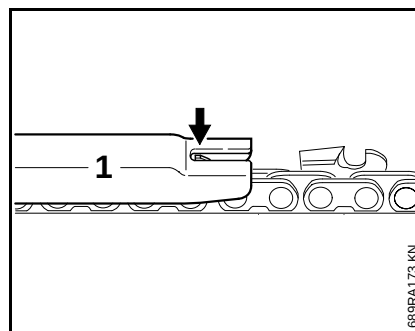
3.18.3 Checking Depth Gauge

It is necessary to check the depth gauge setting every time the cutters are resharpened. A special filing gauge is available for each chain pitch which enables all important angles and settings to be checked.



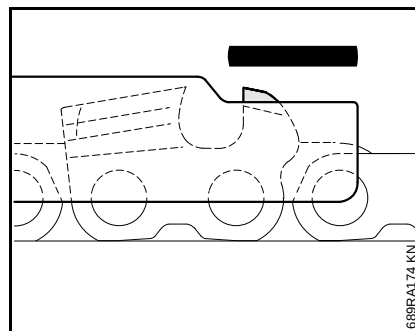
The depth gauge setting (a) determines the height at which the cutter enters the wood and thus the thickness of the chip removed. Depth gauge settings ("a") vary according to chain pitch:

Chain pitch		Depth gauge setting "a"	
inch	(mm)	mm	(inch)
1/4 P	(6.35)	0.45	(0.018)
1/4	(6.35)	0.65	(0.026)
3/8 P	(9.32)	0.65	(0.026)
.325	(8.25)	0.65	(0.026)
3/8	(9.32)	0.65	(0.026)
.404	(10.26)	0.80	(0.031)



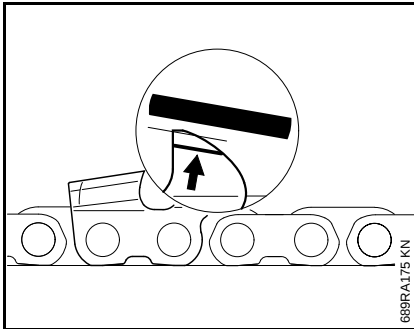
Use a filing gauge (1) that matches the chain pitch and place it on the chain. If the depth gauge projects from the filing gauge (arrow), the depth gauge has to be lowered.

Lowering depth gauges

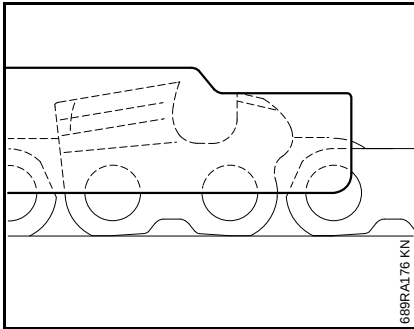


Use a flat or triangular file to file down the depth gauge until it is level with filing gauge.

The depth gauge setting may be increased by up to 0.2 mm for cutting soft wood in mild weather conditions – no frost. To do this, take one to two additional file strokes off the prescribed dimension – use filing gauge of the next size up, e.g. 0.80 mm instead of 0.65 mm



When all depth gauges are level, file the top of the depth gauge parallel to the stamped service marking (see arrow), but do not lower the highest point of the depth gauge in this process.
The kickback tendency of the chainsaw is increased if the depth gauges are too low.



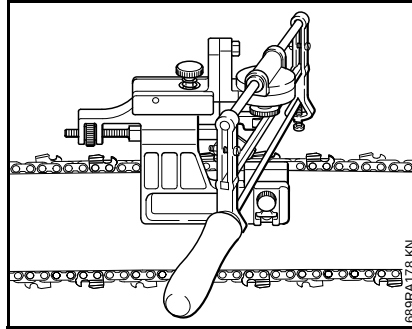
Place the filing gauge on the chain – the highest point of the depth gauge must be level with the filing gauge.

On chains with humped drive links, lower the upper part of the humped drive link (with service marking) along with the depth gauge. The other parts of the humped drive link must not be filed since this may increase the kickback tendency of the chainsaw.

3.18.4 Filing Tools

FG 1 and FG 3

Almost all chains can be sharpened with these filing tools. They are simply attached to the guide bar. The file is guided in a frame-like file holder. General operating instructions are supplied with every filing tool.

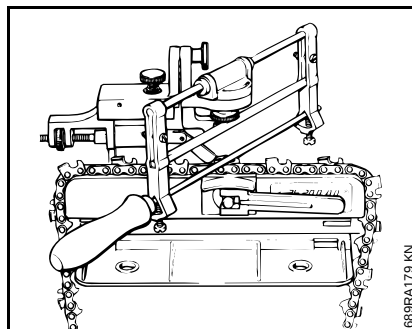


FG 3 filing tool: All-metal precision manual filing tool

FG 2 filing tool (Filerite)

Almost all saw chains can be sharpened with the FG 2 "Filerite". The filing tool is mounted to a bench or similar work surface. This means that the chain has to be removed from the saw. The FG 2 is easier to use and more accurate than the FG 1 or FG 3.

This tool also comes with operating instructions.



FG 2 filing tool (Filerite): Precision workshop filing tool

3.18.5 Sharpeners

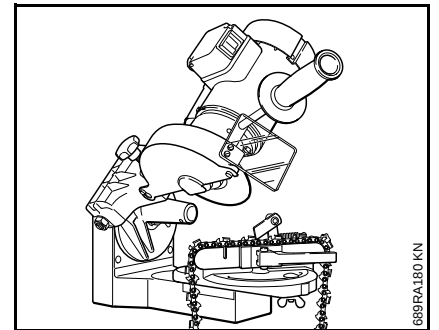
HOS electric sharpener

The inclination of the grinding wheel is not adjustable on the HOS sharpener, i.e. it is permanently fixed at 40°. This inclination is specifically designed for sharpening chipper chains.

The HOS will sharpen all STIHL chains except for square ground and carbide-tipped chains.

USG electric sharpener

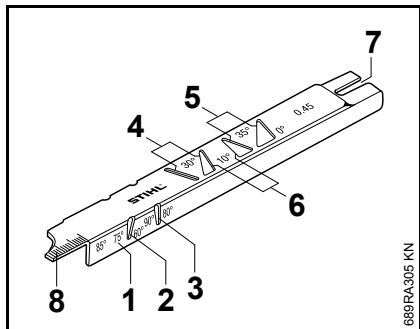
The inclination of the grinding wheel on the USG is fully adjustable. This means that the USG is suitable for sharpening not only all chipper chains (except square ground chains) but also carbide-tipped chains as well as hedge trimmer blades and circular saw blades when equipped with the appropriate attachment.



USG universal electric sharpener

3.18.6 Checking Angles

The side plate and filing angles should be checked from time to time during sharpening. It is best to use the appropriate filing gauge for this purpose. Windows are punched in the back of the filing gauges for filing angles of 10°, 30° and 35°. The side of the filing gauge has windows or edges marked with the angles 60°, 70°, 80°, 85° and 90° for checking the side plate angle.



Filing gauge

- 1 75° sighting edge
- 2 60° sighting edge
- 3 80° sighting edge
- 4 Sighting edges for filing angle of 30°
- 5 Sighting edges for filing angle of 35°
- 6 Sighting edges for filing angle of 10°
- 7 Cut-out for depth gauge setting
- 8 Bar groove cleaner and scale for measuring groove depth

Chain pitch inch	(mm)	Filing gauge Part No.
1/4 P	(6.35)	0000 893 4005
1/4	(6.35)	1110 893 4000
3/8 P	(9.32)	1110 893 4000
.325	(8.25)	1110 893 4000
3/8	(9.32)	1110 893 4000
.404	(10.26)	1106 893 4000

The check is performed by positioning the filing gauge on the chain so that one side locates against the chain. The filing gauge is then moved along the chain until the cutter is in line with one edge of the sighting window (side plate angle or filing angle). If the cutting edge and window edge are parallel, the angle is correct.

3.18.7 Sharpening Errors

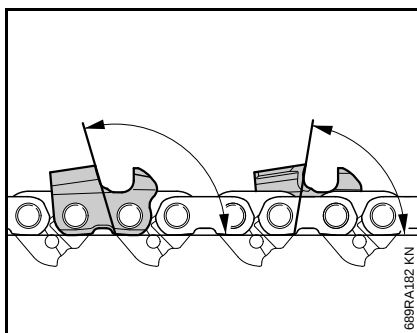
The specified side plate angle and filing angle can only be obtained if the correct tools are used (file holder and file for manual sharpening, or specially shaped grinding wheels) and the correct adjustments are made.

Every deviation affects at least one of the fixed factors. For example, if the file is too thin or the file holder used sets the file too low, the side plate and top plate cutting angles obtained will be too narrow (too acute). On the other hand, if the file diameter is too large or the file is set too high, the resultant side plate and top plate cutting angles will be too wide (obtuse).

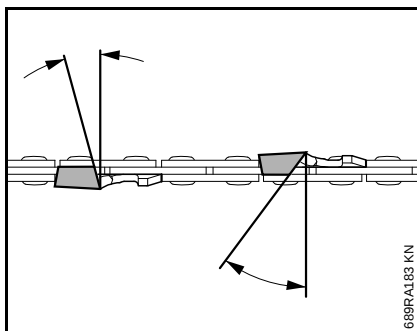
Incorrectly dressed grinding wheels have a similar effect on the side plate and top plate cutting angles. If the file is held incorrectly or the filing tool or sharpener are not properly adjusted, the side plate and top plate cutting angles and the filing angle will vary. The top plate cutting edge is the main cutting edge on the cutter. Although this angle is difficult to measure, it will automatically be correct if the other specified angles are maintained. Uneven cutter lengths make the chain run roughly, cause the bottoms of the cutters to wear at a high rate, cause wandering in the cut and can result in the chain breaking.

If the depth gauges are too low, cutting behavior will be rough and increase the kickback tendency of the saw.

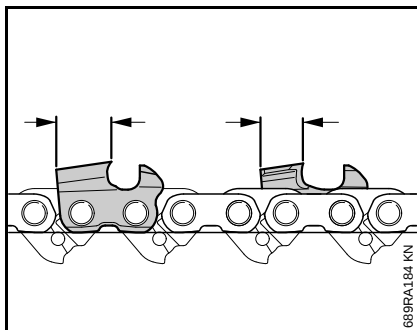
For effects of incorrect depth gauge setting and filing angle see 6.1.3 and 6.1.4.



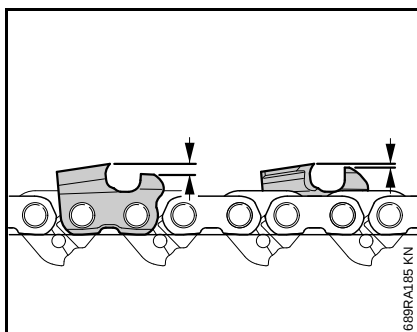
Different side plate angles



Different filing angles



Different cutter lengths



Different depth gauge settings

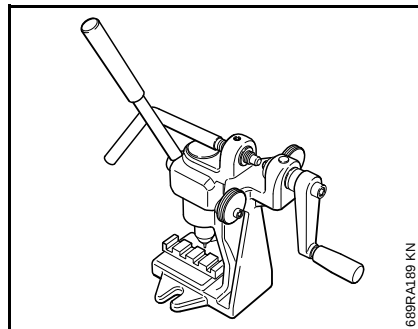
3.19 Repairing Saw Chain

Owing to the relatively high chain speed, any contact the chain and particularly the cutters make with hard materials (metal, stone etc.) has a destructive effect on the chain links concerned. Errors in sharpening and incorrect chain tension can also cause damage to individual links. Chipped cutters and faulty links must be replaced.

3.19.1 STIHL Rivet Spinners and Chain Breakers

The STIHL NG 4 chain breaker, STIHL NG 5 rivet spinner and STIHL NG 7 chain breaker and rivet spinner can be used for mobile repairs but require a stable mounting surface.

The stationary STIHL NG 3 chain breaking and rivet spinning machine is designed only for use in the repair shop.



STIHL NG 7 chain breaker and rivet spinner combination

3.19.2 Replacing Chain Links

Repairs are performed in accordance with the operating instructions supplied with the unit. To ensure flawless operation of a repaired chain it is essential to observe the following general rules:

- The assembly sequence of the chain links must never be changed.
- Rivets should always be formed or spun so that the links move freely with a minimum of play.
- The newly fitted chain link must be matched to the other links: the cutter and depth gauge must be filed back to the size of the master cutter and the bottom faces filed back to match the neighboring links.

A repair should never be attempted without a suitable chain breaking and rivet spinning tool. Improper repairs can cause damage to the new links and other parts of the chain and this, in turn, can result in chain breakage.

4. Ematic Guide Bars

STIHL manufactures a full line of guide bars to suit every STIHL chainsaw and every cutting application. STIHL guide bars with the oil-saving STIHL Ematic system (see 4.4) are marked with the letter "E".

STIHL guide bars are available in a wide range of lengths with groove widths of .043" (1.1 mm) (Rollomatic Mini), .050" (1.3 mm), .058" (1.5 mm) and .063" (1.6 mm).

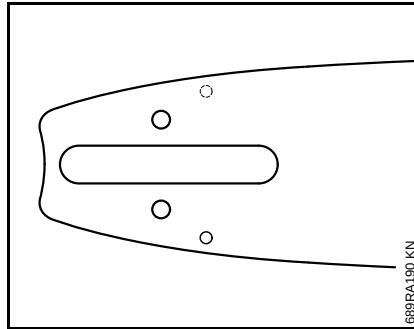
The contour of the various types of guide bars has been optimized to meet the requirements laid down for:

- cutting capacity
- straight-line control
- kickback behavior
- resistance to wear

4.1 Criteria for Selection

Four different characteristics define a guide bar:

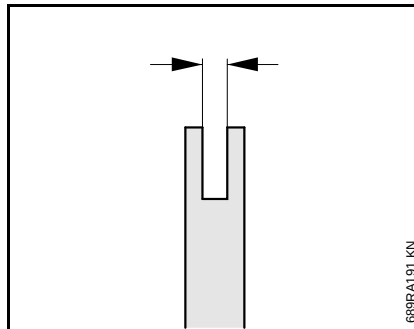
Bar tail



The bar tail assigns the guide bar to specific chainsaw models (power classes).

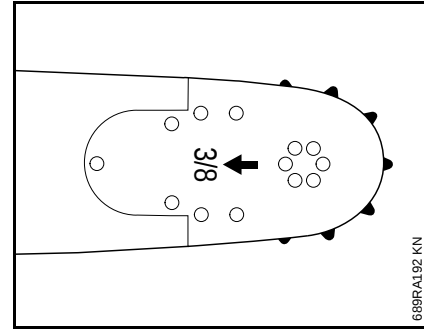
Groove width

A continuous groove is machined in the periphery of the bar. The tangs of the drive links extend into the groove to keep the chain running in a straight line. The bar groove also serves as a supply channel for chain and bar lubricant. The chain rides on the rails on either side of the groove.



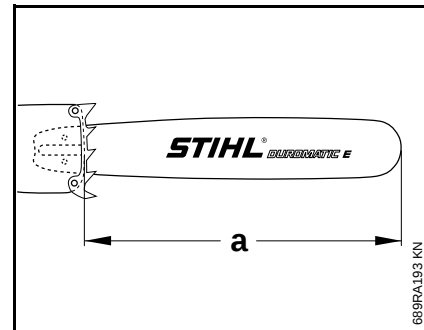
The groove width assigns the bar to certain types of chain (drive link gauge).

Nose sprocket



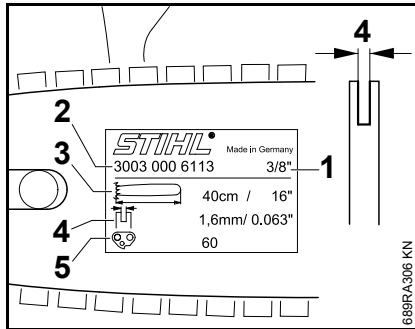
The pitch of the nose sprocket assigns Rollomatic bars to certain sprocket and chain pitches.

Cutting length



The length of the bar (**a**) determines the area of application (e.g. log diameter).

Service data

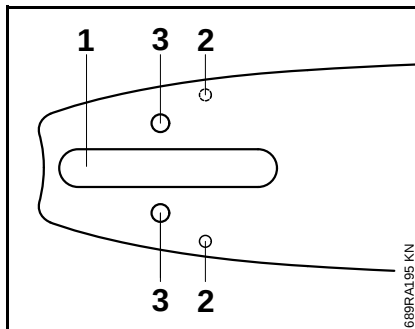


The technical data and part number are etched by laser in the tail end of every STIHL guide bar.

Key

- Chain pitch (1) (Rollomatic only)
- Part number (2)
- Cutting length (3)
- Groove width (4)
- Number of drive links (5)

4.1.1 Bar Tail



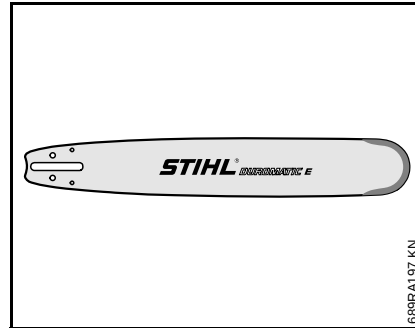
The tail of the bar is defined by the position of the slot (1) for the mounting studs, the position of the oil inlet holes (2) and the fixing holes (3) for the chain tensioner. The necessary dimensions are determined by the bar mounting flange on the chainsaw for which the bar is designed.

4.2 Basic Types and Versions

STIHL guide bars are available in two basic types:

- Duromatic
- Rollomatic

4.2.1 Duromatic E

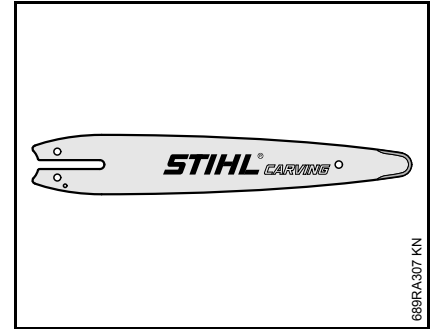


Duromatic bars are made in a single piece from a specially formulated wear-resistant tool steel. The contour is cut by laser while the bar groove is ground in the blade body in a special process. "Duro" (from the Latin "durus" meaning hard) denotes that these guide bars are spring hard and highly wear resistant. Their great resilience makes them substantially resistant to flexing stresses and warping. The rails are induction hardened and the highly stressed bar nose area is stellite tipped in a special laser welding process.

Applications

For very heavy-duty professional felling and bucking operations on high powered saws.

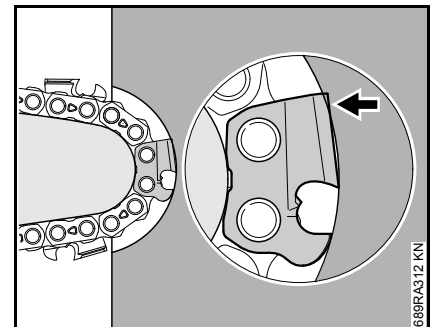
4.2.2 Carving



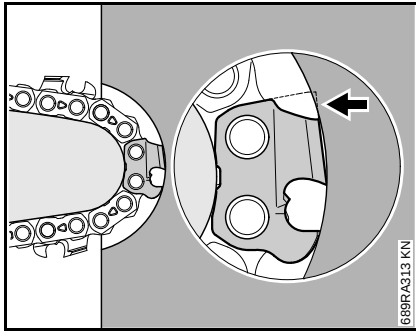
Special version with a very narrow profile and a very small nose radius. Owing to the small nose radius, only STIHL 1/4" RAPID™ Micro™ Spezial chain may be used on STIHL Carving guide bars.

Carving guide bars and 1/4" RAPID™ Micro™ Spezial

The small nose radius of the Carving bars enables fine details to be cut.



When working with the bar nose, the tail of the long top plate (arrow) on a standard chain causes the cutting edge to be lifted out of the cut. This increases the feed effort required for boring and cutting with the bar nose.



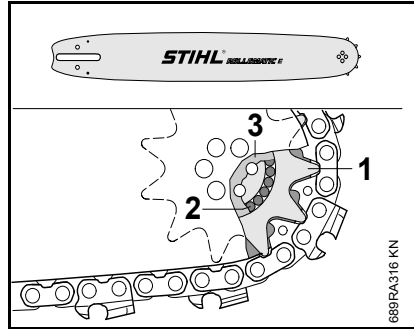
On the 1/4" RAPID™ Micro™ Spezial, the forward sloping tail of the top plate (arrow) does not make contact when cutting with the bar nose. The clearance between the cutter and kerf prevents the top plate snagging – the cutting edge is not pushed out of the cut.

- Reduced load on bar nose
- High plunge cutting speed
- Less feed effort for plunge cutting
- Smooth cutting with bar nose
- Low vibrations

Applications

Tree service, wood carving and woodworking

4.2.3 Rollomatic Guide Bars

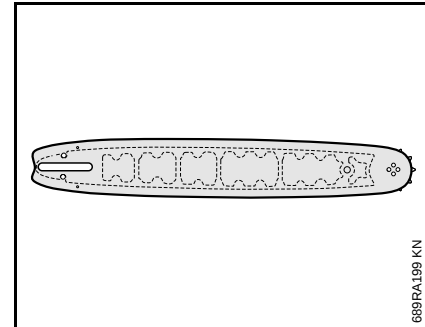


The main feature of Rollomatic bars is the nose sprocket (1). It is supported in a ring of cylindrical rollers (2). The nose sprocket carries the chain from one side of the bar to the other. Friction and wear on the bar nose are substantially reduced in comparison with a Duromatic guide bar (rolling friction instead of sliding friction). The nose sprocket bearing is protected from dust and dirt by thin sheet steel covers (3) at both sides and is maintenance-free. The chain oil that reaches the bearing from the bar groove provides sufficient lubrication, i.e. no special lubrication is necessary.

Assuming the same driving power, Rollomatic bars have a much higher cutting capacity than Duromatic bars. This increase in performance is most noticeable on lower powered chainsaws. The lower rate of frictional wear and higher cutting capacity also have a positive effect when limbing.

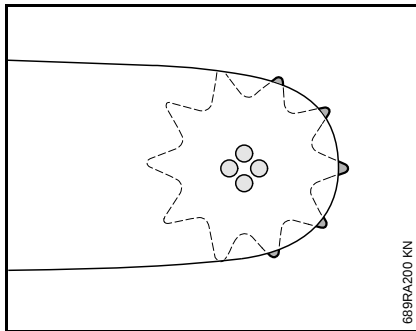
These benefits and the narrow contour make Rollomatic bars the ideal choice for limbing applications. Rollomatic guide bars are available in several versions to suit the different chainsaw power categories and operating requirements.

4.2.4 Rollomatic E



The blade of the Rollomatic E consists of three electrically welded steel plates (a center plate sandwiched between two side plates). The thickness and outer contour of the center plate produce the specified groove width and depth. Large areas of the center plate are punched out to save weight.

Compared to a solid-blade Duromatic bar, the Rollomatic E is much lighter and very strong. Guide bar rails are induction hardened and the nose sprocket is replaceable. The size of the nose sprocket is expressed as the number of teeth. The size of the bar nose (nose sprocket) has an effect on the cutting and kickback behavior of the guide bar. Rollomatic E guide bars are manufactured with a pitch of 3/8" and with two different sizes of nose sprockets (bar noses) to cover a wide range of applications:



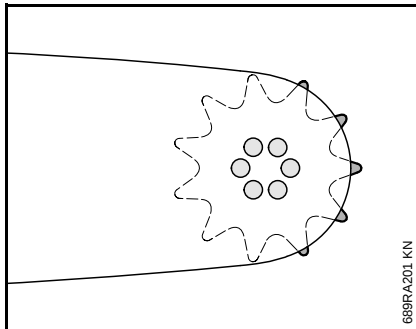
Narrow radius bar nose

(up to 10 teeth):

- Reduced kickback
- Average plunge cutting performance
- Sprocket bearing mounted with 4 rivets

Applications:

All around use in agriculture and construction industry, including small wood harvesting and limbing in the forestry industry on machines up to about 3.5 kW.



Wide radius bar nose

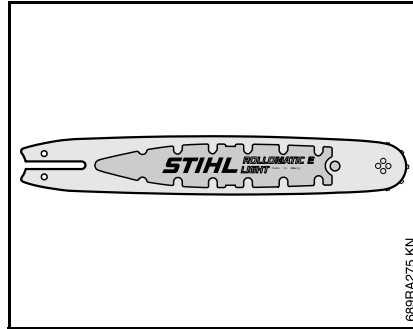
(11 or more teeth):

- Higher kickback tendency
- High plunge cutting performance
- Large sprocket bearing mounted with 6 rivets

Applications

Demanding professional use in logging and bucking on medium to high powered machines of more than 3.5 kW.

4.2.5 Rollomatic E Light



The body of the "Light" consists of three hollowed-out steel plates which are welded together. The cavities are filled with fiberglass-reinforced polyamide in an injection molding process.

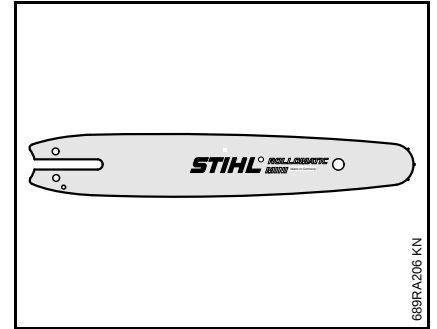
Compared to the Rollomatic Standard, the Rollomatic E Light weighs 30% less and offers good strength.

Guide bar rails are induction hardened and the nose sprocket is replaceable.

Applications:

Limbing and tree surgery.

4.2.6 Rollomatic E Mini

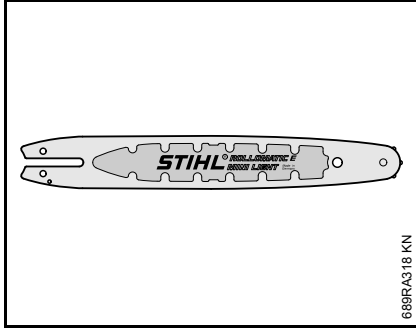


Special version of Rollomatic E with very slim profile and groove width of .043" (1.1 mm) exclusively designed for use with the PICCO™ Micro™ Mini chain.

Applications:

General purpose cutting on electric saws, gasoline saws and pole pruners up to 1.5 kW.

4.2.7 Rollomatic E Mini Light

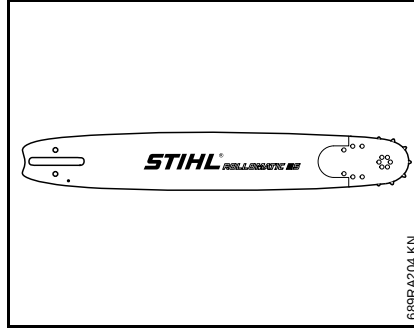


Special version of Rollomatic E Mini consisting of three hollowed-out steel plates which are welded together. The cavities are filled with fiberglass-reinforced polyamide in an injection molding process. Compared to conventional bars, the Rollomatic E Mini Light weighs up to 25% less and offers good strength.

Applications

General purpose cutting on electric saws, gasoline saws and pole pruners up to 1.5 kW.

4.2.8 Rollomatic ES

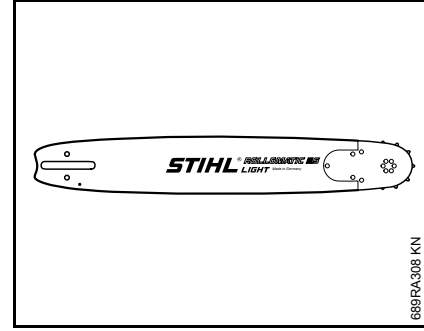


Like the Duromatic, the blade of the Rollomatic ES is made of tough, wear-resistant steel in a special laser cutting process. The nose sprocket is accommodated in a separate bar nose which is riveted to the bar body. Rollomatic ES bars combine the high strength and robustness of the Duromatic with the lower nose wear (rolling friction instead of sliding friction) of the Rollomatic bar. The bar nose is replaced in the case of nose sprocket wear.

Applications:

For very demanding professional felling and bucking operations on high powered saws.

4.2.9 Rollomatic ES Light



Like the Duromatic bar, the blade of the Rollomatic ES Light is made of tough, wear-resistant steel in a special laser cutting process. Large cavities and longitudinal ribs in the bar body make it up to 30% lighter than the Rollomatic E Super. The cavities are sealed with a cover plate in a special laser welding process. This ensure good strength and improved balance.

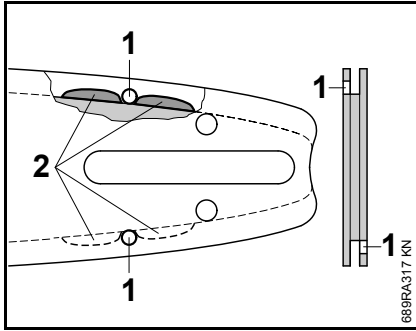
Applications

Professional usage in forestry, agriculture and construction industry.

4.3 Guide Bar Applications

Basic type	Version	Description	Applications
Duromatic	Duromatic E	– made from special tough and wear-resistant tool steel – single piece – laser cut – resilient (resistant to flexing and warping) – stellite-tipped bar nose	Heavy-duty professional felling and bucking operations
	Carving (special)	– special version – very narrow profile – very small nose radius	Carving projects, tree surgery
Rollomatic	Rollomatic E	– three welded steel plates – extremely low weight – induction hardened rails	All around use, felling and bucking operations
	Rollomatic E Light	– three hollowed out, welded steel plates – cavities filled with fiberglass-reinforced polyamide – induction hardened rails	Limbing, tree service
	Rollomatic E Mini	– special version of Rollomatic E – very narrow profile	All around use on machines up to 1.5 kW
	Rollomatic E Mini Light	– special version of Rollomatic E Mini – three hollowed out, welded steel plates – cavities filled with fiberglass-reinforced polyamide	Pole pruners, lightweight saws for harvesting small-sized timber
	Rollomatic ES	– made from special tough and wear-resistant tool steel – laser cut – roller sprocket in separate bar nose – resilient (resistant to flexing and warping) – induction hardened rails	Heavy-duty professional usage in forestry, agriculture and construction industry
	Rollomatic ES Light	– special version of Rollomatic ES – large-area cavities save weight	

4.4 STIHL Ematic Principle

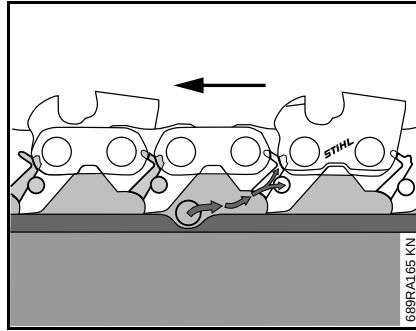


The distinguishing features on the guide bars are the oil inlet hole (1) drilled through one side of the bar rail and the ramp-like hump (2) in the groove at both sides of the bar tail – next to the oil inlet hole. The one-sided oil inlet hole prevents oil seeping between the guide bar and chain sprocket cover. The ramp ensures that the chain oil in the bar groove is transported with very little loss through the groove to the chain joints and bar rails as soon as the chain starts running.

The Ematic principle therefore makes more efficient use of the lubricating oil. The oil feed rate can be reduced to the amount actually needed at the chain joints. It is not necessary to increase oil flow to make up for waste. This minimizes environmental impact and reduces running costs.

Ematic S is a further development of the Ematic principle and is available on long guide bars. An elliptic oil inlet hole increases the flow speed of the chain oil and improves lubricating efficiency. This extends the wear life of the guide bar and saw chain.

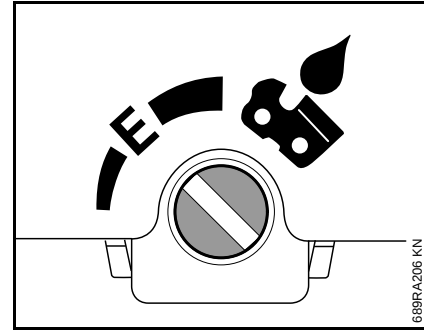
4.5 STIHL Ematic system



STIHL Ematic is a system designed to better utilize and help reduce the consumption of chain lubricating oil by up to 50%.

The STIHL Ematic system consists of the three components:

- STIHL OILOMATIC® chain on which the lubricating oil is fed directly to the chain joints.
- STIHL Ematic guide bars on which the chain lubricating oil is conveyed through the entire length of the bar groove with a minimum of loss.
- STIHL Ematic oil pumps. When an adjustable oil pump is used together with an STIHL OILOMATIC® chain and a STIHL Ematic guide bar its flow rate may be reduced as described in the instruction manual. Oil pumps with no manual control are preset at the factory for a reduced oil feed rate.



Adjustable oil pump set to Ematic

4.6 Maintenance

Guide bar wear is highest in the area where most of the cutting is done. That is normally the underside of the bar. On Duromatic bars, the bar nose is another highly stressed area.

Before mounting the guide bar and chain:

- Clean the oil inlet holes and the bar groove. The groove cleaner on the filing gauges is suitable for this purpose.
- Check the groove depth.
- Turn the guide bar over to ensure it wears as evenly as possible on both sides.

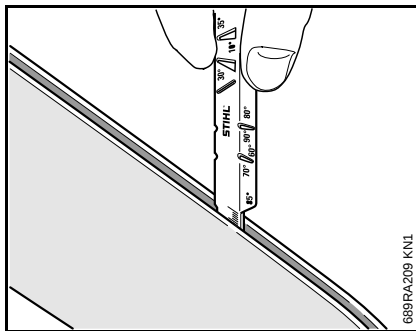
Groove depth

As the rails wear the bar groove becomes shallower. A minimum depth must be maintained in order to ensure that the drive link tangs do not scrape along the bottom of the groove:

Chain pitch	Minimum groove depth
1/4" P	4 mm
1/4"	4 mm
3/8" P	5 mm
.325"	6 mm
3/8"	6 mm
.404"	7 mm

The cutters and tie straps will not otherwise ride on the rails.

Checking groove depth



Rollomatic guide bars

Use the scale (groove cleaner) on a filing gauge to check the groove depth on the top and the bottom of the guide bar.

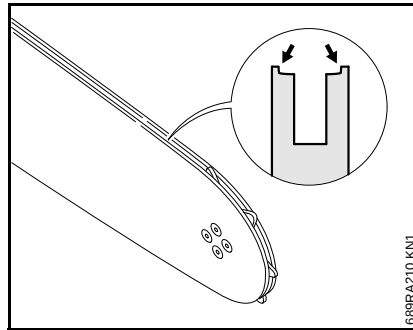
Duromatic guide bars

Use the scale (groove cleaner) on a filing gauge to check the groove depth over its entire length.

If the measured depth is less than specified, the guide bar must be replaced.

4.7 Repairing

4.7.1 Bar Rails, Removing Burrs

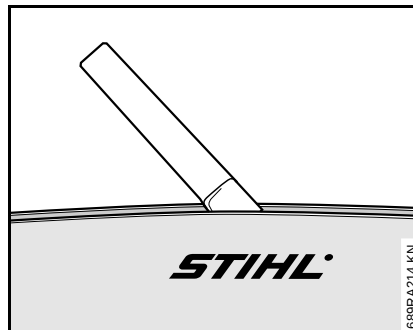


The bar rails wear and burrs form on their outside edges. Remove the burrs with a grinding wheel or a belt grinder, guide bar dresser or a sharpening file (flat or triangular)

A belt grinder with a stop is required to level bar rails that have worn unevenly, e.g. because of an incorrectly sharpened chain.

4.7.2 Opening the Groove

Recommended only for minor pinched areas of bar. Clamp the guide bar in a vise.

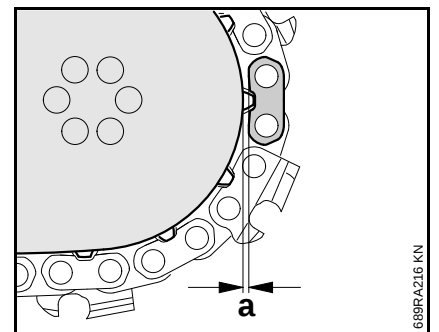


Insert a groove drift which matches the specified groove width in the groove at an angle of about 45° at a point where the width is still correct.

Use a hammer to knock the groove drift through the pinched portion of the groove.

Repeat this process several times until a chain with the correct drive link gauge and, on a Rollomatic bar, the right pitch can be pulled around the whole bar without resistance. Examine the whole bar for any signs of cracks, especially at the point of deformation. If any cracks are found, the guide bar must be replaced to avoid any risk of injury.

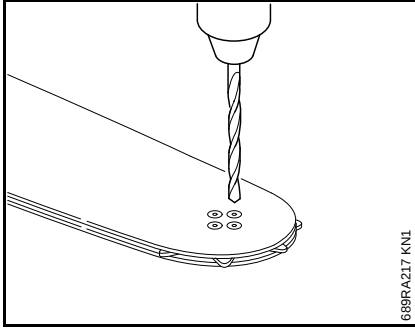
4.7.3 Replacing the Nose Sprocket



Replace the nose sprocket if:

- there is no clearance "a" between the chain and bar nose – teeth of nose sprocket are worn – or
- the roller bearing is damaged.

Removing



Drill away the heads of the rivets (use a twist drill with a diameter about 0.5 mm larger than the rivet head). Knock out the rivets with a punch. Pull out the nose sprocket with bearing from between the two side plates.

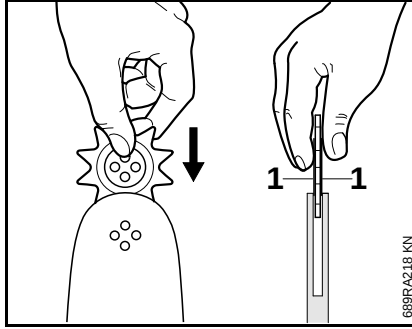
The complete sprocket assembly must be replaced to ensure troublefree operation.

Installing

Clamp the guide bar vertically in a vise.

Select the nose sprocket that matches the guide bar.

The roller bearing is covered with two Plexiglas discs which held in position by a clip. These Plexiglas discs simplify installation of the nose sprocket and prevent the bearing rollers dropping out.

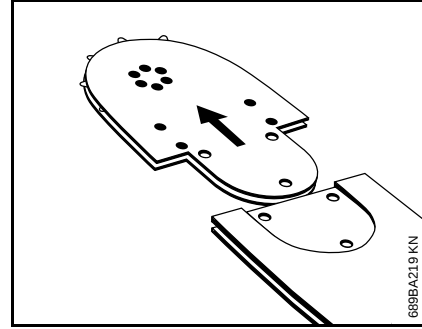


Remove the clip and carefully push the nose sprocket into the bar nose – making sure the two Plexiglas discs (1) are held together and cover the bearing. The Plexiglas discs are no longer required after the nose sprocket is installed. Line up the bearing race so that its holes line up with the holes in the bar nose. Fit the countersunk rivets and form the heads so they completely fill the hole recesses. Thoroughly lubricate the repaired guide bar before is used for cutting.

4.7.4 Replacing the Bar Nose

The complete nose can be replaced on Rollomatic ES guide bars with a riveted bar nose. This is necessary if the rails are chipped or cracked, or there is no clearance between the chain and bar nose – see "Replacing the Nose Sprocket" – or if the roller bearing is damaged.

Removing

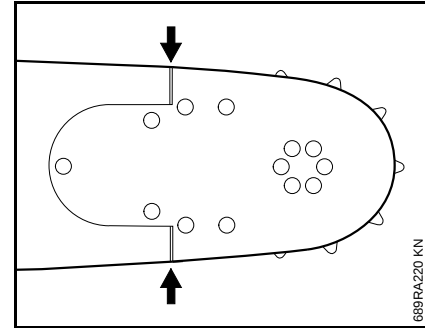


Drill away the heads of the rivets (use a twist drill with a diameter about 0.5 mm larger than the rivet head). Knock out the rivets with a punch and remove the bar nose.

Installing

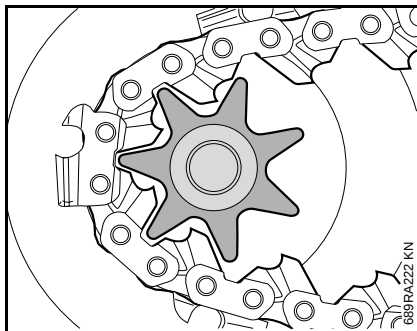
Select a bar nose that matches the guide bar and push it on to the guide bar.

Form the rivets as described above for the nose sprocket.



Check that the joints in the bar rails are the same height. If this is not the case, the projecting rails must be ground down, e.g. on a belt grinder, to obtain a level transition.

5. Chain Sprockets



The chain sprocket transmits the engine's torque to the saw chain. The teeth of the chain sprocket engage the rear flanks of the drive link tangs and thus drive the chain.

The number of teeth on the chain sprocket has a direct influence on the cutting power and the velocity of the saw chain:

Large number of teeth

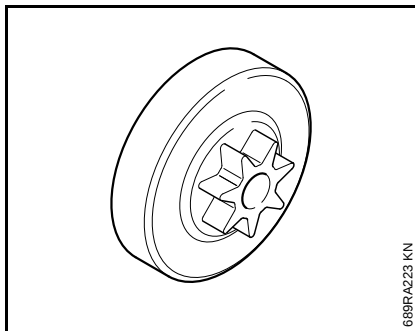
- Larger diameter
- Higher chain speed
- Less lugging power on saw chain
 - more sensitive to feed pressure
- Higher driving power required

Small number of teeth

- Smaller diameter
- Lower chain speed
- Higher lugging power on saw chain – less sensitive to feed pressure
- Lower driving power required

The diameter of the chain sprocket is exactly matched to the guide bar tail as this determines the angle of drive link run-in to the bar groove. For this reason only chain sprockets designed for a specific chainsaw model may be used in each case. The pitches of the chain sprocket, saw chain and the nose sprocket on Rollomatic bars must match.

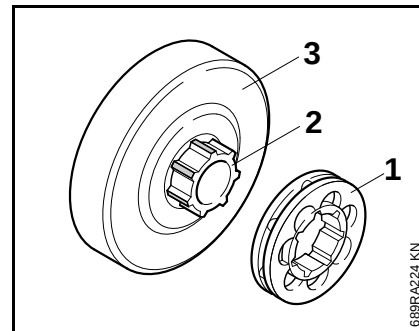
5.1 Spur Sprocket



This chain sprocket is made from a highly wear resistant star-section bar. On gasoline saws the spur sprocket is permanently attached to the clutch drum. On electric saws the chain sprocket is mounted separately on the output shaft.

The spur sprocket is usually standard equipment on chainsaws for occasional users, farmers and the construction industry. Country-specific variations are possible.

5.2 Rim Sprocket



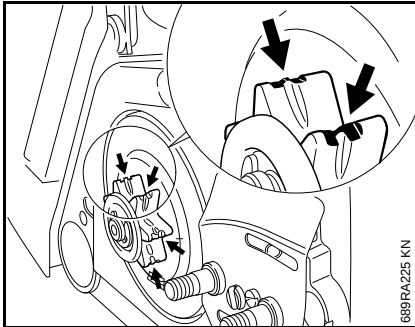
This rim sprocket (1) is made from sintered steel and is ring-shaped. The teeth are enclosed on both sides by a circular wall. The sprocket can move axially on the hub (2) of the clutch drum (3) and is positively located by means of splines.

The bottom faces of the chain links ride on the circumference of the rim and the side walls of the rim keep the chain in line.

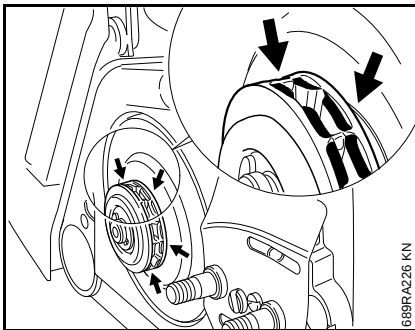
Most chainsaws for the forestry industry are equipped with a rim sprocket. Country-specific variations are possible.

5.3 Checking the Chain Sprocket

The drive link tangs dig into the flanks of the teeth and cause the chain sprocket and chain to wear.



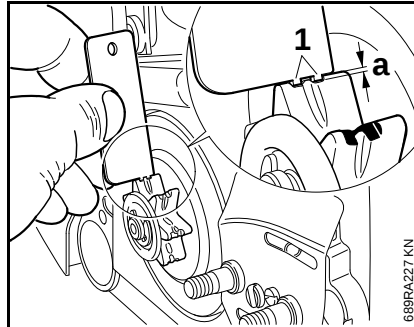
On the spur sprocket the tips of the teeth wear (arrows). This is caused by the bottoms of the cutters and tie straps.



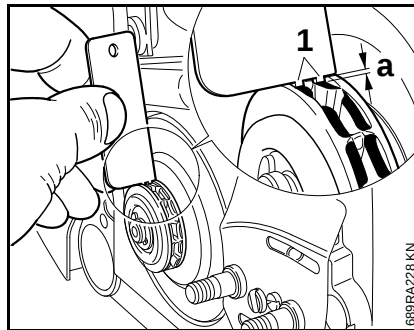
On the rim sprocket wear is primarily visible on the circumference (arrows), which is caused by the bottoms of the cutters and the tie straps.

Checking sprocket wear

Spur sprocket



Rim sprocket



Place the reference gauge 0000 893 4101 on the chain sprocket. The sprocket must be replaced if the wear marks are the same depth (0.5 mm) or deeper than the gauge lugs (1).

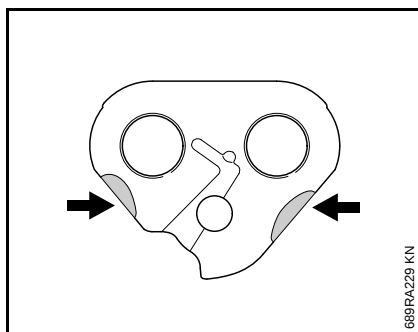
A chain sprocket will normally last the equivalent of two chains. The sprocket and saw chains should be broken in together and wear at the same rate. This avoids abnormal wear on the sprocket and chain. It is therefore advisable to always use two saw chains in rotation.

When fitting a new chain, always check the chain sprocket and replace it if necessary. A worn sprocket will quickly ruin a new chain.

6. Faults – Causes, Remedies

6.1 Saw Chain

6.1.1 Drive Links



Condition

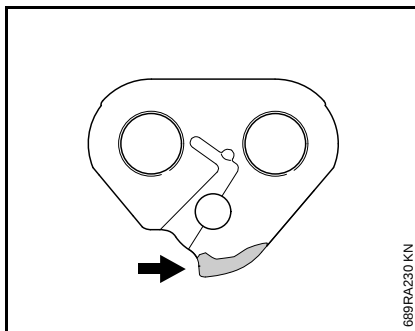
The fronts and backs of all drive links are peened.

Cause

- a) Insufficient chain tension.
- b) Sprocket pitch does not match chain pitch.
- c) New chain run on a worn sprocket.

Remedy

- a) Install new chain and tension it correctly.
- b) and c) Install a new chain and a new sprocket that matches the chain pitch and the saw.



Condition

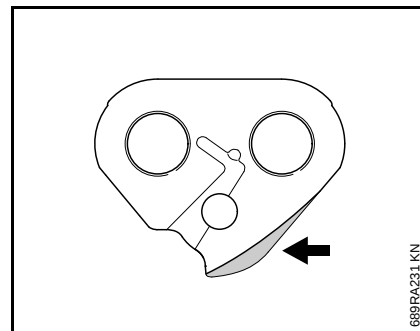
Battered and chipped tangs on several drive links in a row.

Cause

Loose chain has jumped off the bar or, if chain has broken, the links concerned have jammed in the sprocket.

Remedy

Install new chain or replace affected length of chain. Match new parts to other parts of chain. Tension chain properly.



Condition

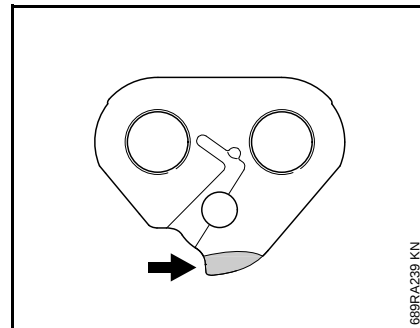
The backs of all drive link tangs are rounded.

Cause

As a result of excessive chain stretching (play in joints) the pitch no longer matches the sprocket – insufficient lubrication.

Remedy

Install new chain sprocket and new chain. Check chain lubrication and repair if necessary.



Condition

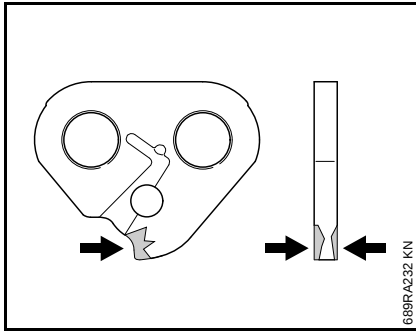
Rounded, concave bottom on all drive link tangs.

Cause

Groove too shallow at nose of Duromatic bar.

Remedy

Install a new guide bar.



Condition

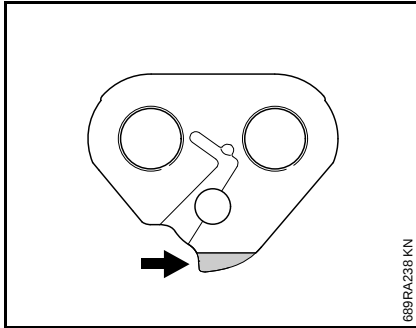
Nicks in both sides of several drive link tangs (not always in consecutive tangs).

Cause

Insufficient chain tension. Drive links jump out of the groove and snag at the bar nose or in the groove entry area.

Remedy

Tension chain properly. Check groove entry area on bar tail and restore funnel shape if necessary.



Condition

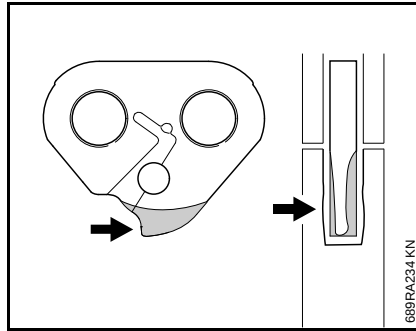
Tangs of all drive links flattened.

Cause

Bar groove too shallow.

Remedy

Install a new guide bar.



Condition

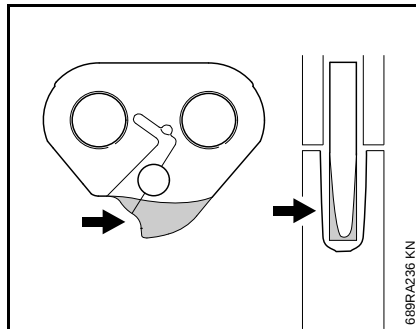
All drive link tangs worn unevenly at one side.

Cause

Cutters on one side of the chain incorrectly sharpened (angles, cutter lengths, depth gauges).

Remedy

Resharpen chain correctly. If this has caused excessive groove wear, replace the guide bar.



Condition

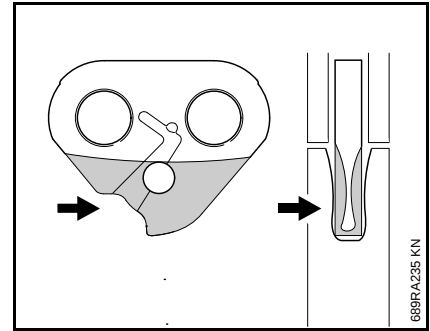
Sides of all drive link tangs worn and points rounded.

Cause

Chain wobble in bar groove because groove is worn or spread.

Remedy

Replace the guide bar.



Condition

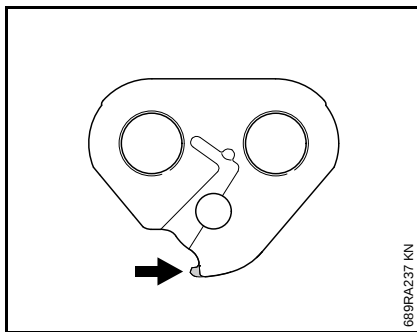
All drive link tangs worn to "hourglass" shape.

Cause

Chain wobble in bar groove because of unevenly sharpened cutters (angles, lengths, depth gauges) in an irregular pattern on both sides of chain.

Remedy

Resharpen chain correctly. If this has caused excessive groove wear, replace the guide bar.



Condition

Points of all drive link tangs battered.

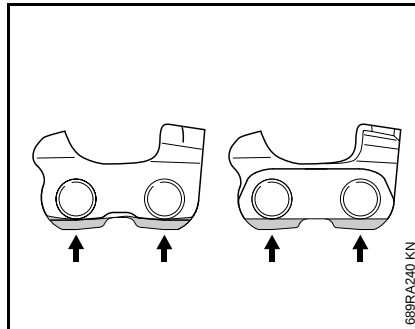
Cause

Drive links bottoming in sprocket. This is brought about by excessive wear on tooth tips through chatter of loose chain.

Remedy

Install new chain sprocket and new chain. Tension chain properly.

6.1.2 Cutters and Tie Straps



Condition

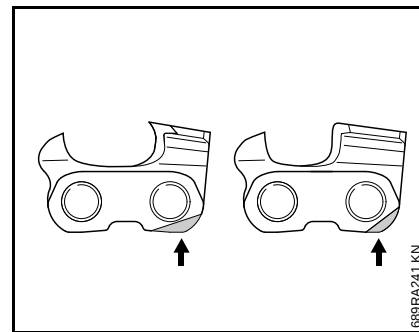
Uniform wear on all cutters as far as wear marks and opposing tie straps.

Cause

Normal cutting with correctly sharpened and tensioned chain and properly functioning chain lubrication.

Remedy

Install a new chain.



Condition

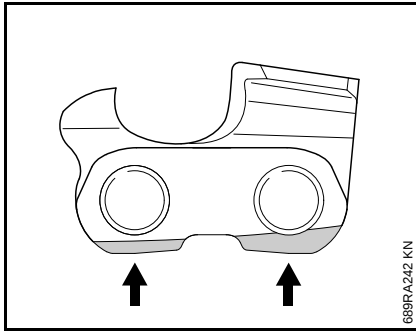
Excessive wear on all cutters and opposing tie straps under the rear rivets (usually accompanied by frequent breaking of drive links)

Cause

a) Backward sloping side plate (side plate angle too wide).
 a) Forward sloping side plate (side plate angle too small).
 c) Depth gauge setting too low.
 d) Dull cutters.
 e) Chain too loose.
 In all cases the cutters tend to sit up at the front.

Remedy

a), b) and d) Sharpen all cutters correctly.
 c) File back all cutters until specified depth gauge setting is obtained.
 e) Tension chain properly.



Condition

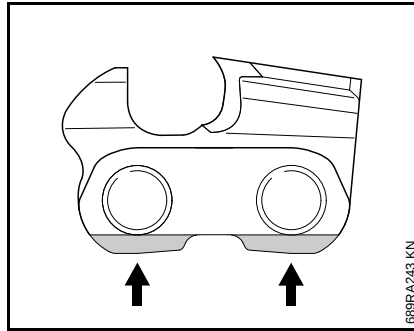
Bottoms worn at an angle (from front to rear) on all cutters and opposing tie straps.

Cause

a) Insufficient chain tension. Excessive pressure has been applied to make dull cutters and/or cutting edges with over-wide side plate angle cut.

Remedy

Install new chain and tension it correctly.



Condition

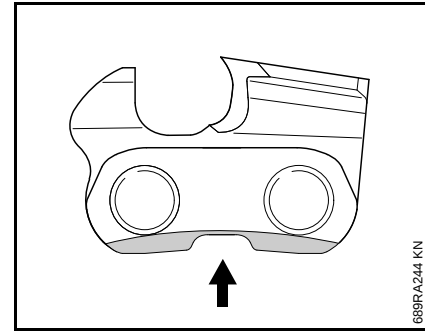
Excessive wear on bottoms of all cutters and tie straps although cutting edges are only slightly worn.

Cause

a) Chain running dry (lack of lubricating oil).
b) Excessive pressure applied to make dull chain with high depth gauges cut.

Remedy

a) Check chain lubrication and repair if necessary.
b) Sharpen chain correctly, rework depth gauges.



Condition

Concave wear on bottom of all cutters and tie straps.

Cause

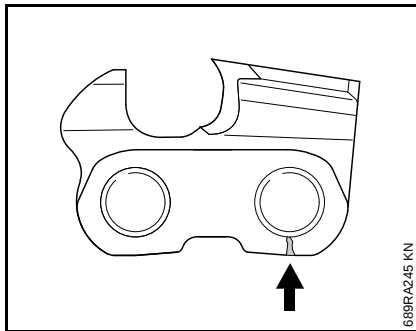
Chain over-tensioned and is also running dry (lack of lubricating oil). If cutting is continued under these conditions the chain will overheat and result in cracked tie straps.

Remedy

Tension chain properly, check chain lubrication and repair if necessary.

Note

This condition occurs mostly with Duromatic type bars.



Condition

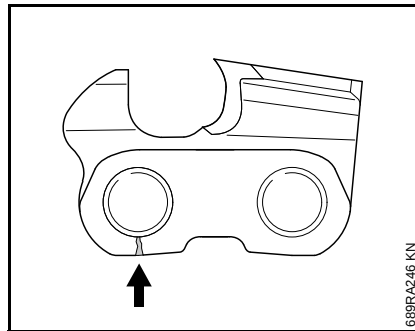
Cracks only under the rear rivet hole of a few or all cutters and opposing tie straps.

Cause

- a) Dull cutters.
- b) Backward sloping side plate (side plate angle too wide).
- c) Forward sloping side plate (side plate angle too small).
- d) Depth gauge setting too low.
- e) Excessive pressure applied to make a chain cut in case a) and b).

Remedy

Install a new chain.



Condition

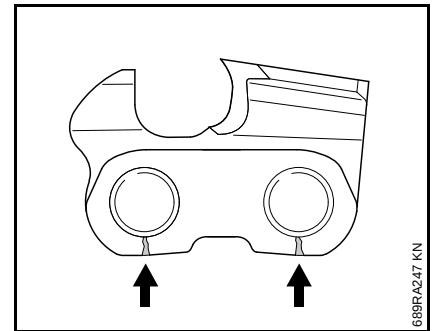
Cracks only under the front rivet hole of a few or all cutters and opposing tie straps.

Cause

Depth gauge setting too high and excessive pressure being applied to make chain cut.

Remedy

Install a new chain.



Condition

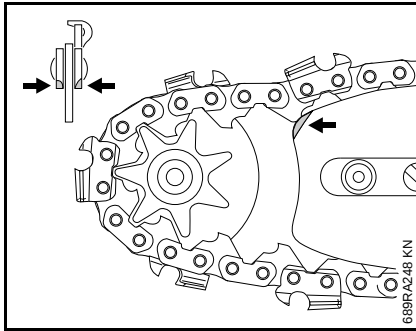
Cracks under both rivet holes of a few or all cutters and tie straps.

Cause

- a) Dull cutters.
- b) Backward sloping side plate (side plate angle too wide).
- c) Forward sloping side plate (side plate angle too small).
- d) Incorrect depth gauge setting.
- e) Overtensioned chain; occurs primarily at very low outside temperatures.

Remedy

Install a new chain.



Condition

Peened or chipped front corners on all cutters and tie straps.

Cause

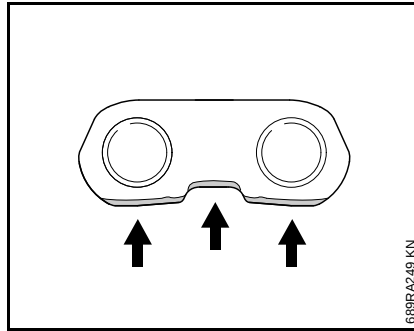
- a) Chain sprocket is too small.
 - b) Chain tension too loose.
 - c) Bar groove is too wide at the point of chain entry.
- In all cases the chain hits the bar groove entry area.

Remedy

- a) Install a chain sprocket which matches the guide bar.
- b) Tension chain properly.
- c) Replace the guide bar.

Note

If this damage has caused chain joints to become stiff, install a new chain.



Condition

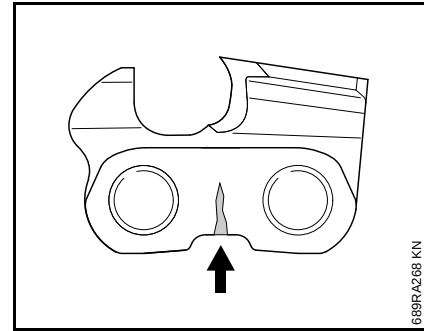
Notch peened on all cutters and tie straps, also accompanied by excessive burrs on bottoms of these chain links, and on bar rails.

Cause

- a) Chain knocks and vibrates as a result of too loosely tensioned chain or unevenly sharpened cutters (angles, lengths).
- b) New chain has been run on either a worn sprocket with deep scores or one of the wrong pitch

Remedy

- a) Sharpen and tension chain correctly.
- b) Install new chain, chain sprocket and guide bar.



Condition

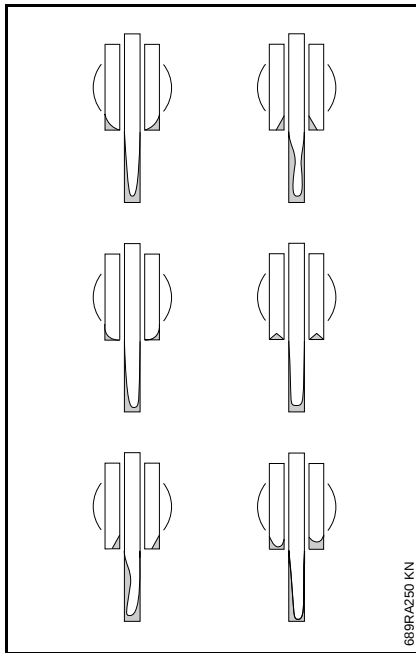
Cracks in center of several tie straps opposite cutters.

Cause

Chain has been run on a worn spur sprocket. Insufficient chain tension.

Remedy

This chain is unserviceable; install a new chain, chain sprocket and guide bar. If only one of these parts is replaced, it will be quickly worn again by the other defective parts.



Condition

Typical wear patterns on running faces of cutters, tie straps and drive links.

Excessive wear on guide bar and chain sprocket.

Result

Chain runs roughly, sticks and does not cut straight. Excessive feed pressure is necessary.

Cause

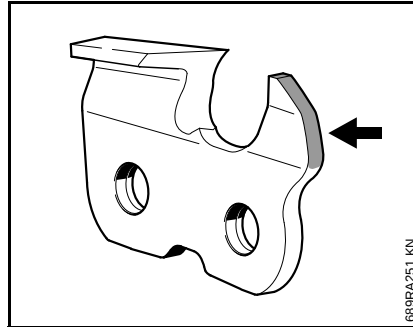
Chain dull or unevenly sharpened (filing angle, side plate angle, cutter length, depth gauges) and/or guide bar not properly maintained (burrs, groove depth). Chain therefore wobbles in bar groove or runs at an angle.

Remedy

Install new chain sprocket, guide bar and chain. If only one of these parts is replaced, it will be quickly worn again by the other defective parts.

6.1.3 Depth Gauges

Only the primary effects are listed under "Condition". Secondary effects (damage) are found under "Cutters and Tie Straps".



Appearance

Whole depth gauge has shiny surface.

Condition

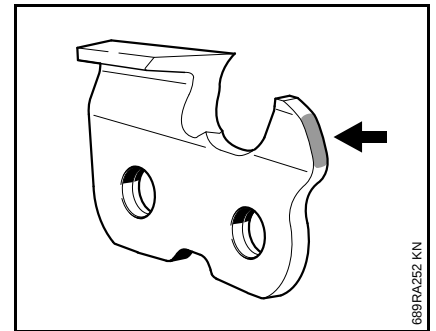
Chain must be forced to cut by applying high pressure. Poor cutting performance.

Cause

Depth gauges are too high.

Remedy

Lower depth gauges to specified setting.



Appearance

Only front area of depth gauge is shiny or worn.

Condition

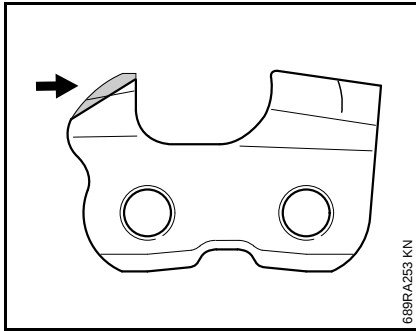
Chain runs roughly and snags. Noticeable loss of power.

Cause

Depth gauges are too low. Insufficient chain tension.

Remedy

File back cutters until specified depth gauge setting is obtained. Tension chain properly.



Appearance

Depth gauge is too steep (pointed).

Condition

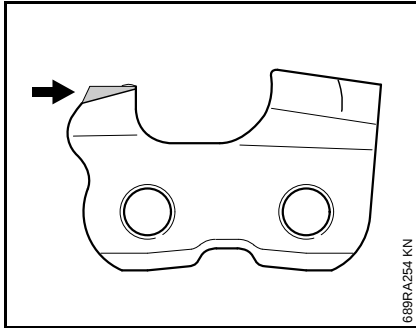
Depth gauge buries itself in wood, thus reducing cutting performance.

Cause

Depth gauge not properly filed.

Remedy

Restore correct shape. Also file back the cutters. If the cutters are already very short, install a new chain.



Appearance

Front edge is blunt, not sloped.

Condition

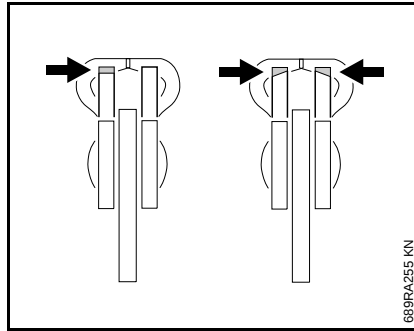
Chain runs roughly.

Cause

Depth gauge not properly filed.

Remedy

Restore correct shape.



Appearance

Depth gauge heights are uneven or not square.

Condition

Chain runs roughly.

Cause

Depth gauge not properly filed.

Remedy

Restore correct shape. Also file back the cutters. If the cutters are already very short, install a new chain.

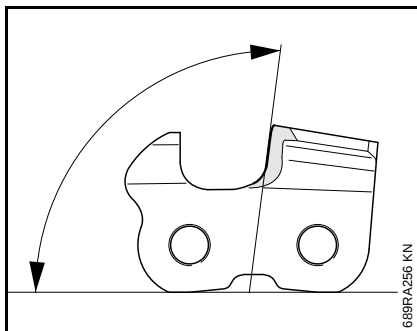
6.1.4 Incorrect Sharpening Angles

There are a number of reasons for incorrect sharpening angles:

- wrong file diameter
- wrong file holder
- incorrect filing
- incorrect adjustment of sharpener or filing tool
- incorrectly dressed grinding wheels

Only the primary effects are listed under "Condition". Secondary effects (damage) are found under "Cutters and Tie Straps".

If incorrect sharpening angles occur on only one side of the chain (along its whole length), the chain will wander in the cut. The same happens if the chain is dull on one side.

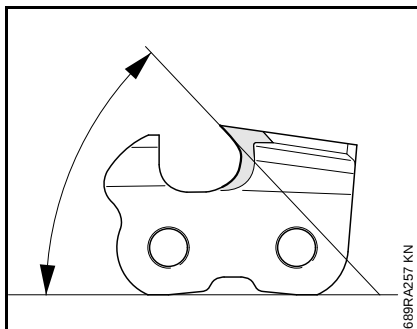


Appearance

Backslope on side plate cutting edge (side plate angle too wide).

Condition

Chain must be forced to cut by applying high pressure. Poor cutting performance and high rate of wear on chain and guide bar.

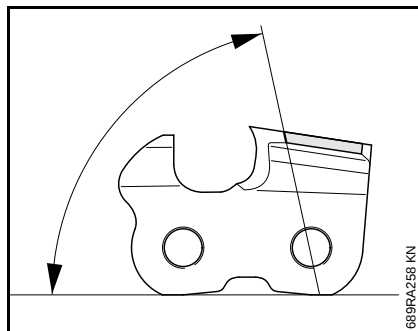


Appearance

Hook in side plate cutting edge (side plate angle too acute).

Condition

Cutters bite too deeply into wood, snag and stick. Chain snatches and breaks in cut, has short life and an increased tendency to kick back.

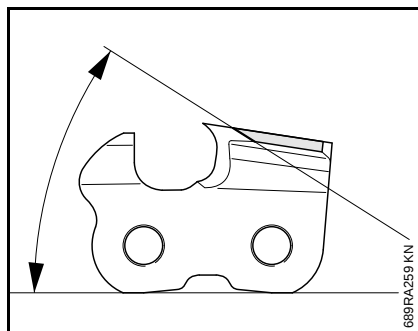


Appearance

Blunt top plate cutting angle.

Condition

This chain produces very poor cutting results – if it cuts at all – and is very difficult to feed into wood.

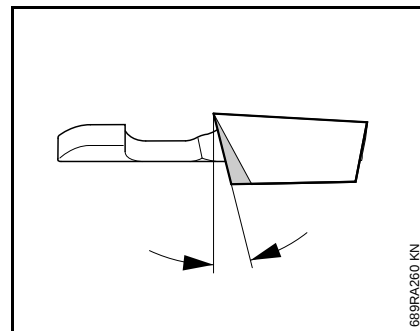


Appearance

Top plate cutting angle too acute.

Condition

This chain has a short edge life because the top plate cutting edges are weak and quickly dull.

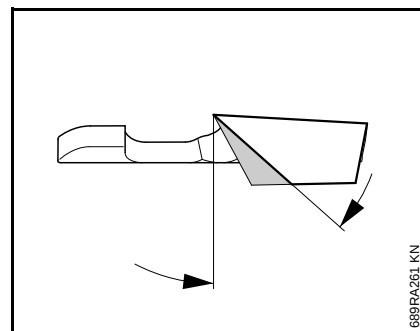


Appearance

Top plate filing angle less than 25°, produces blunt side plate cutting edge.

Condition

Bucking performance not ideal. Chain runs roughly.



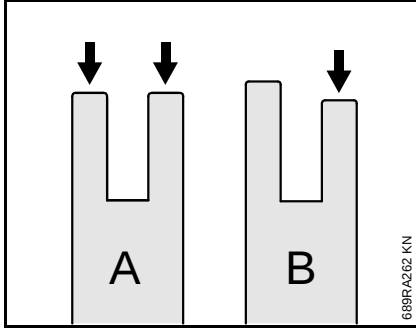
Appearance

Top plate filing angle more than 35°, produces pointed side plate cutting edge.

Condition

Bucking performance not ideal. Chain runs roughly. Short edge life. Side plate cutting edges are too thin and dull quickly.

6.2 Guide Bars



Appearance

- A) Evenly worn bar rails – minimum depth has been reached.
- B) Unevenly worn bar rails.

Condition

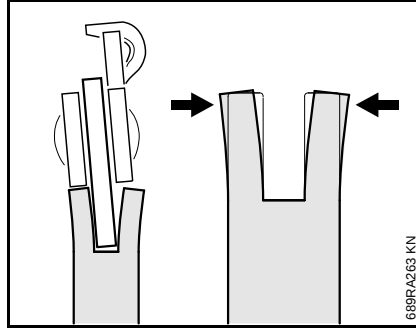
- B) Chain tips to one side and does not cut straight.

Cause

- A) Normal wear.
- B) Incorrectly sharpened chain.

Remedy

- A) Install new chain sprocket, guide bar and chain. If only one of these parts is replaced, it will be quickly worn again by the other defective parts.
 - B) Level the bar rails and sharpen the chain properly.
- If minimum groove depth cannot be maintained, replace the cutting attachment.



Appearance

Splayed bar rails (groove spread).

Condition

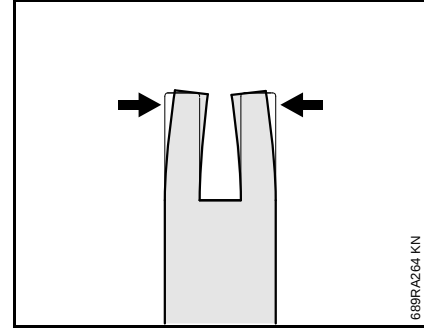
Chain wobbles in the bar groove and does not cut straight. Bottoms of cutters and tie straps wear quickly.

Cause

Force has been used, e.g. during wedging.

Remedy

Replace the guide bar.



Appearance

Pinched bar groove.

Condition

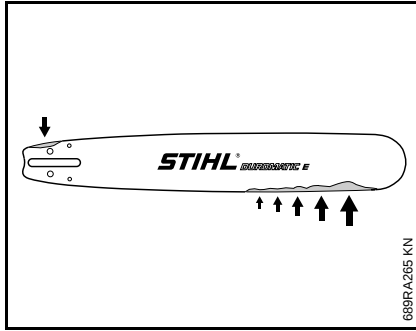
Chain jams.

Cause

Force has been used, e.g. when cutting attachment is pinched in the cut.

Remedy

Open up the bar groove and examine the whole bar for any signs of cracks, especially at the point of deformation. If any cracks are found, replace the guide bar.



Appearance

Bar rails battered at top in entry area and at bottom behind nose; underside of bar rippled.

Condition

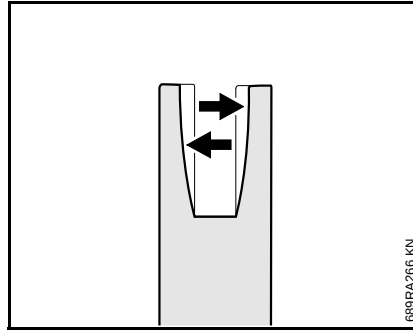
Chain runs roughly. Using a guide bar in this state will cause it and the chain to wear very quickly.

Cause

Chain tensioned too loosely for extended period.

Remedy

Level the bar rails. If damage is too advanced, install a new cutting attachment (chain sprocket, guide bar, chain). If only one of these parts is replaced, it will be quickly worn again by the other defective parts.



Appearance

Bar groove worn funnel-shaped.

Condition

Chain wobbles in the bar groove and does not cut straight. Wear on running faces of cutters and tie straps.

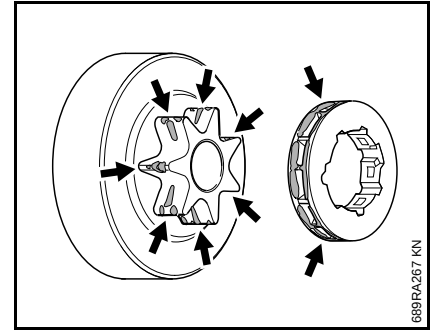
Cause

Normal wear

Remedy

Install new chain sprocket, guide bar and chain. If only one of these parts is replaced, it will be quickly worn again by the other defective parts.

6.3 Chain Sprockets



Appearance

Excessive wear on teeth or circumference.

Cause

Apart from normal wear (about the life of two chains), chain knock and wobble causes premature wear on the tips of the teeth. Excessive chain stretching or incorrect pitch cause severe scoring of the tooth flanks or the circumference of rim sprockets.

Remedy

Install a new sprocket of the correct pitch.



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