



NORDIC SKI PREPARATION

RACING 2010-2011

SWIX TRIAC®

Your winning margin in every detail!

Swix has reinvented the XC ski pole and created the next generation of ski poles: Swix Triac®!

The Swix Triac® 1.0 is built with the most advanced materials and technology available today. Starting from scratch, we have utilized both internal and external resources; Swix racing service, world cup athletes, university research teams, and our own engineering department to develop the world's finest ski pole. Every detail has been thoroughly reviewed and tested before being placed into production.

When only the very best will do, there is no room for compromise.

For more information, visit www.swixtriac.com

FACTS

HANDLE

- Lightweight and proven geometri in World Cup
- Improved fixation and adjustments
- Perfect control

FACTS

STRAP

- Optimized thumb/palm support
- Easy to adjust
- Less energy loss

FACTS

BASKET

- Interchangeable baskets for different snow conditions
- Lightweight
- Mechanical 3D/triple locking fixation systems (patent pending)

FACTS

SHAFT

- High stiffness and strength
- Super lightweight
- Ultimate pendulum

SWIX Triac®

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COVER:
Petter Northug and
Øystein Pettersen
Photo: Nordic Focus



Aker is the main sponsor of
Petter Northug and Øystein
Pettersen the Norwegian
Cross Country Team.

With this manual it is the objective to present the most up to date waxing methods based upon the feed back from our World Cup Service Teams.

For more information about Swix products please visit us web pages www.swixsport.com and www.swixschool.com.

FACTORS INFLUENCING WAXING

The purpose of waxing is either to create friction, or grip, in the case of kick wax, or to reduce it as with glide wax. The intention with the waxing process is to make the ski base as compatible as possible with the features of the snow surface. However, the snow conditions change with time and temperature. Even when temperatures remain below freezing, time (hours and days) will progressively deform sharp, classic snow crystals into more rounded forms. We call this transformed snow. The higher the temperature, the faster the transformation will proceed.

Water also plays a significant role. Water molecules surround snow crystals as thin water films even when temperatures are below the freezing point. Above freezing, water plays a greater role as free water mixes with the snow pack. The distribution of water and ice will influence friction and abrasiveness. Therefore modern Swix waxes take into consideration many factors in their formulation and composition. The result is different waxes for different conditions. In this chapter Swix will guide you through the main features of snow and friction to make the choice of the proper ski wax easier.

Temperature

Taking a reading of the air temperature in the shade is the first basic starting point for wax selection.

This should be done at several points along the course. Snow temperature at the surface can also be helpful. But remember that once the temperature reaches the freezing point (0°C or 32°F), snow will remain at that temperature regardless of rising air temperature. At this point it is best to use air temperatures and focus on the proper steps for dealing with the increased water content of the snow.

Humidity

Humidity is important, but more as a local climate trend rather than a need to measure every percentile. It is important to know if the competition is taking place in a dry climate, meaning average humidity below 50%; a normal climate of 50% to 80%, or a high humidity climate 80% to 100%. Beyond this, of course, is adjusting to the situation of falling precipitation.

Snow Granulation

The appearance of the snow crystal and consequent snow surface is important for wax selection. Falling, or very fresh new fallen snow is the most critical situation for waxing. The sharp crystals require a wax that will resist snow crystal penetration, but at warmer temperatures must also have the ability to repel water. It is in this special, critical waxing situation that Cera F excels.

Man-made snow is today common racing situations. Freshly made snow at cold temperature definitely require the addition of synthetic paraffin such as with CH4, LF4, HF4, HF4BW and CH6, LF6, HF6 and HF6BW. After man-made snow has "settled" for some days and the surrounding atmosphere has affected the snow surface, the gliding characteristics of the snow improve and normal waxing considerations return.

At rising air temperatures above 0°C (32°F) the snow temperature still remains at 0°C (32°F). The water surrounding the snow crystals increases until the snow pack becomes saturated with water. Waxes that are highly water repellent and coarse base structures are needed.

Snow friction

The friction on ice and snow is a mixed friction. It means that it is neither a true dry friction nor

a true fluid friction. The contact is partly dry, partly wet. At very low temperatures the frictional mechanisms gradually might be described by laws governing dry friction.

At intermediate freezing temperatures, around -4°C to -10°C (25°F to 14°F), the water film between the frictional partners has the optimal thickness to create low kinetic friction.

Approaching the freezing point, the water film increases in thickness, and when conditions for melting is present, free water enters the system.

The contact area between ski and snow increases and the friction will increase. Suction gradually builds up as the amount of water increases.

Swix Snow Classification System

Swix has introduced a simple classification system for snow identification. The symbols are created to help skiers find the best wax for actual conditions.

Group 1.

Falling and new fallen snow characterized by relatively sharp crystals, demanding relatively hard ski wax.

Group 2.

An intermediate transformation stage, characterized by grains no longer possible to identify as the original snow-crystal shape; often called "fine-grained" snow in ski-wax terminology.

Group 3.

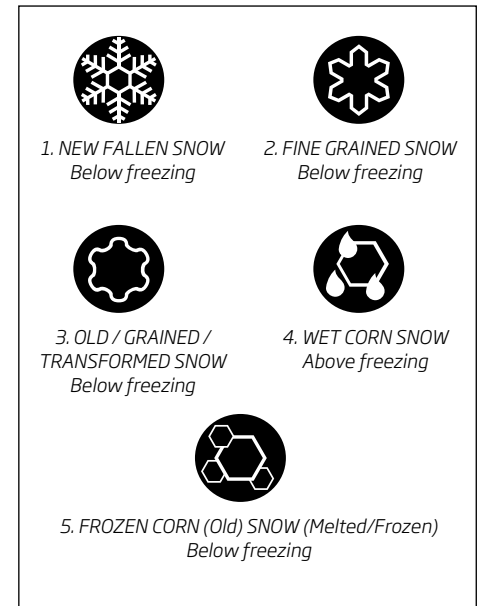
The final stage of transformation. Uniform, rounded, bonded grains characterize the snow surface. Also called "old" snow.

Group 4.

Wet snow. If snow-grains belonging to group 1, 2 or 3 are exposed to warm weather, the result is wet snow.

Group 5.

Frozen or refrozen. When wet snow freezes it is identified as group 5, characterized by large grains with frozen melt water in between. The snow surface is hard and icy, normally requiring a klister as kick wax.



BASE STRUCTURES AND SWIX RILLING / IMPRINT TOOLS

Structure is a term used to describe patterns cut into the base to reduce base contact on the snow and to release surface tension from water films caused by base friction. These structure patterns are most often produced by stone grinding machines at the factory during production or by shops that specialize in the stone grinding process. It is also possible to produce structures using hand tools.

For a period of time there was much experimentation and testing of many types of patterns in order to find the best structure for different snow types. The search with different stone grinders, different structure depths, widths, and patterns, all aiming to find "the ultimate structure", was overwhelming. Recently however, the development showed signs of simplification. Now service technicians agree more that snow types can be classified in more general terms to which more certain structure patterns can be matched. An appropriate structure is still of absolute importance, but it is applied with a set of basic principles in mind. The result is that variations in machine set structures are fewer and standardized. The tendency to "simplify" variations in stone grinding can allow for a more accurate comparison of other significant factors such as skis and waxes, and in theory it is possible to travel with fewer pairs of skis.

Last but not least, structures made by hand on top of structures produced by machine have proven to give outstanding results. Manually set structures in combination with stone grinding can match the day's conditions more accurately and therefore enhance the effectiveness of a basic stone ground base.

There is an important difference between structures produced by machine and those produced by hand. Stone ground structures are cut into the base, and are more permanent in nature. Hand structures use "imprint" tools that press the structure into the base, and consequently are temporary.

Swix imprint tools have the advantage of being easy and quick to use while at the same time offer the most adaptability of adjusting the structure to match the snow type. During the process of rewaxing the heat from the iron will cause the pattern to leave the base while keeping the stone ground pattern intact. In this way the base is ready once again for the next hand produced structure treatment and it is possible to apply the perfectly matching structure according to the conditions of the day.

Although there are variations in the patterns applied, structures can be classified into "fine", "medium-fine", "medium-coarse" and "coarse" structures. The most frequently used structures in World Cup are "fine" and "medium-fine". For classic races more coarse structures are used as well. The difference between classic and skating is related to more varying conditions in a skating coarse than in a classic track. Also the factor of "feeling" that has to do with the resistance when "pushing" the ski forward is significant in skating, but less in classic. The "free feeling" can be lost, especially when skating uphill, when the structure is too coarse.

Four Different Grades of Stone Grinding

The Norwegian XC-team has introduced a color coding system to select corresponding skis and structure of the glide zone:

Green (-5°C and colder):	Fine
Blue (0°C to -5°C):	Medium/Fine
White (0°C to +3°C - moist):	Medium/Coarse
Red (+1°C to +10°C - wet):	Coarse

It is normal to apply two or more labels on the skis. At the tip the colored labels (one or two) indicate actual snow condition range for the actual pair, i.e. green and blue. In front of the binding there is only one label, i.e. green, to indicate existing structure. For optimal performance of this pair in "blue" snow conditions, it is therefore necessary to run a hand-made structure to transform "Fine" to "Medium / Fine". In this way, good skis might be utilized in more snow conditions. In addition, the number of skis taken to races is perhaps reduced.

In free-technique (skating) the coarse structure is seldom used. Consequently, a free-technique ski for wet, coarse-grained snow often has a red label on the tip and a white label in front of the binding.

Fine structures:

Fine structures are mainly used on new snow and fine grained snow. For skating; fine structures are normally used from 0°C (32°F) and colder, for classic; -5°C (23°F) and colder. Sharp crystals (present in dry new/fine snow) and a sharp structure is not optimal. A newly set (fresh) structure will in general give a "sharp" structure. In dry, cold, new and fine snow conditions (usually lower than -7°C (19°F)), the fine "sharp" structure should be "rounded" with Fibertex T264 (or a plexi scraper). Though, this process is normally more important for skating than for classic skiing. On the other hand, in new snow with high humidity close to 0°C (32°F) the structure should preferably be sharper.

Medium/Fine structures:

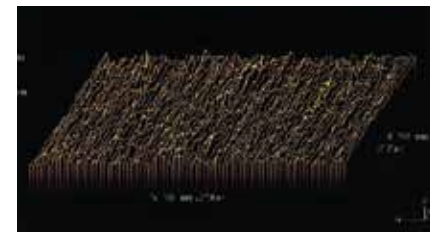
This structure is a widely used structure. For skating it is used in most snow conditions normally from -7°C (19°F) up to wet snow. In very wet conditions a medium/fine structure combined with the use of an imprint tool has proven good results.

For classic skiing we recommend this structure in new and fine grained snow (normally between -7°C (19°F) and 0°C (32°F)).

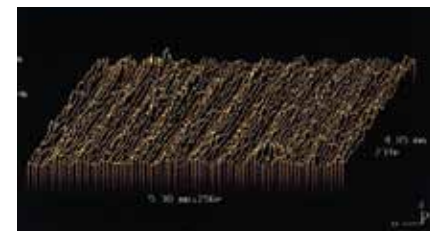
STRUCTURE EXAMPLES



FINE



MEDIUM/FINE



COARSE

Medium/Coarse structures:

Mainly for classic skiing on coarse moist snow and wet, glazy new snow between 0°C (32°F) and +3°C (37°F), a medium/coarse structure is preferred.

This structure is also used sometimes in free technique (skating) on wet, coarse-grained snow. In this case, most racers would prefer to adjust a medium structure towards a more coarse structure by using a manual tool. Reference the table below for specific recommendations.

Coarse structures:

This structure is rarely used in skating. For classic skiing it is used on coarse wet snow.

Note!

In general, it is better to use a somewhat finer structure than a structure too coarse.

Improving Stone Ground Skis by using Swix Imprint Tools

The following chapter describes how to improve and adjust standard stone-ground skis to actual snow conditions by using manual structure tools. Swix manual structure tools can be used on all basic stone-ground structures. We then have the possibility to adjust less number of skis to actual conditions. This is convenient for all racers from World Cup to citizen racers. All Swix structure tools have rollers which imprint the structure, except the simple rilling tool T0401 which has treaded steel producing the pattern.

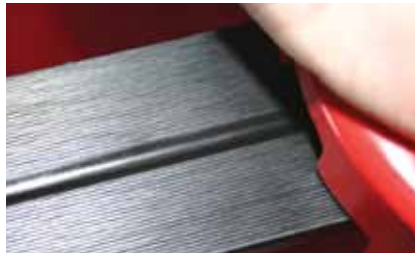
Swix «Super Riller» Structure Tool T0401

Swix Super Riller is used in combination with stone-grinding, normally after scraping, brushing of glidewax and Cera F powder.

T0401 is delivered with standard 0.75 mm structure steel. The 0.75 mm steel, and certainly the 1.00 mm steel, are frequently used as a "booster" by World Cup servicemen. See table for details.



SWIX SUPER RILLER (T0401)
with Medium 0.75 mm blade.



The range of optional blades for the T0401:

Fine	0.5 mm
Medium	0.75 mm
Coarse	1.0 mm
X Coarse	2.0 mm

Swix World Cup Imprint Tool Set T0405

The Swix World Cup Imprint Tool T0405 is a hand crafted, high quality tool. It comes with imprint rollers manufactured in a very high steel quality undergoing advanced production processes.

The T0405 creates structure in a different way than other imprint tools by pressing the most accurate yet shallow base structure in the market. Structure is applied in a rolling movement. The steel rollers have a cross-hatch (fishbone) structure for the optimal result.

Due to high production cost, the T0405 has been mostly used at top racing levels, but Swix expects its advantages to be recognized by club teams, colleges, specialty tune-up shops, and dedicated World Loppet skiers. See chart on page 11.

Swix T0405 is delivered with two imprint rollers:

FINE 0.3 mm:

To be used in new, fine grained and coarse snow from -12°C to -5°C (10°F to 23°F).

MEDIUM 0.5 mm:

To be used in new, fine grained, coarse, and icy snow from -5°C to +1°C (23°F to 34°F).

In addition we have:

MEDIUM 0.75 mm:

To be used in fine grained and coarse grained snow from -1°C to +3°C (30°F to 37°F).

COARSE 1.0 mm:

To be used in wet- and very wet-, coarse snow. From 0°C to +20°C (32°F to 68°F).



STRUCTURE TOOL SET (T0405)
Steel, with two Fishbone structures,
0.3 mm and 0.5 mm.
For Racing Service and Team use.



1 mm

Swix Structure Tool T0406

T0406 is the new World Cup tool with imprint rollers running in the speed direction. The tool is delivered with the following four rollers to be inserted for selected structure combinations.

Linear structure:

T0406075G 0.75 mm
T0406100G 1.0 mm

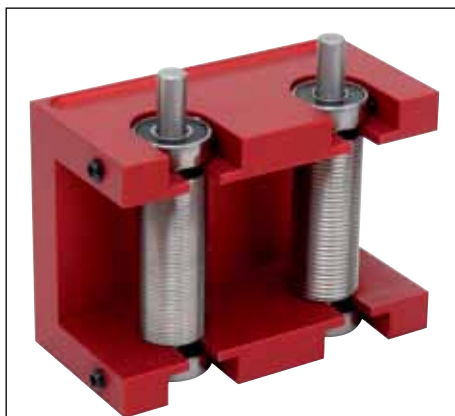
Screw structure:

T0406100SL 1.0 mm left screw
T0406150SR 1.5 mm right screw

In addition:

T0406100SR 1.0 mm right screw
T0406150SL 1.5 mm left screw
T0406GU Rubber roller

These rollers also fit into the T0405 tool.



T0406



T0403



Swix Structure Tool T0403

An economic and practical alternative to hand-milled specialty tools. Delivered with standard broken 0.5 mm V-roller. It is simple to change the roller and the following rollers are available:

Broken structure:

T0403030V 0.3 mm
T0403075V 0.75 mm
T0403100V 1.0 mm

Linear structure:

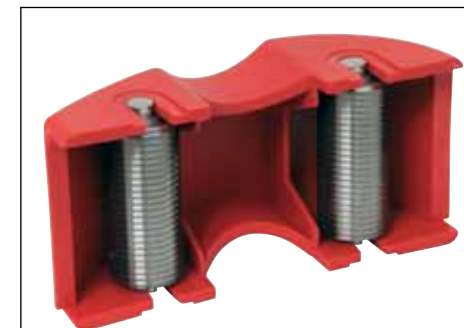
T0403075G 0.75 mm
T0403100G 1.0 mm

Screw structure:

T0403100SL 1.0 mm left screw
T0403100SR 1.0 mm right screw
T0403150SL 1.5 m left screw
T0403150SR 1.5 mm right screw

Swix Structure Tool T0404

A successful World Cup tool, used extensively in Middle Europe. Delivered with two rollers, 1.5 mm right and left screw structure. Delivers a long broken diamond structure that has been used with excellent results in -2°C and warmer. Very well suited for skating skis.



T0404



AKER is the main sponsor of Marit Bjørgen and the Norwegian Cross Country Team.

Practical advice for the use of Swix manual structure tools

Linear, broken and screw structures:

There are no exact rules when to use the different structures. We have to do tests at the actual site to find the best alternatives. Generally, we can say that linear structure and broken linear structure (V) are mostly used in classic races. Screw and cross-structures often give a good "feeling" in free technique (skating) races.

Procedure when choosing structure:

1. Check snow type, temperature and air humidity.
2. Course is classic or free technique (skating)?
3. Decide the stone-grinding structure.
4. Set the hand-structure as the last step, after brushing.

Use of the different imprint steels will vary with the underlying stone grind. If the base has a fine structure it can be taken to "medium" by using the coarse imprint steel. In this way you will be able to make a fine stone grind fit "medium" conditions. However, it is not possible to make a coarse stone grind 'fine' with a 'fine' steel.

- Manually produced structure should be set after waxing, application of Cera F and brushing. After setting the structure, brush once more with the Blue Nylon brush.

- Always apply manual structures on race day since the intended effect can be reduced over time.

- For skating skis, start from the tip applying light pressure for the first third of the base, slowly increase pressure from the front of the binding using medium pressure until the back of binding, from there to the tail use firm pressure.

- For classic skis, use even pressure, but preferably lighter pressure on the front part.

- If two or more imprint steels are used in combination, always start by using the coarser steel.

- With higher air-humidity, use more coarse structure.

- When in doubt, use finer hand-structure.

- Finer stone-grinding combined with "coarse" hand-structure is better than coarse stone-grinding, combined with "finer" hand-structure.

- On wet snow conditions, apply harder pressure on the tool.

- Run the rollers two times.

- Keep the rollers and steels clean and well protected during transport.

Snow condition	CLASSIC		SKATING		
	Linear	Linear broken V	Screw	Linear	Linear broken V
COLD < -5°C New snow Fine grained Coarse grained	0.5 mm T401	0.3 mm T403 or T405		0.5 mm T401	0.3 mm T403 or T405
MEDIUM COLD -5°C to 0°C New snow Fine grained Coarse grained	0.75 mm T401, T403 or T406	0.5 mm T403 or T405 0.75 mm T403 or T405	1.0 mm T403 or T406 1.5 mm T403, T404 or T406	0.5 mm T401	0.5 mm T403 or T405
MEDIUM WARM 0°C to 3°C Wet and moist snow	1.0 mm T401, T403 or T406	0.75 mm T403 or T405 1.0 mm T403 or T405	1.5 mm T403, T404 or T406	0.75 mm T401, T403 or T406	0.75 mm T403 or T405 Linear 1.0 mm T401 + Broken V 1.0 mm T405 or T403
WARM 0°C to 10°C Wet coarse snow	1.0 mm T401 2.0 mm T401	1.0 mm T403 or T405 Linear 1.0 mm T401 + Broken V 1.0 mm T403 or T405	Linear 1.0 mm T401 + Screw 1.5 mm T403, T404 or T406	1.0 mm T401, T403 or T406	1.0 mm T403 or T405 Linear 1.0 mm T401 + Broken V 1.0 mm T405 or T403

SWIX CERA NOVA

HIGH PERFORMANCE GLIDEWAX



With fluorinated compounds from Miteni (Italy)



www.swixschool.com

CERA F POWDERS, SOLIDS AND LIQUID

SWIX CERA F

- *The Reference for Competitors and Athletes.*
- *The Fastest and most frequently used.*
- *The Highest Purity.*
- *The Most Podium Results.*



"Dr. Wax" Leif Axell Torgersen measures contact angles between water and wax.

New productions and additional research within the field of Cera F has made Swix able to improve the quality on our Cera F products the coming season. Testing within the laboratory as well as in the field is an important part of the work aiming for further refinements in the quest to be able to supply racers and snowboard riders with the best possible glide performance.

There are many fluorocarbon products in the market, but very few have gone through the synthesizing steps to modify the fluorocarbon powder like Cera F for specific use on ski and snowboard bases.

Swix Cera F has a coded batch production system for tracking quality control. The result is:

- High speed and acceleration
- High resistance to snow contaminants
- Exceptional purity for best performance
- High longevity, outstanding base bonding capacity

Also, Cera F powders, waxes and liquids do not contain CFCs and are not harmful to the environment.

Safety reminder

Neither Cera F powder or its vapor from ironing should be exposed to temperatures above 300°C (570°F). Therefore avoid exposure to torches, heat guns, space heater, and cigarette smoking.

Recommended ironing temperature for Cera F is approximately 150°C (300°F) to 165°C (330°F), which is far below the level for Cera F decomposition.

Category 1:
100% Fluorocarbon

Cera F Powder



The Cera F powders are now delivered in larger containers, still containing 30 grams. The new vials make it easier to distribute the powder by reducing the lumps.

FC78 - Super Cera F Powder Old Snow

A sensational new Cera F powder with a wide ideal range from +1°C to -10°C. Positioned between FC8X and FC7. High melting point 144°C. Recommended iron setting 165°C (330°F). FC78 is ironed twice during application. Iron, brush back to powder form, and iron again. The base waxes for FC78 are generally HF6, HF6BW, HF7, HF7BW, HF8 and HF8BW.

OBS! Should be used by experienced waxers to avoid overheating of ski base.

FC7 - Cera F Powder Cold

The Cera F for cold conditions. Very wide range in colder and dryer conditions, new or old snow, -2°C to -30°C (28°F to -22°F). Iron temperature setting of 160°C (320°F). One pass with the iron taking no more than 4 or 5 seconds. FC7 is most often ironed for better base bonding, and because of its high melting point (hardness). FC7 is ironed twice during application. Ironed, brushed back to powder form, and ironed again. FC7 can also be applied using the Roto-Cork/Roto-Fleece, or by hand corking. The base waxes for FC7 are generally HF6, HF6BW or LF6, HF7, HF7BW or LF7.

FC8X - Cera F Powder

The temperature range for this powder falls within the average, normal winter temperatures, and therefore FC8X is the most used of all Cera F waxes. Temperature range is +4°C to -4°C (40°F to 25°F). FC8X is ironed once. Maximum ironing temperature setting of 160°C (320°F). One pass with the iron taking no more than 4 or 5 seconds. Roto-Cork/Roto-Fleece or hand corking application is also possible. The base waxes for FC8X are HF8, HF8BW or LF8.

FC10X - Cera F Powder Wet

This powder is designed for very wet conditions. The temperature range is from 0°C to +20°C (32°F to 68°F). Good during thawing conditions, late season when there is strong sun effect, and wet falling snow at 0°C (32°F). Iron once at maximum ironing setting of 160°C (320°F) with a 4 or 5 second pass of the iron. Application with the Roto-Cork, Roto-Fleece or hand corking is also possible. The base waxes for FC10X are HF10, HF10BW or LF10.

FC10B0 - Cera F "Black Snow" Powder

Cera F for wet transformed "dirty" snow, 0°C to +20°C. FC10 with black lubricant additive that reduces friction in polluted wet snow. Iron once at maximum ironing setting of 150°C (300°F) with a 4 or 5 second pass of the iron. Application with the Roto-Cork, Roto-Fleece or hand corking is also possible. Used with HF10BW or HF8BW.

Category 1:
100% Fluorocarbon

Cera F Solid Turbo

Cera F Turbos are square sintered 20 g blocks of 100% Cera F Powders. The Turbos are used in shorter races from 1 km to 5 km such as sprints.

The consistency of the blocks is designed so rub-on application is easier. The rub-on application is also an economical way to use Cera F.

Apply a layer covering the base. Cork-in with a Swix Natural Cork (T20) or use the new Swix Combi Brush (T196) with cork on one side and fine nylon bristles on the other. After corking, finish by brushing with a fine nylon brush such as T196 or T160.

Roto-Corking and Roto-Fleece is also often used in World Cup when applying the Turbos. In this case, the Turbo Waxes are used as a "booster" over Cera F powder or Cera Nova Glide Wax to get extra speed the first few kilometers.

FC7WS - Cera F Solid "Cold Turbo"

100% fluorocarbon solid block of wax. Temperature range from 0°C to -20°C. For transformed/man made snow. Used alone or as the final "accelerator" layer.

FC8XWS - Solid White Uni Turbo

100% fluorocarbon solid block of wax. Temperature range from +4°C to -4°C. For fine grained snow. For clean white snow covering most normal winter conditions. Wide range. Used alone or as the final "accelerator" layer.

FC10BS - Solid Wet Turbo

100% fluorocarbon solid block of wax. Temperature range from 0°C/+20°C. For wet/polluted/coarse snow. The black lubricant additive has positive effect in polluted snow. Used alone or as the final "accelerator" layer.



Category 1:
100% Fluorocarbon

Cera F Liquid

Swix Cera F Liquid is designed for use as the final layer when waxing for top-level competitions. Based on Cera F technology, Swix Cera F Liquid offers the same high performance quality as the Cera F Powder Waxes. It is based on pure Cera F, Fluor Carbons. It's liquid state guarantees a perfect distribution on the ski.

Quick and easy to apply, Cera F Liquid is also ideal for the quick performance fix at events with multiple runs, such as Cross Country Sprints.



FC8L Cera F Liquid

100% fluorocarbon. For normal snow conditions +4°C to -4°C (40°F to 25°F). 29 ml.

FC10L Cera F Liquid

100% fluorocarbon. +2°C to +20°C (36°F to 68°F). For wet fine grained snow and very wet corn snow. 29 ml.



FC8A - Cera F Rocket Spray

100% fluorinated. +4°C to -4°C. For transformed and fine grained snow. Apply on top of HF10, HF8, HF7 or HF10BW, HF8BW, HF7BW. Also used on top of Cera F powder as "topping".

Upside down spray-on for better controlled application. Bottle of 70 ml.

Use of Cera F Liquid as the final layer will absolutely assure that there are no voids in the pure fluorocarbon wax layer resulting in the highest possible speed performance.

Category 2:

HFBW Waxes



HFBW Black Wolf is a result of years of intensive research to improve our gliding products. The waxes have provided excellent results in both the World Cup and World Championships, in cross country, biathlon and alpine skiing. The Black Wolf series strength is its performance on artificial snow, transformed snow and dirty snow and also at cold conditions when the dry frictional phenomena is relatively high. This patented additive gives lower frictional coefficient to the waxes than the BD-additive. Available in 40 gram or 180 gram bar size.

HF4BW

Black, -10°C to -32°C. Made for extremely cold conditions, contributing to a high portion of dry friction. To be used alone or as a base for Swix Cera F FC7.

HF6BW

Black, -6°C to -12°C. Very well suited for man-made snow during cold conditions. The BW-additive reduces friction towards snow-particles and has excellent wear resistance. Mainly used as a base for Swix Cera F FC7 or FC78.

HF7BW

Black, -2°C to -8°C. Easy application. Good dirt resistance. To be used on man-made snow or transformed snow, partly polluted. Used as a base for Swix Cera F FC7, FC78 and FC8X.

HF8BW

Black, +1°C to -4°C. Performs extremely well on man-made snow or transformed natural snow as well as dirty snow due to resistance towards pollutants. Normally used as a base for Swix Cera F FC78 or FC8X.

HF10BW

Black, +10°C to 0°C. The softest wax in the Black Wolf -line. The preferred choice on wet, dirty, coarse-grained snow as a base for Swix Cera F FC10 or FC10B0.

Category 3:

HF Waxes



HF stands for High Fluorocarbon. There are 5 main waxes in this category, which are fluorinated hydrocarbon blends having a high percentage of a low-melt point fluorocarbon additive - a result of Cera F technology. The waxes are unique because they provide fast acceleration, work in a wide range of temperatures, and are durable and dirt resistant. HF waxes are excellent when used alone, but ideal when used in combination with Cera F as an over layer. Available in 40g or 180g bar size.

HF4 - With Nano!

Light green, -10°C to -32°C (14°F to -25°F). Normally at temperatures this cold, the advantages of fluorocarbon content become less. However when the humidity is very high, above 80%, and it is very cold, this wax is excellent.

HF6

Light blue, -6°C to -12°C (21°F to 10°F). At this temperature point the base blend to which the fluorocarbon is added also contains a combination of hard synthetic paraffins which have proven very effective at colder temperatures and abrasive man-made snow. Recommended final Cera F powder layer: FC7.

HF7

Violet, -2°C to -8°C (28°F to 18°F). HF7 fits the important wax conditions that fall between -2°C to -8°C (28°F to 18°F). This popular formulation requested by World Cup technicians can be used alone or mixed with other waxes. Its consistency makes it easy to iron and scrape. Cera F Powder FC7B or FC7.

HF8

Red/pink, +1°C to -4°C (34°F to 25°F). This wax falls into in a common wintertime temperature and therefore is used often. The combination of HF8 and FC7B/FC8X Cera F powder as the final layer has become a highly successful racing standard.

HF10

Yellow, +10°C to 0°C (50°F to 32°F). For very wet conditions. Falling wet snow, rain, and a water saturated snow surface. HF10 is best used with Cera F FC10X/FC10B0 powder as an overlayer.

HF12

COMBI. Contents HF7 Violet 20 g and HF8 Pink 20 g. Two of the most used HF waxes in one package. An economical way to get into the HF-line.

Category 4:

LF Waxes



LF stands for Low Fluorocarbon. These are fluorinated hydrocarbon waxes having a lower percentage of fluoro additive. They are often used as training waxes. Can also be used as racing waxes with Cera F as a final layer, or alone as a race wax mostly at lower temperatures.

The temperature ranges and wax colors of the LF waxes coincide with the HF category, however they are distinguished from the HF waxes by the 60 gram bar size. They are also available in packages of 180 gram.

LF3

LF3 Cold Powder. -10°C to -32°C (14°F to -25°F). A very hard powder wax having a high content of fluorocarbon material. Used when the snow is very fine-grained and very cold. Easy to iron. Also helps to reduce base abrasion on cold, aggressive snow. 30 gram.

LF4

Light green, -10°C to -32°C (14°F to -25°F). For use alone at low humidity at very cold temperatures and harsh man-made snow.

LF6

Light blue, -6°C to -12°C (21°F to 10°F). Very good as a base layer for other waxes. Also a very good training and racing wax alone in low humidity conditions. Resistant against wear on aggressive man-made snow. For racing at normal and high humidity Cera F FC7 is recommended as final overlayer.

LF7

Violet, -2°C to -8°C (28°F to 18°F). Very good race wax at low humidity.

LF8

Red/pink, +1°C to -4°C (34°F to 25°F). The low-percent fluorocarbon counterpart to HF8. For racing it is recommended to use Cera F FC8X as the final overlayer within this temperature range. Also used very often as a wax for training, travelling and cleaning.

LF10

Yellow, +10°C to 0°C (50°F to 32°F). For very wet conditions. Also good for base preparation and to protect the bases when travelling. The snow is often dirty at the temperatures calling for LF10, therefore an overlayer of Cera F FC10X/FC10B0 is recommended.

Category 5:

CH Waxes



CH stands for Hydrocarbon. This category has no fluorocarbon material in the blends. They are 100% high performance hydrocarbon paraffins. Although they can be looked upon as an economical racing wax group, the colder waxes perform very well alone, and the warmer waxes make an acceptable base layer for Cera F.

Their colors and temperature ranges coincide with the HF and LF Waxes. The CH waxes can be distinguished from the LF waxes by their darker shade of color. Comes in 60 gram or 180 gram bar size (CH3 in 30 gram).

CH3

-12°C to -32°C (12°F to -25°F).

A pure white hydrocarbon powder for very cold conditions. Can be used alone or as a base for other waxes during abrasive conditions. Easier to apply and scrape than other cold conditions waxes.

CH4

Green, -10°C to -32°C (14°F to -25°F).

Is somewhat harder than HF4 and LF4. Can be used alone or mixed with other LF or HF waxes to increase durability on aggressive snow. In dry conditions can it be used up to -7/-8°C. Should be scraped while still warm. See wax application section.

CH6

Blue, -6°C to -12°C (21°F to 10°F).

For common cold conditions. Contains also some synthetic wax, which makes it durable in aggressive snow. Good training wax alone. It offers good glide plus base protection at an economical price.

CH7

Violet, -2°C to -8°C (28°F to 18°F).

CH7 is a good general purpose pre-wax and travel wax because its range for use falls in the middle of the system. CH7 makes a good base bonding wax for warmer waxes. Good alone for training and to get skis "driven in".

CH8

Red/pink, +1°C to -4°C (34°F to 25°F).

A very good, reliable and economical racing wax, as well as a general base prep wax and travel wax for "cold" skis.

CH10

Yellow, +10°C to 0°C (50°F to 32°F).

For very wet, saturated snow. This is the Worlds most frequently used wax for base prep/saturation and as travel wax for warm skis.

BASE BRUSHING

The Swix Brush Programme in General

The Swix Brush Program is subject to continuous development based on feedback from the Swix Racing Service Department that serves World Cup technicians, athletes, and teams throughout each season. As a result, Swix customers are guaranteed the highest quality products taking into account the latest developments and methods of World Cup technicians.

Swix Brushes are divided into three main categories of use, plus the economy line.

- The Swix "Pre-Wax" Brushes are designed to use before waxing for base restoration ("freshening") by removing the burnish and oxidization from the base surface, and brushing old wax out of the structures (base patterns) in ski and snowboard bases to clean and "open" the base for better wax absorption.

- The Swix "Post-Wax" Brushes are for use after waxing and scraping to brush the wax out of the base patterns. To many, these brushes are the most important. The base must be waxed, yet the structure patterns must also be revealed to minimize friction.

- The Swix "Cera F" Brushes have the purpose of "application brushing" and final finish brushing. Professional technicians reserve these brushes just for use with Cera F so the final waxing result cannot be compromised with wax other than Cera F.



For each of these categories the Swix brushes are carefully selected with special qualities in mind. Swix selects not only the specific material for each purpose, but also the certain length of each fiber, a certain thickness and stiffness for each fiber, and lastly, the bristle density. By specifying the characteristics thoroughly, each of the Swix brushes has its own "personality" and fulfils a specific purpose.

It is recommended to use separate brushes for the waxes from the brushes used for Cera F.

A fully equipped range of brushes should contain:

- The Fine Steel Brush used before waxing to clean the structure and remove oxidized material (T191B). Also used as second brush on waxes.
- The Medium Coarse Steel Brush to use after waxing and scraping (T179).
- The Blue Nylon Brush as final finish (T160).

For Cera F Powder the following three brushed are needed:

- 1) One stiff Black Nylon Brush (T194) for the "brush up" step and after ironing.
- 2) One Wild Boar Brush (T164).
- 3) One Blue Nylon Brush (T160 or T196) for final finish.

Tip: The Blue Nylon Brush T196 has cork on one side for hand corking with Cera F Turbo Solid or Liquid.



AKER is the main sponsor of Petter Northug and the Norwegian Cross Country Team.

Brushes after waxing and scraping

T179 Steel Brush (or T162 Bronze Brush)

A medium coarse steel or bronze brush to use after waxing and scraping. 10-12 strokes.

T160 Blue Fine Nylon Brush

A fine nylon brush for polishing. 4-5 strokes.

T191B Steel Brush Ultra Fine

An ultra fine steel brush for renewal and cleaning of bases in-between heats in sprint races. Also used as brush number two on glide waxes.

Brushes for Cera F Powder

T194 Stiff Nylon Brush

For "brush up" (not away) of Cera F powder after ironing (and before ironing FC7 and FC78 the second time). 4-5 strokes back and forth.

T164 Wild Boar Brush (or T157 Horsehair Brush)

Second brush on Cera F powder. An "animal" brush for brushing powder away. 10-12 strokes.

T160 Blue Fine Nylon Brush

A fine nylon brush for polishing. 4-5 strokes.

One brush for Cera F Solid Turbo

T196 Combi "Turbo"Brush

This is another handy brush, that some World Cup Technicians use at the race start site for second-run or in between sprints Cera F Solid application. This brush has natural cork on one side and short, fine nylon bristles on the other.



ROTO BRUSH PROGRAM

Use of a Roto Brush is a great way to save time when there are many skis or boards to prepare. For club team racers where coaches and parents are preparing the skis for the entire team, a Roto Brush is almost a necessity.

RPMs from about 1500 are used for brushing.

T16M Horsehair

The best all round brush. The initial brush on all waxes. Used on regular waxes and Cera F. (Do not use the same brush on regular wax and Cera F.) 100 mm wide.

T17W White or Blue Nylon

Polish brush for wax and Cera F. 100 mm wide.

T15HS Horsehair and Steel

Wax brush. The most used wax brush in World Cup. Horsehair is used first finish with steel. Horsehair is used first to avoid that the steel is "clogging" up. Deburr the steel lightly with sandpaper #100 before using it first time on skis. 140 mm wide.

T15DB Horsehair and Soft Nylon

Economy all round brush for both wax and Cera F powder. Start with the horsehair and finish with the nylon. 140mm wide.

T19S Steel

Fine steel brush to clean base structures before waxing. Can be used as second brush on wax after T16M Horsehair brush.

T18C Cork

High quality cork for application of Cera F powder, Cera Solid and Cera Liquid. Specially recommended for Cera Solid. 100 mm wide.

T18F Fleece

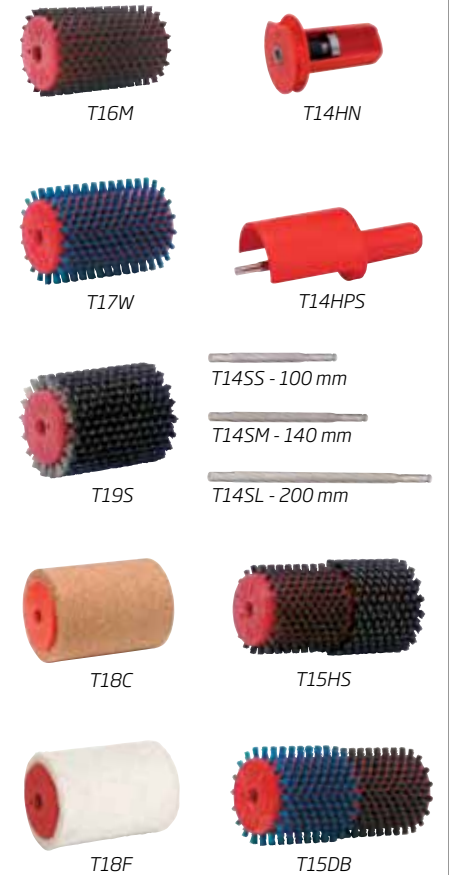
The Fleece-Roto improves Cera F performance when the snow is warmer than -4°C. Apply the Cera powder to the base with a wax iron first. The Fleece-roto should be used a couple of times to get optimal performance. NB! Use separate Fleece brushes for each type of Cera F. 100 mm wide.

T15HPS

Handle with 140 mm driveshaft and 100 mm wide protection cover.

T14HPS

Handle with 100 mm driveshaft and protection cover.



NOTE!

- Always use safety glasses when rото-brushing.
- Use the Protective Cover (T12PS) to avoid getting wax particles and powder in the face.
- Don't press too hard, let the brush do the work!
- Brush from tip to tail with the brush rotation throwing the wax particles towards the tail.

IRONING

Important rules:

- 1: Use an iron build for skiwaxing to ensure stable temperatures and avoid "burned" bases.
- 2: Use the proper iron pass speed, like 4 to 5 seconds per length for Cera F (skating ski).
- 3: Iron at normal room temperature.
- 4: Have the proper ski base condition at the start of the process.



"T73" Performance Waxing Iron (T73110)

500 Watt.
8 mm plate gives a stable temperature. T73 has manual choice of temperature by indication of degrees and is simply done by an adjustment-wheel. Adjustment range from 100°C to 165°C.



"T74 Sport" iron (T74110)

400 Watt.
Reasonable and reliable waxing iron with temperature control showing the degrees. Standard iron plate. Control light for temperature regulation.



"T71" World Cup Waxing Iron (T71110)

For Professional Racing. 1000 Watt.
A 25 mm thick plate gives stable temperature and optimal control when applying Cera F. Temperature reaches 180°C. Easy to set temperature with LED buttons. The iron remembers the last plotted temperature if current is interrupted. The temperature is regulated at 1°C deviation by a micro processor. The thick plate facilitates the use of the iron at lower temperatures than normal room temperature. The heating plate has an angle to facilitate application of Cera F. In front it is straight to control glide zone waxing of classical skis.

The choice of World Cup Service Men!

Note! When waxing with Cera F Powders like FC78 Super Cera, FC7 and FC8X it is important to have an optimal iron like T71 to get a good result.



"T72" Racing Digital Iron (T72110)

550 Watt.
A 12 mm plate gives optimal temperature stability. The iron is controlled by a micro processor and has digital temperature regulation. On the back, the heating plate has an angle to facilitate application of Cera F. In front it is straight to control glide zone waxing and classical skis..

						— 160°C 320°F
						— 150°C 300°F
						— 150°C 300°F
						— 140°C 280°F
						— 135°C 275°F
						— 120°C 245°F
						— 110°C 230°F

POST-TREATMENT OF NEW SKIS OR NEWLY STONE GROUND SKIS

Skis put through a stone grinder need accurate follow-up treatment for optimum performance. This process depends partly on the type of pattern given to the base.

Cold snow patterns need more extensive treatment than wet snow conditions. This means that the work performed using Fibertex polishing, back and forth on the base has to be repeated many times more on a cold snow ski with finer structure than on a wet snow ski with a coarser structure.



- 1.** Brush lightly with the Steel Brush (T179) or Bronze Brush (T162).



- 2.** Moisten a piece of Fibrelene (T150) with Glide Wax Cleaner (I84) and apply to the glide zone of the base.



- 3.** Rub forward and backward a few times with a Nylon Brush (T161B).



- 4.** Wipe off as much as possible with Fibrelene (T150).

Let the ski dry for 5-10 minutes.



- 5.** Brush firmly with the Bronze Brush (T162). The ski is now ready for application of new glide wax.



- 6.** Saturate the base with a relatively soft wax (CH10). The temperature of the waxing iron should be regulated to be hot enough to give immediate melting of the wax. Approximately 115°C (235°F).



- 7.** Start at the ski tip and move the iron in one continuous motion toward the tail. This technique prevents overheating the base.

Let ski cool down approx. 5 minutes.



- 8.** Apply CH10, iron in, and wait 5 minutes. Iron in three times, apply more wax if necessary. No scraping in between.



- 9.** Scrape off after cooling to room temperature (5-10 minutes).



10.
Use the Medium Coarse Bronze Brush (T162) or Steel Brush (T179). Use the brush in tip to tail direction, approx. 5-10 times.



11.
Apply the harder LF6/HF6. Iron temperature approx. 140°C (280°F).



12.
Scrape off after cooling to room temperature (5-10 minutes).



13.
Brush with the Bronze Brush (T162) or Steel Brush (T179) approx. 10-20 times.

"WET SNOW" SKI: Continue to # 16.



14.
"COLD SNOW" SKI: Use Purple Fibertex (T266N) to cut micro burrs. 20-25 strokes back and forth.

"Wet snow" skis don't need Fibertex treatment.



15.
"COLD SNOW" SKI: Apply LF6 for the second time. Iron in. Let cool for 5-10 minutes. Scrape and brush.



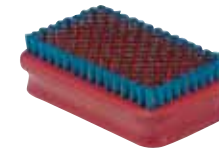
16.
Use White Fibertex (T266), 20-25 strokes.



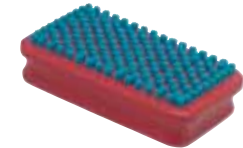
17.
Saturate the base with LF8 if it is a "wet snow" ski or with LF6 if it is a "cold snow" ski. Wait 5 minutes. Iron in three times. Apply more wax if necessary. No scraping in between. Scrape off and brush with Bronze Brush (T162) or Steel Brush (T179) 10 strokes.



T824



T162



T160

GLIDE-WAXING

Practical Application of CH, LF and HF Waxes

This is a general description of the methods and procedures used by servicemen on top level.



- 1.** Scrape off the travel wax applied after the last race or training. Use the Plexi scraper (T824) and the groove scraper (T88).



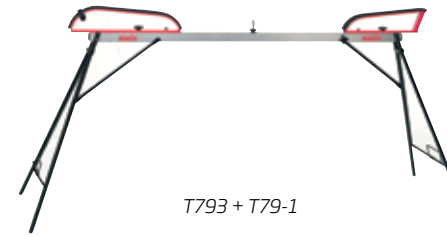
- 2.** Brush with the Bronze Medium Coarse Brush (T162) or Steel Brush (T179). 5-10 repetitions from tip to tail, to remove remaining wax.



- 3.** Apply the actual wax for today's conditions. Use the iron, dripping wax on both sides of the groove.



- 4.** The wax should easily melt. Check the temperature recommendation on the wax. Keep the iron in steady motion from tip to tail. On pass should take approx. 10-15 sec. on a skating ski. Repeat 2-3 times. Let the ski cool off to room temperature approx. 5-10 min.



T793 + T79-1



T71



T88



- 5.** Don't forget to remove all excess-wax in the groove and on the sides with a scraper (T87 or T88). We recommend scraping the groove **before** the base to protect the surface in case the groove scraper slips and makes scratches.



- 6.** If the actual waxes are hard, brittle like CH4/CH6, LF4/LF6 or HF4/HF6, scrape off most of the wax before it becomes solid. After the ski has cooled off, continue scraping using a sharp Plexi scraper (T824).
Other waxes like CH7/CH8/CH10, LF7/LF8/LF10 or HF7/HF8/HF10 are scraped when the ski has cooled off to room temperature, 5 min.



- 7.** Brush the base with the Bronze Medium Coarse Brush (T162) or Steel Brush (T179). 5-10 strokes.



- 8.** Do the final brushing and polishing with the Blue Nylon Polish Brush (T160).

APPLICATION OF CERA F

Powder, Solid Turbo and Liquid

Cera F Powder Application Tips

Base Pretreatment

Before Cera F is applied, the base is treated with the wax matching the day's conditions. The higher the fluoro content in the wax (such as HF), the better the Cera F is bonded to the base. Scraping and thorough brushing is required before applying Cera F.

Application by ironing

When there is a need for Cera F to stay on the base for a long time, as in distances above 5 km, Cera F should be applied with an iron. First the powder is distributed evenly on the base. A 30 gram container will be enough for approximately 4 pairs of classic skis, or 3 pairs of skating skis.

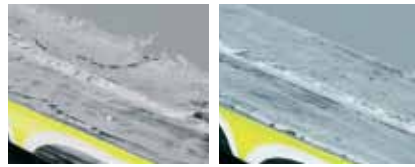
The recommended temperature setting on the iron is 160°C (320°F) for FC7, FC8X and FC10X.

The recommended temperature for ironing FC78 is 165°C (330°F).

When ironing FC8X and FC10X only one continuous pass of the iron is needed. Make one pass with the iron on each side of the groove. The movement of the iron should be approximately 4-5 seconds from tip to tail (skating ski).

When using FC78 and FC7, after cooling, the powder is "brushed up" (not brushed away) by using a back and forth scrubbing motion with the stiff Black Nylon Brush (T194). Afterwards, make another single pass with the iron. See page 36-39 for "Step by Step Application".

APPLICATION BY IRONING



FC78 and FC7

FC8X and FC10X

Brushing

Before brushing allow the skis to cool for about 5 minutes. Use the Swix Black Nylon Brush (T194) first, then the Wildboar Brush (T164). No scraping is needed.

Finish with the Swix Polishing Brush (T160).

All final brushing is done in a direction from tip to tail.

Application of powder by corking

This applies to short sprint cross country races of about 2 to 5 km.

The powder is distributed evenly on the base. Less is used than when ironing. Use the Swix Synthetic Cork (T0010), or Swix Natural Cork (T0020). Use firm back and forth pressure to create heat to form a waxy layer. Next "brush-up" the powder with a Horsehair Brush (T157), and then cork into the base once again. Finish by brushing with the Swix Horsehair Brush (T157), and then the Swix Polishing Brush (T160).

Application by Roto Fleece

Some teams prefer this method as it saves the ski somewhat from the very hot irons. Has also given excellent results re. Glide. See page 40 for "Step by Step Application".

SAFETY RECOMMENDATIONS

- Wax room ventilation. Make the extra effort to see that the area where you work on skis has exhaust fans and fresh air supply. Race organizers usually give the location for working on race equipment too low a priority, and often the waxing areas have little or no ventilation.
- Do not expose waxes to open flames such as from a waxing torch, heat guns, space heaters, fire places, etc. Do not smoke cigarettes while waxing with fluorocarbon or fluorinated hydrocarbon waxes. In fact, don't smoke at all! There is a chemical danger associated with fluorocarbon waxes when they are overheated. If fluorocarbon waxes are exposed to a heat source having a temperature higher than approximately 300°C (570°F), the fluorocarbon material disintegrates developing a poisonous gas. Normal iron temperatures will not cause a harmful breakdown of Swix waxes.
- When using power brushes for brushing waxes a substantial amount of wax "dust" particles occur. To prevent inhalation of the particles use a "particle" mask. This can be the paper-type used in wood working.
- Use safety glasses when power brushing.
- If you question the quality of the waxes you are using, or feel that your exposure amount to waxing is extensive, use a respirator mask. It should be a cartridge type for filtering organic vapors. This type of mask is important to use when doing base repair with a burning polyethylene repair candle or base welder.
- Be aware of the type of base cleaner you are using. Have good ventilation. And dispose of the rags or Fiberlene properly.
- The addition of fluorocarbon materials into the hardwaxes and klusters means they must not be exposed to open flames of any type. Waxing torches should not be used for application or removal of fluorinated kick waxes. During application the warming-in of the wax with an iron is acceptable. Use a solvent for removal.



RECOMMENDED APPLICATION OF CERA F POWDER IRONED TWICE - FC78 SUPER CERA AND FC7

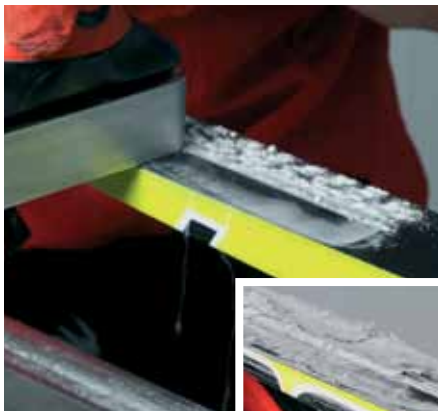
A standard package of 30 grams normally is enough to wax 3 pairs of free-technique skis (skating skis) or 4 pairs of classical skis (tip and tail waxing). A sufficient layer of powder has to be applied. If the layer is too thin, the high temperature of the iron may damage or destroy the base.

Before the application of Cera F, the skis need to be waxed with the traditional wax for the day's conditions. This will act as a base layer for the Cera F you are about to apply. Follow steps 3 to 8 given in the section "Glide-Waxing", pages 32-33.

When applying FC78 or FC7, it is very important to use a high quality waxing iron. We recommend our T71 or T72 iron. These high quality irons will help prevent damage to your ski base from an iron that does not have proper and precise temperature regulation.



- 1.** Distribute the Cera F powder in an even layer. Apply enough powder to protect the ski base from the high temperature of the iron and allow penetration into the base material.



- 2.** Move the iron in one continuous pass on each side of the groove. Recommended iron temperature for FC78 is 165°C. For FC7 it is 160°C. The velocity of the iron corresponds to a time of approximately 4-5 seconds for one ski (skating ski).

IMPORTANT:
The powder will not completely melt and the base might look partly white after this initial treatment.



- 3.** Brush the powder up but not away from the base with the Black Stiff Nylon Brush (T194).



- 4.** Iron the powder once more as described in #2. Let the ski cool down 5-10 minutes. You might still see white spots, but they are less than after the first pass with the iron.



- 5.** Brush with the Stiff Nylon Brush (T194), 5-10 strokes, and continue with the Wild Boar Brush (T164), 10-20 strokes.



- 6.** Finish with the Blue Nylon Brush (T160), 3-4 strokes.



RECOMMENDED APPLICATION OF CERA F POWDER IRONED ONCE - FC8X, FC10X, FC10B0

A standard package of 30 grams normally is enough to wax 3 pairs of free-technique skis (skating skis) or 4 pairs of classical skis (tip and tail waxing). A sufficient layer of powder has to be applied. If the layer is too thin, the high temperature of the iron might destroy the base.

Before the application of Cera F, the skis have to be waxed with the actual, traditional wax for today's conditions. Follow steps 3 to 8 given in the section "Glide-Waxing For Today's Competition", pages 32-33.



1.
Distribute the Cera F powder evenly on the base. Don't forget to apply enough powder to protect the base from direct contact with the iron.



2.
Move the iron in one continuous pass from tip to tail on each side of the groove. Recommended iron temperature setting for FC8X and FC10X is 160°C. For FC10B0 the temperature setting should be approx. 150°C. One pass with the iron from tip to tail takes approx. 5 seconds.

IMPORTANT:
The powder will not completely melt and the base might look partly white after this initial treatment.



3.
After cooling to room temperature (5 min.) brush the powder up from the base with the Stiff Black Nylon Brush (T194), 5-10 strokes.



4.
Continue with the Wild Boar Brush (T164), 10-20 strokes.



5.
Finish with the Blue Nylon Brush (T160), 3 - 4 strokes.



CERA F POWDER ROTO FLEECE APPLICATION

The initial steps before Cera F Roto Corking are the same as for the ironing in method of Cera F. It is recommended to have one separate T18F Roto Fleece for each different Cera F.



- 1.** Apply Cera F evenly.

You can "fix" the powder to the base by using a waxing iron temperature of 150°F (300°F) by quickly going over, approx. 3 seconds.



- 2.** Use the T18C Roto Cork first at a speed of approx. 1,500 RPM. Start from the tip and work the Cera F into the base by moving the drill back and forth approx. a foot at a time as you work your way towards the tail. Use light pressure.

Repeat the procedure above with Roto Fleece (T18F).



- 3.** Use the T16M/T15DB Horsehair Roto Brush with speed 1,500 RPM. Start from the tip and move back and forth approx. a foot at a time towards the tail. Use light pressure. (OBS! Do not use the same brush as for standard waxes.) You can also use a Horsehair Hand-Brush (T157), 10 strokes.



- 4.** Finish with the T17W/T15DB Soft Nylon Roto Brush with speed 1,500 RPM. Start from the tip and move back and forth approx. a foot at a time towards the tail. (OBS! Do not use the same brush as on standard waxes.) Use light pressure. You can also use a Blue Nylon Hand-Brush (T160), 3 - 4 strokes.



CERA F TURBO ROTO FLEECE APPLICATION



- 1.** Rub on an even layer.



- 2.** Use the T18C Roto Cork first at a speed of approx. 1,500 RPM. Start from the tip and work the Cera F into the base by moving the drill back and forth approx. a foot at a time as you work your way towards the tail. Use light pressure.

Repeat the procedure above with Roto Fleece (T18F).



- 3.** Use the T16M/T15DB Horsehair Roto Brush with speed 1,500 RPM. Start from the tip and move back and forth approx. a foot at a time towards the tail. Use light pressure. (OBS! Do not use the same brush as for standard waxes.) You can also use a Wild Boar Hand-Brush (T164), 10 strokes.



- 4.** Finish with the T17W/T15DB Soft Nylon Roto Brush with speed 1,500 RPM. Start from the tip and move back and forth approx. a foot at a time towards the tail. (OBS! Do not use the same brush as on standard waxes.) Use light pressure. You can also use a Blue Nylon Hand-Brush (T160), 3 - 4 strokes.



CERA F TURBO HAND CORK APPLICATION



- 1.**
Rub on an even layer.



- 2. a**
Cork in with a Natural Cork (T20).



- 2. b**
Or the Combi Cork/Brush (T196).
Approx. 20 strokes.



- 3.**
Brush with the Blue Nylon Brush (T196 or T160). Approx. 10 strokes.



FC8A ROCKET ROTO FLEECE APPLICATION



- 1.**
Spray on the FC8A by moving the bottle along both sides of the groove while pressing the button. Keep the nozzle 4-5 cm above the base.

Let dry for approximately 5 minutes.



- 2.**
Use the T18C Roto Cork first at a speed of approx. 1.500 RPM. Start from the tip and work the Cera F into the base by moving the drill back and forth approx. a foot at a time as you work your way towards the tail. Use light pressure.



- 3.**
Repeat the procedure above with Roto Fleece (T18F).



- 4.**
Finish with the Blue Nylon Brush (T160). Approx. 5 strokes.



FC8A ROCKET HAND CORK APPLICATION



- 1.** Spray on the FC8A by moving the bottle along both sides of the groove while pressing the button. Keep the nozzle 4-5 cm above the base.

Let dry approximately 5 minutes.



- 2.** Work the liquid into the base with a Natural Cork (T20) or Combi Cork/Brush (T196). Approx. 20 strokes.



- 3.** Finish with the Blue Nylon Brush (T160 or T196). Approx. 5 strokes.



CERA F LIQUID ROTO FLEECE APPLICATION



- 1.** Apply with Fiberlene or felt applicator. Let dry for 5 minutes.



- 2.** Use the T18C Roto Cork first at a speed of approx. 1,500 RPM. Start from the tip and work the Cera F into the base by moving the drill back and forth approx. a foot at a time as you work your way towards the tail. Use light pressure.

Repeat the procedure above with Roto Fleece (T18F).



- 3.** Brush with the Wild Boar Brush (T164) alt. Horsehair Brush (T157). Approx. 10 strokes.



- 4.** Finish with the Blue Nylon Brush (T160). Approx. 5 strokes.

Winter Week has races for all tastes!

Vasaloppet Week 2011 is getting nearer. For Vasaloppet is not just one competition, but eight. From the shortest race of 3 km to the 90 km classic distance. There's something for all ages, sexes, and families. No matter where you start, everyone finishes in the same place. In Mora. Register now and begin training tomorrow!

VASALOPPET

Dream – Challenge – Adventure

REGISTRATION FEES 2011 (EUR)

	01.06.-31.10.	01.11.-31.01.	Later Entries
KortVasan	41	53	63
TjejVasan	69	81	101
UngdomsVasan	15	15	15
Öppet Spår, Sunday	95	107	120
Öppet Spår, Monday	73	88	105
HalvVasan	71	79	95
StafettVasan	238	247	276
Vasaloppet	136	151	171
SkejtVasan, 30 km			
Comp. 17-18	21	23	27
Comp 19-20	21	23	27
Recr. 12-18	20	20	20
Recr. 19-	31	33	37
SkejtVasan 45 km			
Comp 21-	43	55	67
Recr. 17-	39	51	57

Vasaloppet 2010 in figures:

16,462 registered skiers
 3,500 functionaries worked
 91,500 buns were eaten
 686,000 paper mugs were used
 4,290 km competition tracks laid

Vasaloppet is the oldest, the longest and the biggest cross-country ski race in the world. 90 km an endurance test in finest nature & perhaps one of the greatest challenges you can take up.

COMPETITION FACTS WINTER WEEK 2011

	Date	Distance	Start	Technique	Min.age born
KortVasan	Feb 25	30 km	Oxberg	Classic	1999
TjejVasan	Feb 26	30 km	Oxberg	Classic	1994
UngdomsVasan	Feb 27	3/5/7/9 km	Mora	Classic	2002
Öppet Spår	Feb 27-28	90 km	Sälen	Classic	1994
HalvVasan	March 1	45 km	Oxberg	Classic	1994
StafettVasan	March 4	5 person team	Sälen	Classic	1999
SkejtVasan	March 4	30/45 km	Oxberg	Free	1992/1999
Vasaloppet	March 6	90 km	Sälen	Classic	1992

Vasaloppet Winter Week 2011, 25 Feb – 6 March
www.vasaloppet.se



CERA F LIQUID HAND CORK APPLICATION



1.
 Apply with Fiberlene or felt applicator. Let dry for 5 minutes.



2.
 Cork in with a Natural Cork (T20) or the Combi Cork/Brush (T196). Approx. 20 strokes.



3.
 Finish with the Blue Nylon (T196 or T160). Approx. 5 strokes

SWIX HARD WAXES AND KLISTERS

About Kick Waxing in General

It is relatively simple to apply kick waxes with some experience and knowledge of the performance of the waxes you are using; however, the most experienced skier can still become confused before a race. Nerves are brittle and wax tips come from all over. This racing manual will give you some helpful advice and guidelines for competitions and will give you information that will improve your everyday skiing experience, both for touring and training.

In many situations, ski waxing means compromising. The final goal is superb kick and great glide; however, many times the conditions are variable and that can make this goal difficult. Most important is to find the best balance between kick and glide that will give you the best overall performance. A common mistake is to wax too slippery. Skiers are afraid of losing glide and wax either too thin or too hard a wax. Experience tells us that a racer will lose more time uphill, due to bad kick than gaining speed on the downhill with good glide. Swix wants to kill the myth that top-racers use slippery skis to gain better glide. Truth is that many racers apply kick waxes somewhat softer than what is suggested by temperature, create a longer kick zone and wax thicker than many recreational skiers might believe.

We will start with a few, general tips, based upon many years of field experience by the Swix World Cup service team. Following the guidelines written below we will give you a good foundation for making waxing decisions in stressful and difficult situations.



- Remember, practice makes perfect. The more you test and experiment during training the better you will be able to wax for competitions.
- Do not experiment with products or wax combinations that you have not previously used in training.
- When you are out training and you have poorly performing skis, take the additional 5 minutes to stop and re-wax. It makes no sense to continue on bad skis.

To see and learn how to wax correctly please visit www.swixschool.com. Also remember the Swix Wax Wizard at our web site www.swixsport.com.

Sanding of the Kick Zone

As a general rule, the kick zone usually starts at the heel and goes 65-70 cm forward. Most shops who specialize in selling racing skis will be able to make an exact measurement of the kick zone. You might get an approximate idea yourself by using the "paper method". Place the skis on the floor. Stand on both skis, with half of your body weight on each ski. Let somebody move a piece of paper forward and backward between the ski and the floor. Make a sign at the points where the paper meets resistance.

Use sandpaper to treat the kick zone. You might use a special cork (T11) with #100 grit sandpaper on one side or a paper (T330). Move the paper in both directions. Do not sand sideways as this could round the edges of the ski, this will make work later on with the iron less precise.

A new ski or a new stone grained ski needs thorough treatment, while a pre sanded ski only needs a few additional passes with sandpaper. Sanding of the kick zone is also done before each race. Always sand after the treatment of the glide zones has been completed. Avoid fluoro powder remaining in the kick zone before kick waxing; otherwise, the adhesion of the wax is critically reduced. Make a distinct divide between the glide and kick zone by applying a small piece of tape to separate the zones. Remove dirt and burr with Fiberlene (T150) before applying the kick wax.

Tip:

Take a cork or a sanding block and fold the sandpaper around it. Use it on the edge at the point exactly where you start the sanding.

Application of Hard Waxes

In most cases we recommend to apply base wax (VG35) as a first layer. For longer distances or on aggressive snow, this is a safe choice. On less aggressive snow (cold, fine grained snow) we recommend the base wax VG30 as first layer.



**VG30
BLUE BASE WAX**
+1°C to -20°C (30°F to -4°F).
To be used as first layer for all hard waxes in new and fine grained snow.



**VG35
GREEN BASE BINDER**
-1°C to -22°C (30°F to -7°F).
A durable base wax for the VR- and V-waxes, for coarse grained and old snow colder than -1°C (30°F).

We recommend using an iron when applying base wax. Apply a thin layer and iron it into the base (iron temp. 110°C) until it completely covers the entire sanded area. After the treatment you may want to make a few passes with a waxing cork, let the ski cool before applying a layer of V30. Iron once more using only light pressure to prevent the two layers from mixing. Finish with light corking and let the ski cool off to outside temperature before applying today's wax.

Base waxes are frequently used in top level racing in conditions demanding dry / hard waxes. Many of the best national teams now consequently prefer Swix base waxes. In citizen races accurate base-waxing is decisive. Both VG35 and VG30 hold the ordinary dry-waxes, conserving the kick, without reducing the kick.

Tip:

Base wax is much easier to apply when it is cold. Store it in the fridge or in the snow before application.

Today's Hard Wax

The choice of today's hard wax is based upon temperature, air-humidity, and snow consistency and on your own personal experience. The temperature declarations on the boxes give a good starting point, but often you have to adjust. Apply more thin layers. By this we mean a layer, evenly distributed, without lumps. Because skis are different in stiffness, length of kick zone etc., it is difficult to give a general rule suggesting the number of layers. But normally we recommend about 4 to 10 layers. If you need fewer layers the skis are probably too soft, and if you need more layers, the skis are probably too stiff.

To avoid creating a sharp edge at the ends of the kick zone, we normally apply the hard waxes in a pyramid shape; which means that the layers gradually are applied thinner and thinner, and the wax thickness will have its peak at the highest point of the ski curvature. Normally, we apply 3-4 full length layers, and then gradually shorten the layers.

The waxing cork is an essential tool. Each layer has to be corked before applying a new one. Also, run the cork down the groove a few times (with the oval edge) to smooth the wax in this area. The closer to freezing (0°C), and the fresher the snow, the more important it is to cork the wax to an even and smooth surface, reducing the risk of icing up. For the hardest (coldest) waxes we recommend not corking too hard. A slight structure in the wax might contribute to better kick.

Three possible scenarios

When you have finished waxing and are ready to test your skis, be prepared for one of the following three scenarios (we assume that you have applied the wax correctly length/thickness according to the stiffness of the ski and the kick zones):

A: You have correctly selected and applied the wax properly and have perfect kick.

B: You have applied too hard a wax and have slippery skis.

C: You have applied too soft a wax and the skis are icing up.

Scenario A

Shortly: Congratulations and enjoy the trip!

Scenario B

If you have slippery skis, first try to apply a thicker layer of the same wax. If this does not work you probably have chosen a wax that was too hard. If this is the case then go to a wax one step softer, this may give you satisfactory kick. If you still need additional grip, continue the same way. If you feel you are getting close, more often one or two extra layers is better than going even softer.

Scenario C

In this case we are referring to snow and ice building up under the skis.

By icing up there is no way out of this situation other than scraping off the warm wax and reapply a harder colder wax. The initially chosen wax was too soft and collected snow particles which were not removed by gliding. This situation usually only happens with new transformed snow. Coarse-grained snow seldom causes icing, only slow skis from using too soft a wax.

There is another type of icing. In this case there will be an almost invisible thin layer of ice on the wax, creating both slippery and slow skis. (Ice on top of snow is by no means an ideal condition). You might see some blank spots in the kick zone. If you try to put on more wax it may not work. You have to remove the ice and the ski must be dry. Then try a harder wax.

About V- and VR-Waxes

Swix V-line waxes are a series of hard waxes containing somewhat less expensive raw materials than the VR-series. However, all the V-waxes are composed of the traditionally high quality Swix-raw materials. The V-line waxes are still used from time to time at top level racing, most notably the classic Swix "Blue Extra".

The difference in performance between V- and VR-series is that the VR-waxes are more flexible, covering a wider range of conditions. VR-waxes contain fluorine additives and will provide better glide in all temperature ranges above

and below freezing. It should also be mentioned that some V-waxes are slightly softer (warmer) than the corresponding VR-waxes.

In the last couple of years many VR-waxes have had the formulas adjusted. Thus VR30, VR40, VR45 and VR50 now have improved grip (kick) without reducing the glide characteristics. The "feeling", going on flat or moderate uphill terrain, has been improved.

Application of Klister

We recommend applying klister indoors; and if possible, at room temperature. Klister are softer and much easier to handle in these conditions. Tools like a waxing table, waxing profile, waxing iron and heat gun will simplify the application and give a better final result.

Always start by application of base klister. KB20 makes an excellent binder. It is possible to spray directly on the ski (look for more exact application information on page 64 of this manual).

KR20 can also be used. Heat the tube with a heat gun. Apply a thin string on each side of the groove. Then iron the klister into the base (110°C). The iron might be put on edge passing the base. This gives a more controlled and better distribution of the klister. It should not enter the groove or side edges only cover the sanded kick zone. The klister could be corked afterwards to remove any small irregularities. Let the klister cool to room temperature before application of the next layer.

As a mid layer we recommend KR30 or KR35. The purpose of this layer is to "glue" the klister you have selected preventing it from moving "backwards" and to improve wear. Heat the tube and apply the klister in a thin layer in a "fish-bone"-like pattern. The best way to smooth the klister is to use the thumb, but you can also use a synthetic cork. The heat gun could also be used to soften the klister.

The last layer is today's actual klister. Like hard waxes, the klister is applied full length in the kick zone, but remember that klister "builds" more than hard waxes. If you use the same pair of skis on both hard wax and klister conditions, you

should wax somewhat shorter when using klister. Also remember that it is the top layer which gives most of the kick. This layer should be thicker than the base and middle layers put together; therefore, be careful not to apply the first layers too thick.

If you have to adjust your klister after an initial snow test, be careful to remove all humidity from the klister. Use a heat gun or hand, not an iron. Moisture in the klister before reapplication will cause an undesirable, grayish chewing gum like consistency.

Tip:

If you want to mix two klister, in the same layer, you might apply every other string in fish bone pattern and then smooth it out together.

"Orange skin pattern"

The term "orange skin" is used as a description of the surface pattern of klister that has been applied correctly. After testing your skis you might recheck your klister application. If you have satisfactory kick and observe many small imprints (orange skin) in the surface, this is a good indication that your klister is working. This pattern is caused by snow particles that are penetrating the surface of the klister and then released when you start skiing. The imprints are most visible when using the softer klister (KR35, KR60, KR70, K22n).

Covering Klister with Hard Waxes

To reduce icing, klister can be covered by hard waxes. In order to do this, the klister must be cold in order to apply the hard wax in an even layer. Use at least three layers, carefully corked in between each layer to cover the klister. We want a distinct border between the two different wax types.

The most actual klister subjects for covering are KR35, KR50 and K21. The most actual hard waxes used for covering are VR40, VR45, VR50 and VR55. When covering klister, the hard wax is often somewhat harder than the temperature should indicate. The reason is that a harder

wax gives a better icing protection.

KR35 is primarily a mid layer klister, but it can also be used alone. A good mid layer klister on top of green klister. Prevents the top klister, red or universal, to slide backwards.

KR50 is designed for changing conditions; i.e. a mix of coarse grained and fine grained snow with rising temperatures around freezing. By cold temperatures KR50 could be covered by VR40/VR45, around freezing VR50 and even VR55 are actual waxes to make the klister less tacky.

K21n works well down to $-3^{\circ}\text{C}/-4^{\circ}\text{C}$, but works better than KR50 in moist/wet mixed conditions or on icy trails around freezing. Current waxes for covering K21n are VR45, VR50, VR55 or VR60.

Tip:

Covering klister with hard wax should take place outdoors after the skis have adjusted to the outside temperature. Do not use too much pressure on either wax or cork, it is better to apply more thin layers of wax.



VR-LINE HARD WAXES



- New fallen snow
-7°C to -20°C (19°F to -4°F)
- Old, transformed snow
-10°C to -30°C (14°F to -22°F)

VR30 LIGHT BLUE

Designed for cold to extremely cold conditions. New recipe 2007.



- New fallen snow
+2°C to 0°C (36°F to 32°F)
- Old, transformed snow
0°C to -3°C (32°F to 27°F)

VR55 SILVER/VIOLET

For moist snow around freezing and for older, more coarse snow just below freezing. Perfect balance between kick and glide.



- New fallen snow
-2°C to -8°C (28°F to 18°F)
- Old, transformed snow
-4°C to -12°C (25°F to 10°F)

VR40 BLUE

For normal, subfreezing temperatures. New recipe 2007.



- New fallen snow
+2°C to 0°C (36°F to 32°F)
- Old, transformed snow
+1°C to -2°C (34°F to 28°F)

VR60 SILVER

Designed for wet snow with little water content. When used below freezing high humidity and transformed snow is required.



- New fallen snow
0°C to -4°C (32°F to 25°F)
- Old, transformed snow
-2°C to -8°C (28°F to 18°F)

VR45 FLEXI

Light violet. A flexible wax for temperatures around freezing and colder. New recipe with better kick 2007.



- New fallen snow
+3°C to 0°C (38°F to 32°F)
- Old, transformed snow
+1°C to -1°C (34°F to 30°F)

VR65 RED/YELLOW/SILVER

A great kick wax! Used on fresh- and moist to moderately wet snow.



- New fallen snow
+1°C to -2°C (34°F to 28°F)
- Old, transformed snow
0°C to -5°C (32°F to 23°F)

VR50 VIOLET

Designed for moist to dry snow around freezing 0°C (32°F). When used below freezing high humidity and transformed snow is required. New recipe without silver 2008.



- New fallen snow
+3°C to +1°C (38°F to 34°F)
- Old, transformed snow
+2°C to 0°C (36°F to 32°F)

VR70 KLISTERWAX

Red. For wet and moist new snow. Works also on wet transformed snow down to 0°C (32°F). Apply thicker if very wet.



- New fallen snow
+2°C to +5°C (36°F to 41°F)

VR75 KLISTERWAX SOFT

Yellow. For wet snow, glazy tracks. Must be applied evenly. To be used in tracks only.

V-LINE HARD WAXES



- New fallen snow
-8°C to -15°C (18°F to 5°F)
- Old, transformed snow
-10°C to -18°C (12°F to 0°F)

V20 GREEN



- New fallen snow
0°C (32°F)
- Old, transformed snow
-1°C to -3°C (30°F to 27°F)

V50 VIOLET



- New fallen snow
-2°C to -10°C (28°F to 14°F)
- Old, transformed snow
-5°C to -15°C (23°F to 5°F)

V30 BLUE



- New fallen snow
+1°C to 0°C (34°F to 32°F)
- Old, transformed snow
0°C to -2°C (32°F to 28°F)

V55 RED SPECIAL



- New fallen snow
-1°C to -7°C (30°F to 19°F)
- Old, transformed snow
-3°C to -10°C (27°F to 12°F)

V40 BLUE EXTRA



- New fallen snow
+3°C to 0°C (38°F to 32°F)
- Old, transformed snow
+1°C to -1°C (34°F to 30°F)

V60 RED/SILVER



- New fallen snow
0°C to -3°C (32°F to 27°F)
- Old, transformed snow
-2°C to -6°C (28°F to 21°F)

V45 VIOLET SPECIAL

TIP:
On older, transformed snow you wax softer than on fresh, new snow at the same temperature.

KR-LINE KRYSTAL KLISTER



Frozen corn (old) snow

KR20 BASE KLISTER

Green Base Klister.

-3°C to -25°C (27°F to -13°F).

This is mainly a Base Klister and has high resistance against ice and hard coarse snow. To be used as the first layer for better adhesion of the other

klusters to the base. Always apply indoors with a waxing iron appr. 110°C (230°F). Only cover the sanded grip zone. Heat the tube slightly for easier application. By "edging" the waxing iron you get a controlled equal distribution of the klister.



Frozen corn (old) snow

KR30 ICE KLISTER

Blue ice klister.

0°C to -15°C (32°F to 5°F).

For coarse snow/hard tracks and icy conditions. Is excellent on hard packed coarse cold snow, but can also be an alternative to KR20 as base klister.

It is easier to apply than KR20. It is also often used as the "in between" klister on top of KR20. KR30 is rarely used as the last layer in a ski race due to the preparation of the tracks. For general skiing on cold mornings after it has been wet the day before, it is a highly useful product.



Frozen corn (old) snow

Wet corn snow

KR35 VIOLET SPECIAL KLISTER

+1°C to -4°C (34°F to 25°F).

For conditions around 0°C (32°F) and slightly colder. Good mid layer klister on top of green klister. Top klister, red

or universal, will then not slide backwards.



Frozen corn snow

Transformed moist fine grained snow

Wet corn snow

KR50 FLEXI KLISTER

Violet Flexi klister.

+3°C to -4°C (37°F to 25°F).

Flexi differs from the other klusters by being made for more varied snow, from fine to coarse. The ideal range is slightly on the colder side, but gives also grip above freezing.(32F). It is the klister that can take the most fine grained snow of all klusters in the market. The reason is that KR50 contains silver. Compared to KR21N Silver Universal it is slightly harder and can thus take colder and more finegrained snow.



Transformed moist fine grained snow

Wet corn snow

KR60 VARIO KLISTER

Red Klister for wet to moist snow. 0°C to 5°C (32°F to 41°F).

For changeable conditions right around freezing with the ideal range on the warm side. It works in moist, medium coarse to coarse snow up to appr. +5°C (41°F).



Wet corn snow

KR70 AQUA KLISTER

Dark Red klister for wet coarse snow +2°C to +12°C (36°F to 52°F).

Used when the snow has a high water content such as slush. The KR70 is the softest among the Swix klusters and will thus handle coarse wet snow the best.



KB20 GREEN BASE KLISTER SPRAY

First klister layer to be applied.

To be used with regular klister on top, or aerosol Quick Klister. For Racing, Sport and Recreation. Spray nozzle for upside down application that gives better control and less waste. The new spray nozzle makes it easy to apply a thin layer of base klister with only one stroke.



Frozen corn snow

Wet corn snow

K22N VM UNIVERSAL KLISTER

+10°C to -3°C (50°F to 27°F).

Improved flexibility toward fine-grained moist snow, without icing up. Improved grip on wet, coarse-

grained snow. Improved "feeling". To be applied as the final layer of klister. Comparable to the old, famous VM-klister from 1982. Frequently used in World Cup competition.



Frozen corn snow

Transformed moist fine grained snow

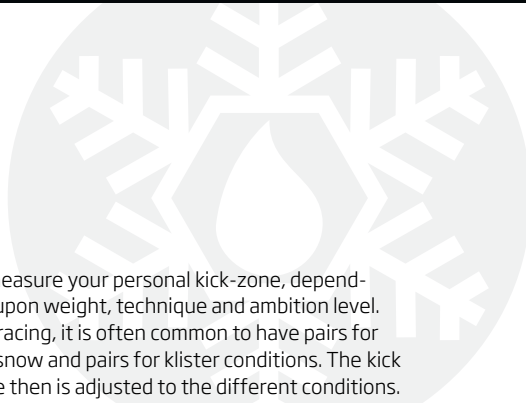
Wet corn snow

K21N SILVER UNIVERSAL

+3°C to -5°C (37°F to 23°F).

For mixed wet and dry snow conditions (fine/medium coarse) to coarse, moist snow. Can be used on both sides of freezing but is more used on finer snow than K22 VM Universal. K21N is somewhat softer than KR50 FLEXI and gives better grip when it gets warmer and has thus a wider range than KR50.

ZERO-CONDITIONS



First, we must define what we mean by the term “zero-conditions”. In ski terminology “zero-conditions” means a situation characterized by air-temperature close to the melting-point, 0°C, in addition, there is typically falling or new fallen snow, which is usually moist. The conditions are further characterized by shiny, icy tracks after some use. Note that temperatures close to zero do not always result in the same challenge to waxing. If the snow has gone through one or more cycles of melt-freeze, the snow consistency does not change that rapidly around the critical temperature of 0°C.

Due to the fact that kick waxes for these conditions are relatively soft, they are vulnerable to icing. Although it might be somewhat difficult to find the right wax for skating, the problems are mainly involving classical skiing. There are no exact rules to follow; however, we will give some general advice. As always, the choice of wax depends upon snow consistency, air-humidity and temperature. Just small variations in temperature cause large changes in snow consistency around the melting point where both ice, water and water-vapor might exist together. Falling or new fallen snow around zero normally calls for a soft type of hard-wax. Klusters are too soft. With more transformed snow and snow gradually building up free water, klusters begin to work.

In between the extremes of using hard-wax and kluster, there are many possible combinations, involving thin layers of kluster, covered by hard wax. The hard wax protects towards icing and the bottom kluster works as a “pillow”, giving improved kick.

The Kick Zone

Advanced skiers frequently have more than one pair of skis, selected for different snow conditions. In the racing shops you will find assistance

to measure your personal kick-zone, depending upon weight, technique and ambition level. For racing, it is often common to have pairs for dry snow and pairs for kluster conditions. The kick zone then is adjusted to the different conditions.

If you have only one pair, to be used in all conditions, it is practical to have kick zone markings for dry snow, zero-conditions and kluster. In this case the length will be shortest for the kluster. However, it is hard to find a pair, working well in all conditions, due to differences in ski-constructions and base materials, but it is possible to do efficient adjustments to the glide zones using rilling tools.

Waxing alternatives for different snow conditions

Below we have given alternative solutions for waxing by different conditions. As mentioned, zero-conditions imply that small differences in the choice of wax might have large consequences on the performance. Therefore, we always recommend accurate testing on the actual site. Even “experts” fail from time to time. Learn from experience and do the experiments while training and then trust your knowledge when racing!

Falling and new-fallen moist snow

Apply one layer of VG30 base wax by warming it into the base with an iron temperature of 110°C. Let the skis cool down to room-temperature. Apply a layer of V30 Blue, which also is warmed by iron at 110°C. Work carefully so that the blue wax covers the base wax and does not blend into it. Let it cool and work by cork T10 or T12 synthetic cork to make the surface smooth.

Then cover this with thin layers of VR55, corking in between each layer. The number of layers depends upon ski stiffness, but normally

we recommend 3-4 layers. If the skis are slippery, more layers or working with the softer waxes (VR60, VR65, VR70, VR75) are the two alternatives.

It is not always necessary to start with the VR55. After some experience you might go directly to one of the softer waxes. However, there is a general rule to start hard and go softer. A soft wax which ices up has to be removed before a harder wax is applied.

Tip 1: Use a relatively new cork working with soft kick waxes. On zero-conditions we stress the importance of exact corking. All irregularities in wax thickness might introduce icing.

Tip 2: Do sufficient testing to judge the kick. In zero weather the skis often feel slippery in the beginning, but work well after the first 5-600 meters. It is a common mistake to judge too early by testing too short, and go back and apply a wax a little softer, which might ice up or go too slow.

Slush and falling wet snow («rubbing-conditions»)

Alt. 1

Apply VG30 and V30 as described above. Apply 3 layers of VR70, the last layer melted at 80-85°C. Work slightly to obtain a smooth, shiny surface, without pushing the wax to the sides or into the groove.

Alt. 2

Same procedure as Alt. 1, but substitute VR70 with VR75. This might be a good alternative in steady precipitation.

Alt. 3

Spray on a layer of KB20 spray base kluster. Then apply a thin layer of K21 silver universal kluster.

Once more we repeat the importance of a smooth, even layer. Let the skis cool down to surrounding temperature. Then add a layer of VR75 which should be ironed at 80°C (same as Alt. 1).

Alt. 4

Use Zero-skis (or rubbed skis). In many cases this will correspond to the ideal range of Zero-skis. See treatment of those below.

Tip: Keep the skis moving; do not take off the skis outside the track. To go outside the trail, might cause instant icing.

Glossy, shiny trails

Alt. 1

Spray on a layer of KB20 spray base kluster. Then apply one thin layer of K22 VM universal kluster. Smooth, even the layer out. Cool to surrounding temperature. Apply one layer of VR70 which then is ironed at 80-85°C.

Alt. 2

As Alt. 1, but K22 VM and K21 are blended in equal ratio.

Alt. 3

Apply one layer of KB20 spray base kluster. Cover this with one layer of K22 VM universal kluster. This alternative demands wet snow conditions.

General tip: Zero conditions seldom cause much wear. A thick layer of wax is not necessary and might reduce glide too much.

Zero skis

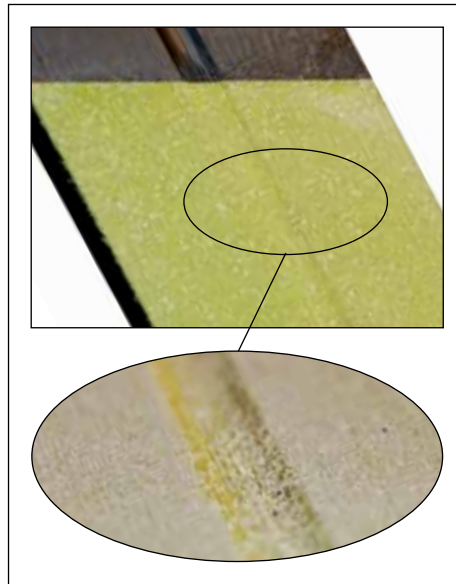
The new Zero skis might be an ideal alternative on falling or new fallen snow close to 0°C. All major ski brands now carry such models. They have a special rubber/polymer blend material in the kick zone, which to a certain degree can be manipulated by sanding paper. The grit# to use is determined by track and snow conditions. Most common are #60 to #100.

General tip

With precipitation a combination of #80 and #100 is satisfactory. These conditions are characterized by a continuously supply of moist snow, never creating very hard or glossy trails.

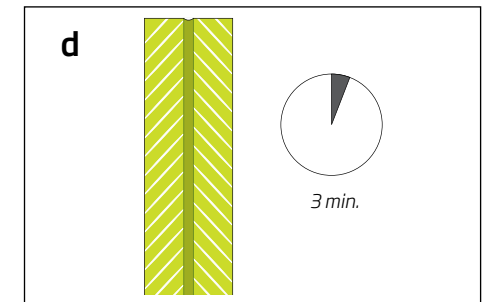
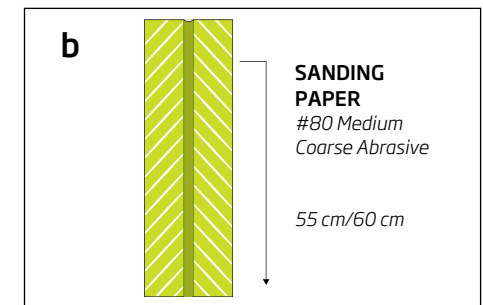
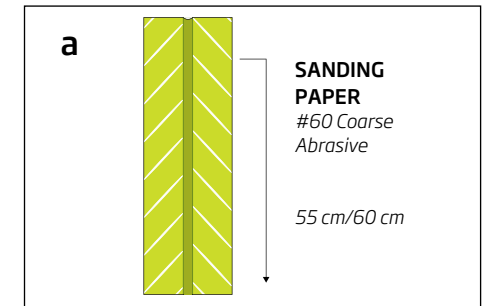
With shiny tracks a more coarse paper might be used such as #60 and #80.

Remember that Zero skis are not always the solution for difficult conditions. During long lasting competitions or tracks having large altitude differences, conditions might alternate or change. In such cases, the alternatives of using traditional wax, might work better.



PROCEDURE FOR RUBBING

- 1.** Set the marks for the kick zone, about the same length as for soft kick waxes.
- 2.** Roll the sanding paper around a waxing cork to get a stable surface for working.
- 3.** Sand the kick zone by working at a 45 degree angle, towards the running direction along the kick zone. Repeat the process from the other side, thus creating an arrow pattern towards speed direction.
- 4.** Remove dust and debris with Fiberlene (T150) or similar.
- 5.** You can now repeat point 2-4 using a finer grit# paper. Two different grits are often used, but always start with the more coarse one.
- 6.** Lastly, treat the base with Zero spray (N0002). Keep the bottle 4-5 cm from the base, spray on both sides of the groove (4-5 sec. on each side). Let the skis dry for 2-3 minutes before use. It is also possible to work in Cera F powder (FC8X) by hand to the rubbed kick zone.
- 7.** The kick zone will always collect dirt. Cleaning with a wax remover (I64 or I74) is recommended. Let the ski dry for 30 minutes.



APPLICATION OF BASE WAX



1. Sand the grip zone with #100 grit paper (T330 Sand Paper or T11 Combi Sanding Block) approximately 60-65 cm. Wipe off dirt and base residue with Fiberlene (T150). We recommend sanding only in the tip to tail direction of the ski to prevent rounding-off of the side-edges. *Sanding should always take place AFTER treatment of the glide zones, to avoid getting glide wax/powder into the kick zone.*



2. Apply a thin layer of base wax (VG35 or VG30) in the kick zone.



3. Iron (110°C to 80°C) and let the wax cool off for a few minutes.



4. Apply a layer of V30 Blue (or V40 Blue Extra).



5. Swiftly move the warm iron over the kick-zone once more. This wax layer should melt on top of the base wax and not mix with it. Let cool off and cork out.



HARD WAXES (0°C and colder)

Grip waxes are available in many different consistencies (hardness and tackiness) meaning different application methods are essential for the best results. Hard waxes for colder snow temperatures (VR30-VR50 and V05-V45) are easier to apply than the softer, warmer ones (VR55-VR75 and V50-V60); but a few simple tricks make it easy to use the soft waxes.

Tip 1:

It is possible to build the layers like a "pyramid", applying thinner and thinner layers, ending up with the thickest layer under the foot.

Tip 2:

Try not to apply the wax with thick layers. You will get a better result by applying more thin layers than fewer thick ones.

Tips 3:

When corking in the hard wax do not apply too much pressure. You will have better performance from your kick wax if you leave some "structure or texture" in the wax.

Tip 4:

Apply the first layers indoors, but it is always an advantage to apply the last layers outdoors. Let the ski adjust to the air temperature outside before testing.

6.

Select the actual kick wax of the day. Apply 4-8 thin layers, cork between each layer.

SOFT WAXES (0°C and warmer)

Base wax is applied the same way as described in points 1 to 5 above. As an alternative, points 2 and 3 could be substituted with Application of Base Klister (page 62 in this manual).

Try to apply the layers of wax as thin as possible. *Softer kick waxes will naturally be thicker than when using harder waxes; therefore, it is normal to apply fewer layers of soft waxes.*

Tip 1:

The colder the wax, the more easy the application. Apply outdoors or put the wax in the fridge or the snow before application.

Tips 2:

Soft waxes are easier to cork out using a new cork. If you cork too hard you risk the wax getting a "chewing gum consistency". Consequently, use light pressure and more strokes.

Tips 3:

Cork to an exact, even layer. This way the risk of icing-up is greatly reduced.

TIP:
Angle the wax against the base and the application becomes easier!

APPLICATION OF BASE KLISTER (KB20)



1.
Sand the grip zone with #100 grit paper (T330 Sand Paper or T11 Combi Sanding Block) approx. 60-65 cm. We recommend sanding only along the length of the ski to prevent rounding of the ski side-edges. Sanding should always take place AFTER treatment of the glide zones, to avoid getting glide wax/powder into the kick zone. Wipe off dirt and base residue with Fiberlene (T150).



2.
Fasten a small piece of tape at the end of each kick zone to prevent any klister in the glide zones.



3.
Apply the base klister by holding the bottle upside-down and move it slowly along the ski on both sides of the groove. Distance between base and nozzle should be 4-5 cm.



4.
Use the forefinger to remove klister in the groove.



5.
Then carefully use your thumb on each side of the groove to smooth out the klister. It is important that you smooth out the klister immediately after spraying.

Remove the tape and let the klister dry for 2-3 minutes. The ski is now ready for the next klister/wax layer (step 4 and 5 page 65).

APPLICATION OF KLISTERS



1.
Sand the kick zone with #100 grit paper (T330 Sand Paper or T11 Combi Sanding Block). Approx. 60-65 cm.

Always do the sanding after the glidezones are all finished and brushed to avoid getting glidewax like Cera F powder into the kick zone. The kick zone for klister in top racing is generally about the same as for hard wax, somewhat longer than many realize.



2.
Apply the first layer of klister very thin, just covering the sandpapered area. KB20 or KR20 is a strong and durable klister normally selected as a base for KR30, KR35, KR50, KR60 and KR70. KR30 can also be used as the first layer of klister, i.e. as a base for KR60 or KR70 in wet snow conditions.



3.
Iron the first layer of klister carefully into the ski base. Thereby a much better contact is achieved between klister and ski.

Let the ski cool.



4.
Apply the middle layer of klister. KR35 and KR30 are the most used. Apply it in a fish bone pattern. Use a heatgun lightly to soften it, and rub it in with the thumb to an even layer.

Let the ski cool.



5.
Select and apply the klister of the day. Use a heatgun lightly and rub it in with the thumb to an even layer. Scrape the groove with the Groovescraper (T88).

AFTER THE RACE

THE USE OF GLIDE WAX CLEANER (I84) - GLIDE SECTION/SKATING SKIS



- 1.** Brush lightly with the Steel Brush (T179) or Bronze Brush (T162).



- 2.** Moisten a piece of Fiberlene (T150) and apply to the glide zone of the base.



- 3.** Rub forward and backward a few times with a Nylon Brush (T161B).



- 4.** Wipe off as much as possible with Fiberlene (T150).

Let the ski dry for 5-10 minutes.



- 5.** Brush firmly with the Bronze Brush (T162). The ski is now ready for application of new glide wax.



- 6.** Apply the travel wax: The most likely wax to be used in the next race. National Teams use often HF8 or LF8. BP88 is also an alternative. Iron in.



KICK SECTION

- 1.** Remove as much as possible using a scraper (T87 or T85).



- 2.** The remainder is taken away with wax remover (I64) and Fiberlene (T150). Don't forget the sides and the tops of the skis.



- 3.** Wipe off as much as possible with Fiberlene (T150).

Let the ski dry for 5-10 minutes.

Base Cleaners and Accessories for Removal of Hard Waxes, Klisters and Glide Waxes

Waxes and klisters to a high degree consist of water-resistant, inert, tough stable materials. This means that they are also difficult to remove from the ski base. Solvents are necessary for thorough base cleaning.

Swix Base Cleaner and Swix Citrus Solvent are both formulated to minimize health and fire hazards.

Traditional solvents like trichlorethylene or methylenechloride were frequently used as solvents for oil, fat and also waxes. These high aromatic solvents, however, are considered as health hazards and should be avoided. They are not found in the Swix wax removers.



SWIX BASE CLEANER

The active ingredient in the 500 ml (10064) and 1 liter (10067) is a low aromatic hydrocarbon with good solvent capacity.



CLEANER FOR FLUORO GLIDE WAX / CONDITIONER FOR RACING SKIS

Makes the ski faster!

Cleaner for fluoro glide wax and CH wax. Solves fluoro components, improves glide and conditions the base.

For glide sections on all racing skis.
10084: 500 ml/17.5 fl. oz.
10084-150: 150 ml/5 fl. oz.



SWIX CITRUS SOLVENT

(10074)
500 ml Citrus Solvent is a 100% citrus-based product, which also is a strong solvent.



FIBERLENE CLEANING TOWEL,
50 m (T0150).

SWIX WAXING TABLES AND PROFILES

To secure good waxing results it is mandatory to have the right working conditions: Good light and stable waxing benches.

SWIX CROSS COUNTRY ADJUSTABLE PROFILE (T0793) mounted with legs (T0079-1).

- Turns your profile into a traveling wax bench.
- Ideal for the traveling racer and coach.
- Provides great stability.
- Use alone on your existing wax bench or with legs (T0079-1).
- Compact, fits into your ski bag.
- Adjustable length.
- Locks into the skibinding.



SWIX WAXING TABLE (T0076) mounted with profile (T0769), skiholder (T0076SH) and waxing light (T0076WL).





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Cover photo: Nordic Focus
Photos: Swix Sport AS & Nordic Focus
Printed on recycled paper in Norway
by BK Gruppen

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