swix®

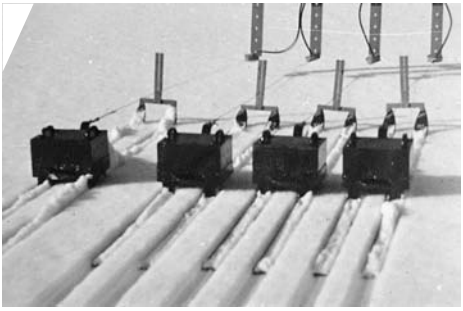
Nordic Ski Preparation

RACING 2009

swix SCHOOL

main sponsor xc Cresco

Founder of Swix, Martin Matsbo, is testing grip in 1946.



Scientific glide testing in 1946.

Test skier in speedtrap - 1946.

Swix takes pride in its 60 year history as one of the strongest and most recognized brand names in skiing.

Followed by pioneering research work in the mid 40's, the Astra Pharmaceutical Company introduced revolutionary ski waxes based upon synthetic materials. The new 3-colored system was a breakthrough for all skiers, and de-mystified and simplified waxing. The new Swix system of waxing replaced the unscientific and often secret concoctions of tar, beeswax, melted bicycle tire inner rubes, and phonograph records, to mention just a few of the obscure ingredients. Before long Swix waxes were found the world over, and recreational skiers and racers alike realized a new level of enjoyment and success.

In 1974 the Liljedahl ski pole factory merged with Swix. At that time bamboo poles were on the way out in recreational skiing and aluminum poles were being replaced with high tech composite materials in racing.

In the end of the 80's, Swix was the first to commercially introduce the 3rd generation ski wax, Cera F fluoro powder. "Cera F" has become a standard within ski waxing and is a trademark of Swix.

During its 60 year history Swix has compiled an unbeaten record of Olympic and World Championship victories.

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.

Contents

STEP BY STEP

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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.

1. NEW FALLEN SNOW
Below freezing

2. FINE GRAINED SNOW
Below freezing

3. OLD / GRAINED / TRANSFORMED SNOW
Below freezing

4. WET CORN SNOW
Above freezing

5. FROZEN CORN (Old) SNOW (Melted/Frozen)
Below freezing

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

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 T262N (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.

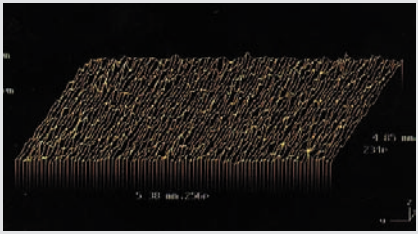
Medium/Fine structures:
This structure is a widely used structure.
For skating it is used in most snow conditions normally from -7°C (19°F) up to wet snow.
In very wet conditions a medium/fine structure combined with the use of an imprint tool (Swix T401/T405) has proven good results.
For classic skiing we recommend this structure in new and fine grained snow (normally between -7°C (19°F) and 0°C (32°F)).

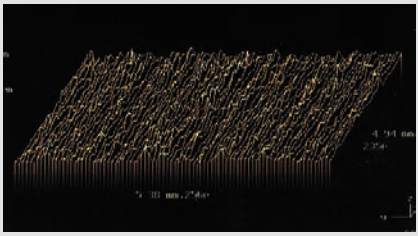
Medium/Coarse structures:
For classic skiing on coarse moist snow and wet, glazy new snow, often between 0°C (32°F) and +3°C (37°F) (KR50 Violet Silver klister conditions), a medium/coarse structure is preferred.

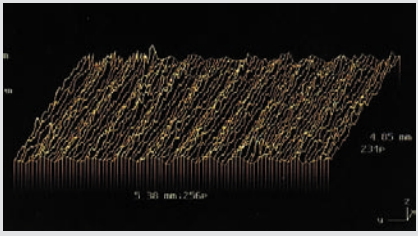
This structure is not often used in skating. Most skiers would then prefer to modify a medium/fine structure with the use of an imprint tool (as described further down).

Coarse structures:
This structure is rarely used in skating.
For classic skiing it is used on coarse wet snow (red klister conditions) and shiny/icy tracks above 0°C (32°F).

STRUCTURE EXAMPLES


FINE


MEDIUM/FINE


COARSE

Improving Stone Ground Skis by using Swix Imprint Tools

Over the last few seasons, Swix' Imprint Tool T405 has only gained popularity and by now most of the World Cup skiers are having their skis tuned with the T405.

The following chapter describes when to use and how to make a normal stone ground base even better to match the conditions of the day. The Swix Imprint Tool T405 and Rilling Tool T401 can be used independent of stone grinding. One advantage of the Swix Hand Structure Tools is that with one or two pairs of skis, you can easily adjust the structure to the conditions of the day. This is rational for young and older racers as well as for top racing athletes.

The use of the terms "Imprint" (T405) and "Rilling" (T401) has to do with the method the structure is applied to the base. While the T405 use steel rollers which apply structure to the base in a rolling movement, the T401 uses fixed brass blades.

Swix Super Riller T401

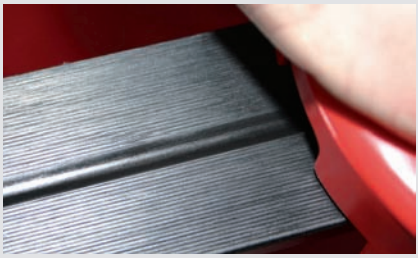
When using Swix Super Riller in combination with stone grinding, it is generally after scraping and brushing. In cold temperatures the fine irons are used, and from -1°C/0°C (30°F/32°F) and warmer the medium and coarse irons are used.
Swix Super Riller does not deform the base, but presses the structure in. When rewaxing a couple of times with a hot iron, the base will regain most of its original structure. The T401 1 mm and 2 mm rilling blades are constantly used by top Racers/Technicians in the World Cup. It can give an increase in speed of as much as 1 km/h.

The T401 comes as standard with the Medium (0.75 mm) blade.

The range of optional blades for the T401 Super Riller includes:

X Fine	0.25 mm
Fine	0.5 mm
Medium	0.75 mm
Coarse	1.0 mm
X Coarse	2.0 mm
XX Coarse	3.0 mm

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



Swix World Cup Imprint Tool Set T405

The Swix World Cup Imprint Tool T405 is a hand crafted, high quality tool. It comes with imprint rollers manufactured in a very high steel quality undergoing advanced production processes.

The T405 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. The World Cup Imprint Tool T405 comes as a set with two structure rollers (0.3 mm and 0.5 mm).

Due to high production cost, the T405 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 9.

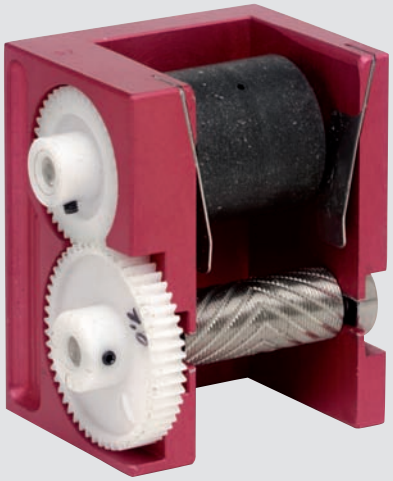
The Swix T405 includes the following rollers:

FINE 0.3 mm:
To be used in new, fine grained and coarse snow from -12°C to 0°C (10°F to 32°F).

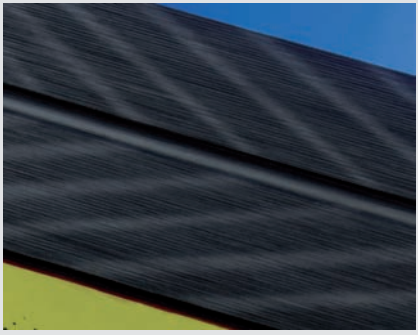
MEDIUM 0.5 mm:
To be used in new, fine grained, coarse, and icy snow from -5°C to +1°C (23°F to 34°F).
To be used in mixed (new and transformed) snow from -1°C to +3°C (30°F to 37°F).

Optional blade for the T405:

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). Can be combined with the T401 structure tool (1, 2 and 3 mm).



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



1 mm

Practical Guidelines when Setting Structure with Hand Held Tools

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.

In skating a medium/coarse or coarse structure is rarely used due to varying conditions in a skating slope and the negative effect this will give on “feeling” (which has to do with the resistance in pushing the ski forwards). In skating a fine or medium structure is preferred as the standard, these structures will then be modified with the use of the structure/imprint tools “on top of” the underlying stone grind. Be aware of the amount of pressure when applying the hand made structure. In skating it is most important to apply light pressure on the front half of the ski. A harder pressure will be applied from the binding and backwards. This has shown to give an optimal mix of “good glide” and “free feel.”

- 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.

OBS!
Keep your structure rollers/blades clean and store them separately and protected.

Never clean your structure tool with a metal brush!

GUIDELINES FOR THE USE OF T405 AND T401:

Description of snow and wax	Air temperature in °C (°F)	Air humidity in %	Blade/Roller to use		Pressure on tool	
			T401	T405	Pressure	Tool
New, fine, coarse, artificial snow CH4, LF4, HF4	Colder than -12°C	Low	No use	0.3	Light	T405
New, fine, coarse, artificial snow (LF6, LF4) HF6, HF4	-12°C – -5°C	40% +	No use	0.3	Light	T405
New, fine, coarse, glazed icy tracks, coarse dry snow (FC7, FC8)	- 5°C – +1°C	60% +	0.5	0.5	Light	T401 or T405
New, fine, coarse, mixed and moist snow (FC8)	- 1°C – +3°C	60% +	0.75 + 0.5	0.5 + 0.3	Medium	T401 or T405
Wet, coarse snow (FC8, FC10)	0°C – +10°C	60% +	1	1	Medium	T401 and T405
Extreme wet snow (FC10, KR70)	0°C – +20°C	60% +	1/ 2 / 3	1	Hard	T401 and T405

Comments:
- **Structure should always be fresh (sharp) except in very cold (dry) conditions.**
- **It may seem like a freshly set structures functions better than older set structures.**
- **Always use light pressure on the front part of the ski when applying structure.**


swix
HIGH PERFORMANCE GLIDEWAX
CERA NOVA
With fluorinated compounds from Miteni (Italy)
CATEGORY 1 FC
100% Fluorocarbon
CATEGORY 2 BW
High Fluorocarbon
CATEGORY 3 HF
High Fluorocarbon
CATEGORY 4 LF
Fluorocarbon
CATEGORY 5 CH
Hydrocarbon
CERAF 10B
CERAF FC10
CERAF FC8
CERAF FC7
CERAF FC TOL
CERAF FC BL
CERAF SPRAY FCBA ROCKET
BW10BW
BW8BW
BW7BW
BW6BW
BW4BW
HF10
HF8
HF7
HF6
HF4
LF10
LF8
LF7
LF6
LF4
CH10
CH8
CH7
CH6
CH4
PR0901

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.**

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.

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

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

FC78 - Super Cera F Powder

A sensational new Cera F powder with a wide ideal range from +1°C to -10°C. Positioned between FC8 and FC7. Used with a base of HF4, 6, 7 or 8, or HFBW4, 6, 7 or 8. 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. Available in packages of 30 gram.

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 155°C/160°C (310°F/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, or by hand corking. The base waxes for FC7 are generally HF6, HF6BW or LF6, HF7, HF7BW or LF7. Available in packages of 30 gram.

FC8 - Cera F Powder Universal

The temperature range for this powder falls within the average, normal winter temperatures, and therefore FC8 is the most used of all Cera F waxes. Temperature range is +4°C to -4°C (40°F to 25°F). FC8 is ironed once. Maximum ironing temperature setting of 150°C (300°F). One pass with the iron taking no more than 4 or 5 seconds. Roto-Cork or hand corking application is also possible. The base waxes for FC8 are HF8, HF8BW or LF8. Available in packages of 30 gram.

FC10 - Cera F Powder Wet

This powder is designed for very wet conditions. The temperature range is from +2°C to +20°C (36°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 150°C (300°F) with a 4 or 5 second pass of the iron. Application with the Roto-Cork or hand corking is also possible. The base waxes for FC10 are HF10, HF10BW or LF10. Available in packages of 30 gram.

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. Used with HF10BW or HF8BW. 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 or hand corking is also possible. Available in packages of 30 gram.

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 also is an economical way to use Cera F.

Roto-Corking 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.

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.

FC7BS - Cera F Solid "Cold Turbo"
100% fluorocarbon solid block of wax.
Temperature range from -0°C to -20°C (earlier FC1S). For transformed/man made snow. The black additive has positive effect in cold snow, dry friction. Used alone or as the final "accelerator" layer.

FC8WS - 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, 8, 7 or HFBW10, 8, 7. Also used on top of Cera F powder as "topping".

New 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 and fully substitute the BD-line. 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 it's 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 FC8.

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 FC8.

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. Conditions of high humidity are optimal for HF waxes. Availble 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 FC78 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 FC78/FC8 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 FC10/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.

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 FC8 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 traveling. The snow is often dirty at the temperatures calling for LF10, therefore an overlayer of Cera F FC10/FC10B0 is recommended.

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.

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
-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.

• The economy brushes are multipurpose brushes made as an affordable alternative for the sport skier.

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.

Most of the Swix brushes come in two sizes. The smaller rectangular are easy in use and convenient when travelling. The larger oval brushes are suited for efficiency and comfort when preparing multiple skis.

A fully equipped range of brushes should contain:
- The Fine Steel Brush used for cleaning and base surface restoration (T192N/T188) before waxing.

- The Medium Coarse Steel Brush to use after waxing and scraping (T179R/T179O).

- The Blue Nylon Brush as final finish (T160/T186).

For Cera F Powder the following three brushed are needed:
- One stiff Black Nylon Brush (T194N/T199) for the “brush up” step and after ironing.

- One Wild Boar Brush (T164/T198) or Horsehair Brush (T157/T195).

- One Blue Nylon Brush (T160/T186 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.

Photo: Scanpix

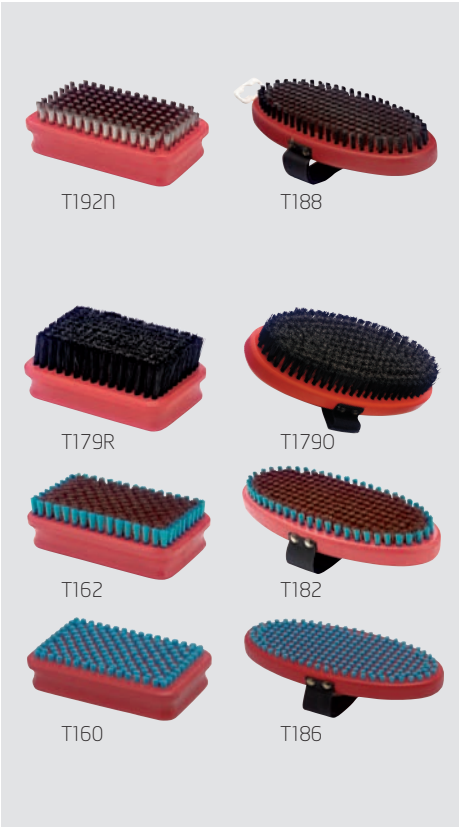
Brushes used before waxing

T192N/T188 Steel Brush
A fine steel brush for “cleaning” deep into the structure before waxing. 5-6 strokes. For refreshing the base. Makes bases absorb more wax.

Brushes after waxing and scraping

T1790/T179R Steel Brush (or T162/T182 Bronze Brush)
A medium coarse steel or bronze brush to use after waxing and scraping. 10-12 strokes.

T160/T186 Blue Nylon Brush
A fine soft nylon brush for polishing. 4-5 strokes.



Brushes for Cera F Powder

T194/T199 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.

T157/T195 Horsehair Brush
(or T164B/T198B Wild Boar Brush)
Second brush on Cera F powder. An "animal" brush for brushing powder away. 10-12 strokes.

T161/T186 Blue Nylon Brush
A fine soft 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. Even many top level technicians will use Roto Brushes for initial brushing after scraping, and then usually finish with hand brushing. Also Roto-corking is often the preferred way to apply Cera F Powder, Solids and Liquid.

The best drill choice for roto-brushing is one with a power cord rather than batteries. These drills retain a more constant speed, have higher revolution per minute capacity, and variable speed options. RPMs from about 1000 to 2000 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.

T17B Black Stiff Nylon
Special brush for hard cold waxes. Can also be the first brush on Cera F. 100 mm wide.

T17W White or Blue Nylon
Polish brush for wax and Cera F. Also preferred by some as “all round” brush. 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.

T15NH Black Stiff Nylon and Horsehair
Cera F brush. Start with the stiff nylon and finish with the horsehair. 140 mm wide.

T15DB Horsehair and Soft Nylon
Economy all round brush for both wax and powder. Start with the horsehair and finish with the nylon. 140mm wide.

T15HPS
Handle with 140 mm driveshaft and 100 mm wide protection cover.

T14HPS
Handle with 100 mm driveshaft and protection cover.

T18C Cork
High quality cork for Cera F application of powders, liquids and solids. 100 mm wide.

T19S Steel
Fine steel brush to clean base structures before waxing. Can be used as second brush on wax after T16M Horsehair brush.

NOTE!
- Always use safety glasses when roto-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.


T16M


T14HN

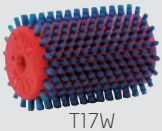

T14HPS


T17B


T14SS - 100 mm


T14SM - 140 mm


T14SL - 200 mm

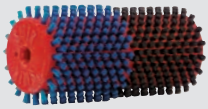

T17W


T18C


T15HS


T19S


T15NH


T15DB

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.

T72 “World Cup” Digitale iron (T72110)
With a 12 mm extra thick heating plate which provides optimal temperature stability.
New generation and patented “Heating paste technology”.

This digital iron utilizes an advanced microchip to control the temperature. Easy to set temperatures by pressing buttons, temperature given in an accurate digital temperature display.
The heating plate is angled in one end for easy and precise application control when waxing with Cera F powders. Wax-guide with the right temperature setting for each category included.

T73 “Performance” iron (T73110)
New generation and patented “Heating paste technology”. With 8 mm thick heating plate giving a stable temperature.

Accurate temperature control by microchip and a new dial design. Heating interval from 100°C - 165°C (212°F-330°F). The heating plate is angled for easier application control when waxing with powders. Wax-guide with the right temperature setting for each category included.

T74 “Sport” iron (T74110)
Economical iron with adjustable temperature. Standard heating plate. Light indicator for correct temperature setting. With clip for the FCI method: Fast Clean Ironing with paper between the wax and the base.

Swix Iron cover (R0384)
For protection and easy traveling. For all irons.

— 165°C/155°C
330°F/310°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

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 loosing 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

Before any application of kick wax, it is very important to sand 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. Start with this zone and then do some minor adjustments after your first time on the snow.

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. Sanding in a sideways motion has never proven to give longer lasting kick.

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. The base will have a grayish look after rubbing. 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, before any other hard wax we recommend the use of base wax (VG35) as the first layer. For longer distances or on aggressive snow (transformed), this is a safe choice.
On less aggressive snow (cold, new or fine-grained), the amount of VG35 could be reduced or substituted with V30 Blue wax. The risk of loosing glide, using VG35 even on such conditions, is very limited.

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 wax is used at top level racing events whenever hard waxes are used. Many of the leading teams in the world consequently use Swix VG35. VG35 has excellent durability and wear qualities and holds other waxes, without reducing glide.

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

VG35 BASE BINDER GREEN
-1°C to -22°C (30°F to -7°F).
A flexible and practical Base Wax for the VR- and V-waxes for colder conditions than -1°C (30°F).

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 witch 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.

Waxing near the Freezing Point (0°C)

The most difficult and critical condition to wax in is falling or new fallen snow at freezing. There are no rules to handle this, but we can give some general directions. The choice of wax will, as always, depend upon snow consistency, air humidity and temperature, and only small variations within these parameters may cause large differences in wax performance.

The most important factor is the snow consistency. If we have new or fine grained snow a klister will probably be too soft and cause icing. A soft, hard wax is most often the best alternative. High air humidity is compensated for by using even softer hard wax.

On more transformed snow, klister is a more likely alternative. In between there are many variations and combinations that often involves klister covered with hard wax. The hard wax creates a harder, less tacky surface, and reduces icing in certain parts of the trail that have lower temperatures. The VR55 – VR75 waxes are most current at "zero-conditions". VR70 is the only one without "silver" and works well in glazed trails, alone or in combinations with klister.

About V-Waxes

The V-line waxes are price sensitive. Although they do not have any fluorine additives, their raw materials are of very high quality.

The V-line includes all Swix classics, which have won numerous medals over the last 60 years. They are still used from time to time at the World Cup level. Swix "Blue Extra" still has an extremely high reputation with World Cup service personnel.

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.

Application of Klisters

We recommend applying klister indoors; and if possible, at room temperature. Klisters 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 62 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 KR40. 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 klisters, 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 klisters (KR40, KR60, KR70, K22n).

Covering Klisters with Hard Waxes

To reduce icing, klisters 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 KR40, 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.

KR40 is used on coarse grained snow (transformed) snow and is a relatively aggressive klister. Temperature should not fall too far below freezing before we recommend covering with VR40 or VR45.

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.

K21 can not handle cold temperatures. KR50 is tackier. K21n works well down to -3°C/-4°C, but works better than KR50 in moist/wet mixed conditions or on icey 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.

Swix Racing Service Team in action - Terje Smedvold og Ole Bjørn Tretterud.

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 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 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.

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.

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.

VR-LINE HARD WAXES

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 KLISTERS

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 klisters 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

Wet corn snow

KR40 COARSE SNOW KLISTER

Violet Klister for coarse snow.
+2°C to -7°C (36°F to 19°F).
Violet klister is an excellent klister for older coarse snow working on both sides of freezing. It is meant more for the cold side, but also functions well in wet conditions provided the snow is coarse. It has properties almost like a "Universal Klister". KR40 has become popular in World Cup Racing.

Tip: Applied thinly with a waxing iron it is a good base for VR50 and VR45 in older snow.

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 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 klisters 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 klisters 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.

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. New spray noozle 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. 70 ml.

Transformed moist fine grained snow

Wet corn snow

KR60 VARIO KLISTER - New recipe!

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. KR60 comes this year with a new recipe tested in World Cup with excellent results! KR60 takes over when KR40 becomes slippery. 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 (36°F) and warmer. Used when the snow has a high water content such as slush.
The KR70 is the softest among the Swix klisters and will thus handle coarse wet snow the best.

Frozen corn snow

Wet corn snow

K22N VM UNIVERSAL KLISTER

+10°C to -3°C (50°F to 27°F).
For coarse, granular snow changing from wet to crust. K22N VM Universal functions best in wet coarse snow. In Racing it can be positioned between KR60 and KR70. Remember to apply Base klister.

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.

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 patterns. It is very critical that all micro-burrs are removed from the base in cold 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.
Start by waxcleaning. It may be some dirt left from the stone grinding. 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).

2.
Scrape off after cooling to room temperature (5-10 minutes), and brush with a Medium Coarse Bronze Brush (T162) or Steel Brush (T179).

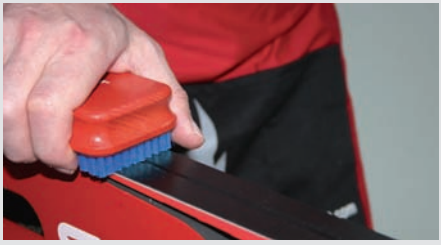
3.
Saturate the base with a relatively soft wax (CH10). The temperature of the waxing iron should be regulated to be hot enough to give immediate melting of the wax. Approximately 115°C (235°F).

4.
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.

5.
Apply CH10, iron in, and wait 5 minutes. Repeat four times. No scraping in between.

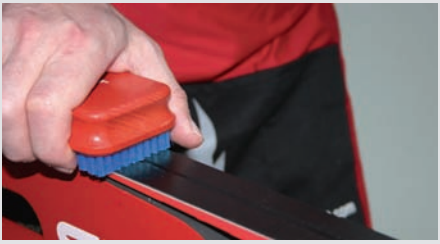
6.
Scrape off after cooling to room temperature (5-10 minutes).



7.
Use the Medium Coarse Bronze Brush (T162) or Steel Brush (T179). Use the brush in tip to tail direction, approx. 5-10 times.

8.
Apply the harder LF6. Iron temperature approx. 140°C (280°F).

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



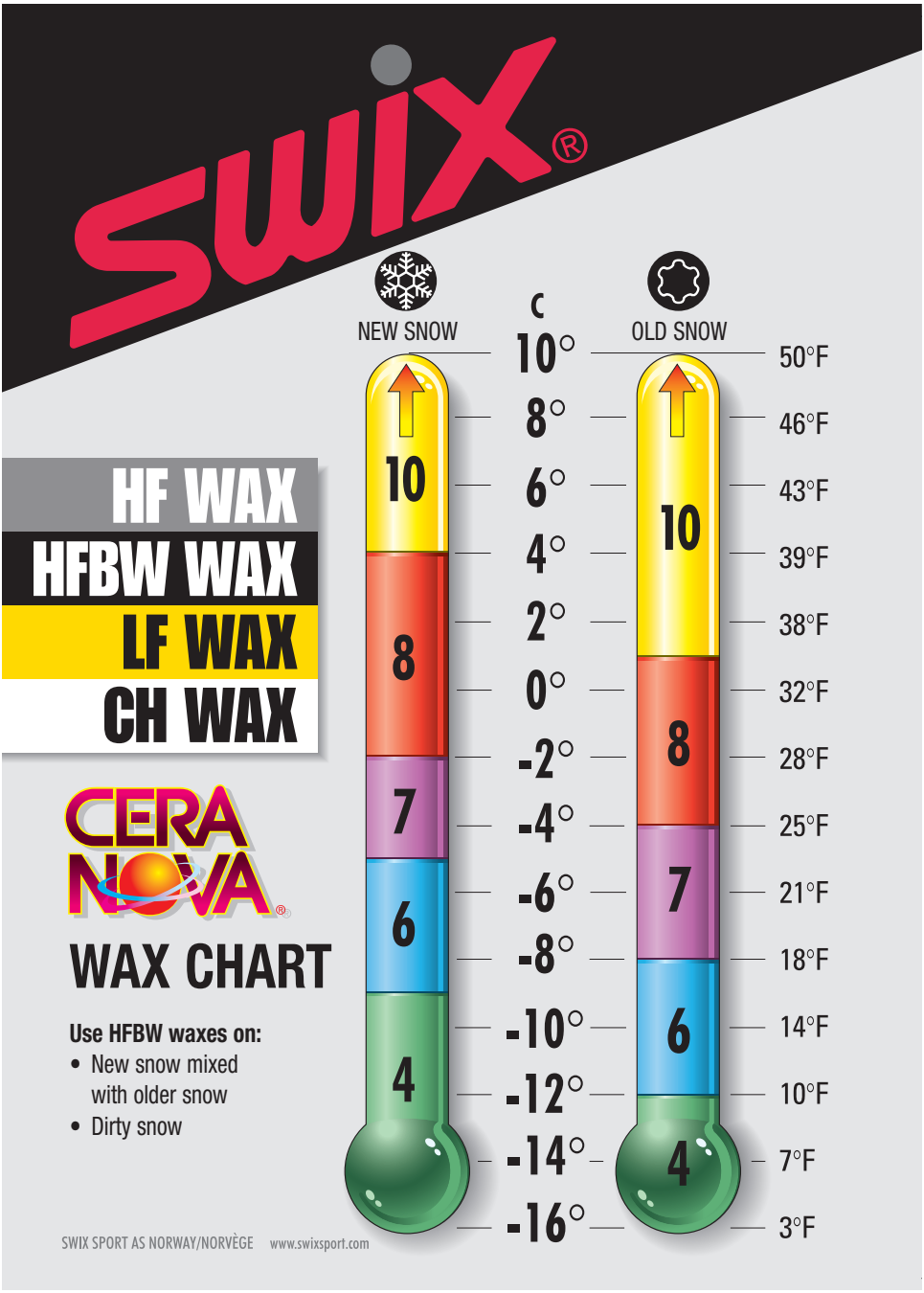
10.
Brush with the Bronze Brush (T162) or Steel Brush (T179) approx. 10-20 times.

11.
Use Purple Fibertex (T266N) to cut micro burrs. 20-25 strokes back and forth.

12.
Apply LF6 for the second time. Iron in. Let cool for 5-10 minutes. Scrape and brush.

13.
Use White Fibertex (T266). 20-25 strokes.

14.
Saturate the base with CH10/BP88 if it is a “wet” snow ski or with CH8/CH7 if it is a “cold” snow ski. The temperature of the waxing iron to be approximately 115°C/125°C (235°F/250°F). Wait 5 minutes. Apply four times. Iron in. No scraping in between. Scrape off and brush with Bronze (T162) or Oval Bronze (T182) 10 strokes.


swix®
HF WAX
HFBW WAX
LF WAX
CH WAX
CERA NOVA®
WAX CHART
Use HFBW waxes on:
• New snow mixed with older snow
• Dirty snow
NEW SNOW
OLD SNOW
C
10°
8°
6°
4°
2°
0°
-2°
-4°
-6°
-8°
-10°
-12°
-14°
-16°
50°F
46°F
43°F
39°F
38°F
32°F
28°F
25°F
21°F
18°F
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6
4
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Glide-Waxing

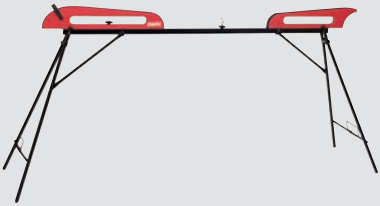
Practical Application of CH, LF and HF Waxes

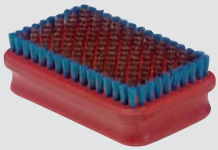
This is a general description of the methods and procedures used by servicemen on top level.

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). 20 repetitions from tip to tail, to “open” the base and remove surface oxidation.

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





4.

The waxes should easily melt, but the temperature must not be so high that smoke develops. Keep the iron in steady motion from tip to tail. Repeat 2-3 times. Let the ski cool off to room temperature.

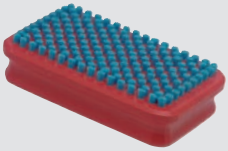
5.

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 (T823).

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 minutes.



7.
Brush the base with the Bronze Medium Coarse Brush (T162) or Steel Brush (T179).

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 155°C (310°F) for FC7.

The recommended temperature for ironing FC8 and FC10 is 150°C (300°F).

When ironing FC8 and FC10 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 FC7, the "hardest" powder, after approximately 5 minutes, the powder is "brushed up" (not brushed away) by using a back and forth scrubbing motion with the stiff Black Nylon Brush (T194/T199). Afterwards, make another single pass with the iron.
See page 46-49 for "Step by Step Application".

Brushing
Before brushing allow the skis to cool for about 5 minutes. Use the Swix Nylon Brush (T194) or Wildboar Brush (T164/T198). 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), or Swix Cera F Polisher (T154). 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 corking
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 50 for "Step by Step Application".

Use a separate brush for Cera F to avoid the mix with other waxes in the finishing layer.

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 klisters 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 USAGE OF FC78 SUPER CERA F POWDER WITH IRON

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 9 given in the section "Glide-Waxing", pages 41-43.

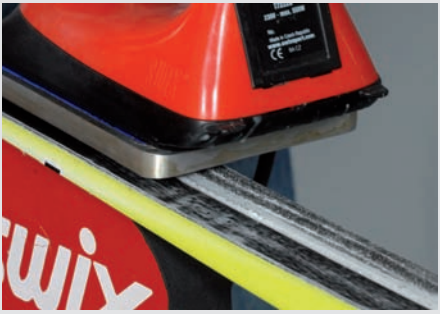
When applying FC78, it is very important to use a high quality waxing iron. We only recommend our T72 iron. The T72 with its high quality and advanced thermostat will help prevent damage to your ski base from an Iron that is too hot.

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. 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. 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), 10 strokes, and continue with the Wild Boar Brush (T164), 10 strokes.

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

RECOMMENDED USAGE OF CERA F POWDER WITH IRON

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 9 given in the section "Glide-Waxing For Today's Competition".

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 FC7 is 155°C.

For FC8 the temperature setting should be approx. 150°C. One pass with the iron from tip to tail takes approx. 5 seconds.

3.

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

NOTE:

FC7 should be ironed twice: Brush the powder up (not away) with the T194 brush and iron once more. Wait 5 minutes and brush away with the same brush, T194. FC7 can first be carefully scraped with a Plexi scraper because this powder is much harder to remove than the other powders.

4.

Continue with the Wild Boar Brush (T164). 10 strokes.

5.

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

CERA F POWDER ROTO CORK 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 T18C Roto Cork for ea tch different Cera F. Roto corks can be cleaned by setting in drill at high speed and then apply handbrush T162B Bronze towards the cork.

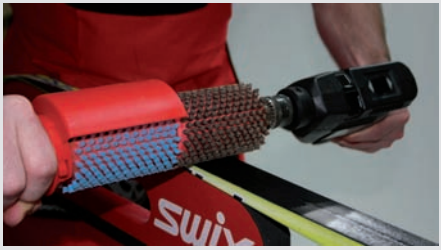
Cera F apllied with Roto Cork is sometimes applied on top of ironed and brushed Cera F as a "topping".

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 at a speed of approx. 1.000-1.500 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.

Use the 16M 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. (OBS! Do not use the same brush as for standard waxes.) Use light pressure. You can also use a Horsehair Hand-Brush (T157). 10 strokes.

4.

Finish with the T17W Soft Nylon Roto Brush. Twice in one continuous pass from tip to tail in four to five seconds. (OBS! Do not use the same brush as on standard waxes.) Use light pressure. You can also use a Blue Nylon Hand-Brush (T160/T186). 3 - 4 strokes.

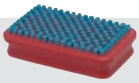
CERA F TURBO ROTO CORK APPLICATION

1.
Rub on an even layer.

2.
Use the T18C Roto Cork 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.
Use the 16M 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. (OBS! Do not use the same brush as for standard waxes.) Use light pressure. You can also use a Horsehair Hand-Brush (T157). 10 strokes.

4.
Finish with the T17W Soft Nylon Roto Brush. Twice in one continuous pass from tip to tail in four to five seconds. (OBS! Do not use the same brush as on standard waxes.) Use light pressure. You can also use a Blue Nylon Hand-Brush (T160/T186). 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/T186). Approx. 10 strokes.

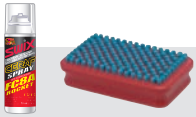
FC8A ROCKET ROTO CORK APPLICATION

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 for approximately 5 minutes.

2.
Work the liquid into the base with the Roto Cork (T18C). 1000-1500 rpm. Work from tip to tail moving the drill back and forth. Do not press too hard.

3.
Finish with the Blue Nylon Brush (T160/T186).



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). 15-25 strokes.

3.
Finish with the Blue Nylon Brush (T160/T186 or T196). 5 strokes.

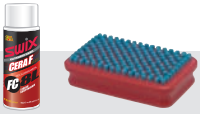
CERA F LIQUID ROTO CORK APPLICATION

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

2.
Use the T18C Roto Cork at a speed of approx. 1.000-1.500 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.
Brush with the Wild Boar Brush (T164) alt. Horsehair Brush (T157). Approx. 10 strokes.

4.
Finish with the Blue Nylon Brush (T160/T186). 5 strokes.



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).
15 - 25 strokes.

3.
Finish with the Blue Nylon (T196 or T160/T186). 10 - 15 strokes

CERA F LIQUID IRON APPLICATION

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

2.
Two passes with the iron. 3 - 4 seconds.
Wait 5 minutes for the ski to cool down.

3.
Brush with the Wild Boar Brush (T164).
Approx. 10 strokes.

4.
Finish with the Blue Nylon Brush (T160/T186).
5 strokes.

Abrading Cross Country Skis

The following describes a technique used to provide kick with less chance of icing during freshly fallen moist snow, or falling snow, at 0°C. For these special snow conditions, the temperature calls for soft (warm temperature) waxes, but the snow crystals are sharp and wanting to "catch" in the wax causing icing.

Most ski companies now have special "0 degree" racing skis that have various types of "mechanical" base material in the grip zone for providing grip during these difficult snow conditions. However, by using the following technique, normal skis can be modified to accomplish the same result. When all attempts to find the correct wax fail, it is then time to try the abrading method. Keep in mind that during longer races (30km, 50km) the snow conditions can change whereby the abrading method for kick can start to fail.

Choice Of Skis

Normally medium stiffness is recommended. When conditions are experienced where abrading is considered, the normal wax would be a soft kick wax (klisterwax) or a thin layer of klister like KR50 covered with a kick wax. The skis that are going to be used should fit this type of wax and snow condition. If the skis are too stiff it will be difficult to get grip. If they are too soft the skis will drag and be slow. Ideally, you should have one pair of skis used just for abrading.

The Process

The kick zone needs to be completely cleaned of any kick wax. Start by using #60 grit sandpaper. The sandpaper type should be silicon carbide or aluminum oxide. The sandpaper should be wrapped around a waxing cork or something similar. Abrade at an angle of approximately 45 degrees on each side of the groove.
Use short back and forth strokes with firm pressure. You want to create a fishbone angle pointing in the forward movement direction of the ski. Next repeat the procedure using #80 grit sandpaper with firm pressure. Under special (extreme) conditions when the track gets hard and glazed, you may need to use #40 and #60 grit sandpaper. You will need even harder sanding pressure with these grits. The base will look like it has been cut with a sharp tool. Later, even after stone grinding, you will still detect patterns from abrading. This is a reason for having a pair of skis reserved for this method.

After Treatment

When you are finished with the sandpaper treatment, it can help to go over the sanded area lightly with a blow torch (1 to 2 seconds).
This is to burn the fine hairs created by abrading in order to reduce the risk of icing.

Next you need to impregnate the abraded area with glide wax. Usually Cera F (FC8) is used. Thoroughly work the powder into the abraded area. An alternative is to use FC8A Rocket, liquid Cera F. Use enough to thoroughly saturate the zone and "massage" it well into the base.

Keep in mind that abrading needs to be repeated each time the technique is used since the sharp abraded pattern will wear down. Also the abraded area needs to be rewaxed following each treatment.

1

SANDING PAPER
#60 Coarse Abrasive

55 cm/60 cm

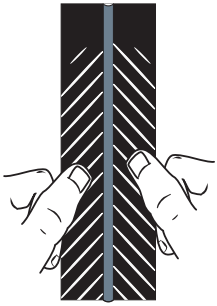
2

SANDING PAPER
#80 Medium Coarse Abrasive

55 cm/60 cm

3

4



"Massage" well into the base!

Application of Hard Waxes

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.

HARD WAXES (0°C and colder)

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) in the kick zone.

3.
Iron 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.

6.
Select the actual kick wax of the day. Apply 4-8 thin layers, cork between each layer.

NOTE:
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 1: 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 2: 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.
Tips 3: 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.

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.

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. Wipe off dirt and base residue with Fiberlene (T150). 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.

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 63).

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 glide-zones 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. KR20 or KB20 is a strong and durable klister normally selected as a base for KR30, KR40, 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. KR40 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.

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

GLIDE SECTION/SKATING SKIS

1.
Brush with the fine Steel Brush (T192N) or with the Steel Brush (T179R) approx. 10-20 times. The fine steel brush will clean the base and structure efficiently.

2.
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.

THE USE OF GLIDE WAX CLEANER (I84)

1.
Brush lightly with the Steel Brush (T179R).

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 Steel Brush (T179R). The ski is now ready for application of new glide wax.

KICK SECTION

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

2.
The remainder is taken away with wax remover and Fiberlene (T0150). Don't forget the sides and the tops of the skis.

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 (I0064) and 1 liter (I0067) is a low aromatic hydrocarbon with good solvent capacity.

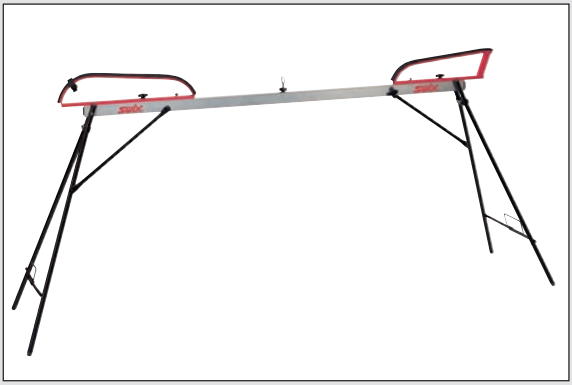
CLEANER FOR FLUOR GLIDE WAX / CONDITIONER FOR RACING SKIS (I0084)
Makes the ski faster!
Cleaner for fluoro glide wax and CH wax. Solves fluoro components, improves glide and conditions the base.
For glide sections on all racing skis and snowboards.
500 ml/17.5 fl. oz.

SWIX CITRUS SOLVENT
(I0074)
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 (T0771), skiholder (T0076SH) and waxing light (T0076WL).

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