



Datasheet

MARTENSITE

martensitic high-performance stainless damascus (#FFMARTENSITE)



#FFMARTENSITE is a stainless damascus steel, where we combine two high-performance martensitic steels UHB AEB-L + UHB SS716. Our production of damascus steel is a highly controlled process, made under high pressure in a protective atmosphere.

As a first composite, we use UHB AEB-L produced by Uddeholm with good corrosion resistance and excellent cutting abilities. Its maximal hardness is 64 HRC; however, we recommend tempering up to 61 HRC. This steel was developed for razors and razorblades because of its fine grain microstructure.

As a second composite, we use UHB SS716 produced by Uddeholm with good corrosion resistance and excellent toughness and fatigue properties. This steel was developed for the production of medical scalpels.

The number of layers depending on the size of basic „packet“ ranges between 150-350 layers. The final stainless damascus composite is fully hardenable and it brings nice silver-black contrast. This material is intended for production of high-end knives.

Technical information

Composition

For the production of our damascus steel, we use premium martensitic stainless steels by Uddeholm.

As a first composite, we use UHB AEB-L with excellent cutting abilities and good corrosion resistance. Its maximal hardness is 64 HRC; however, we recommend tempering up to 61 HRC. This steel was developed for razors and razorblades because of its fine grain microstructure.

As a second composite, we use UHB SS716, which brings toughness to our damascus. This steel is developed for medical scalpels production and has good corrosion resistance and excellent toughness and fatigue properties.

The final stainless damascus composite is fully hardenable, and it brings nice silver-black contrast.

Steel	Color	C	Si	Mn	P	S	Cr	Mo
AEB-L	Silver-shiny	0,65	0,4	0,65	<0,025	<0,015	12,8	
UHB716	Black	0,38	0,5	0,55	<0,025	<0,015	13,5	I

Forging

Generally, we do not recommend further forging of our damascus steel. It may lead to the destruction of steel fine grain structure and loss of its properties. However, if there's a need to forge our damascus steel, follow those instructions:

- The forging temperature is 950-1050 °C.
- Forging has to be done smoothly to prevent the creation of cracks.
- Forged steel is very durable, so forging is more difficult in comparison with usual carbon steels.
- Slow cooling is necessary after the forging process.
- The forged piece has to be annealed properly.

Machining conditions

Our products are soft annealed to provide the best possible machining and reaching hardness approx. 250HV. You can use all conventional types of machining. Recommendation of machining condition below:

- Milling – monolithic carbide mill --- Vc50-60 m/min
- For hard-milling (sizing) with monolithic carbide, mill feed up to Vc100 m/min
- Milling with VBD mill --- Vc75-100 m/min
- Milling with HSS-Co mill --- Vc14-16 m/min
- Drilling - HSS-Co drill --- Vc10-12 m/min
- Drilling – PVD coated carbide drill ---Vc60-80 m/min



Grinding

You can grind our steel on all conventional types of grinders. We recommend belt-grinders or Berger grinding machines.

We recommend sanding belts with ceramic grains for belt grinders, like 3M Cubitron II; however, all range of conventional abrasives is usable (for example, SAIT, Klingspor, Norton, VSM, etc.)

Watch out for not to overheat (tempering) the steel by grinding. When it's heat-treated, it may lose required properties.

Heat treatment

Soft annealing

Our materials are delivered soft annealed. You have to apply this process only after forging.

- Heat the material in a furnace to 830 °C / 1526°F.
- Hold at the temperature for at least 4 hours.
- Slow cooling in a furnace.
- You can remove the steel from a furnace when the temperature drops below 380°C / 716°F.

Hardening

To reach full corrosion resistance and the final hardness of the steel, it's necessary to harden it. We recommend hardening the steel by heat treatment professionals using vacuum technology like Bodycote.

Recommended hardening process below:

- Heating up to 1050-1060 °C / 1922-1940°F
- Hold at the temperature for 15 minutes
- Cooling by nitrogen gas (salt-bath is also possible)
- Deep freeze -150/-196 °C / -302/-384 °F and hold for 1-3 hours. (optional process - increases hardness and durability of steel)

Tempering

It's necessary to make the tempering process as soon as possible, after hardening.

- For knife blades, we recommend tempering process 2x1h 150-180°C / 300-355°F. Final hardness is 60-61 HRc.
- For decorative and art pieces, we recommend tempering process 1x2h 250°C / 480°F. Final hardness is 56-57 HRc.

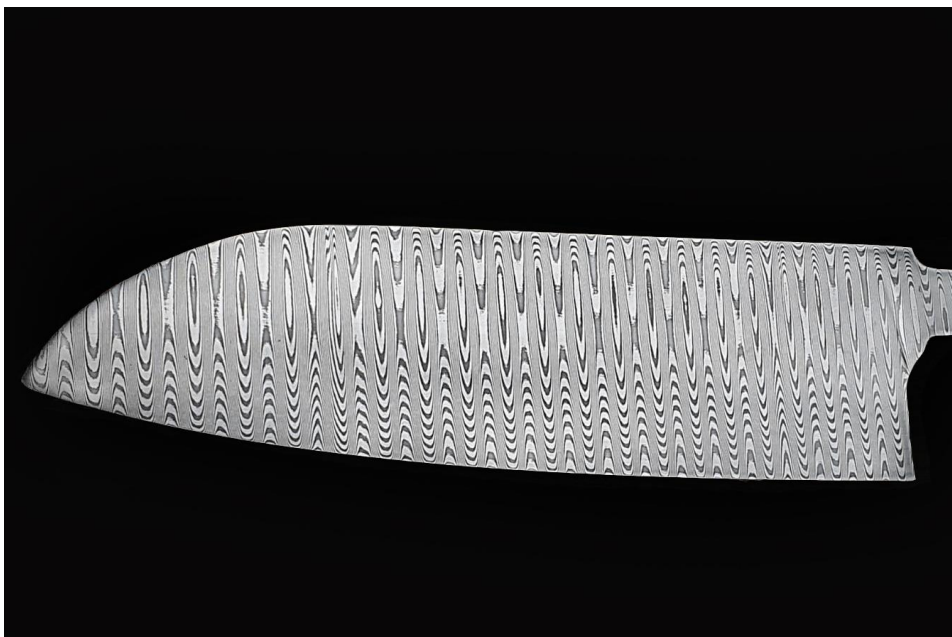
Etching instruction

Etching

To properly contrast the damascus steel layers, it's necessary to etch the material (blade). You can experiment with various etching techniques depending on your skill; however, you'll get nice results following the below-mentioned steps.

Etchant	Solution	Concentration	Time	UHB716	AEB-L
Sulfuric acid H ₂ SO ₄	H ₂ SO ₄ + Distilled water (50-60°C)	15-20%	5-10 minutes	Black	Silver-shiny

- The blade's surface has to be smooth, clean and without scratches (etching won't hide them), finished up to 1000+ grit or polished.
- You must properly degrease the blade (cleaning in the soap-water works fine).
- Before you start etching, you can try the solution on a sample piece of material (heat-treated).
- You can observe the blade during an etching process by removing it from a solution but beware of „maps“ on a surface.
- When the etching is finished, you have to neutralize the blade using Na₂CO₃ (Sodium carbonate) or NaHCO₃ (Baking soda). You can also use soap-water and properly clean the etching residues from a blade.
- Dry etched blade. We recommend spraying the blade with WD-40 (or similar) and drying it again to remove any possible residues.
- You can slightly polish the etched blade on a buffing wheel with sandpaper with 2000+ grit for better contrast. We recommend testing it on a sample piece.
- Warning: using other etchants (like Fe₃Cl) or non-compliance with the etchants heating procedure (50-60°C) leads to poor results.



Product marking

Marking: FF MARTENSITE

Hashtags: #StainlessFuturon #FFMARTENSITE

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