

FF CONTRAST

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FF CONTRAST is a stainless damascus composed of Uddeholm AEB-L + AISI 304 steels. AEB-L is martensitic stainless steel with a fine structure developed for razors and surgical scalpel production. Austenitic stainless AISI 304 brings toughness and a bright shine. This material is intended for knives, jewelry, watchcases, and artwork production.

Steel	Color	C	Si	Mn	P	S	Cr	Ni
AEB-L	Black-Grey	0,65	0,4	0,65	<0,025	<0,015	12,8	
304L	Silver-shiny	<0,03	<0,75	<2	<0,045	<0,03	18-20	9

MACHINING

Our products are soft annealed to provide the best possible machining, reaching hardness approx. 280HV. You can use all conventional types of machining. We don't recommend cutting (format) material on machine shears. We recommend bandsaw cutting, milling or laser, or waterjet cutting.

MILLING/DRILLING

- 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 grid our steel on all conventional types of grinders. We recommend belt-grinders or Berger grinding machines. For belt grinders, we recommend sanding belts with ceramic grains, like 3M Cubitron II; however, all range of conventional abrasives is usable (for example, SAIT, Klingspor, Norton, VSM, etc.). Watch out for not overheating (tempering) the steel by grinding. When it's heat-treated, it may lose the required properties.

HEAT TREATMENT

FORGING

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

- The forging temperature is 950-1050 °C / 1742- 1922 °F
- Forging must be done smoothly to avoid 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 properly annealed.

SOFT ANNEALING

- Our materials are delivered soft annealed. You have to apply this process only after forging.
- Heat the material in a furnace to 820 °C / 1508°F
- Hold at the temperature for 4 hours at least
- Slow cooling in a furnace
- You can remove the steel from a furnace when the temperature drops below 380°C / 716°F.

HARDENING

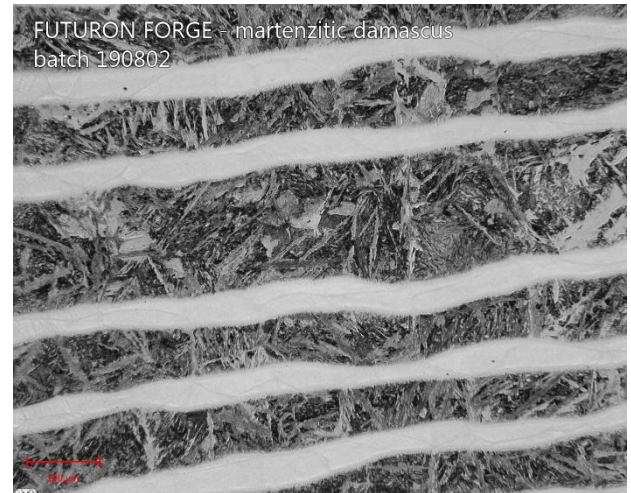
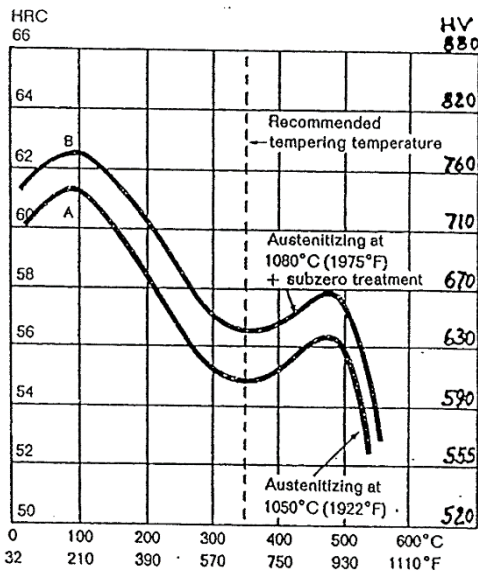
Hardening is necessary to reach full corrosion resistance and the final hardness of the steel. We recommend hardening the steel by heat treatment professionals using vacuum technology like Bodycote. Recommended hardening process:

- Preheating temperature 1050-1080 °C / 1922-1976°F.
- Hold at the temperature for 15 minutes
- Cooling by nitrogen gas (oil cooling 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

After hardening, it's necessary to begin the tempering process as soon as possible.

- We recommend tempering process 2x1h 150-180 °C / 302-356°F for knife blades (AEB-L 60-61 HRC)
- For decorative and art pieces we recommend tempering process 1x2h 250°C / 480°F. Final hardness of AEB-L is 56-57 HRC.



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, following the below-mentioned steps, you'll get nice results.

Etchant	Solution	Concentration	Time	AEB-L	304L
Ferric Chloride Fe3Cl	Fe3Cl + Distilled water	20-25%	5-10 minutes	Black-Grey	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.
- The blade has to be properly degreased (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 reuse etching solution several times. Before you get the blade into the solution, check if there's no dirt on the solution's 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 and water and properly clean the etching residues from a blade.
- Dry the etched blade. We recommend spraying the blade with WD-40 (or similar) and drying it again to remove any possible residues.
- For better contrast, you can slightly polish the etched blade on a buffing wheel. We recommend testing it on a sample piece.
- If you want to make your etching solution more reactive, increase the concentration of Fe3Cl or add vinegar.

MARKING

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