

Multi-Layered Steel (Takefu Suminagashi)

This Suminagashi steel is ideal for making high quality cutting tool and knife blades. It is a lamination of low carbon, non-hardenable steel (11 layers on each side) and an approximately 1.5 mm thick, hardenable middle layer made of Takefu "White Steel" (C = 1.0%, Cr = 0.2 - 0.5%, Ni = 0.7 - 1.3%, Mn < 0.5%, Si < 0.35%, P < 0.03%, S < 0.03%). The steel blanks are supplied in an unhardened state. In order to craft them into blades they are usually forged, ground and hardened. They can also simply be ground and hardened, however additional forging helps the steel's grain become finer and more homogenous.

Heat Treatment

Annealing (normalizing) at 750°-800° C.

Hardening at 780°-820° C. Quenching in oil or lukewarm water (quenching in water will result in harder (+1° to 2° RC), but more brittle steel. We recommend using oil (i.e. vegetable oil) only!

Tempering at 150°-250° (exposure should last until the steel is heated all the way through). Final hardness of 59 - 62 RC. Tempering at a higher temperature or for a longer period of time reduces the hardness of the steel but increases its elasticity.

Forging Recommendation

Takefu steel should, like all steels with a high carbon content, be forged at approx. 800°-900° C (red-yellow heat). Higher temperatures will cause the steel to oxidize and lose its fine-grained structure, lower temperatures can lead to cracks in the steel. To maintain the highest quality crystalline structure, we recommend completing the final steps of forging at a somewhat reduced temperature (750°C) and a higher frequency of hammer blows. Try to keep the time spent heating and forging the steel to a minimum to prevent the carbon from diffusing out of the steel. The best results are attained using a charcoal fire (sulphur and phosphate-free). The steel blank should be fully formed and ground prior to heat treatment.

Grinding

It is very important to avoid temperatures above 150°C once the steel has been hardened and annealed. Grinding it on a dry sharpening machine or belt sander is especially harmful to its crystalline structure. We recommend using a water-cooled sharpening machine or sharpening by hand using Japanese waterstones.

Corrosion Protection

Multi-layered Suminagashi steel is not corrosion-free. We recommend wiping the finished blades with an acid-free oil (camellia oil) to protect them from corrosion damage.

Etching

The visible pattern of the surface of multi-layered steel can be accentuated by etching the blade using an acid solution. The surface of the blade must be 100% free of grease. Use a 20% solution of hydrochloric acid at a temperature of 30°-50°. The treatment takes 10-20 minutes depending on the desired effect as well as other factors. Rinse the blade with water and check it regularly during treatment. The cutting edge layer responds to the treatment quicker than the rest of the blade. The resulting blackening of the cutting edge can be removed by polishing the blade after the acid treatment.

Caution: handling acid is hazardous to your health! We do not provide any guarantees for the quality of the results of this treatment or accept any responsibility for the associated health risks.