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Sandvik 12C27

(Strip steel)

Sandvik 12C27 is a martensitic stainless chromium steel with an optimized analysis for high quality professional knife applications. After heat treatment, the composition of carbon and chromium gives a unique combination of properties including:

- Very high hardness
- Good corrosion resistance
- Very high wear resistance

Typical applications for Sandvik 12C27 are hunting and fishing knives, pocket knives, skate blades and ice drills.

STANDARDS

- ASTM (420), (440A)
- UNS S42000
- W.Nr. (1.4034), (1.4037)

In brackets, nearest corresponding grade.

CHEMICAL COMPOSITION (NOMINAL) %

C	Si	Mn	P max	S max	Cr	Mo
0.6	0.4	0.4	0.025	0.010	13.5	-

FORMS OF SUPPLY

The strips can be supplied either in coils or as straightened lengths of 0.5 - 4.0 meter (1.6 - 13.1 feet). The coil weight is max 5 kg/mm (280 ibs/in.) of strip width.

Hardening and tempering of the strip steel is needed to achieve the correct finish and to meet the properies required by the end user.

DIMENSIONS

Thickness mm (in.)		Width mm (in.)	
Min.	Max.	Min.	Max.
1.0 (0.039)	4.5 (0.177)	10 (0.394)	380 (14.96)

Other sizes can be supplied to meet specific requirements.

Tolerances
The thickness and width tolerances are +/- tolerances to the nominal size. The normal tolerance classes for most of our strip products are T2 and B1. Tighter tolerances as well as other tolerance limits can be offered upon request.

MECHANICAL PROPERTIES

As-delivered	Tensile strength MPa (ksi)	Hardness* HV	HRB
Soft annealed	max 700 (102)	max 215	max 94.3
Annealed	750 ± 100 (109 ± 14)	235 ± 35	97.4 ± 6
Cold rolled	700–1000 (102–145)	215–315	94.3–106.6

* Hardness data is for guidance only.

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PHYSICAL PROPERTIES

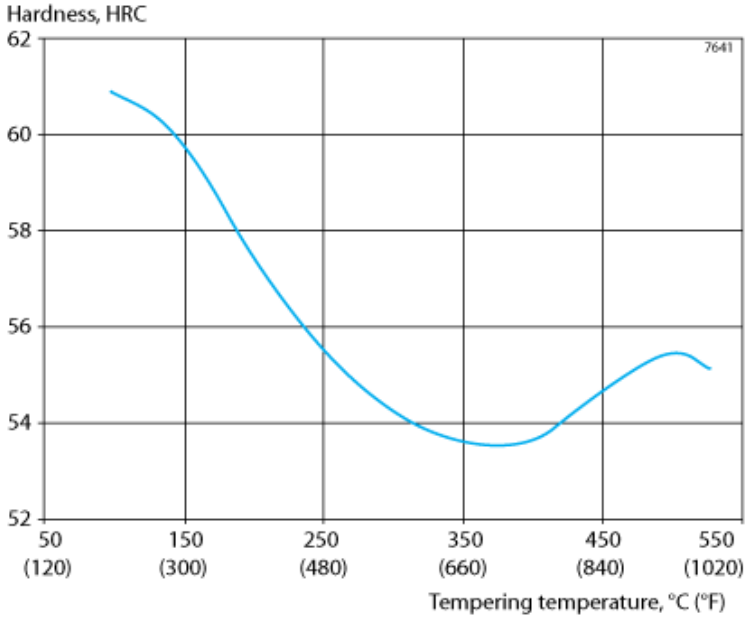
The physical properties of a steel are related to a number of factors, including alloying elements, heat treatment and manufacturing route, but the data presented below can generally be used for rough calculations.

Density	
g/cm^3	7.7
lb/in.^{3}	0.28

HEAT TREATMENT

Hardening data
Hardening temperature 1080°C (1975°F), holding time 5 minutes, quenching in oil.

Tempering data
Strip thickness 2.5 mm (0.098 in.), tempering time 30 minutes.

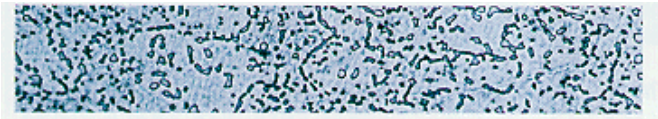


Brittleness occurs with tempering above 450°C (840°F).

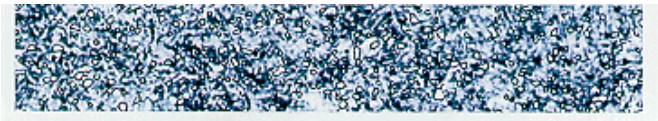
Additional recommendations regarding hardening can be found in Sandvik's hardening guide.

The following figures show the importance of using the right hardening conditions to optimize the microstructure and properties.

Too high hardening temperature gives coarse structure, high austenite content (30%), few carbides. Consequence: low hardness and bad wear resistance.



Too low cooling rate after austenitizing gives carbide precipitations in the grain boundaries. Consequence: brittleness and reduced corrosion resistance.



Optimized hardening conditions give optimal austenite content (15%), many uniformly distributed carbides. Consequence: optimal combination of hardness, wear resistance, ductility and corrosion resistance.

How the hardening parameters affect the product properties

- Too high hardening temperature gives low hardness and bad wear resistance due to excessive content of retained austenite.
- A low hardening temperature gives low hardness and reduced corrosion resistance.
- Too long holding time at the optimal hardening temperature increases the amount of retained austenite and lowers the hardness.
- Too short holding time at the optimal hardening temperature has the same effect as low austenitizing temperature.
- The maximum hardness will be obtained at a retained austenite content of about 15%.
- Deep freezing, i.e. cooling to below room temperature, increases the hardness by about 1–2 HRC.
- With deep freezing, the highest possible hardness will be achieved by increasing the hardening temperature. Read more in the Sandvik hardening guide.
- High cooling rate after hardening is necessary to avoid brittleness and reduced corrosion resistance. 600°C (1112°F) should be reached within 1–2 minutes and room temperature within 30 minutes.
- Rehardening is generally not recommended as it will not give optimal product properties.

DISCLAIMER:
Recommendations are for guidance only, and the suitability of a material for a specific application can be confirmed only when we know the actual service conditions. Continuous development may necessitate changes in technical data without notice. This datasheet is only valid for Sandvik materials.