SANDVIK

Datasheet updated 2012-10-14 11:01:48 (supersedes all previous editions)

Sandvik 14C28N

(Strip steel)

Sandvik 14C28N is a martensitic stainless chromium steel with a chemistry optimized for high quality professional knife applications. The chemical composition provides a unique combination of properties including:

- Excellent edge performance
- Very high hardness
- Good corrosion resistance

Sandvik 14C28N is mainly recommended for knife applications which put very high demands on edge sharpness, edge stability and corrosion resistance. Examples are pocket knives, chefs knives, hunting knives and fishing knives.

CHEMICAL COMPOSITION (NOMINAL) %

C	Si	Mn	P	S	Cr	N
			max.	max.		
0.62	0.2	0.6	0.025	0.010	14	0.11

FORMS OF SUPPLY

The strip steel can be supplied either in coils or as straightened lengths of 0.5–4.0 m (1.6–13.1 ft). The coil weight is max. 5 kg/mm (2800 lb/in) of strip width.

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

DIMENSIONS

Thickness		**Width**	
mm (in)		**mm (in)**	
min.	max.	min.	max.
1.0 (0.039)	4.5 (0.177)	5 (0.1968)	380 (14.96)

Other sizes can be offered on request.

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 : 7.7 g/cm^3 (0.28 lb/in^3)

MECHANICAL PROPERTIES

As-delivered	Tensile strength	Hardness*	
	MPa (ksi)	HV	HRB**
Soft annealed	max. 700 (102)	max. 215	max. 94.3
Annealed	750 ±100 (109±14)	235 ± 35	97.4 ± 6
Cold rolled	700-1100 (102-160)	215-345	94.3-108.7

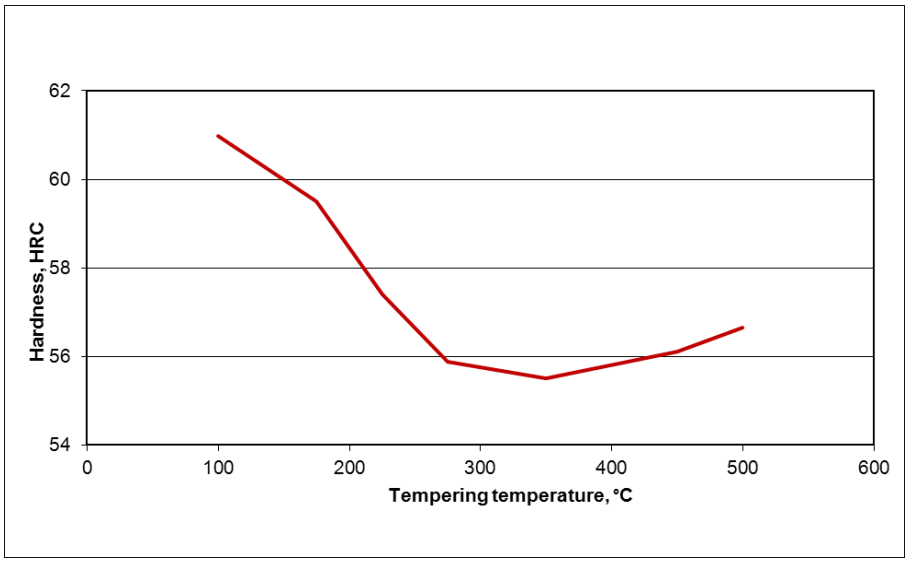
* Hardness values are converted from tensile strength and shall be considered approximate
** Values above 100 are outside the HRB range and are provided as indication only

HEAT TREATMENT

Hardening data
Hardening temperature 1050°C (1922°F), holding time 5 minutes, quenching in oil.

Tempering data
The following diagram exemplifies the tempering response for Sandvik 14C28N. More detailed hardening data can be found in the Sandvik hardening guide.

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

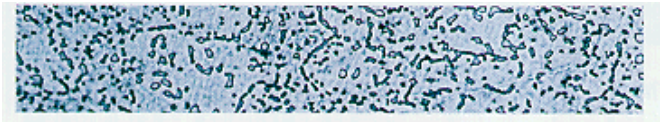


Brittleness and loss of corrosion resistance occur with tempering above 450°C (840°F).

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.