

Zapp® 9.9440 YL Martensitic Steel Datasheet

Precision Wire



Zapp is certified to ISO 9001

Zapp® 9.9440 YL

The new developed grade 9.9440 YL offers a useful alternative to steels with high carbon content as the 1.4112 (AISI 440B) or the 1.4125 (AISI 440C).

The positive feature of the high hardness accounting is preserved since the new developed and suggestively aligned chemical composition and the huge primary carbides are avoided at the same time.

Furthermore, the corrosion resistance is increased, since the grain boundary precipitation is suppressed.

The wear resistance is assured through the accumulation of dispersed special carbides.

Zapp® 9.9440 YL

Composition	Short symbol	Circa-value [%]
Carbon	C	0.6 - 0.75
Silicon	Si	1.00
Manganese	Mn	1.00
Phosphor	P	0.04
Sulphur	S	0.03
Chromium	Cr	16.00 - 18.00
Molybdenum	Mo	0.75
Nickel	Ni	-

Heat Treatment

9.9440 YL	Forging and lamination	Soft annealing	Hardening	Tempering
Temperature[°C]	800 - 1,100	750 - 800	1,020 - 1,060	100 - 400
Period [h]	-	2 - 6	-	2
Quenching	Furnace	Air or furnace	Oil	-

Mechanical Properties

	Short symbol	Test result at 20 °C	Unit
Tensile strength	Rm	≤ 900	MPa
0.2 % Yield stress	Rp 0,2	≤ 500	MPa
Elongation after fracture	A 50	20	%
Hardness HB 30	HB 30	≤ 280	[HRC]

Physical Properties

	Short symbol	Test result at 20 °C	Unit
Density	ρ	7.7	$\frac{\text{kg}}{\text{dm}^3}$
Specific heat	c	460	$\frac{\text{J}}{\text{kg} \cdot \text{K}}$
Heat conduction	λ	30	$\frac{\text{W}}{\text{K} \cdot \text{m}}$
Specific electrical resistance	ρ	0.65	$\frac{\Omega \cdot \text{mm}^2}{\text{m}}$
Young's-Modulus	E	215	kN/mm ²

Welding

This alloy is not commonly welded due to its tendency to air harden.

If it must be welded, preheat to 260 °C and post weld treat at 732 - 760 °C for 6 hours followed by a slow furnace cooling to avoid cracking.

Use similar filler metal and high heat inputs during operations.

The 9.9440 in Comparison to Conventional Martensitic Steel with Significant Smaller Carbides

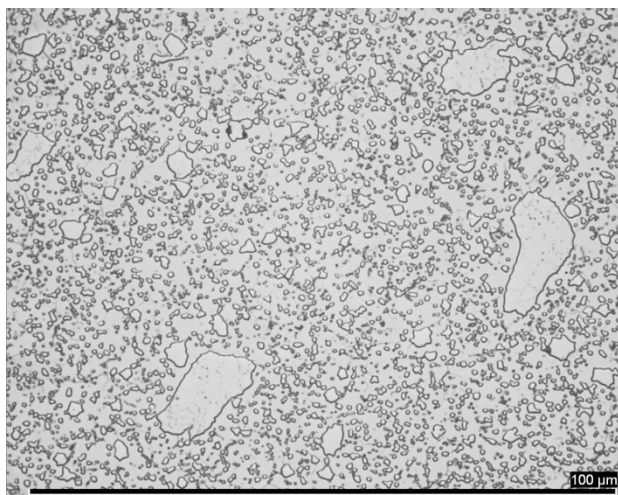


Image 1: Conventional, 1.4112 (AISI 440B)

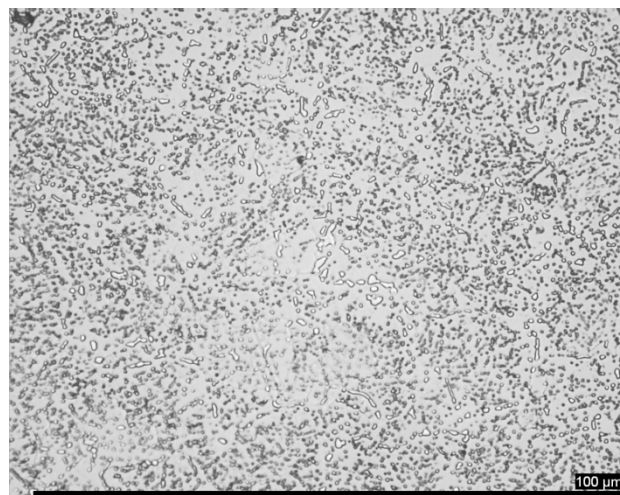


Image 2: New developed, 9.9440 YL

Corrosion Resistance of Zapp® 9.9440 YL

The reason of the reduced accumulation of chromium carbides is the limited carbon content. Thereby more chrome is chemically active in the matrix which improves the corrosive resistance of the 9.9440 YL in comparison to the 1.4112 (AISI 440B) or 1.4125 (AISI 440C).

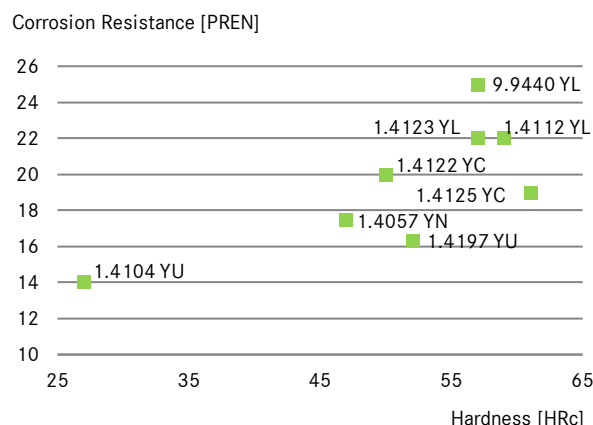
Wear Resistance

Alloying concepts as the 1.4125 (AISI 440C) or 1.4112 (AISI 440B) possess a high hardness of the matrix and many huge primary and secondary types of carbide. Those carbides are wear-resistant. However, they can be problematically when breaking out of the matrix because of their dimension.

In order to minimize this risk, the carbon content has been reduced to a level which enables dispersed primary carbides. Thus the break out of the huge primary carbides is prevented which improves abrasive wear.

Image 1 illustrates the structure of conventional martensitic steel with high carbon content and huge primary carbides. The new developed 9.9440 YL with clearly smaller carbides is represented in image 2.

Martensitic Grades 17% CR-Corrosion Resistance and Hardness



PRECISION WIRE

Zapp Precision Metals GmbH

Letmather Straße 69
58239 Schwerte
precisionwire@zapp.com
www.zapp.com

Further information regarding our products and locations are available in our image brochure and under www.zapp.com

The illustrations, drawings, dimensional and weight data and other information included in this data sheet are intended only for the purposes of describing our products and represent non-binding average values. They do not constitute quality data, nor can they be used as the basis for any guarantee of quality or durability. The applications presented serve only as illustrations and can be construed neither as quality data nor as a guarantee in relation to the suitability of the material. This cannot substitute for comprehensive consultation on the selection of our products and on their use in a specific application. The brochure is not subject to change control.

Last revision: July 2026