Ergste® 9.9440YL Martensitic Steel
Datasheet | Precision Wire

Zapp is Certified to ISO 9001

Ergste® 9.9440YL

The new developed grade 9.9440YL 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.

Ergste® 9.9440YL

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

9.9440YL	**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	$\frac{kg}{dm^3}$
Specific heat	c	460	$\frac{J}{kg \cdot K}$
Heat conduction	λ	30	$\frac{W}{K \cdot m}$
Specific electrical resiastance	ρ	0.65	$\frac{\Omega \cdot mm^2}{m}$
Young´s-Modulus	E	215	kN/mm²

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

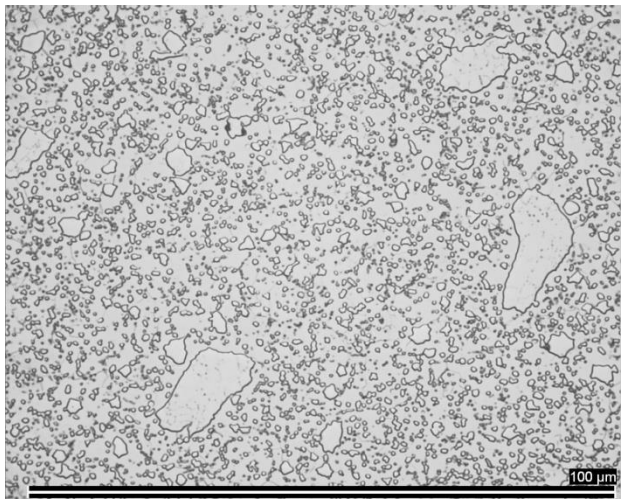


Image 1: Conventional, 1.4112 (AISI 440B)

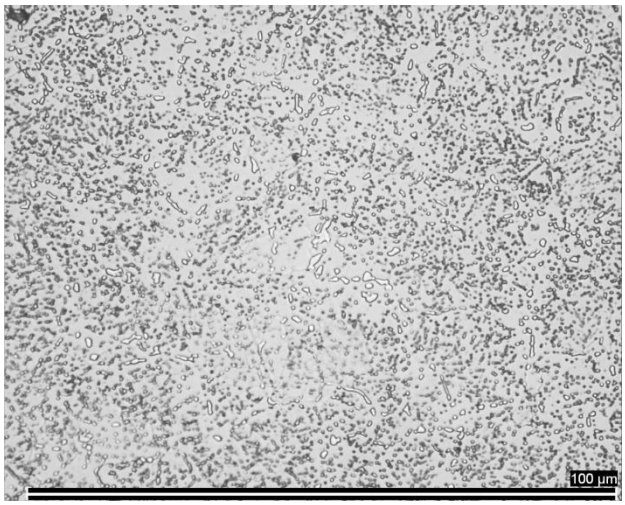


Image 2: New developed, 9.9440YL

Corrosion Resistance of Ergste® 9.9440YI

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 9.9440YL in comparison to the 1.4112 (AISI 440B) or 1.4125 (AISI 440C).

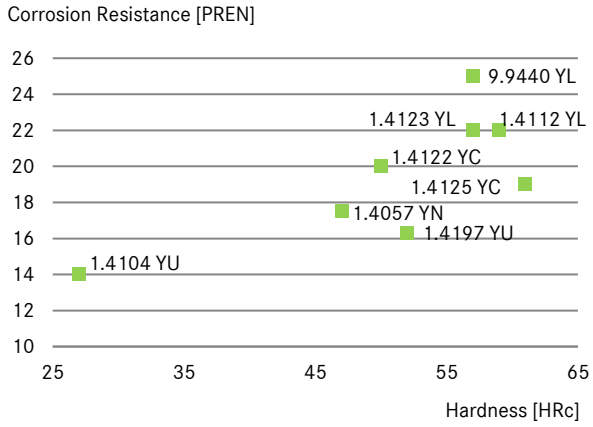
Image 1 illustrates the structure of conventional martensitic steel with high carbon content and huge primary carbides. The new developed 9.9440YL with clearly smaller carbides is represented in image 2.

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.

Martensitic Grades 17% CR-Corrosion Resistance and Hardness



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