W 1.2312

TECHNICAL DATASHEET

CHEMICAL ANALYSIS

	C	S	P	Si	Mn	Cr	Mo
Min.	0.35	0.05	-	0.30	1.40	1.80	0.15
Typical	0.40	0.06	0.012	0.30	1.50	1.90	0.20
Max.	0.45	0.10	0.030	0.50	1.60	2.00	0.25

W 1.2312: A prehardened mold steel (300 HB/32 HRC) with improved machinability

MATERIAL PROPERTIES

Prehardened Cr-Mn-Mo steel, designed for plastic mold industry, with a specific sulfur addition to improve machinability. Compared to 1.2311 grade, 30% increase in milling speed and 300% increase in drilling speed can be expected.

FOR WHICH TOOLS, FOR WHICH PLASTICS

Plastic injection mold cores and cavities, extrusion dies for thermoplastics (PE, PP, PS), thermosetting plastics, transparent melts. Not suitable for polishing requirements.

PROPERTIES, ACCORDING TO STANDARD

> AFNOR 40 CMD8S
> SYMBOL 40 CrMnMoS 8-6
> WERKSTOFF 1.2312
> AISI P20+S

METALLURGICAL PROPERTIES

W 1.2312 has an excellent hardenability resulting in good uniformity of hardness and microstructure.

Internal soundness

All plates are ultrasonically tested according to EN 10160 S3 E4 or SEP 1921 Gr4 Class D/d.

Grain size

Uniform 7/8 grain size according to ASTM E112.

MECHANICAL PROPERTIES

1.2312 is delivered **quenched and double tempered to 280 – 325 HB (29 – 34 HRC)**

Hardness	Rp 0.2 Yield Strength		Rm Tensile Strength		Elogation	Reduction of Area	K C V 20ºC	Elastic Modulus	
HB	MPa	Ksi	MPa	Ksi	%	Z%	J	GPa	Ksi
300	850	123	960	139	10	45	20	205	29733

PHYSICAL PROPERTIES

Thermal Conductivity W.m-1.K-1	Thermal expansion Coefficient (10-6.K-1)				
20ºC	20 - 100ºC	20 - 200ºC	20 - 300ºC	20 - 400ºC	Specific Heat J/Kg ºC
34	11.5	11.6	12.5	12.8	470

Typical Values

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W 1.2312

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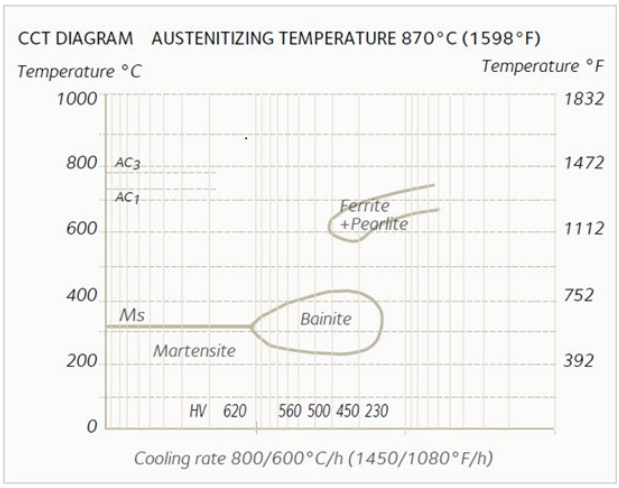
Metallurgical transformation points

AC_1	AC_3	M_s	V_1	V_2
733ºC	780ºC	320ºC	1000ºC/h	300ºC/h
1351ºF	1436ºF	608ºF	1830ºF/h	540ºF/h



HEAT TREATMENT

For specific applications where mechanical properties higher than 300HB are required, hardening can be performed in the following way:

> heating (about 850ºC / 1560ºF) with a sufficient holding time (1 hour/inch).

> water, oil or air quenching depending on thickness (see C.C.T. diagram)

> The tempering temperature controls the mechanical characteristics.

The following instructions must be followed to obtain an efficient tempering:

- Uniform heating at the selected tempering temperature
- (see tempering curve).
- Holding time of one hour per inch of total thickness.
- Double tempering with complete cooling to room temperature for each treatment.

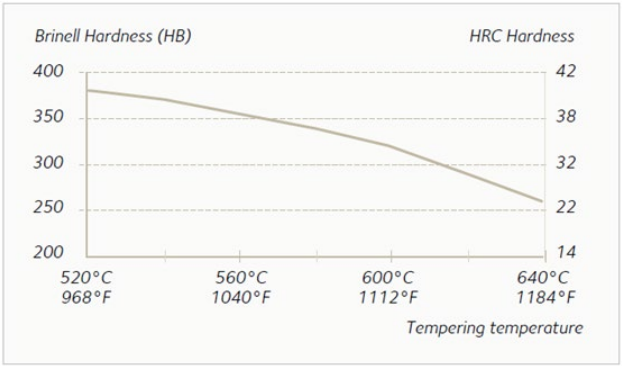
Tempering curve

Test conditions:

> austenitization 870ºC (1598ºF)

> tempering / holding time 1 h

> air cooling



Note that complicated shapes require accurate control of steel temperature uniformity and sufficient holding times to limit stresses and prevent cracking.

W 1.2312

TECHNICAL DATASHEET

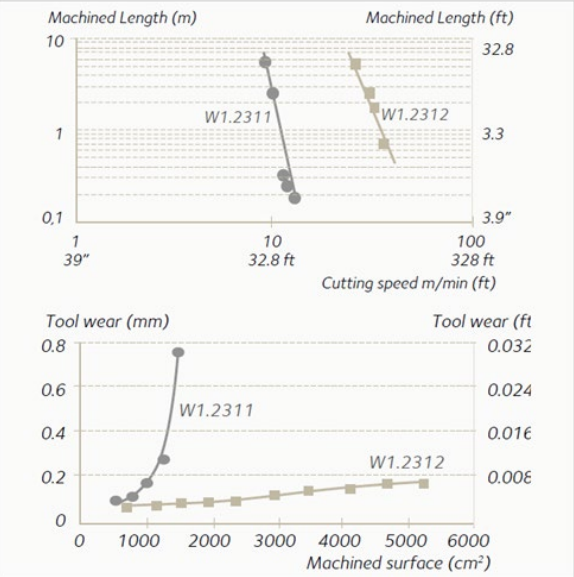
MACHINING

W 1.2312 grade shows high performance in drilling and in milling using high speed steel or carbide tools. The machinability of W 1.2312 in increased (compared to W 1.2311) by a controlled sulfur addition which aims at:

> 500% increase in milling tool life (at constant cutting speed)
> 300 % increase in drilling speed
> 30% increase in milling speed

Cutting conditions (cutting speed, feed rate..) depend on the tool, but those of 1.2311 could be applied taking into account:

> 30% increase in milling speed with carbide inserts
> 300% increase in drilling speed with high speed steel tools



WELDING

GTAW is the recommended process to ensure a clean weld without sulphides, porosities or oxides which effect properties of the weld such as chemical etching ability, polishability. Pre and postheating treatment must be achieved to ensure crack free welds. A specific procedure was developed to limit the risks of cracking and improve the response of the welded area to polishing and etching. For more information, please contact your Swiss Steel USA representative.

DIMENSIONAL PROGRAM

Thickness	
7 – 125 mm	Continuous casting hot rolled
126 – 610 mm	Ingot casting forged

GENERAL NOTE

All statements regarding the properties or utilization of the materials or products mentioned are for the purpose of description only. Guarantees regarding the existence of certain properties or a certain utilization are only valid if agreed upon in writing.

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TECHNICAL DATASHEET

NORTH AMERICAN DISTRIBUTION

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