

**HOT WORK
TOOL STEEL**

HP1

**HIGH PREMIUM
QUALITY STANDARDS SPECIFICALLY SUPPLEMENTED**

KIND&CO
EDELSTAHLWERK

HIGH PREMIUM QUALITY HP1

A new developed quality standard by specific use of trace elements with improved useful properties and a high economic efficiency.

Material properties:

HP1 is a hot working tool steel with a high level of high-temperature strength and outstanding toughness properties. HP1 is only available as an ESR (Electro Slag Remelting) grade.

Application:

To be used at applications with highest demands like die casting, extrusion industries and hot forming. Delivery condition: Soft annealed, max. 220 HB.

Nitriding possible:

For die casting dies we recommend our nitriding Program 99 without compound layer.

Preheating before use:

100-400 °C depending on application.

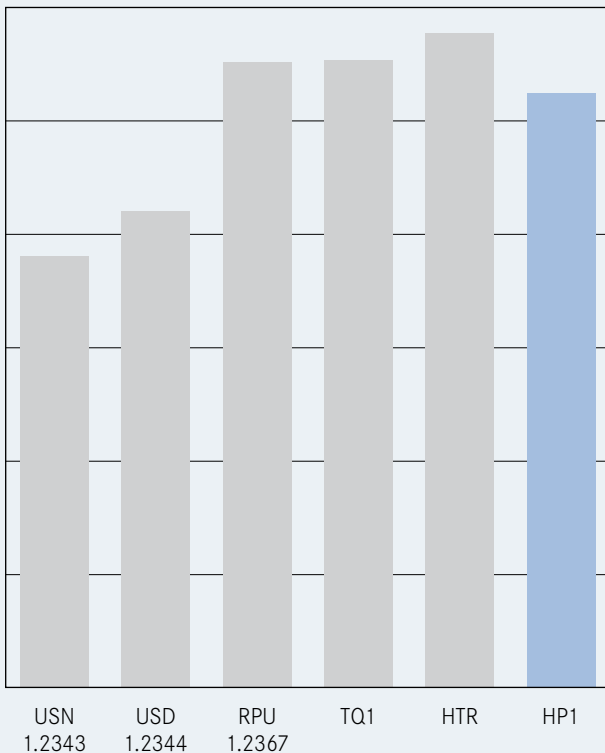
	Temperature	Cooling
Soft annealing	820 - 840 °C 4 - 6 h	slow cooling in furnace
Stress relieving	approx. 650 °C 2 - 4 h	slow cooling
Hardening	1020 °C Soaking time 60 min	Air, nitrogen gas at vacuum hardening. martempering at 540 °C, oil or polymer (to be interrupted at 230 - 280 °C)

Material	Short name	C	Si	Mn	P	S	Cr	Mo	V	Nb	W
USN 1.2343 (H11)	X37CrMoV5-1	0,37	1,00	0,40	<0,020	<0,005	5,20	1,20	0,40		
USD 1.2344 (H13)	X40CrMoV5-1	0,40	1,00	0,40	<0,020	<0,005	5,20	1,30	1,00		
RPU 1.2367	X38CrMoV5-3	0,38	0,40	0,40	<0,020	<0,005	5,00	3,00	0,50		
TQ1**		0,36	0,25	0,40	<0,012	<0,003	5,20	1,90	0,55		
HTR		0,32	0,20	0,30	<0,015	<0,005	2,20	1,20	0,50		3,80
HP1**		0,35	0,20	0,30	<0,012	<0,003	5,20	1,40	0,55	+	

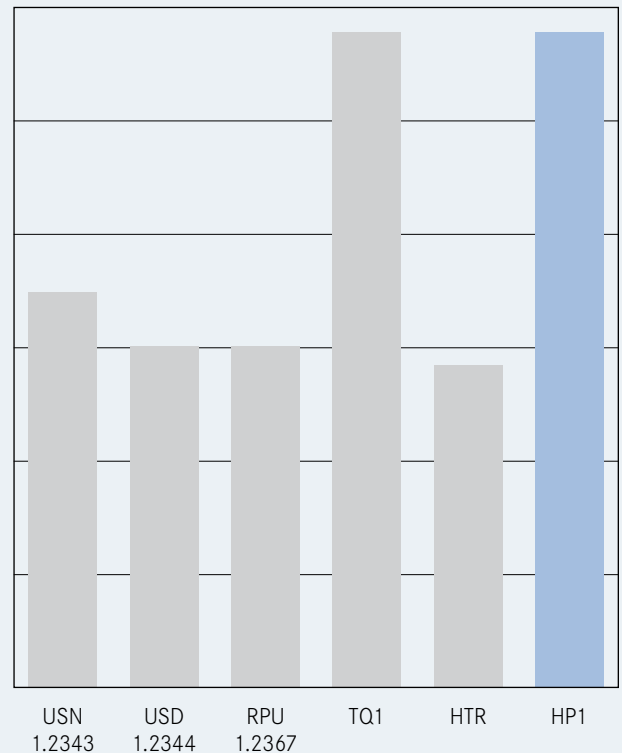
* Specific use of trace elements

** With lowest level of trace elements

High-temperature strength



Toughness



Tempering diagram 60 mm Ø, 1020°C Oil

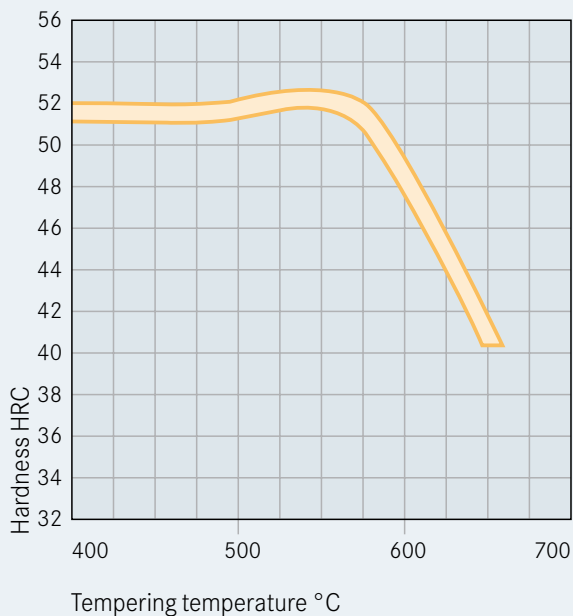
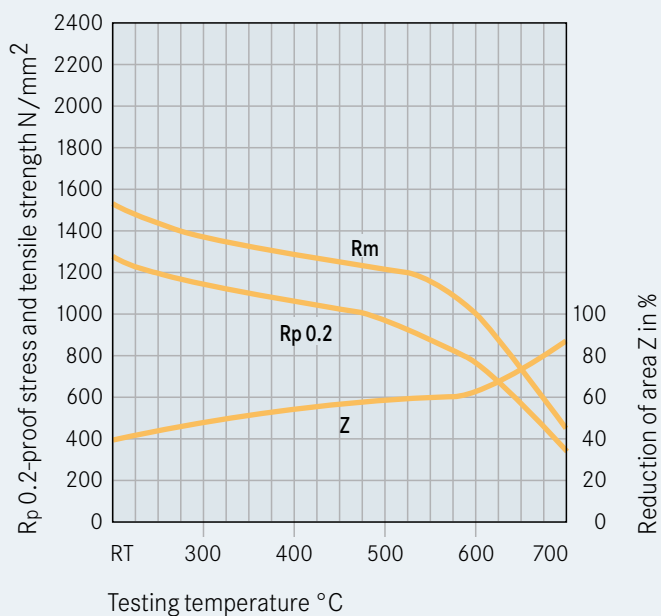


Diagram of high temperature strength 30 mm Ø, 1020°C Oil



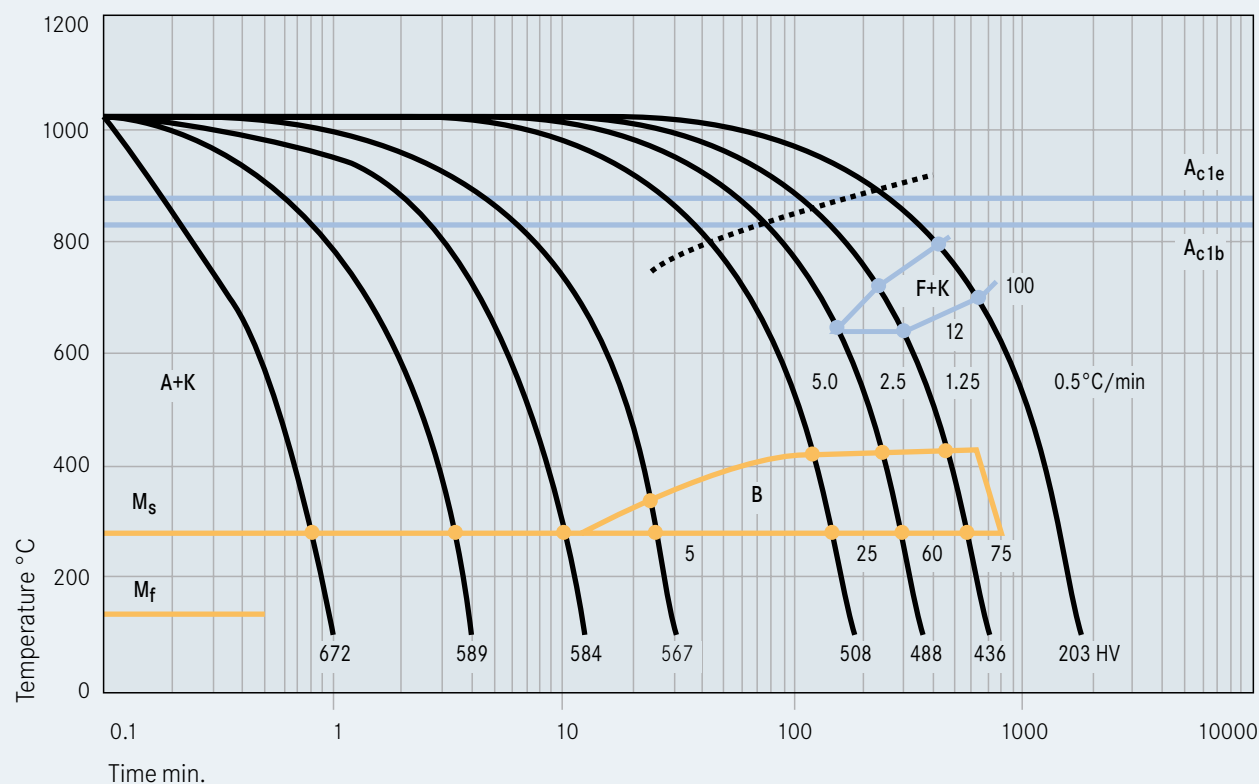
Coefficient of linear thermal expansion $10^{-6}m/(m \times K)$

Material	Temperature interval in °C		
	20-100	20-400	20-600
1.2343 (H11)	11.8	12.7	12.9
1.2344 (H13)	10.9	12.7	13.3
1.2367	11.9	12.8	13.3
HTR	12.3	13.6	13.8
TQ1	10.3	12.5	13.0
HP1	11.5	12.6	13.1

Thermal conductivity $W/(m \times K)$

Material	Testing temperature in °C		
	20	200	400
1.2343 (H11)	26.8	27.8	27.3
1.2344 (H13)	25.5	27.1	27.7
1.2367	29.9	32.1	32.4
HTR	35.2	34.6	33.0
TQ1	29.8	31.0	31.4
HP1	29.5	30.5	30.5

TTT-Diagram Austenitizing temperature 1020 °C





**More ESR, more power,
even more quality**

Electroslag remelting is used to meet special quality requirements in terms of purity, toughness, and polishability, all in a reproducible manner.



**Open Die Forging – an optimum
of forging ratio for more value**

The first forming operation for the manufacturing of hot-work tool steels with outstanding toughness and high temperature resistance properties is an important step in the process chain of producing high premium toolings.



**Heat treatment - the way to the
desired useful properties**

Reliability and profitability are the essential criteria which make the difference of the quality of a tooling. Beside the steel grade special refining procedures will optimize the wear resistance of your superior toolings ending up in a longer lifetime.



More service

Tool steels and
special materials

Melting

Forging

Ring rolling

Heat treatment

Machining

Surface treatment



KIND & CO., Edelstahlwerk, KG
Bielsteiner Str. 124-130 · D-51674 Wiehl-Bielstein
Tel. +49 (0) 22 62 / 84-0 · Fax +49 (0) 22 62 / 84-175
info@kind-co.de · www.kind-co.de