KIND&CO
EDELSTAHLWERK

Hot Work Tool Steel

TQ1

Top Quality by Highest Purity

Top Quality TQ1

Specially designed Super Clean quality. Using a particular process technology, the content of trace elements is reduced to the minimum. This leads to a clear improvement of useful properties as compared with Premium quality.

Material properties:
TQ1 is a hot-work tool steel with maximum toughness and high temperature strength.
TQ1 is exclusively produced using the ESR process.

	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	1010 °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)

Application:
To be used at applications with highest demands like die casting, extrusion industries and hot forming, as well as applications which require maximum polishability.

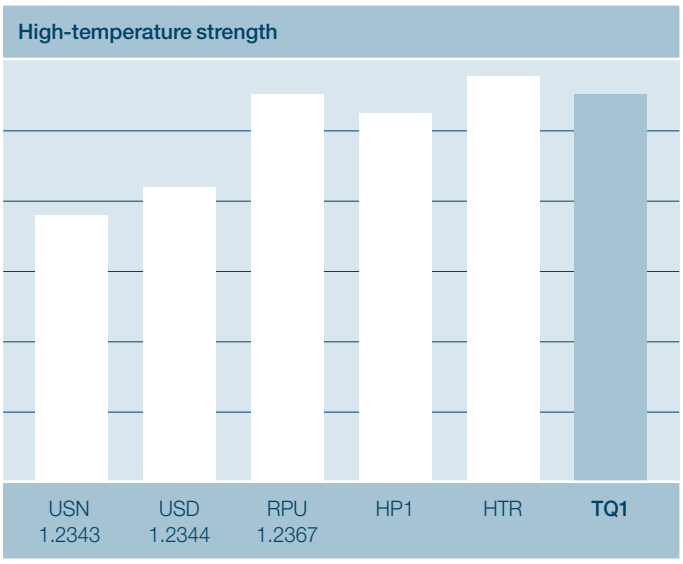
Delivery condition:
Soft annealed, max. 220 HB.

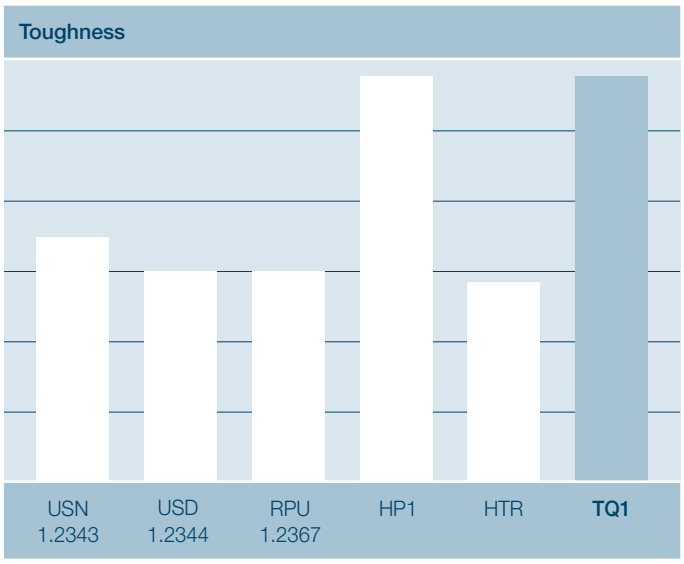
Nitriding possible:
For die casting dies we recommend our nitriding Program 99 without compound layer.

Preheating before use:
100-400 °C depending on application.

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		
HP1*		0.35	0.20	0.30	<0.012	<0.003	5.20	1.40	0.55	+	
HTR		0.32	0.20	0.30	<0.015	<0.005	2.20	1.20	0.50		3.80
TQ1**		0.36	0.25	0.40	<0.012	<0.003	5.20	1.90	0.55		

* Specific use of trace elements ** With lowest level of trace elements





Tempering diagram 60 mm Ø, 1010°C Oil

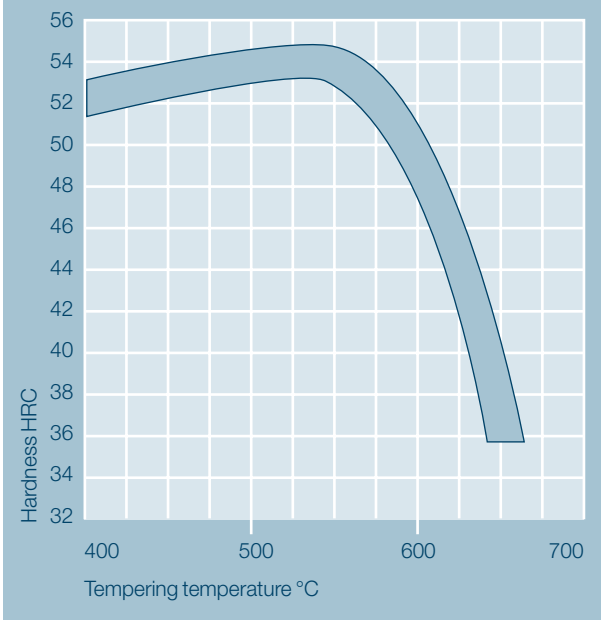
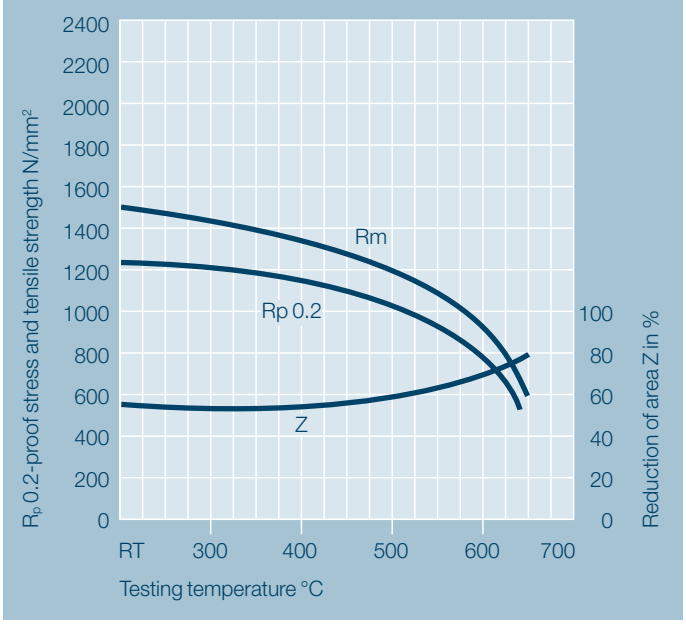


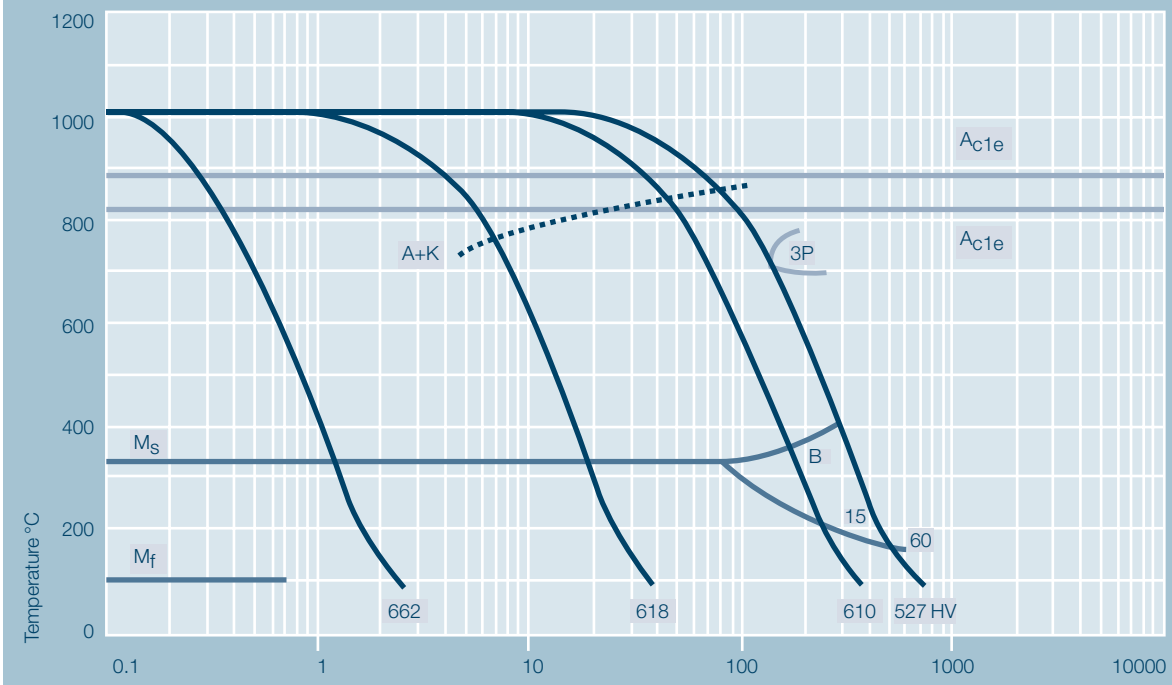
Diagram of high temperature strength 30 mm Ø, 1010°C Oil



Coefficient of linear thermal expansion 10^{-6}m/(m x 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
HP1	11.5	12.6	13.1
HTR	12.3	13.6	13.8
TQ1	**10.3**	**12.5**	**13.0**

Thermal conductivity W/(m x 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
HP1	29.5	30.5	30.5
HTR	35.2	34.6	33.0
TQ1	**29.8**	**31.0**	**31.4**

TTT-Diagram Austenitizing temperature 1020 °C



Service

Tool Steels

Melting

Forging

Heat Treatment

Machining

Surface Treatment

Products

Hot Work Tool Steels

Cold Work Tool Steels

Die Forging Steel

Steel for Plastic Moulds

Industries

Punching

Cutting

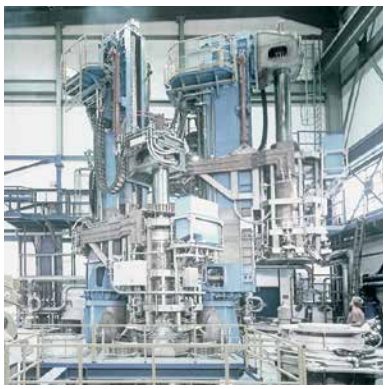
Forming

Bending

Rolling

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.

Kind & Co., Edelstahlwerk, GmbH & Co. KG
Bielsteiner Str. 124-130 · D-51674 Wiehl
Fon. +49 (0) 22 62 / 84-0 · Fax +49 (0) 22 62 / 84-175
info@kind-co.de · www.kind-co.de