



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.

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.

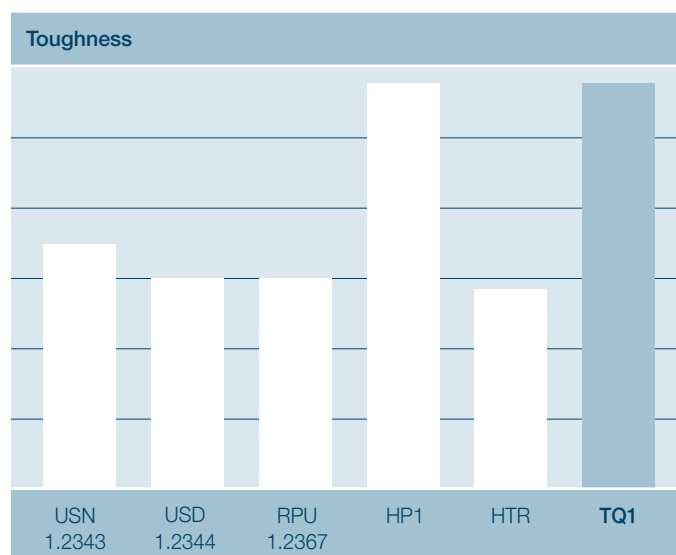
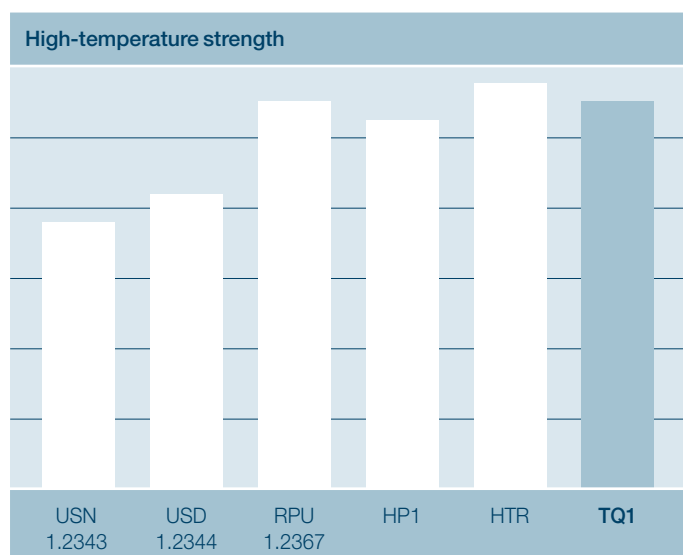
Preheating before use:

100-400 °C depending on application.

	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)

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

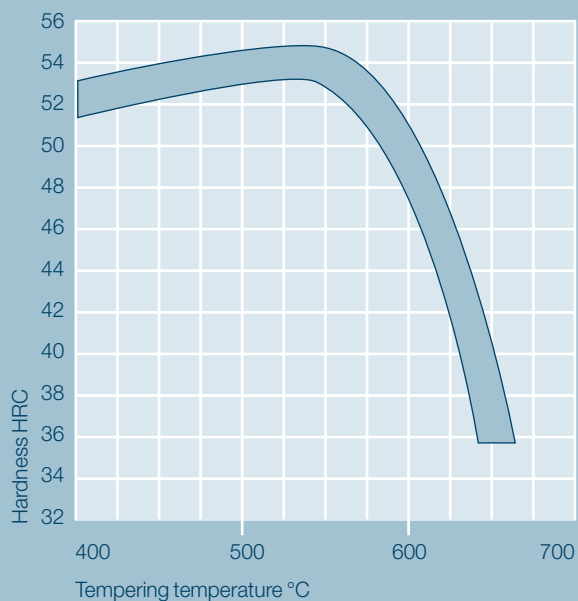
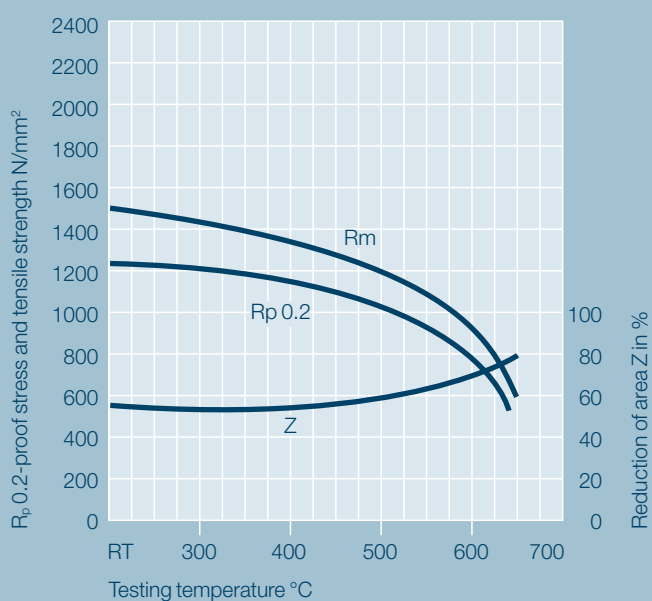


Diagram of high temperature strength 30 mm Ø, 1010°C Oil



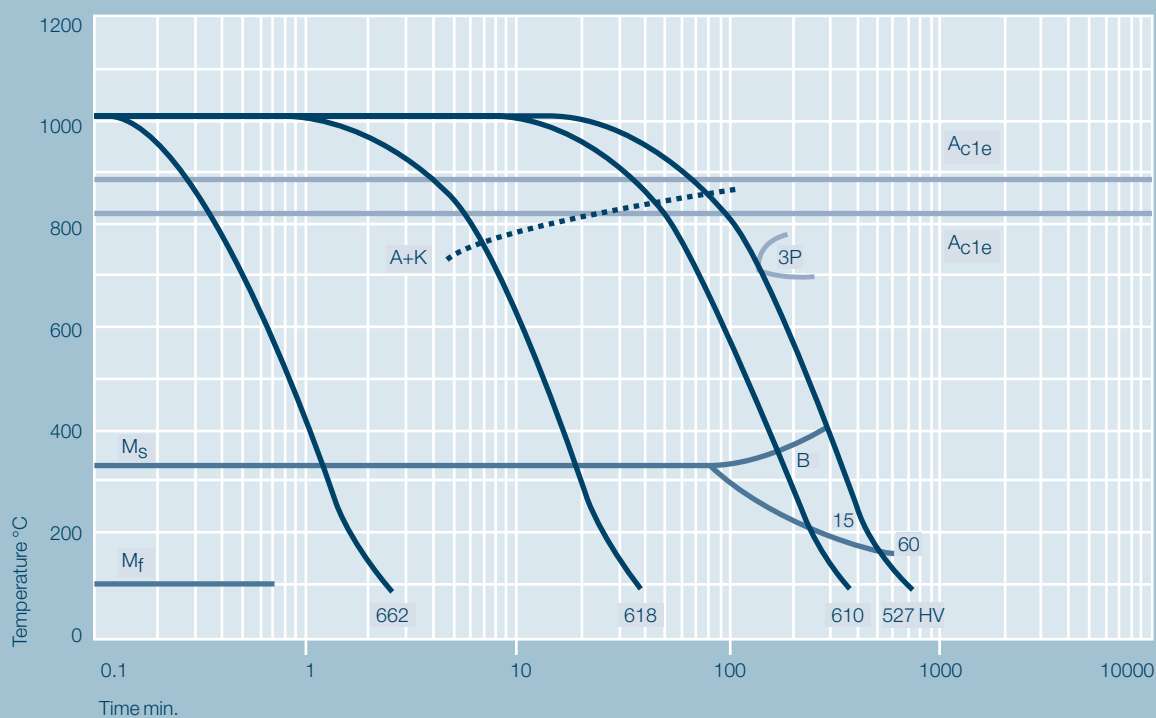
Coefficient of linear thermal expansion $10^{-6}m/(m \times K)$

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
HP1	11.5	12.6	13.1
HTR	12.3	13.6	13.8
TQ1	10.3	12.5	13.0

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

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
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



Production processes

Melting

Forging

Heat treatment

Mechanical processing

Vacuum hardening

Surface treatment

Products

Hot-work tool steels

Cold-work tool steels

Die forging steels

Plastic mould steels

Industries

Die casting

Extrusion

Die forging

Pipe technology

Plastics technology

Hot-stamping

Special applications

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