TUNLOX
PREHARDENED TOOL STEEL

2009-09-20

Product sheet:
44, 450 HBW (~45 HRC) with ESR properties

Specification

Hardness	HBW 410 - 475		
Impact toughness	Test temperature 20 °C	Impact energy, Charpy-V-test for plate, transverse direction; min J ≤ 130 mm 18	Impact energy, Charpy-V-test for forged bar, thickness direction; min J > 130 mm 11
Ultrasonic inspection	Ultrasonic inspection is carried out according to: EN 10 160 (rolled plates) EN 10228-3 (forged bars) with extra demands according to specification V6		
Etching	Tunlox 44 fulfils the etching requirements of NADCA # 07-2006.		
Dimensions	Tunlox 44 is supplied as plate in thicknesses between 5 - 130 mm, or as forged bars in thicknesses between 150 - 300 mm.		
Delivery condition	Quenched and tempered at a minimum temperature of 590 °C.		
Heat treatment	Tunlox 44 is not intended for further heat treatment. If Tunlox 44 is heated above 590°C after delivery no guarantees for the properties of the steel are given.		
Nitriding/coating	Nitriding or surface coating may be carried out if the temperature is below 590 °C.		
Testing	Testing according to EN 10 025 and EN ISO 6506-1. Hardness is measured on a milled surface 0.5 - 2 mm below the original surface.		
Tolerances	Thickness, length, width and flatness tolerances according to "Dimension program and tolerances for new rolling of tool steel plates. Forged bars; According to DIN 7527.		
Surface finish	On delivery the plate meets the following specifications: - free from mill scale - not repair welded - surface defects below the nominal ordered thickness are not permitted. Forged bars according to DIN 7527.		

contact tungstek@tungstek.com.br

http://tungstek.com.br/site/index.phppagina=81conteudo=34

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Technical information

Usage
Tunlox 44 is a new steel delivered quenched and tempered with high impact toughness and very low residual stresses to get good dimensional stability. Despite its hardness of 450 HBW (~45 HRC), Tunlox 44 is easily machined. Tunlox 44 has high strength at elevated temperature and is suitable for dies and tools such as plastic, rubber, die casting, bending and sheet forming tools. Tunlox 44 is also well suited as machine components such as wear parts, guide rails, hot applications. With proper surface treatment, the service life of the tool/component can be prolonged.

Typical Values

CHEMICAL COMPOSITION	
C	0.32%
Si	0.6-1.1%
Mn	0.8%
P	max 0.010%
S	max 0.003%
Cr	1.35%
Mo	0.80%
V	0.14%
Ni	max 1%
CEIIW	0.92-0.96
CET	0.55-0.57

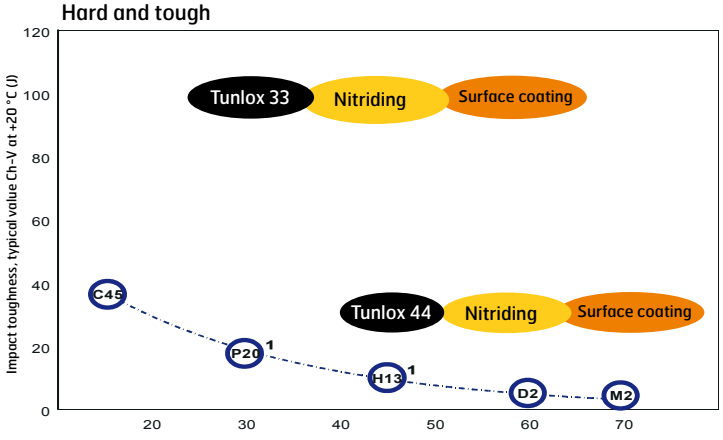
MECHANICAL PROPERTIES	+20°C	+200°C	+300°C	+400°C	+500°C
Tensile strength, R_m [MPa]	1450	1380			
Yield strength, $R_{p0,2}$[MPa]	1300	1200			
Elongation, A_5 [%]	13	10			
Compressive yield strength, $R_{c0,2}$ [MPa] - after 170 h soaking time	1250	1120	1120	1060 1060	930 910
Impact toughness [J]	30	60	80	80	
Hardness [HBW]	450				
Hardness [HRC]	45				

INCLUSIONS	
Inclusion size (equiv. diam)	6 µm
Area fraction	0.015%
Aspect ratio	1.2

PHYSICAL PROPERTIES	+20°C	+200°C	+400°C
Heat conductivity [W/m • K]	34	32	31
Thermal expansion coefficient, [10-6/K]	13.5	13.5	13.5

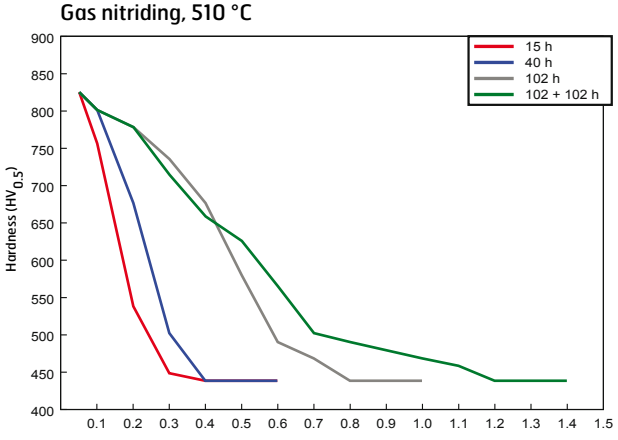
Surface technology

Hard and tough



Footnote 1: P20 = W.Nr 1.2311 and H13 = W.Nr 1.2344

Gas nitriding, 510 °C



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Machining

Tunlox 44 can be machined using conventional machines. It is important that sharp tools are used, with a positive cutting angle and that vibration is avoided. Use the following recommendations as guidelines and the starting point for your own evaluation of best practice.

Milling

Cemented carbide cutter ISO class P 20

Always use a positive cutting angle

Cutting speed V_c = 100-150 m/min

Feed f = 0.10-0.15 mm/tooth

Speed (rpm) $n = \frac{V_c \times 1000}{\pi \times D}$

Roughing
Use milling cutters with circular inserts

Finishing
Use milling cutters with a 45˚setting angle

Drilling

Carbide

Cutting speed V_c = 30-40 m/min

f = 0.10-0.15 mm/revolution

Feed (f) and speed (rpm) (n)

are dependent on the drill bit

diameter D

Use coolant

High speed steel HSS-Co

Cutting speed V_c = 6-8 m/min

Speed (rpm)

$n = \frac{V_c \times 1000}{\pi \times D}$

Use coolant

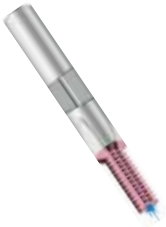
D [mm]	FEED, f [mm/rev]
5	0.05
10	0.09
15	0.15
20	0.20
25	0.25
30	0.30

Threading

Thread milling

Cutting speed V_c = 30 m/min

Feed (f) = 0.03 mm/tooth



Threading HSS-Co

Cutting speed

V_c = 2.5-4 m/min

DIMENSION	SPEED
M6	160
M8	120
M10	95
M12	80
M16	60
M20	50

Gas cutting / Welding

Recommended preheat temperature when gas cutting and welding. **Min. 250˚C**

Recommended stress relief annealing (after slow cooling to room temperature).
after gas cutting and welding. **580 ˚C**

For further information see Best Practice or please contact SSAB.

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Dimensional range

Standard stock dimensions

	TUNLOX 33 / 44	TUNLOX 33 / 44	SM 100 / 140[2]	TUNLOX 33 / 44
Thickness (mm)	5 - <104	≥104 - 130	>130 - 165	>165 - 320[3]
Width[1] (mm)	1050 - 2100	850 - 1700	850 - 1700	700 - 1150
Length[1] (mm)	up to 5800	up to 5800	up to 5800	up to 5600

[1] The possible width and length is depending on the thickness.

[2] **SM 100/140 is inspected and tested as TUNLOX 33/44 and has the same properties except:**
- in the centre of the plate thickness, approximately ±5% of the actual plate thickness, the polishing properties may not fulfil the requirements of high demands. The explanation for these abbreviations is a risk for small porosities in the plate centre.

[3] Material above 165 mm in thickness will be supplied as forged blocks.

New Rolling

	TUNLOX 33	TUNLOX 44	SM 100[2]	SM 140[2]
Thickness (mm)	5 - 130	5 - 130	>130 - 165	>130 - 165
Width[1] (mm)	1680 - 3000	1680 - 3000	1680 - 2400	1680 - 2400
Length[1] (mm)	4100 - 12000	4100 - 12000	4100 - 5700	4100 - 5700

[1] The width and lenght is depending on the thickness.

[2] **SM 100/140 is inspected and tested as TUNLOX 33/44 and has the same properties except:**
- in the centre of the plate thickness, approximately ±5% of the actual plate thickness, the polishing properties may not fulfil the requirements of high demands. The explanation for these abbreviations is a risk for small porosities in the plate centre.

If you require smaller sizes than those offered in the stock list please contact your Approved Toolox Dealer.
If larger formats are required, please contact Tungstek.

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