

Product sheet: Toolox[®] 33, 300 HBW with ESR properties

Specification

Hardness	HBW 275 - 325		
Impact toughness	Test temperature 20 °C	Impact energy, Charpy-V-test for plate, transverse direction; min J ≤ 130 mm 35	Impact energy, Charpy-V-test for forged bar, thickness direction; min J > 130 mm 35
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 SSAB V6.		
Etching	Toolox 33 fulfils the etching requirements of NADCA # 207-2006.		
Dimensions	Toolox 33 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	Toolox 33 is not intended for further heat treatment. If Toolox 33 is heated above 590 °C after delivery from SSAB Plate 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 from SSAB Plate". Forged bars: According to DIN 7527.		
Surface finish	On delivery from SSAB Plate the plate meets the following specifications: <ul style="list-style-type: none">- free from mill scale- not repair welded- surface defects below the nominal ordered thickness are not permitted. Forged bars according to DIN 7527.		

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Technical information

Toolox[®] 33

Usage

Toolox 33 is a new steel delivered quenched and tempered with high impact toughness and very low residual stresses to get good dimensional stability. Toolox 33 has a low carbide content, and is therefore excellent to machine. Toolox 33 is suitable for plastic moulding, for rubber moulding and machine components. With proper surface treatment, the service life of the tool/component can be prolonged.

Typical Values

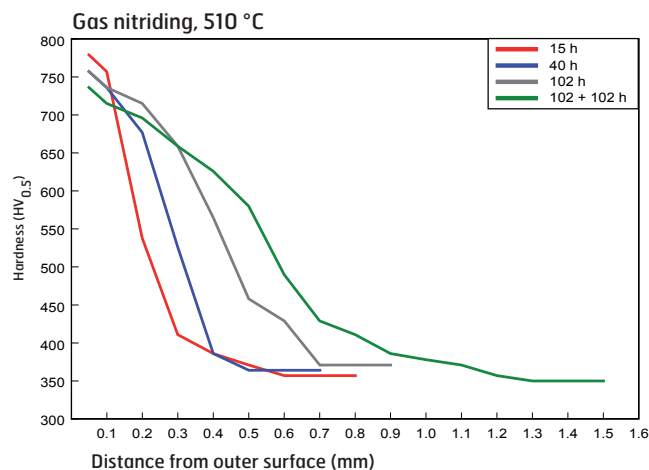
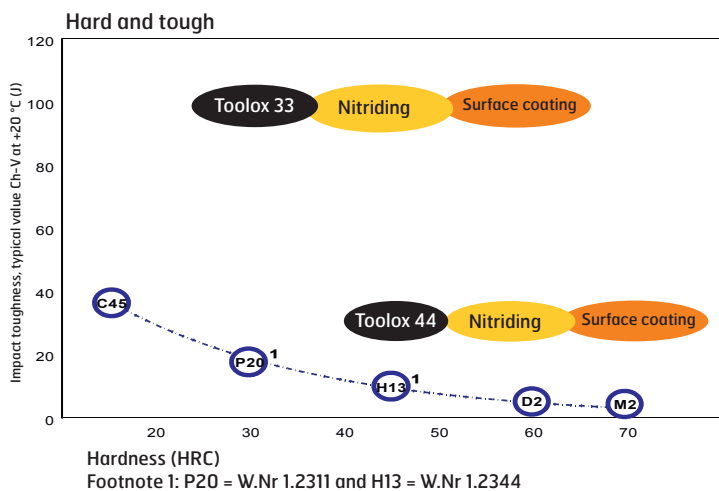
CHEMICAL COMPOSITION	
C	0.22-0.24%
Si	0.6-1.1%
Mn	0.8%
P	max 0.010%
S	max 0.003%
Cr	1.0-1.2%
Mo	0.30%
V	0.10-0.11%
Ni	max 1%
CE _{IIW}	0.62-0.71
CET	0.40-0.44

MECHANICAL PROPERTIES					
	+20 °C	+200 °C	+300 °C	+400 °C	+500 °C
Tensile strength, R _m [MPa]	980	900			
Yield strength, R _{p0.2} [MPa]	850	800			
Elongation, A ₅ [%]	16	12			
Compressive yield strength, R _{c0.2} [MPa]	800	750	700	590	560
Impact toughness [J]	100	170	180	180	
Hardness [HBW]	300				
Hardness [HRC]	29				

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]	35	35	30
Thermal expansion coefficient, [10 ⁻⁶ /K]	13.1	13.1	

Surface technology



Machining Toolox[®] 33

Toolox 33 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 $V_c = 150-250$ m/min

Feed $f = 0.10-0.20$ 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 $V_c = 40-50$ m/min

$f = 0.10-0.18$ 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 $V_c = 13-15$ m/min

Speed (rpm)

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

Use coolant



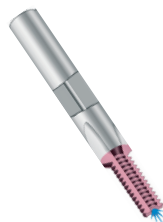
D [mm]	FEED, f [mm/rev]
5	0.10
10	0.10
15	0.16
20	0.23
25	0.30
30	0.35

Threading

Thread milling

Cutting speed $V_c = 30$ m/min

Feed (f) = 0.03 mm/tooth



Threading HSS-Co

Cutting speed

$V_c = 7-9$ m/min



DIMENSION	SPEED
M6	450
M8	300
M10	250
M12	200
M16	150

Gas cutting / Welding

Recommended preheat temperature when gas cutting and welding. **Min. 175 °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 Plate.

Standard dimensions

Toolox[®] 33

THICKNESS MM	WIDTH AND LENGTH
8 9,5 11,5 14 18 22 28 35 40 43 50 53 60 66 80 84	The standard width is 2100 mm and lengths between 4 and 5.8 m. Plates are delivered with mill edges. If necessary, the plates can be divided.
THICKNESS MM	WIDTH AND LENGTH
104 120 130	The standard width is 1700 mm and lengths between 4 and 5.8 m. Plates are delivered with mill edges. If necessary, the plates can be divided.
THICKNESS MM	WIDTH AND LENGTH
180 220 270 320	Forged bars in widths of 600 -1200 mm, dependent on thickness, and lengths of approximately 2.8 m. Please contact SSAB Plate or representatives for further information.

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 SSAB Plate.

Toolox is the registered trademark for tool steels produced by SSAB Plate.
For more information about Toolox 33, contact SSAB Plate.

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