

Standard dimensions TOOLOX33



Thickness mm	Width and Length
8	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.
9.5	
11.5	
14	
18	
22	
28	
35	
40	
43	
50	
53	
60	
66	
80	
84	
Thickness mm	Width and Length
104	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.
120	
130	
Thickness mm	Width and Length
180	Forged bars in widths of 600-1200 mm, dependent on thickness, and lengths of approximately 2.8 m. Please contact SSAB or representatives for further information.
220	
270	
320	

If you require smaller sizes than those offered in the stock list please contact your Approved TOOLOX Dealer. See our home page www.toolox.com.
If larger formats are required, please contact SSAB Oxelösund AB.

TOOLOX is the registered trademark for tool steels produced by SSAB Oxelösund AB. For more information about TOOLOX 33, contact SSAB Oxelösund AB.

TOOLOX
PREHARDENED TOOL & MACHINE STEEL

SSAB Oxelösund AB, SE-613 80 Oxelösund, Sweden. Tel +46(0)155 25 40 00, Fax +46(0)155 25 55 34. www.toolox.com

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Product sheet: TOOLOX33[®] 300 HBW with ESR properties



November-06

Specification

Hardness	HBW 280 - 330		
Impact toughness	Test temperature °C 20	Impact energy, Charpy-V-test for plate, longitudinal direction; min J ≤ 130 mm 27	Impact energy, Charpy-V-test for forged bar, thickness direction; min J > 130 mm 14
Milling	At a cutting speed of 300 m/min, feed 0.15 mm and 10 min effective machining time using Sandvik Coromill 200 and inserts GC 1025, we guarantee maximum edge wear of 0.3 mm.		
Ultrasonic inspection	All plates and forged bars tested in accordance with SSAB Standard V6.		
Etching	TOOLOX 33 fulfils the etching requirements of NADCA 207-2003.		
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 Oxelösund AB 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	Plate;	According to EN 10 029 - thickness tolerance according to Class C. - flatness tolerance according to Class N, steel type L.	
	Forged bars;	According to DIN 7527	
Surface finish	On delivery from SSAB Oxelösund AB the plate meets the following specifications: - free from mill scale - not repair welded - surface defects deeper than the nominal ordered thickness are not permitted. Forged bars according to DIN 7527		

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Technical information TOOLOX33



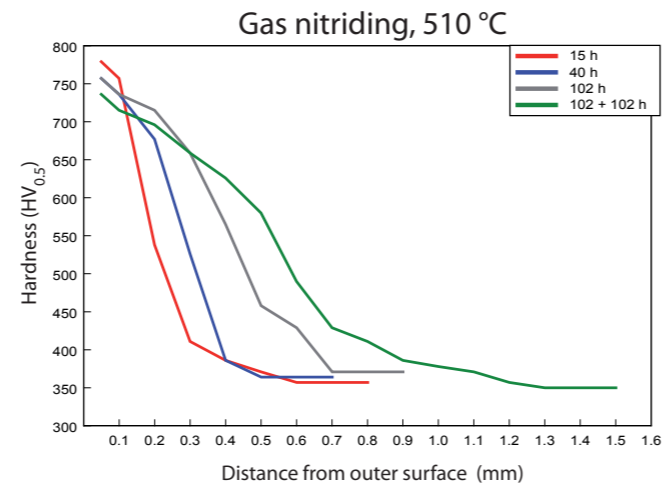
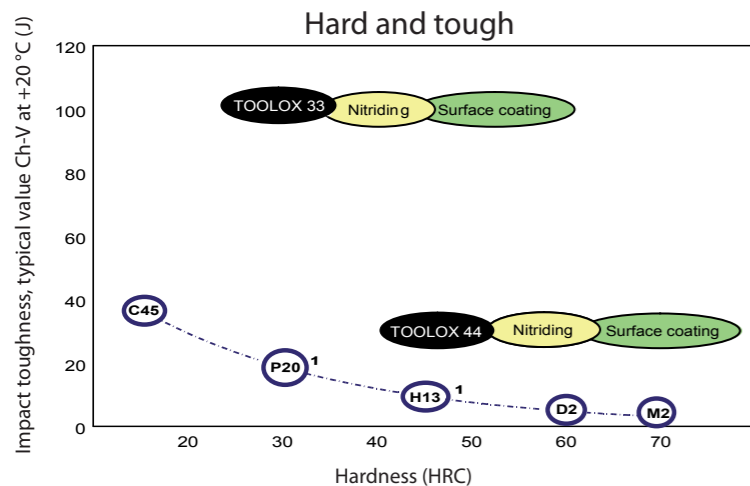
Usage

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		Mechanical properties				
		+20°C	+200°C	+300°C	+400°C	+500°C
C	0.22-0.24%	Tensile strength, R_m [MPa]	1080	1000		
Si	0.6-1.1%	Yield strength, $R_{p0.2}$ [MPa]	950	860		
Mn	0.8%	Elongation, A_5 [%]	16	12		
P	max 0.010%	Compressive yield strength, $R_{c0.2}$ [MPa]	880	750	700	590
S	max 0.003%	Impact toughness [J]	100	170	180	180
Cr	1.0-1.2%	Hardness, [HBW]	310			
Mo	0.30%	Hardness, [HRC]	29			
V	0.10-0.11%					
Ni	max 1%					
CE _{inv}	0.62-0.71					
CET	0.40-0.44					
Inclusions		Physical properties				
Inclusion size (equiv. diam)	6µm	+20°C	+200°C	+400°C	+600°C	
Area fraction	0.015%	Heat conductivity [W/m · K]	35	35	30	23
Aspect ratio	1.2	Thermal expansion coefficient [10 ⁻⁶ /K]	13.1	13.1		

Surface technology



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

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Machining TOOLOX33



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

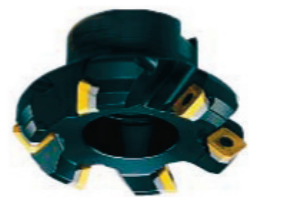
Feed $f = 0.10-0.20$ mm/tooth

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/revolution]
5	0.10
10	0.10
15	0.16
20	0.23
25	0.30
30	0.35

Threading

Thread milling

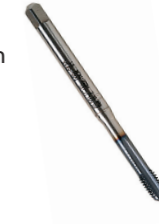
Cutting speed $V_c = 30$ m/min

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. **Minimum 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 Oxelösund.

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