

TOOLOX 33, 40 AND 44

ENGINEERING & TOOL STEEL

TYPICAL VALUES

Toolox 33 - Mechanical Properties	+20°C	+200°C	+300°C	+400°C	+500°C
Hardness (HBW)	300				
Hardness (HRC)	~29				
Yield strength $R_{p0.2}$ (MPa)	850	690	680	590	560
Tensile strength R_m (MPa)	980	900			
Elongation, A5, (%)	16	12			
Impact toughness, Charpy-V (J)	100	170	180	180	

Toolox 40 - Mechanical Properties	+20°C	+200°C	+300°C	+400°C	+500°C
Hardness (HBW)	400				
Hardness (HRC)	~40				
Yield strength $R_{p0.2}$ (MPa)	1150	1010	990	900	780
Tensile strength R_m (MPa)	1260	1170	1160	1060	900
Elongation, A5, (%)	14	14	14	15	16
Impact toughness, Charpy-V (J)	38				

Toolox 44 - Mechanical Properties	+20°C	+200°C	+300°C	+400°C	+500°C
Hardness (HBW)	450				
Hardness (HRC)	~45				
Yield strength $R_{p0.2}$ (MPa)	1300	1150	1120	1060	930
Tensile strength R_m (MPa)	1450	1380			
Elongation, A5, (%)	13	10			
Impact toughness, Charpy-V (J)	30	60	80	80	

Physical Properties	+20°C		+200°C		+400°C	
	Toolox 33	Toolox 44	Toolox 33	Toolox 44	Toolox 33	Toolox 44
Heat conductivity (W/m*K)	35	34	35	32	30	31
Thermal expansion coefficient (10 ⁻⁶ /K)	13.1	13.5	13.1	13.5	13.1	13.5

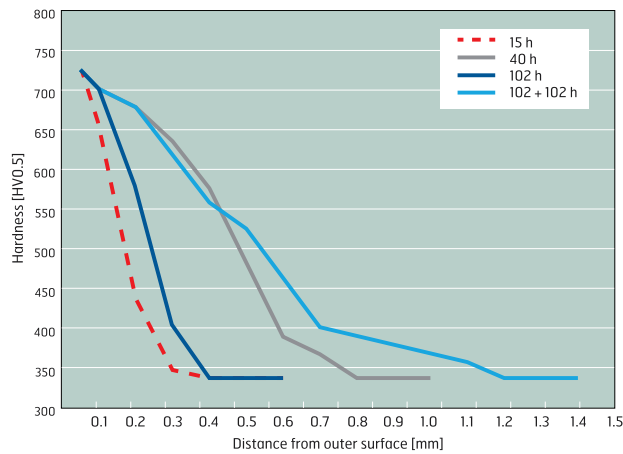
Inclusions			
	Toolox 33	Toolox 40	Toolox 44
Inclusion size (equiv. diam.)	6 micron	6 micron	6 micron
Area fraction	0.015%	0.015%	0.015%
Aspect Ratio	1.2	1.2	1.2

Chemical composition	Toolox 33	Toolox 40	Toolox 44
C	0.22-0.24%	0.28%	0.32%
Si	0.6-1.1%	1.1%	0.6-1.1%
Mn	0.8%	0.6%	0.8%
P	Max 0.010%	Max 0.010%	Max 0.010%
S	Max 0.002%	Max 0.002%	Max 0.002%
Cr	1.0-1.2%	1.22%	1.35%
Mo	0.30%	0.5%	0.80%
V	0.10-0.11%	0.12%	0.14%
Ni	Max 1.0%	Max 1.0%	Max 1.0%
CEIIW	0.62-0.71	0.77-0.81	0.94-0.98
CET	0.40-0.44	0.45-0.50	0.55-0.57

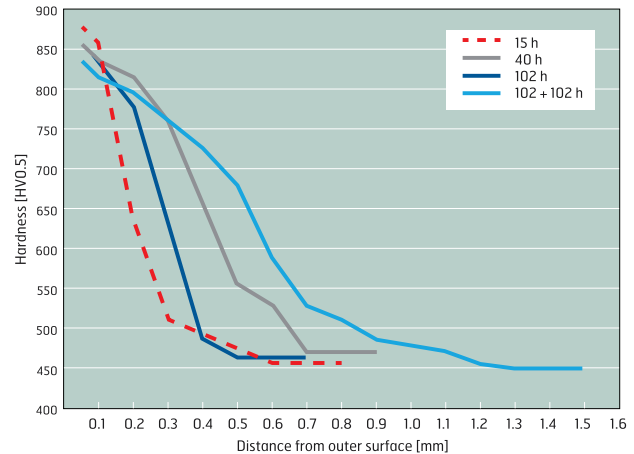
607-en-Toolox:Typical values V1-2014-Halleledo

SURFACE TECHNOLOGY

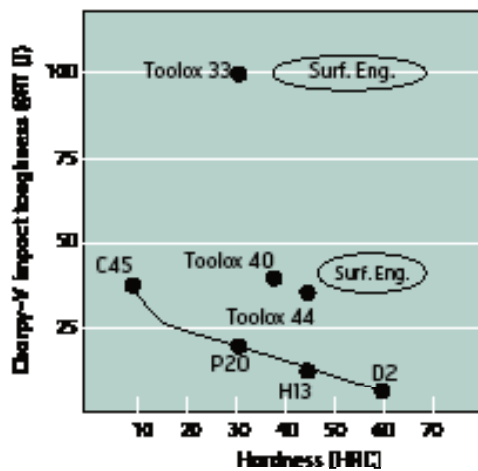
Gas nitriding of Toolox 33



Gas nitriding of Toolox 44



HARD & TOUGH



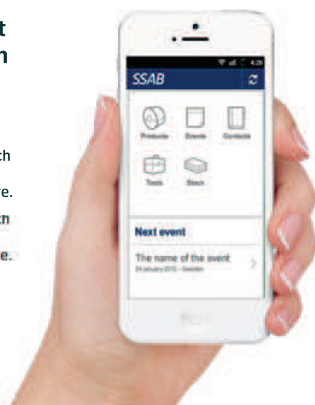
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