TOOLOX® 44

45 HRC WITH ESR PROPERTIES

NOMINAL 45 HRC

A new quenched and tempered steel designed to have high impact and low residual stresses and therefore good dimensional stability.

KNOCK OUT THE COMPETITION

- MACHINE COMPONENTS
- WEAR COMPONENTS
- PLASTIC MOLDS
- RUBBER MOLDS
- PRESS FORMING
- DIE CAST DIES
- FORGING DIES
- COREBOXES
- PERMANENT MOLDS

Features

Despite hardness of Nominal 45 HRC, this new steel is easy to machine.

Particularly suitable for manufacturing plastic molds because it can be polished and etched with very good results.

Great for guide rails, bending tools, etc. when stability materials are required.

Supplied as plate in thickness between .200" - 5 1/8".

INTERNATIONAL MOLD STEEL, INC.

6796 Powerline Dr. • Florence, KY • 41042
1-800-625-6653 • Web: www.imsteel.com

Specification

Hardness	Hardness range 41 - 47 HRC
Impact toughness	Test temperature °F 68 — Impact energy, Charpy-V-test for plate, direction; Guaranteed minimum Ft. lbs. 14
Milling	At cutting speed of 140m/mm, feed 0.15 mm and 10min effective machining time using Sandvik Coromil 200 and inserts GC 1025, we guarantee maximum edge wear of 0.3 mm
Etching	TOOLOX 44 fulfills the etching requirements of NADCA 207-2003
Dimensions	TOOLOX 44 is supplied as plate in thickness between .200" - 5 1/8"
Heat treatment	TOOLOX 44 is not intended for further heat treatments. If TOOLOX 44 is heated above 590°C, no guarantees for the properties of the steel can be given
Nitriding/coating	Below tempering temperature <590°C / 1094°F

Usage

Machine Components

Plastic Molding

Press Forming

TOOLOX 44 is a new quenched and tempered steel designed to have high impact resistance and low residual stresses and therefore good dimensional stability. Despite a hardness of 45 HRC, the new steel is easily machined. TOOLOX 44 is particularly suitable for manufacturing plastic molds because it can be polished and etched with very good results. Fields of application: plastic molds, rubber molds, wear components and machine components, such as guide rails, bending tools, etc., where stability materials are required.

Technical Information (Typical Values)

Chemical Composition *(typical values)*

C	0.31%
Si	0.60%
Mn	0.90%
S, max	40 ppm
Cr	1.35%
Ni	0.70%
Mo	0.80%
V	0.145%

Mechanical Properties *(typical values)*

	+20°C	+200°C
Tensile strength, PSI	210,300	200,150
Yield strength, PSI	188,500	174,045
Elongation, A_5 [%]	13	10
Impact Toughness, Typical	22 ft. lbs.	
Hardness, [HRC]	45	

Compressive Strength *(typical values)*

Yield strength, PSI	PSI
at + 20°C	181,300
at + 200°C	165,340
at + 300°C	162,400
at + 400°C	150,840

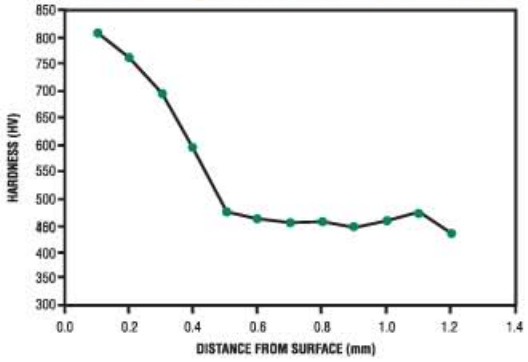
Physical Properties *(typical values)*

Thermal expansion coefficient	Inch/inch F°
68°F –> 750°F	7.5

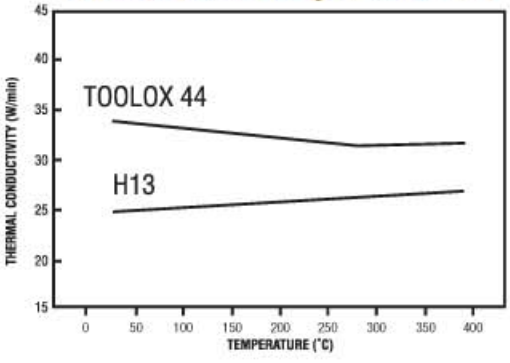
Inclusions *(typical values)*

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

Gas nitriding of TOOLOX 44, 60h, 510°C



Thermal conductivity in tool steel



Machining

TOOLOX 44 can be machined on 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
V_c = 100-150 m/min
Feed (f) = 0.10-0.15 mm/tooth

$$\text{Speed (rpm) } n = \frac{V_c \times 100}{3.1428 \times D}$$

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

$$\text{Speed (rpm) } n = \frac{V_c \times 100}{3.1428 \times D}$$

Use coolant

D (mm)	Feed, f (mm/revolution)
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

Thread HSS-Co
Cutting speed
V_c = 2.5-4 m/min

Dimension	Speed (rpm)
M6	160
M8	120
M10	95
M12	80
M16	60
M20	50

GAS CUTTING / WELDING

Recommended preheat temperature when gas cutting and welding **Minimum 250°C**

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

INTERNATIONAL MOLD STEEL, INC.

6796 Powerline Dr. • Florence, KY • 41042 • 1-800-625-6653 • Web: www.imsteel.com