Industeel

ArcelorMittal

MX01

MX01: Steel for forging dies

MX01 is a steel grade especially developed to minimize operating cost of forging dies by providing :
- Improved mechanical properties and die resistance to indentation and wear
- Excellent softening resistance. The global die lifetime will be extended by preserving the dimensional integrity of cavities and forged pieces during longer time than conventional grades.
- Hardness consistency. Hardness and mechanical properties are consistent throughout the whole die, even in the center of heavy blocks, thanks to boron addition ensuring an efficient through hardening.

Toughness, linked to the chemistry of the grade ensuring a fine distribution of carbides in the matrix. Toughness will provide a good resistance to all phenomena such as chipping, cracking or even failures on the die in hot condition but also during calibration at room temperature.
- In some cases can also be used in low series Aluminium dies casting mold..

PROPERTIES

CHEMICAL ANALYSIS -% WEIGHT

Typical heat analysis

	C	Mn	Ni	Cr	Mo	V	Others
Conventional material	0.50	0.85	0.90	1.10	0.50	0.05	-
MX01	0.19	1.5	1.00	2.00	0.80	0.20	B

MECHANICAL PROPERTIES

> **Delivery condition:** MX01 is delivered in prehardened at 360/400 HB (38/42 HRC)

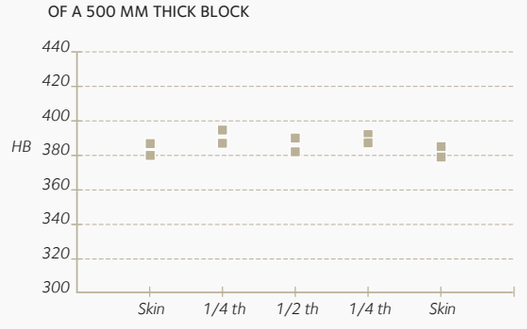
> **Typical mechanical properties:** Measured at room temperature on 375 mm / 14.8" thick block

Hardness (HB)	YS (MPa/ksi)	UTS (MPa/ksi)	Elongation (%)	Charpy V (J/ft.lb)
382/392	1034/150	1194/173	13	22/16

THROUGH THICKNESS HOMOGENEITY

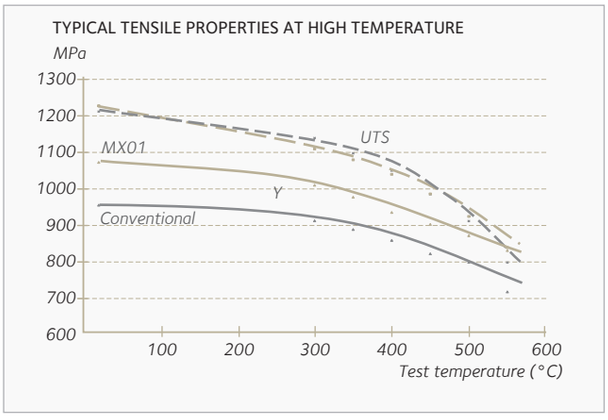
Hardness homogeneity is also representative of very homogeneous mechanical properties (tensile). Both characteristics are ensuring very consistent performances in all parts of the tool.

HARDNESS READINGS PERFORMED THROUGH THE THICKNESS OF A 500 MM THICK BLOCK



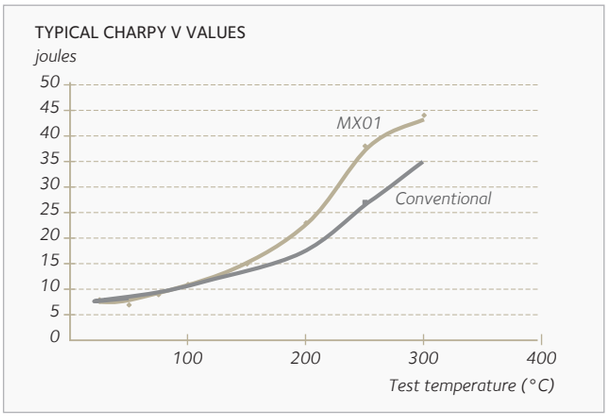
SOFTENING RESISTANCE

Throughout the whole service temperature range, for a similar hardness level, MX01 exhibits a higher yield strength than conventional grades providing a better resistance to indentation (plastic deformations)



TOUGHNESS

High toughness is important to prevent failures of highly stressed forging dies, deep and complex shapes or during calibration at room temperature.



PHYSICAL PROPERTIES

Density	Thermal conductiv. $W\ m^{-1}\ K^{-1}$	Thermal expansion coefficient $10^{-6}°C^{-1}/10^{-6}°K^{-1}$			Young Modulus *GPa*			
20°C 68°F	20°C 68°F	20 - 100°C 68 - 212°F	20 - 200°C 68 - 392°F	20 - 300°C 68 - 572°F	20°C 68°F	200°C 392°F	300°C 572°F	400°C 752°F
7.8	36	12.1	12.7	13.2	213	199	192	184

WELDING

Welding Process	GMAW, FCAW, SMAW, SAW
Filler Material	- SK D 250 G for hot working parts - ER70 for other parts
Shielding	- 98%Ar-2%O_2 for SK D 250 G - 82%Ar-18%CO2 for ER70
Preparation	Machining, Cleaning, degreasing
Cleaning	Grinding, brushing
Preheating temperature	150°C
Interpass temperature	200°C
Measurement method	Digital thermometer or tempil sticks at 100 mm of the weld
Postheating temperature	200°C/2 hours
Heat Input	10-25KJ/cm

DELIVERY CONDITIONS

MX01 is delivered in pre-hardened condition. It normally requires no further heat treatment. For specific properties, please consult the mill

DIMENSIONAL PROGRAM

Thickness	Width
200 mm (8") - 500 mm (20")	Up to 2000 mm (78")

For specific sizes, please consult the mill

YOUR CONTACTS

Perrine Lavalley
Tel. +33 3 85 80 52 56
perrine.lavalley@arcelormittal.com

http://industeel.arcelormittal.com

Industeel France
Le Creusot Plant
56 rue Clemenceau
F-71202 Le Creusot Cedex