Industeel

ArcelorMittal

1.2738 Mod HH-1% Ni-

1.2738 Mod HH-1% Ni is a prehardened 330- 380 HB,grade specially designed for abrasive plastic mold industry. Chromium, molybdenum, manganese and Nickel additions are optimized to have a fully martensite-bainite microstructure after quenching. The steel is melted in an electrical furnace and refined with VOD or DH device. The cleanliness of the steel is guaranteed as well as the soundness. This makes the steel particularly well adapted for mold steel even when polishing or chemical etching are required for surface finish quality.

Typical applications for 1.2738 Mod HH-1% Ni grade are:

>Plastic injection molds for thermoplastics.

> Extrusion dies for thermoplastics

>Compression molds.

STANDARD

> WERKSTOFF ~ 1.2738mod HH
> AISI ~ P20Mod HH

PROPERTIES

CHEMICAL ANALYSIS (TYPICAL; IN WEIGHT%)

	C	Mo	Ni	Si	Mn	Cr	S	P	B
Min	0.23	0.5	0.8	0.05	1.4	1.2	-	-	-
Typ	0.26	0.6	1.0	0.1	1.5	1.4	<0.003	< 0.012	+
Max	0.28	0.7	1.2	0.20	1.6	1.8	-	-	-

PHYSICAL PROPERTIES (REFERENCE VALUES)

Hardness range	Thermal conductivity ($W\ m^{-1}\ K^{-1}$)	Thermal expansion coefficient ($10^{-6}°C^{-1}/10^{-6}°K^{-1}$)			Specific heat ($J.kg\text{-}1.°C\text{-}1$)
330-360 HB	20°C (68°F)	20-100°C	20-200°C	20-300°C	-
Min 320	40	12	13	13	480

METALLURGICAL PROPERTIES

Internal soundness: all plates are ultrasonically tested. The acceptance standards of ASTM A5 78.96.S9 are guaranteed. Grain size: uniform 5/6 grain according to ASTM E1 1 2.

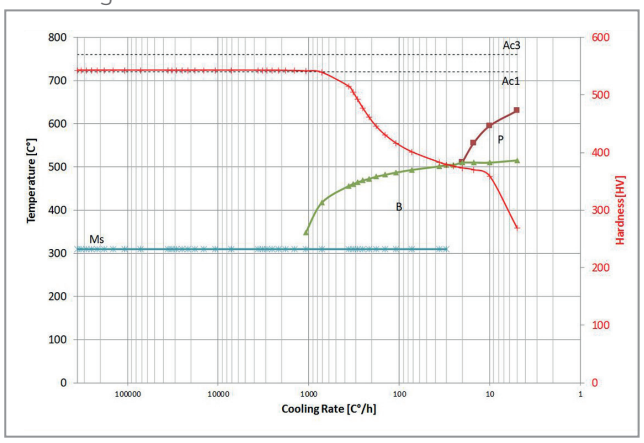
Cleanliness: **1.2738 Mod HH** is melted in an electric arc furnace and refined through a VOD or DH process- consequently, the content of non metallic inclusions is reduced to an extremely low level. This ensures a good polishability and chemical eching ability.

Non metallic inclusions content is assessed in accordance with ASTM E45 Method A ("worst field"). **1.2738 Mod HH-1% Ni** has a good hardenability resulting in good uniformity of hardness and microstructure.

Metallurgical transformation points

AC1 (°C)	AC3 (°C)	Ms (°C)	V1 (°C/h)	V2 (°C/h)
730	800	320	1100	< 40

CCT Diagram



TTT Diagram

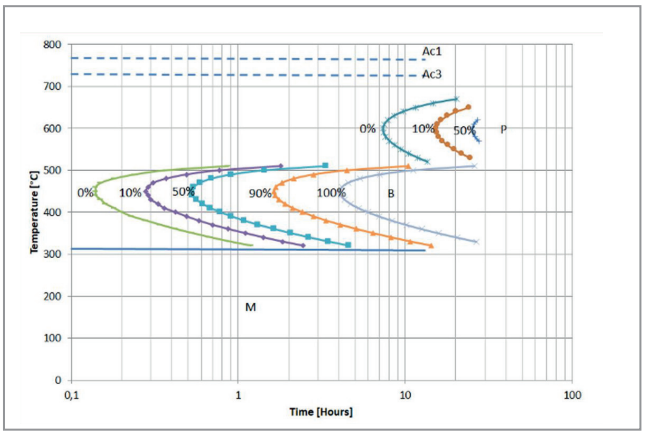


PLATE PROCESSING

HEAT TREATMENT

For specific applications where mechanical properties are different than 330 - 360 HB, hardening can be performed in the following way:

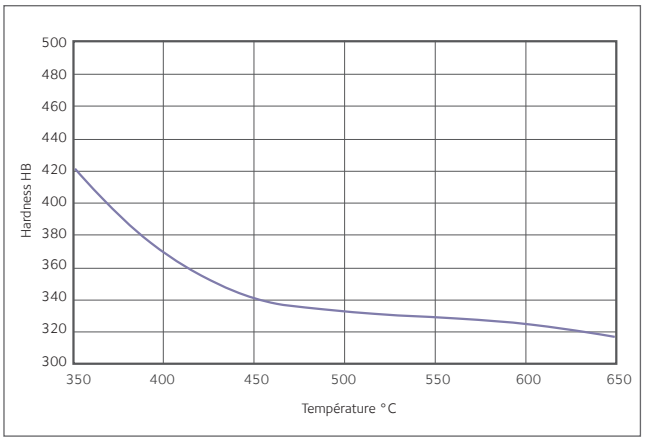
> Heating about 850ºC - (1560ºF) with a sufficient holding time 1 hour/25mm of thickness.

> Media : Water, oil or air quenching depending on thickness (see C.C.T diagram)

> Apply a first tempering temperature according to the wished hardness (see tempering curve) with an holding time of one hour per 25 mm of thickness

> Apply a second tempering temperature 30°C below the previous tempering with a holding time of one hour per 25 mm of thickness.

Tempering Curve



SURFACE TREATMENT

The quality of surface treatments depends widely on the surface roughness and characteristics after polishing.
Homogeneity of hardness, microstructure and good cleanliness ensure a good behaviour for chromium plating, nickel plating or nitriding.
Nevertheless, after hard-chromium plating, the steel should be tempered for about 4 hours at 180ºC (356º F) to avoid any hydrogen embrittlement.

MACHINING

1.2738 Mod HH-1% Ni grade performs very well in drilling and in milling using high speed steel or carbide tools. Cutting conditions (cutting speed, feet rate, etc..) can be taken from 1.2738 Mod HH . Advice on machining conditions can be provided on demand.

1.2738 Mod HH-1% Ni is suitable for EDM. Precaution should be taken to avoid the presence, after machining, of a rehardened surface layer ("white layer") on the steel. It is advisable to remove completely this layer by grinding and polishing.

POLISHING

1.2738 Mod HH-1% Ni has a good polishability in quenched and tempered condition. After grinding, polishing shall be made with aluminium oxide or diamond paste. A typical polishing sequence could be:

		Emery polishing paper or stones		Diamond paste
Grinding	→	FEPA 120 →240 → 320 → 600 → 1000 GRIT 120 → 220 → 280→360 → 500	→	10µm →6µm →3µm→1µm

TEXTURING

1.2738 Mod HH -1% Ni is particularly suitable for texturing. Steel making process and heat treatment of plate leads to uniform structure and homogeneous hardness which ensure accurate and consistent pattern reproduction.

WELDING

Carefully degrease, clean and dry the surface before welding; grind surface defects is necessary. A V-type bevel without sharp angle is recommended. Pre and post-heating treatment must be achieved to ensure crack free welds. GTAW is the recommended process to ensure a clean weld without sulphides, porosites or oxides wich affect properties of the weld such as chemical etching ability, polishability...

DELIVERY CONDITIONS

DIMENSIONAL PROGRAM

Thickness	Width
15 - 910 mm	2000 mm
911mm - 1050 mm	1350 mm

YOUR CONTACTS

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