Industeel

ArcelorMittal

MECASTEEL 90

Prehardened forged rolled steel

MECASTEEL 90 is a steel grade delivered in **prehardened** condition (YS ≥ 90 KSI - 620 MPa) and **available in a very large dimensional program** (width ~ 78'' - 2m thickness up to 37.4" -950mm).

It can be used in substitution to conventional engineering steels, such as AISI 4130 for example in the manufacture of massive steel components (machines, hydraulic systems...).

Its original chemistry and heat treatment process enable to obtain in delivery condition very consistent mechanical properties throughout the whole blocks, even for the heaviest gage.

Consequently, and unlike 4130 type steels, **this material doesn't need any further hardening after machining**, allowing substantial cost savings.

Although it is delivered in prehardened condition, Mecasteel 90 provides outstanding machinability. Its low carbon leads also to excellent weldability and toughness compared to conventional steels.

Delivery conditions

Quenched and tempered.

Chemical analysis - Guaranteed % weight

C	S max	P max	Cr	Mn	Mo	Boron max
.23 - .28	0.010	.01	1.2 - 1.6	1.2 - 1.6	.35 - .55	.003

Physical properties

Density = 7.85 kg/dm^3

Thermal conductivity $W.m^{-1}.°K^{-1}$	Thermal expansion coefficient 10^{-6} $°K^{-1}$			
at 68°F	68-212°F	68-392°F	68-572°F	68-752°F
40	11.9	12.4	12.8	13.1

Guaranteed mechanical properties (in delivery condition)

Hardness

Hardness ≥ 240 HB

Tensile properties

	YS 0.2	UTS	El %	Reduction of area (%)
KSI	*≥ 90*	*≥ 110*	*≥ 15*	*≥ 30*
MPa	*≥620*	*≥758*	*≥ 15*	*≥ 30*

Guaranteed values in length and tranverse direction

Impact properties (for hardness within 240/270 HB)

	-4°F -20°C	-20°F -29°C	-40°F -40°C
Ft.lb	*≥21 (single value) ≥31 (average of 3 specimen)*		
J	*≥28 (single value) ≥42 (average of 3 specimen)*		
Lat. expension	*≥0.015" - 0.38 mm*		

Guaranteed in lenght direction according to ASTM A370
Guaranteed on a QTC (Qualification Test Coupon) or on prolongation at 2.5" (63.5mm) from the skin of the solid block

Slightly different properties may be achieved on request Please consult

Typical mechanical properties (in delivery condition)

Hardness

Typical value = 260 HB

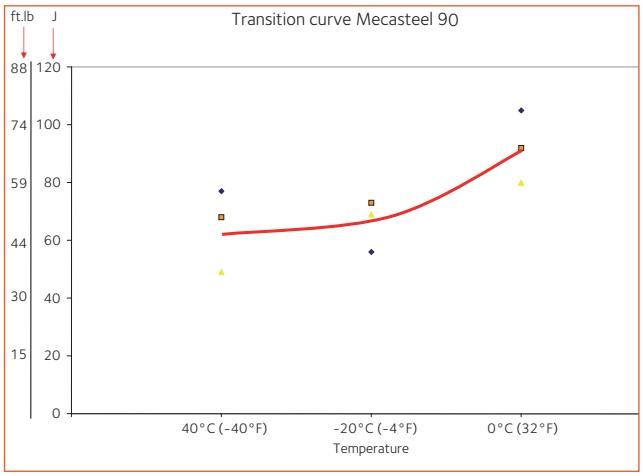
Tensile properties

Typical value measured on a block 30.7 (780 mm) thick

		YS 0.2 KSI (MPa)	UTS KSI (-MPa)	El (%)	Red. of area (%)
Lengh direction	Skin - 2.5"	*95.0 (655)*	*116.2 (801)*	*23*	*66*
	1/4 th.	*93.1 (642)*	*115.0 (793)*	*24*	*63*
	1/2 th.	*95.0 (655)*	*117.5 (810)*	*18*	*43*
Transverse direction	Skin - 2.5"	*97.6 (680)*	*117.4 (823)*	*22*	*64*
	1/4 th.	*94.9 (654)*	*116.2 (801)*	*18*	*46*
	1/2 th.	*95.0 (655)*	*116.5 (803)*	*19*	*50*

Impact properties

Typical value measured 2,5" below the skin of a block 30.7" (780 mm) thick



Structure

MECASTEEL 90 is melted in an electric arc furnace and refined using either a VOD or DH process.

These processes ensure a stringent control of the chemical analysis and an extremly low level of residual oxygen. Cleanliness of the steel is consequently enhanced. Optimized chemical analysis and accurate control of solidification parameters contribute to a more homogeneous microstructure.

Cleanliness

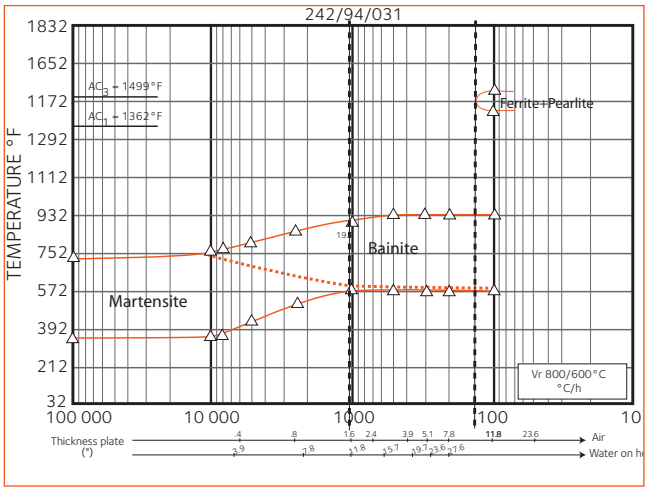
MECASTEEL 90 quality offers improved cleanliness (close to ESR quality), over conventional grades. Guaranteed cleanliness per ASTM E45 method A (worst field).

A	B	C	D
≤ 1.5	≤ 1.5	≤ 1.0	≤ 1.5

Transformation points

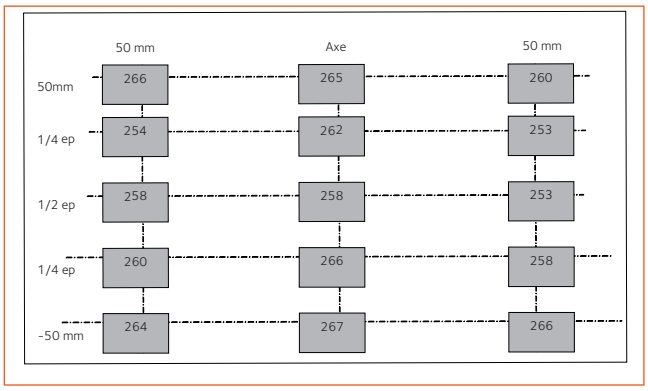
	AC_1 °F	AC_3 °F	M_s °F
MECASTEEL 90	1362	1499	716

CCT Diagram



CCT Diagram MECASTEEL 90

Compared with standard grades, the optimized chemical analysis of MECASTEEL 90 allows the homogeneity to be improved throughout the thickness (reduction of the critical speed of ferrite/pearlite formation and extension of bainitic zone).



Hardness homogeneity of a 780mm / 30.7" thick block Mescasteel 90

Welding

The welding of MECASTEEL 90 requires a preheating at least 225°C / 437°F whereas interpass temperature should remain below 300°C / 572°F.

After the welding, the PWHT should be done at ≈ 580°C to remove welding stress.
MECASTEEL 90 can be welded using SAW and SMAW process.

Consumables used for the welding of MECASTEEL 90 should meet following standards:

Standards	SMAW	SAW (Wire/Flux)
EN	*EN 757 E 69 5 (or 6) Mn2NiCrMo B 42*	*EN 756 S 69 6 FB SZ3Ni2CrMo SA FB 1 65 DC H5*
AWS	*A5.5 E11018-M (or -G)*	*A5.23-97 F11A8-EM4*

A non-exclusive list of suitable filler metals is given hereafter:

	SMAW	SAW (Wire/Flux)
ALW	*TENACITO 80*	-
T-PUT	*Phoenix SH Ni 2 K 100*	-
ESAB	*FILARC 108*	-
BÖLHER	*FOX NiMo 100*	*3NiCrMo 2.5 - UP/BB 24*

Compactness

All blocks are UT according to ASTM A388 (1/8" FBH).

Magnetic particul inspection

MECASTEEL 90 is capable of AMS 2301.

Manufacturing program

Thicknesses	Widths
from 5" to 37.4"	from 40" to 80"

For specific sizes, please ask us.

For any information:

Industeel USA LLC
139 Modena Rd
Coatesville, PA 19320
Tel +1 610 383 3002
Fax +1 610 383 3007

Industeel France
Le Creusot Plant
Marketing Department
56 rue Clemenceau
F-71201 Le Creusot Cedex
Tel +33 3 85 80 51 37
Fax +33 3 85 80 55 00

www.industeel.info
www.arcelormittal.com

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