



# BICO STEEL

# MECASTEEL 90

## Prehardened forged rolled steel

- MECASTEEL 90 is a steel grade delivered in pre-hardened condition (YS  $\geq$  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, allow 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<sup>3</sup>

Thermal conductivity W.m <sup>-1</sup> . °K <sup>-1</sup>	Thermal expansion coefficient 10 <sup>-6</sup> °K <sup>-1</sup>				
	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  $\geq$  240 HB
- Tensile Properties

	YS 0.2	UTS	EI%	Reduction of area (%)
KSI	$\geq 90$	$\geq 110$	$\geq 15$	$\geq 30$
MPa	$\geq 620$	$\geq 758$	$\geq 15$	$\geq 30$

NOTE: Guaranteed values in length and transverse direction.

- Impact properties (for hardness within 240/270 HB)

	-4 °F -20 °C	-20 °F -29 °C	-40 °F -40 °C
Ft.lb	$\geq 21$ (single value)	$\geq 31$ (average of 3 specimen)	
J	$\geq 28$ (single value)	$\geq 42$ (average of 3 specimen)	
Lat. expansion	$\geq 0.015''-0.38$ mm		

NOTE: Guaranteed in length 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)

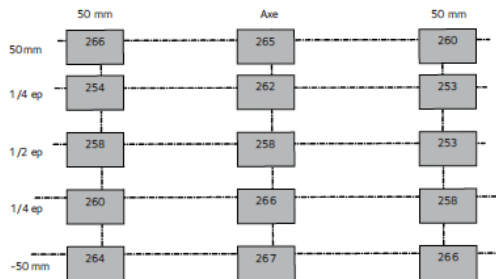
- Hardness  
Hardness = 260 HB

- Tensile Properties

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

- Impact Properties

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



		YS 0.2 KSI (MPa)	UTS KSI (-MPa)	EI (%)	Red. of area (%)
Longitudinal 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

## 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 extremely 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

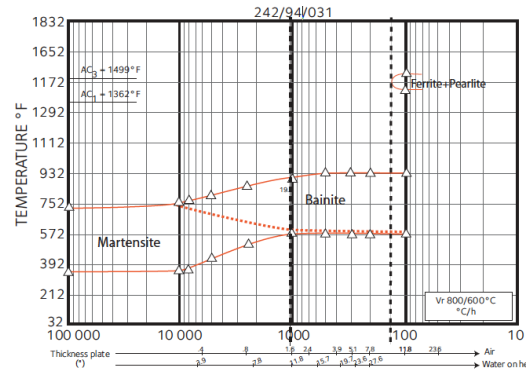
	AC <sub>1</sub> °F	AC <sub>3</sub> °F	M <sub>s</sub> °F
MECASTEEL 90	1362	1499	716

## 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

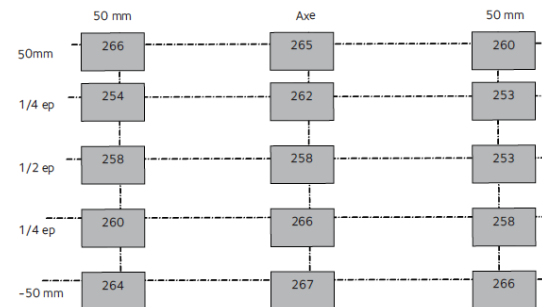
## CCT Diagram



NOTE: 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).

## CCT Diagram



NOTE: Hardness homogeneity of a 780mm / 30.7" thick block MECASTEEL 90.

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

	SMAW	SAW (Wire/Flux)
AL	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"

NOTE: For specific sizes, please consult us.

## For Information:

### Industeel Creusot

56 rue Clemenceau  
5-71201 Le creusot Cedex

### Industeel Belgium

266 rue de Chatelet  
B-6030 Charleroi

Please contact  
Tel +33 3 85 80 55 37 (Mkt)  
+33 3 85 80 51 51 (Sales)  
Fax +33 3 85 80 55 00

### Industeel Loire

118 rue des Etaings - BP 368  
F-42803 Rive de Gier Cedex

Please contact  
Tel +33 4 77 75 21 38 (Sales)  
Fax +33 4 77 75 21 67

[www.industeel.info](http://www.industeel.info)  
[www.arcelormittal.com](http://www.arcelormittal.com)

NOTE: Technical data and information are to the best of our knowledge at the time of printing. However, they may be subject to some slight variations due to our ongoing research program on steels. Therefore, we suggest that information be verified at time of enquiry or order.

Furthermore, in service, real conditions are specific for each application. The data presented here are only for the purpose of description, and considered as guarantees when written formal approval has been delivered by our company.