



**BICO STEEL**

# 4130 Modified

Prehardened/Through Hardened  
290/320 HB (30/34 HRC)

## Chemical Analysis - % Weight

C	Cr	Mn	Mo	Other Element
.25	1.30	1.30	0.4	B

NOTE: Typical values for a plate 100 mm (4" thick).

## Mechanical Properties

Hardness (HB)	Y.S. 0.2 MPa (KSI)	UTS MPa (KSI)	EI 5.65 %	Young Modulus GPa
305	920 (134)	1250 (148)	13.5	205

NOTE: Typical values for a 100 mm (4") 4130 (Mod.) plate.

Hardness is guaranteed within the range of 290 to 320 HB, for thicknesses 20 mm (3/4") to 950 mm (37").

## Metallurgical Properties

- Cleanliness

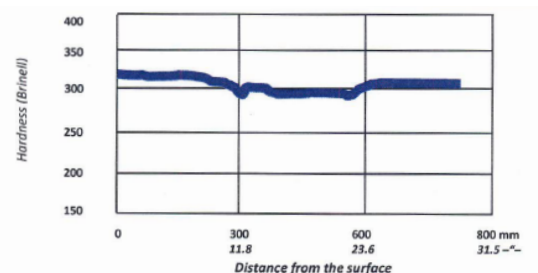
A combination of processes with electric arc furnace and VOD refining are used in the steel making. These facilities allow for very low levels of impurities (oxygen especially).

A	B	C	D
≤ 1.5	≤ 1.5	≤ 1.0	≤ 1.5

- Microstructure

4130 Modified is delivered in pre-hardened condition. Its microstructure is basically made of a mix of bainite and martensite. Optimized balance of alloying elements results in excellent hardenability. Consequently, hardness is very consistent through the whole thickness, even for very thick block up to 950 mm (37").

Low carbon content ensures strong reduction for hard spots. This is helpful in the machining process.



NOTE: Example for an 800 mm (31.5") thick block.

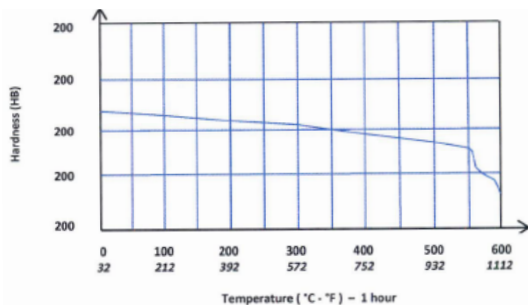
## Heat Treatments

4130 Modified is delivered in pre-hardened condition and therefore should not need any further hardening. Moreover, it is not recommended to hard it to hardness higher than 320 HB.

If, for any reason 4130 Modified is exposed to a temperature higher than 550°C (1020°F) delivery mechanical properties can be affected. It will be then necessary to perform a complete heat treatment cycle, including quenching and tempering to restore original properties.

Following heat treatments have to be performed:

- Austenitization at around 900°C (1652°F), holding time 1 hour/25 mm (1") of section.
- Quenching in water, oil, pressurized gas or air depending on piece thickness and shape.
- Tempering within a temperature range of 500 to 600°C (932 to 1112°F) depending on required hardness.



## Machining

4130 Modified is very well adapted to machining (drilling or milling). Its machinability is much better than a typical 4130. Significant cost and time savings can be achieved using more productive machining parameters (cutting speed and feed).

## 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.