

Niobium N5



**NIOBIUM MULTIGRADE STRUCTURAL STEELS -  
IMPROVING THE EFFICIENCY OF SUPPLY  
CHAINS**

## **MULTIGRADE : ONE STEEL COVERING SEVERAL SPECIFICATIONS**

Multigrade steels add considerable value to the structural steel supply chain. They facilitate easier and faster planning and implementation of production for steelmakers, fabricators through to users of steel frame structures.

They enable reduced inventories and investment capital, lower operational costs and much faster delivery times, improving the competitiveness of the sector.

Multigrade steels have more reliable properties, improving quality and productivity for fabricators and construction companies.

## **AN EXAMPLE OF THE MULTIGRADE CONCEPT FOR STRUCTURAL STEELS**

With just one multigrade steel, it is possible to cover the required properties of several steel specifications.

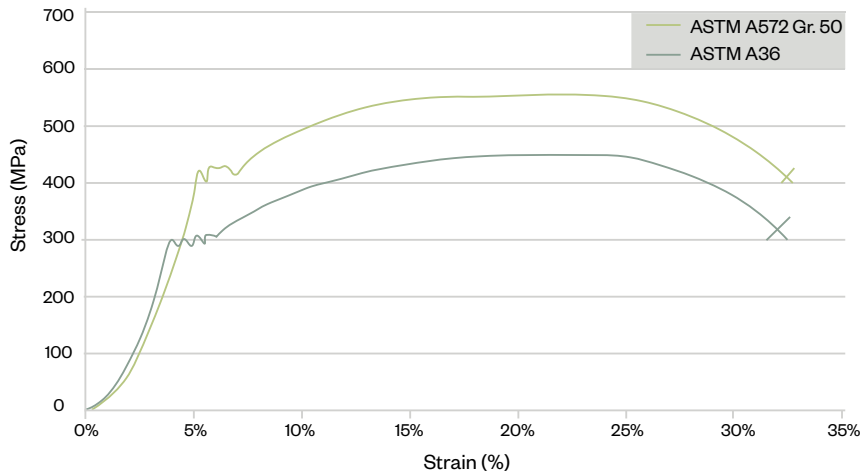
Niobium microalloying helps to reconcile the highest requirements of each steel, resulting in a very reliable product, with savings on production costs and the management of materials for the entire supply chain.

The table below shows how a multigrade steel can cover several specifications.

A36	YS (MPa)	> 250 MPa								
	TS (MPa)	> 400 MPa								
	E (%) 200 mm	> 20%								
	YS/TS	Not specified								
A529-50	YS (MPa)	> 350 MPa								
	TS (MPa)	> 450 MPa								
	E (%) 200 mm	> 18%								
	YS/TS	Not specified								
A572-50	YS (MPa)	> 350 MPa								
	TS (MPa)	> 450 MPa								
	E (%) 200 mm	> 18%								
	YS/TS	Not specified								
A709-36	YS (MPa)	> 350 MPa								
	TS (MPa)	> 450 MPa								
	E (%) 200 mm	> 18%								
	YS/TS	Not specified								
A992	YS (MPa)	> 350 MPa								
	TS (MPa)	> 450 MPa								
	E (%) 200 mm	> 18%								
	YS/TS	< 0.85								
Multigrade: A36, A529-50, A572-50, A709-36, A992	YS (MPa)	> 350 MPa								
	TS (MPa)	> 450 MPa								
	E (%) 200 mm	> 20%								
	YS/TS	< 0.85								

# NIBIUM REFINES THE GRAIN SIZE AND MICROSTRUCTURE, RESULTING IN AN INCREASE OF YIELD STRENGTH (YS) AND TENSILE STRENGTH (TS), WHILST PRESERVING DUCTILITY AND ELONGATION

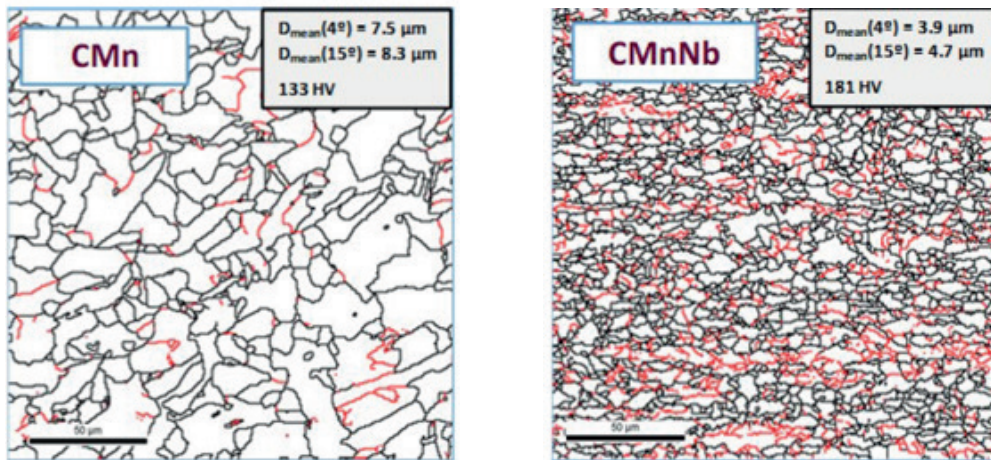
The figure below demonstrates how the use of niobium as a microalloying element can improve the strength of the material whilst also maintaining excellent ductility values.



	ASTM A572 Gr. 50	ASTM A36
Yield Strength (MPa)	402 ± 12	289 ± 12
Tensile Strength (MPa)	555 ± 18	449 ± 18

Standard Designation	Chemical Composition (%)					
	C	Mn	Si	P	S	Nb
ASTM A36	<0.25	0.8 - 1.20	0.15 - 0.40	<0.04	<0.05	-
ASTM A572 Gr. 50	<0.23	0.45 - 1.35	<0.40	<0.04	<0.05	0.005 - 0.05

# NIBIUM REFINES GRAIN SIZE, THE BASIC MECHANISM TO IMPROVE STRENGTH PRESERVING DUCTILITY

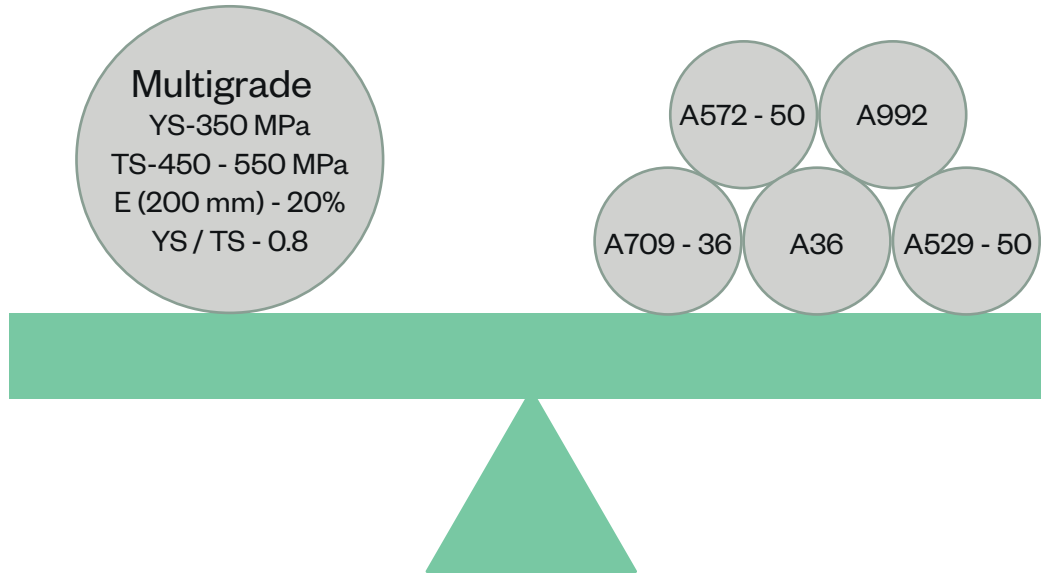


Grain refinement in as rolled flat product by using 0.035%Nb. C-Mn (left) and C-Mn-0.035%Nb (right).

*Ibabe, J.M.R. – Development, Homologation and Dissemination for Extending Nb Application in Steel Processing, Flats and Long Products, D8 – Final Report, Internal report of CEIT, 2018.*

Even with niobium additions below 0.035%, these benefits can be demonstrated in multigrade steels, a major contributor to keeping costs competitive.

Therefore niobium microalloying is fundamental in the development of multigrade steels enabling a much more competitive supply chain for structural steels.



**CBMM technical experts are available to advise on how the use of multigrade steels can improve the competitiveness of your business by streamlining production, reducing inventories and providing a very reliable product for the fabrication of steel framed structures. Our staff and consultants are keen to help our clients to develop the multigrade concept to meet the specific needs of your market.**

# CBMM | Niobium Nb

World leader in the production and commercialization of Niobium products, CBMM has customers in over 40 countries. With headquarters in Brazil and offices and subsidiaries in China, Netherlands, Singapore, Switzerland and the United States, the company supplies products and cutting-edge technology to the infrastructure, mobility, aerospace and energy sectors. CBMM was founded in 1955 in Araxá, Minas Gerais, and relies on a strong technology program to increase Niobium applications, growing and diversifying this market.



Further information  
can be obtained at  
**[www.niobium.tech](http://www.niobium.tech)**

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