

## SLEEVES FOR BEARINGS MATERIAL PROPERTIES COMPARISON (INTERNATIONAL STANDARDS, STEEL AND NODULAR)

See below a study about material properties used for manufacturing sleeves for bearings.

The international standards for manufacturing Sleeves for Bearings are ISO 2982-1 and DIN 5415 while Nuts for bearings are in accordance with ISO 2982-2 and DIN 981. These standards specify the part number, dimensions and tolerances of related parts. **Sleeves for bearings are manufactured according to DIN 5415 standards which specifies a minimum tensile strength of 430 N/mm<sup>2</sup> in its properties. The material used in Nuts, on the other hand, according to DIN 981, suggests 350 N/mm<sup>2</sup> of tensile strength.**

**BGL** manufactures its components using a technology developed by the company with base on the **Nodular BGLFN** material, with similar mechanical properties to DIN EN 1563 Class EN GJS-500-7 (former GGG50), ABNT - NBR6916/81 class FE 500-07 and ASTM A536/80 Class 80-55-06.

COMPARATIVE TABLE				
Standards	MECHANICAL PROPERTIES			
	Tensile Strength	Yield Strength	Elongation	Hardness
	N/mm <sup>2</sup> (MPa)	N/mm <sup>2</sup> (MPa)	%	Brinell (HB)
<b>SLEEVES</b> DIN 5415	Min. <b>430</b>	N/A	N/A	N/A
<b>NUTS</b> DIN 981	Min. <b>350</b>	N/A	N/A	N/A
<b>BGL</b> BGLFN NODULAR *	Min. <b>460</b>	Min. 290	Min. 7,0	Min. 156
<b>STEEL SAE 1020/ ASTM-A36 **</b>	Min. <b>400</b>	Min. 250	Min. 20,0	Min 121

\* BGL's Nodular material can be modified according to the needs and the tensile strength can reach more than 600 N/mm<sup>2</sup>, while steel can reach up to 550 N/mm<sup>2</sup> and depending on its availability in the market.

\*\* Tensile strength in steel decreases after necessary heat treatment, tension relief or annealing. On the other hand, treatment in Nodular material does not apply, therefore there is no reduction in tensile strength, which highlights even more the advantage of nodular material in relation to the laminated steel or mechanical tube.

## TECHNICAL TERMS

**TENSILE STRENGTH** is the tensile stress that the material can withstand before it breaks off. This is a key feature for Sleeves, because that is the stress generated in the region between the end of thread and the beginning of the tapered part when the nut is tightened against the bearing.

**YIELD STRENGTH** is the tensile corresponding to the condition to which the material starts to have plastic deformation, that is, when this has a permanent deformation, not returning to its original form.

**ELONGATION** is the length % that the material elongates before it breaks when undergoing traction stress.

**BRINELL HARDNESS** is a feature related to strength and wear of material.

## NODULAR

An important feature of Nodular is that there is a defined amount of graphite in its composition, element with lubrication property, which, in the case of nuts, reduces friction, allows an ideal grip with less force employed and decreases considerably the possibility of scuffing while tightening.

Another advantage of graphite add-on is that it reduces the possibility of welding the parts together when the assembly undergoes a high compression stress for a long period of time, making it easy to be disassembled.

## CONCLUSION:

Analyzing the above table, we can conclude that BGL's alloy, BGLFN (Nodular, former GGG50) and the Laminated Steel SAE 1020/ASTM A36 have similar mechanical characteristics, and however, the advantages of the Nodular are:

1. Much greater tensile strength than the Laminated steel;
2. Reduced possibility of welding in the shaft due to the presence of Graphite in its structure;
3. Less chance of scuffing because of graphite lubricating property.

It should be noted that despite the advantages of BGL's Nodular material, we manufacture, according to customer request, components in steel or any other specified material.