

BRASS ALLOY CW511L

CW511L is a free cutting and forging brass in the form of rod. The alloy is lead free. The alloy has very good dezincification resistance.

Composition

CW511L	Cu	Zn	Pb	Sn	Fe
Gränser	62.5–63.5%	Rest	≤0,1%	≤0.1%	≤0.1%

Al	Ni	Mn	As	Others
≤0.05%	≤0.1%	≤0.01%	0.02-0.08%	≤0.2%

Standardization

The alloy is, according to international standards, equivalent in composition to

CW511L	CuZn38As
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SS-EN 12163, rod for general purposes

SS-EN 12164, rod for free machining purposes

SS-EN 12165, wrought and unwrought forging stock

SS-EN 12167, profiles and rectangular bars for general purposes

SS-EN 12168, hollow rod for free machining purposes

Structure type

α -phase. Some β -phase may occur.

Application example

Rod:

Fitting parts in contact with water where there are stringent requirements for dezincification resistance.

Residual stress level

Rod must show no evidence of cracking after testing according to SS-ISO 6957 Copper alloys – "Ammonia test for determining resistance to stress corrosion". Moderate stress according to the standard must be applied.

Dezincification resistance

The alloy is dezincification resistant, according to ISO 6509 and AS 2345-2006, appendix C.

Heat treatment

Stress-relief annealing. Temperature 330-350°C. Time 2-4 hours (max). Stress-relief annealing should be carried out after all cold working which gives high residual tensile stresses in the material. It may also be justified after machining. This eliminates the risk of stress corrosion cracking caused by internal stresses.

DZR Heat Treatment. Temperature 500-550°C. Time 1-2 hours.

Workability

Hot workability is good.

Cold workability is good.

Mechanical properties

CW511L from Nordic Brass Gusum meets and exceeds the quality demands defined in the standards. To give an idea of the mechanical properties some empirical values, according to the material condition "M" in the EN standard, are listed below. These values are to be considered as guideline values for the delivered material.

Property	Value	Unit
Rm, Tensile strength	>330	MPa
Rp02, Yield strength	~200	MPa
A5, Fracture elongation	>40	%
Brinell hardness	~90	HB

Corrosion resistance

Copper is a relatively noble metal. Copper and its alloys therefore show little tendency to react with the environment. As a result of this, the copper materials generally have good corrosion resistance. However, corrosion may occur under disadvantageous unfavorable conditions. The type of corrosion which may occur depends on both the environment and the composition of the alloy.

The corrosion resistance of CW511L is

Corrosion types	Corrosion resistance	Comment
Stress Corrosion Cracking, SCC	Very good	
Dezincification, DZR	Very good	

Machinability

The alloy is possible to machine in automats, however, not as easy as the traditional machining brasses, e.g. CW614N, due to the low content of lead.

The chips are able to mix without any problems with alloys containing lead, as CW617N, CW614N and CW602N.

Tool and cutting data. Tungsten carbide according to ISO-group K 10.

Cutting data	Tungsten carbide	High speed steel
Rake angle	2-6°	0-3°
Back rake angle	0°	0°
Clearance angle	4-6°	0-6°
Cutting speed	Approx. 300 m/min or faster	Approx. 150 m/min or faster
Cutting fluid	Dry or cutting oil	Emulsion or cutting oil

Welding and brazing

The following applies to the different welding methods:

Welding method	Suitability	Comment
Fuse welding and resistance welding	Poor	Cannot be carried out with good results.
Braze welding	Poor	Cannot be carried out with good results because of the minimal difference between the melting temperature of the base metal and the working temperature of the solder.
Brazing (hard soldering)	Satisfactory, can be carried out with a silver solder and silver-phosphorus-copper solder	Difficult to carry out with a phosphorus-copper solder and cannot be carried out with satisfactory results with a brass solder (see Braze welding).
Soldering	Excellent	Very easy to carry out.

Surface treatment

Mechanical surface treatment such as grinding, brushing, blasting and polishing is carried out by conventional methods.

Pickling (non-oxidizing pickling) is suitably carried out with diluted sulphuric acid at room temperature.

Pickling to a metallically clean surface (oxidizing pickling) is suitably carried out in a pickling bath containing oxidants such as peroxide, nitric acid or dichromate. For pickling to a high gloss, baths containing nitric acid are mainly used.

Chemical and electrolytic polishing is easy to carry out with mixtures of concentrated acids, e.g. phosphoric acid, nitric acid and acetic acid.

Polishing is suitably carried out with commercial cleaning products for copper.

Dark dyeing is easy to carry out by wet chemical methods, dark sulphide or oxide layers being obtained.

Varnishing with clear varnish means that the appearance obtained after cleaning or dyeing, for example, is retained for a long time. Clear varnishes containing a discoloring inhibitor are available for demanding applications.

Metallization (metallic surface coating) is easy to carry out.