



LUX176 - (925)

TECHNICAL AND USAGE DETAILS



MASTER ALLOY FOR SILVER

Plus-category master alloy suitable for the production of 925‰ caratage silver alloys. The resulting alloy is for the production of investment cast items with and without stones. The main feature of this product is deoxidized casts with limited shrinkage porosity. Items also show a sensitive reduction of Copper oxides (glossy surface spots) and high brightness. It lends itself for hardening.



APPLICATION FIELDS

CASTING



TAB.1 PHYSICAL CHARACTERISTICS

Colour	SILVER
Colour coordinates	L*= 96.30 a*= -0.34 b*= 5.88
Density [g/cm ³]	10.27
Melting range Solidus - Liquidus	803 ÷ 900 °C



TAB.2 MECHANICAL CHARACTERISTICS

Condition	As cast	Hardened
Tensile strength [MPa]	213	
Yield strength [MPa]	82	
Elongations [%]	53	
Hardness [HV]	55	105



HARDNESS AFTER HARDENING [HV]

	250 °C	300 °C	350 °C
60 min	56	94	97
120 min	68	108	101
180 min	62	112	105



HARDNESS AFTER COLD WORKING [HV]

C.W. [%]	0	40	60	80	90
Hardness [HV]	66	121	150	157	172





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INVESTMENT CASTING



CASTING

Put the alloy¹ inside a cold crucible. Reach a temperature of $100 \div 150$ °C more than Liquidus, (as per Tab.1), then pour the metal inside the stabilized flasks at a temperature between $500 \div 700$ °C. Choose temperatures among this range as a function of the dimension of the castings (for heavy pieces it is advisable a low temperature value, for lighter pieces it is advisable a higher one); each one of these temperatures has to be optimized in function to everyone's own manufacturing cycle.



COOLING

After casting, let the cast flasks rest in air for about $5 \div 10$ minutes before quenching in water. The choice of the best timing depends on the sort of pieces to cast: a slow cooling can draw the piece to oxidize; a fast cooling can increase the risk for the piece to break. In case of flasks with stones in place, please refer to the instructions provided by the supplier of the stones.



CLEANING

Once the tree is obtained, clean it with a high pressured water jet, subsequently dip the tree in a $5 \div 10\%$ hydrofluoric acid solution at $50 \div 60$ °C ($122 \div 140$ °F), in order to remove investment residues. A stronger action of the hydrofluoric acid can be obtained by using an ultrasonic tank to combine the mechanical and chemical action together.



PICKLING

Pickling has to be carried out by using some sulphur less acid solutions or sulphur compounds. Use a 10% citric solution at $50 \div 60$ °C ($122 \div 140$ °F) for a normal pickling, while a stronger pickling action can be obtained by adding small amounts of hydrogen peroxide ($1 \div 5$ ml/l) to the solution before use. Renew the acid solution frequently.



SCRAPS REUSAGE

The scraps of this alloy can be reused. It is advisable to use a percentage of not more than 50% of scraps and sprues. The choice of the quantity of scraps to reuse depends on their grade of cleanliness, on the casting techniques applied and subsequently to the state of oxidation of the material and the grade of deflection tolerated by the items to produce. It is recommended to clean very carefully the sprues from each investment remaining, which presence reduces the number of recasting the scraps can endure.

HEAT TREATMENTS



SOLUTION ANNEALING - CASTING

The solution annealing should be carried out on the cast pieces. The aim is to reduce or eliminate all the tensions accumulated by the casting itself, during cooling inside the flask, and consequently to increase the mechanical resistance of the cast pieces. Heat the castings in a furnace (if possible in a protected atmosphere) at a temperature of $85 \div 90\%$ of the Solidus value (as per Tab. 1) for a time between 10 20 minutes. Cooling can be done abruptly in these three different ways: in water, oil or alcohol (these last two guarantee a very reduced presence of cooling tensions).



SOLUTIONIZING

This heat treatment, to be carried out on finished objects, allows to obtain a homogeneous solid solution and to prepare the alloy for the next hardening treatment. Proceed by heating the items in the oven (possibly in a protective atmosphere) at a temperature of $760-780$ ° C for a period of about 60 minutes and then cool them abruptly in water, oil or water-alcohol (the latter guarantee a reduced presence from tensions from cooling down).



HARDENING

Age hardening can be done on finished items, after having taken to conclusion all the deformation steps to produce the piece itself. This heat treatment allows to increase the piece resistance to plastic deformation, which will have, as a consequence, a higher fragility. You have to proceed by heating the pieces to 300 °C, keeping them under this temperature for a time between 60 and 180 minutes in function of the hardness value to be reached (please contact Progold to ask for hardness values). Further on proceed by cooling the pieces very slowly inside the furnace (when a furnace with protected atmosphere is available). In case of problems due to oxidation, the heat treatment can be done by quenching the pieces in molten salts or oil.



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1. In order to guarantee the correct functioning of the product it is advisable to use exclusively 99.99% pure silver. It is necessary, for the finess homogeneity, to do a pre-melting (under protected atmosphere) of the alloy before using by putting inside the crucible, in a sequence, first the master alloy and then pure silver. If the shotmaker is not available it is advisable to put the alloy into the ingot mould, roll and then cut the sheet into small pieces.

2. All the data of this technical sheet refer to 930‰ alloyed silver. If the alloy is used for different finesses from those suggested, please contact Progold for further information. All data presented in this technical sheet have been obtained from samples produced and tested in Progold laboratories, with specific procedures and in compliance with the ASTM standards. Progold preserves the right to rectify the data of this sheet anytime by updating this publication.

