

NI1811-01 Low nickel release all-purpose master alloy for 750‰ (18 Kt) white gold

Technical datasheet and guideline for 18 Kt

GENERAL INFORMATION AND RECOMMENDED APPLICATIONS

Typology	Master alloy for gold
Production process	Universal
Color	White low nickel release

Color	Off-white
Density [g/cm³]	14.6
Melting temperatures	Solidus [°C] 910
	Liquidus [°C] 935
As cast hardness [HV 0.2]	183

Product applications

Stamping production
Casting without stones
Casting in closed systems
Age-hardening
Ingot casting
Continuous casting
Sheet production
CNC and lathe production

FULL CHARACTERIZATION DATA

General characteristics	
Ni release, average value [µg/cm2/week]	0.04
Ni release, maximum value [μg/cm2/week]	0.1
As cast grain size [μm]	65
Fluidity (grid filling test) [%]	98
Color coordinates	20.7
L^	86.7
_a*	3
b*	11.8
C*	12.1
Color shade	Off-white

Mechanical characteristics	
Tensile strength (Rm) [MPa]	565
Yield strength (Rp0.2) [MPa]	450
Elongation at rupture (A) [%]	35
As cast hardness [HV 0.2]	183
Hardness after 70% area red. [HV 0.2]	283
Hardness after annealing [HV 0.2]	192
Hardness after age-hardening [HV 0.2]	280





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CASTING PROCESSING PARAMETERS

Pre-mixing temperature [°C]	1050			
Casting temperatures	Metal - from [°C]	Metal - to [°C]	Flask - from [°C]	Flask - to [°C]
Thin (below 0.5 mm)	1020	1050	650	700
Medium (from 0.5 to 1.2 mm)	1000	1020	580	650
Thick (above 1.2 mm)	980	1000	460	600

Trees without stones

Let the flask cool down for 30-45 minutes, then quench in water.

MECHANICAL WORKING PARAMETERS

Pre-mixing temperature [°C]		1050				
Casting temperature	Metal	- from [°C]	Metal - to [°C]	Recc	omended reductions	
Ingot making	1010 1050		1050	Sheet	- area or thickness [%]	70
Continuous casting		1055	1100	Wire - diameter [%]		45
Mechanical working recommen	nded	Temperature - from	Temperature - to	Time		
annealing		[°C]	[°C]	[min]		
> 5 mm		660	700	40		
1 - 5 mm		660	700	35		
< 1 mm		660	700	30		

AGE HARDENING PROCESSING PARAMETERS

Single step age-hardening	Temperature [°C]	Time [min]	Quenching
treatment	remperature [C]	riine įniinij	Quelicining
Age-hardening	275	90	Air or in furnace





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PRODUCT TECHNICAL GUIDELINES

Flasks t	empera	tures	and
auenchi	na time		

d For casting processes do not exceed 700°C for the investment flask. Use high quality investment in order to reduce reactivity between metal and flask. For casting without stones, quench within 20 minutes after pouring. For casting with stones quench within 45 minutes after pouring.

Microstructure of the item

The item before finishing, or at least the composing items before soldering should be thermally homogenized (760° C x 40' followed by quenching) or annealed (680° C x 30'). Thermal treatments must be done in fornace providing temperature control and protective atmosphere.

Surface porosity

An item without porosity generates on average a lower nickel release than a porous object.

Preliminary checks

A preliminary check on the process and on the kind of items to be produced has to be done, in order to identify possible critical steps. Some kinds of production processes or of finishing are incompatible with nickel release reduction: they have to be eliminated or at least limited and measured, even when using a low nickel release alloy. In order to minimize nickel release, it is important to obtain objects as much as possible without porosity, shiny, with homogeneous microstructure and with the minimum amount of soldered joints.

Pre-mixing

It is advised to pre-mix materials, by granulation or by casting of a semifinished item (bar, wire). This in order to optimize title and homogenization of the elements in the alloy.

Material re-usage

The maximum amount of reused metal allowed is of 50% in weight. The material should be clean, deoxidized and without inclusions. It's anyway advisable to not exceed 30% re-used metal.

Processing temperatures

Strictly respect process temperatures indicated in the technical chart. Preferably use casting systems that provide an easy measurement of the metal temperature.

Parts assemblies

Mechanical assemblies of items constituted by the same alloy at 750% title are to be preferred. Items of other compositions are allowed for assembly (mechanical or by soldering), provided that they are nickel-free.

Soldering

Soldering techniques that give a good process control are to be preferred:

- a. Furnace soldering (with or without soldering pastes)
- b. Laser soldering with or without external material (same composition of the alloy at 750% title). Note: although not forbidden, torch soldering is not advised.

Finishing and cleaning

Only mirror-finish, shiny surfaces are allowed; surface before plating should have the minimum roughness compatible with that accepted for goldsmithry finishing, after using polishing wheels with fine polishing pastes.

Post assemblies

Legor Group policy is that for post assemblies and parts in contact with pierced skin, nickel based alloys should be avoided; this because skin elicitation to nickel ions can occur even for release values that are compliant to the standards.





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Plating processes

An item with low nickel release, on which a plating layer at guaranteed thickness is deposited, allows to pass the accelerated wear test prescribed by the UNI EN 12472:2009 standard. Below, two preferred alternative methods to obtain wear resistant plating layers are described:

- a. Thick Palladium + thick Rhodium (Pd 0,5 μm + Rh 0,20 μm)
- b. Thick Rhodium (Rh >0,25 µm)

Using these plating layers, Legor Group tests have shown reduction on nickel release values of approximately 5 times in comparison with the same item without plating.

Preferred plating products:

RH2M (Ready to use Rhodium plating solution for thick deposits)
PDXW or PDFE (Palladium for bath larger than 40 liters)
PD3-ECO or PD4-FE (Palladium for bath smaller than 40 liters)

Final results assessement

Nickel release depends on very wide range of factors: it is necessary to obtain statistics that are based on one's specific objects, making frequent release tests, if necessary on several models.

This approach is valid also for low nickel release compositions; when starting to use these alloys, they should be frequently tested for nickel release. Nickel release test is as a matter of fact mandatory, because it is needed to obtain a statistical database on the items of a customer. This is the best way to monitor the correct functioning of the final product.

Conclusive notes

The jewelry manufacturing company is the only and sole responsible in front of the end user for what concerns the compliance of UNI EN 1811:2011 standard on a jewelry item.



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