

## NI1811-03 Low nickel release master alloy for casting of 750‰ (18 Kt) white gold

### Technical datasheet and guideline for 18 Kt

#### GENERAL INFORMATION AND RECOMMENDED APPLICATIONS

Typology	<b>Master alloy for gold</b>
Production process	<b>Casting</b>
Color	<b>White low nickel release</b>

#### Product applications

Stone-in-place casting  
Casting without stones  
Casting in closed systems  
Age-hardening

Color	<b>Standard white</b>
Density [g/cm <sup>3</sup> ]	<b>14.6</b>
Melting temperatures	<b>Solidus [°C] 890</b> <b>Liquidus [°C] 920</b>
As cast hardness [HV 0.2]	<b>178</b>

#### FULL CHARACTERIZATION DATA

General characteristics	
Ni release, average value [µg/cm <sup>2</sup> /week]	0.09
Ni release, maximum value [µg/cm <sup>2</sup> /week]	0.15
As cast grain size [µm]	110
Fluidity (grid filling test) [%]	100
Color coordinates	
L*	87.9
a*	2.4
b*	11.6
c*	12
Color shade	Standard white

Mechanical characteristics	
Tensile strength (Rm) [MPa]	560
Yield strength (Rp0.2) [MPa]	400
Elongation at rupture (A) [%]	34
As cast hardness [HV 0.2]	178
Hardness after 70% area red. [HV 0.2]	305
Hardness after annealing [HV 0.2]	184
Hardness after age-hardening [HV 0.2]	285

## NI1811-03 Low nickel release master alloy for casting of 750‰ (18 Kt) white gold

### Technical datasheet and guideline for 18 Kt

#### CASTING PROCESSING PARAMETERS

Pre-mixing temperature [°C] **1040**

Casting temperatures	Metal - from [°C]	Metal - to [°C]	Flask - from [°C]	Flask - to [°C]
Thin (below 0.5 mm)	<b>1010</b>	<b>1050</b>	<b>650</b>	<b>700</b>
Medium (from 0.5 to 1.2 mm)	<b>990</b>	<b>1010</b>	<b>580</b>	<b>650</b>
Thick (above 1.2 mm)	<b>970</b>	<b>990</b>	<b>460</b>	<b>600</b>

#### Trees without stones

Let the flask cool down for 10-15 minutes, then quench in water.

#### Stone-in-place casting trees

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

#### Pickling

Dip in RADIAL solution (50 g/l conc. at 60°C for 2 min.), or in sulphuric acid (10% conc. at 50°C for 5 min.)

#### MECHANICAL WORKING PARAMETERS

Pre-mixing temperature [°C] **1040**

Casting temperature	Metal - from [°C]	Metal - to [°C]
Ingot making		
Continuous casting		

#### AGE HARDENING PROCESSING PARAMETERS

Single step age-hardening treatment	Temperature [°C]	Time [min]	Quenching
Age-hardening	<b>275</b>	<b>90</b>	<b>Air or in furnace</b>

## NI1811-03 Low nickel release master alloy for casting of 750‰ (18 Kt) white gold

### Technical datasheet and guideline for 18 Kt

#### PRODUCT TECHNICAL GUIDELINES

<b>Processing temperatures</b>	Strictly respect process temperatures indicated in the technical chart. Preferably use casting systems that provide an easy measurement of the metal temperature.
<b>Flasks temperatures and quenching time</b>	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.
<b>Microstructure of the item</b>	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 furnace providing temperature control and protective atmosphere.
<b>Surface porosity</b>	An item without porosity generates on average a lower nickel release than a porous object.
<b>Parts assemblies</b>	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.
<b>Soldering</b>	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.
<b>Finishing and cleaning</b>	Only mirror-finish, shiny surfaces are allowed; surface before plating should have the minimum roughness compatible with that accepted for goldsmithy finishing, after using polishing wheels with fine polishing pastes.
<b>Post assemblies</b>	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.
<b>Plating processes</b>	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)

## NI1811-03 Low nickel release master alloy for casting of 750‰ (18 Kt) white gold

### Technical datasheet and guideline for 18 Kt

<p><b>Final results assesment</b></p>	<p>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.</p>
<p><b>Conclusive notes</b></p>	<p>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.</p>
<p><b>Preliminary checks</b></p>	<p>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.</p>
<p><b>Pre-mixing</b></p>	<p>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.</p>
<p><b>Material re-usage</b></p>	<p>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.</p>