

TECHNICAL DATASHEET AND GUIDELINE

NI1811-RHB
Title 18 Kt

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

GENERAL INFORMATION

Typology	Master alloy for gold
Production process	Universal
Color	White low nickel release
Color shade	Off-white
Density [g/cm ³]	14.6
Melting temperatures	
Solidus [°C]	865
Liquidus [°C]	910

Commercial composition	
Cu (%)	73
Ni (%)	10
Rh (%)	2
Zn (%)	15



FULL CHARACTERIZATION DATA

General characteristics	
Ni release, average value [µg/cm ² /week]	0.03
Ni release, maximum value [µg/cm ² /week]	0.07
As cast grain size [µm]	15
Color coordinates	
L*	87.4
a*	3
b*	13.6
c*	13.9
Yellow index	28.7

Mechanical characteristics	
Tensile strength (Rm) [MPa]	583
Yield strength (Rp0.2) [MPa]	407
Elongation at rupture (A) [%]	32
As cast hardness [HV 0.2]	165
Hardness after 70% area red. [HV 0.2]	285
Hardness after annealing [HV 0.2]	170
Single step age-hardening hardness [HV 0.2]	300

PRODUCT APPLICATIONS

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

RELATED PRODUCTS

PD3-ECO	Rhodium plating Thickness
RH2M	Rhodium plating Thickness

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CASTING PROCESSING PARAMETERS

Casting temperatures	Metal - from [°C]	Metal - to [°C]	Flask - from [°C]	Flask - to [°C]
Thin (below 0.5 mm)	1010	1040	650	700
Medium (from 0.5 to 1.2 mm)	990	1010	580	650
Thick (above 1.2 mm)	970	990	460	600

Stone-in-place casting trees

Let the flask cool down for 25 minutes, then quench in water.

Trees without stones

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

Pickling

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

MECHANICAL WORKING PARAMETERS

Casting temperature	Metal - from [°C]	Metal - to [°C]	Recommended reductions	
Ingot making	990	1030	Sheet - area or thickness [%]	70
Continuous casting	1010	1090	Wire - diameter [%]	45

Mechanical working recommended annealing	Temperature - from [°C]	Temperature - to [°C]	Time [min]
> 5 mm	720	740	40
1 - 5 mm	720	740	35
< 1 mm	720	740	30

AGE HARDENING PROCESSING PARAMETERS

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

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PRODUCT TECHNICAL GUIDELINES

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.
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.
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	<p>Soldering techniques that give a good process control are to be preferred:</p> <ul style="list-style-type: none"> a. Furnace soldering (with or without soldering pastes) b. Laser soldering with or without external material (same composition of the alloy at 750‰ title). <p>Note: although not forbidden, torch soldering is not advised.</p>
Preliminary checks	<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.</p> <p>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>
Surface porosity	An item without porosity generates on average a lower nickel release than a porous object.
Flasks temperatures and quenching time	<p>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.</p> <p>For casting with stones quench within 45 minutes after pouring.</p>

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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.

Final results assessment 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.

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

Precious elements content

Conclusive notes NI1811-RHB contains rhodium, an element from the platinum group. This element, during fire assay (cupellation) test, cannot be separated from gold: rhodium content sums up to that of gold. It is advised to declare the presence of rhodium in the alloy on the documentation related to the jewels made using NI1811-RHB (For example: "Au 750‰ + Rh 5‰ alloy").

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.

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.

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 furnace providing temperature control and protective atmosphere.

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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)

Plating processes

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)

Finishing and cleaning

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.