

TECHNICAL DATASHEET AND GUIDELINE

NI1811-01
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] | 910 |
| Liquidus [°C] | 935 |

| | |
|-------------------------------|-----------|
| Commercial composition | |
| Cu (%) | 70 |
| Ni (%) | 18 |
| Zn (%) | 12 |
| | |
| | |
| | |



FULL CHARACTERIZATION DATA

| | |
|--|-------------|
| General characteristics | |
| Ni release, average value [µg/cm ² /week] | 0.04 |
| Ni release, maximum value [µg/cm ² /week] | 0.1 |
| As cast grain size [µm] | 65 |
| Fluidity (grid filling test) [%] | 98 |
| Color coordinates | |
| L* | 86.7 |
| a* | 3 |
| b* | 11.8 |
| c* | 12.1 |
| Yellow index | 25.5 |

| | |
|---|------------|
| 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 |
| Single step age-hardening hardness [HV 0.2] | 280 |

PRODUCT APPLICATIONS

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

RELATED PRODUCTS

| | |
|------------|---|
| NI1811-03 | Low nickel release, deoxidized version |
| NI1811-RHB | The lowest nickel release values |
| LSG406B | Soft solder for 750‰ yellow gold |
| LSG409V | Medium solder for 750‰ yellow gold |

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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) | 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

| Casting temperature | Metal - from [°C] | Metal - to [°C] | Recommended reductions | |
|---------------------|-------------------|-----------------|-------------------------------|----|
| Ingot making | 1010 | 1050 | Sheet - area or thickness [%] | 70 |
| Continuous casting | 1055 | 1100 | Wire - diameter [%] | 45 |

| Mechanical working recommended annealing | Temperature - from [°C] | Temperature - to [°C] | Time [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 treatment | Temperature [°C] | Time [min] | Quenching |
|-------------------------------------|------------------|------------|-------------------|
| Age-hardening | 275 | 90 | Air or in furnace |

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PRODUCT TECHNICAL GUIDELINES

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.

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.

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.

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.

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

Final results assesment **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.

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.

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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.

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.

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.

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)