

NI1811-04 750‰

LOW NICKEL RELEASE ALL-PURPOSE MASTER ALLOY FOR 750‰ (18 KT) WHITE GOLD

GENERAL INFORMATION
General information

| | |
|------------------------|---------------------------|
| Typology | Master alloy for gold |
| Color | White, low nickel release |
| Color shade | Off-white |
| Production process | All-purpose |
| Grain refinement level | Very high |
| Deoxidation level | Minimum |

Commercial composition (%)

| | |
|----|------|
| CU | 70.0 |
| ZN | 17.0 |
| NI | 13.0 |

Melting Temperatures

| | |
|--------------------|-------|
| Solidus [°C] | 880.0 |
| Liquidus [°C] | 910.0 |
| Melting range [°C] | 30.0 |

FULL CHARACTERIZATION DATA
Color coordinates

| L * | a* | b* | c* | Yellow Index |
|------|-----|------|------|--------------|
| 88.0 | 2.5 | 13.8 | 14.0 | 28.5 |

Mechanical characteristics

| | |
|---|-------|
| As cast hardness [HV 0.2] | 170.0 |
| Hardness after 70% area red. [HV 0.2] | 310.0 |
| Hardness after annealing [HV 0.2] | 185.0 |
| Single step age-hardening hardness [HV 0.2] | 270.0 |
| Tensile strength (Rm) [Mpa] | 530.0 |
| Yield strength (Rp0.2) [MPa] | 320.0 |
| Elongation at rupture (A) [%] | 26.0 |

Physical characteristics

| | |
|------------------------------|------|
| Density [g/cm ³] | 14.6 |
|------------------------------|------|

General characteristics

| | |
|---|------|
| As cast grain size [µm] | 50.0 |
| Ni release - maximum value µg/cm ² | 0.1 |

Product applications

Continuous casting
 Ingot casting
 CNC and lathe production
 Massive chain production
 Hollow chain production
 Wire production
 Sheet production
 Cladding production
 Stamping production
 Blanking production
 Production of tube from continuous casting
 TIG tube production
 Age hardening

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CASTING PROCESSING PARAMETERS
Pre-melting temperature

Temperature [°C] 1030

| POURING TEMPERATURES | Flask from [°C] | Flask to [°C] | Metal from [°C] | Metal to [°C] |
|----------------------|-----------------|---------------|-----------------|---------------|
| < 0.5 mm | 660 | 720 | 1000 | 1030 |
| 0.5 - 1.2 mm | 580 | 650 | 980 | 1000 |
| > 1.2 mm | 460 | 600 | 960 | 980 |

Trees without stones

Let the flask cool down for 5 minutes, then quench it in water.

MECHANICAL WORKING PARAMETERS
Pre-melting temperature

Temperature [°C] 1030

Reductions

| | |
|-------------------------------|------|
| Wire - diameter (%) | 45.0 |
| Sheet - area or thickness (%) | 70.0 |

| POURING TEMPERATURES | Countinous from [°C] | Countinous to [°C] | Ingot to [°C] | Ingot from [°C] |
|----------------------|----------------------|--------------------|---------------|-----------------|
| Temperatures | 1010 | 1090 | 990 | 1030 |

| MECHANICAL WORKING ANNEALING | Temp. from [°C] | Temp. to [°C] | Time [min] |
|------------------------------|-----------------|---------------|------------|
| < 1 mm | 660 | 700 | 30 |
| 1 - 5 mm | 660 | 700 | 35 |
| > 5 mm | 660 | 700 | 40 |

Mechanical working quenching

Air cool down to 550°C, then quench in 50%/50% water/alcohol solution or in water.

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AGE HARDENING PROCESSING PARAMETERS

| SINGLE STEP | Temperature [°C] | Time [min] | Quenching |
|---------------|------------------|------------|----------------------|
| AGE HARDENING | 275.0 | 90.0 | In air or in furnace |

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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 semi finished 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.

Process temperatures

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

Flask temperatures and cooling times

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.

Item microstructure

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.

Surface porosity

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

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

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

Ear studs for pierced skin

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.

Plating treatments

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)

Controls on final result

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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.

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.

Normal
0

14

false
false
false

IT
X-NONE
X-NONE

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Final 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 1811:2015 standard on a jewelry item.