# TECHNICAL INFORMATION SHEET
# ARGENTIUM 940 MILLFORM SILVER

Dated: August 2021

ARGENTIUM®
THE FINEST SILVER

## GENERAL INFORMATION

### COMMERCIAL COMPOSITION

| | |
|---|---|
| Silver: | 94.2% |
| Copper | |
| Germanium | |

### MELTING TEMPERATURES

| | |
|---|---|
| Liquidus: | 895°C / 1643°F |
| Solidus: | 860°C / 1580°F |
| Melting range: | 35°C / 95°F |

## FULL CHARACTERISATION DATA

### COLOUR COORDINATES

| | |
|---|---|
| L* | 95.3 |
| A* | -0.3 |
| B* | 3.9 |
| C* | 4.0 |
| Yellow Index | 7.2 |

AS CAST GRAIN SIZE [µm]: 200

DENSITY [g/cm$^3$]: 10.3

### MECHANICAL CHARACTERISTICS

| | |
|---|---|
| As cast hardness [HV 0.2]: | 65 |
| Hardness after 70% area reduction [HV 0.2]: | 170 |
| Hardness after annealing [HV 0.2]: | 65 |
| Single step precipitation hardening hardness [HV 0.2]: | 110 |
| Double step precipitation hardening hardness [HV 0.2]: | 140 |
| Tensile strength (Rm) [MPa]: | 255 |
| Yield strength: (Rp0.2) [MPa]: | 101 |
| Elongation at rupture: (A) [%] | 31 |

### PRODUCT APPLICATIONS

CNC and lathe production
Hand production
Continuous casting
Sheet production
Wire production
Torch and furnace fusible
Precipitation hardening
Solid wire chain production
Laser welded chain production
Hollow chain production
Bi-metal cladding
TIG tube production
Ingot casting
Stamping production

### IMPORTANT: MAXIMISING ARGENTIUM SILVER'S TARNISH RESISTANCE

To initiate and optimise tarnish resistance, a grease-free surface must be achieved as a final finishing process - see 'CLEANING & RINSING' instructions, page 2.

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## MECHANICAL WORKING PARAMETERS

| | | | |
|---|---|---|---|
| REDUCTIONS: | Sheet - area or thickness | 70% | |
| | Wire - diameter | 45% | |
| POURING TEMPERATURE - CONTINUOUS: | 1000°C - 1080°C / 1832°F - 1976°F | | |
| POURING TEMPERATURE - INGOT: | 980°C - 1020°C / 1796°F - 1868°F | | |
| ANNEALING TEMPERATURES: | less than 1mm: | 560°C - 620°C / 1040°F - 1148°F | for 20 minutes |
| | 1mm - 5mm: | 560°C - 620°C / 1040°F - 1148°F | for 25 minutes |
| | more than 5mm: | 560°C - 620°C / 1040°F - 1148°F | for 30 minutes |

CONTROLLED FURNACE ATMOSPHERE FOR ANNEALING: Ratio 95:5 or 90:10 nitrogen:hydrogen

QUENCHING: Quench in water (see HEAT/COLOUR RECOGNITION & COOLING ARGENTIUM SILVER' below).

PICKLING: 10% Sulphuric Acid solution or Sodium Bisulphate, weak Sparex, Phosphoric Acid (diluted as per supplier's instructions). Keep pickling time to a minimum. Do **NOT** use Hydrofluoric Acid.

## PRECIPITATION HARDENING PARAMETERS

| SINGLE STEP PRECIPITATION HARDENING TREATMENT | Temp. [°C / °F] | Time | Cooling |
|---|---|---|---|
| Heat harden in air atmosphere: | 300 / 572 | 90 mins | Slow cool in air or in furnace |

| DOUBLE STEP PRECIPITATION HARDENING TREATMENT | Temp. [°C / °F] | Time | Cooling |
|---|---|---|---|
| Step 1: Heat in a protective atmosphere: | 700 / 1292 | 40 mins | Quench in water * |
| Step 2: Heat harden in air atmosphere: | 300 / 572 | 60 mins | Slow cool in air or in furnace |

## HEAT/COLOUR RECOGNITION & COOLING ARGENTIUM SILVER

Argentium Silver glows a paler colour than standard Stering silver at red-hot temperatures. Take care not to overheat the metal. (Temperature/metal colour recognition is easier to judge working in a shaded area.)

*Argentium Silver retains its heat for longer than standard Sterling silver - allowances for a slower cool must be made when quenching.

## FINISHING PROCESSES

### POLISHING

Argentium Silver can be polished using traditional wheels or mass finishing processes. The use of separate polishing wheels for Argentium Silver items is advised - this prevents cross-contamination of another metal/alloy onto the surface of Argentium pieces, which can compromise tarnish resistance.

### CLEANING & RINSING

To maximise Argentium Silver's tarnish resistance, a grease-free surface must be achieved using ultrasonic cleaning. We do **NOT** recommend electrolytic cleaning or steam cleaning.

Use of distilled water for cleaning / rinsing is recommended to prevent water marks. Please do **NOT** use deionised / reverse osmosis water with Argentium Silver.

**NB.** For high volume production, please refer to 'Argentium Cleaning Guidelines' document by Legor Group.

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