

ARGENTIUM SILVER MASTER ALLOYS

INSTRUCTIONS FOR ALLOYING & GRAINING



Product Codes: MA-A960S-CAST | MA-A940S-CAST | MA-A960-MILL | MA-A940-MILL
Document updated: Sept 2026

ALLOYING PROCESS FOR ARGENTIUM SILVER MASTER ALLOYS

This document describes the recommended sequence for producing Argentium Silver Alloys using Master Alloys. The process is designed to minimise gas contamination and oxidation and to **ENSURE THAT THE FINE SILVER IS FULLY DE-GASSED BEFORE ADDING THE MASTER ALLOY.**

MASTER ALLOYS - APPLICATIONS & MIXING RATIOS

Product code: **MA-A960S-CAST** for investment casting - **96.2% Fine Silver : 3.8% Master Alloy**
Product code: **MA-A940S-CAST** for investment casting - **94.2% Fine Silver : 5.8% Master Alloy**
Product code: **MA-A960-MILL** for sheet & wire (millform) products - **96.2% Fine Silver : 3.8% Master Alloy**
Product code: **MA-A940-MILL** for sheet & wire (millform) products - **94.2% Fine Silver : 5.8% Master Alloy**

EQUIPMENT & MATERIALS

- Clean induction furnace suitable for melting silver
- Clean, dedicated crucible and melting tools
- Certified fine silver
- Argentium Master Alloy
- High-purity argon
- Calibrated temperature measurement equipment
- Suitable weighing equipment
- Suitable casting or graining equipment (over-pressure graining equipment is preferred)

i Important: All materials, tools, crucibles and casting/graining equipment must be clean. Avoid contamination from other alloys, solder, polishing compounds, steel or other metals.

1. FURNACE PREPARATION

1. Ensure the induction furnace, crucible and tools are clean.
2. Check the vacuum system and argon supply before beginning the melt.
3. Where the furnace permits, evacuate and purge the chamber with high-purity argon to minimise atmospheric oxygen and moisture.
4. Charge **fine silver only** into the crucible.

⊘ DO NOT add the Argentium Master Alloy at this stage.

2. MELTING THE FINE SILVER

1. Begin induction heating and melt the fine silver under controlled conditions. Fine silver melts at approximately **962°C / 1763.6°F**
2. Once completely molten, maintain a temperature sufficient to keep the silver fully liquid without unnecessary overheating.
4. Avoid excessive temperature and prolonged holding times, as these can increase oxidation and gas absorption.

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3. DE-GASSING – Critical Stage

✓ **The fine silver MUST be de-gassed before the Master Alloy is added**, thereby reducing the potential for gas-related defects and porosity in the finished alloy.

1. Once the fine silver is completely molten, apply the furnace's **validated vacuum de-gassing cycle**.
2. Maintain the molten fine silver under vacuum to remove dissolved gases, particularly oxygen.
3. Maintain controlled temperature during the de-gassing process.
4. Do not introduce the Argentium Master Alloy during vacuum de-gassing.

NB. The vacuum level, temperature and de-gassing time should be established and validated for the specific induction furnace and batch size.

In an **open casting system**, use a clean graphite crucible and protect the molten silver continuously with argon. Once fully molten, immerse a clean graphite rod and gently move it through the melt. The carbon reacts with dissolved oxygen, forming gaseous carbon oxides that leave the melt. Avoid vigorous stirring. Remove the rod, allow the melt to settle briefly under argon, then add the Argentium Master Alloy.

4. ESTABLISH ARGON PROTECTION

Following completion of the vacuum de-gassing cycle:

1. Discontinue the vacuum.
2. Introduce **high-purity argon** into the furnace.
3. Establish and maintain the specified protective argon atmosphere over the molten fine silver.
4. Avoid unnecessary exposure of the molten silver to atmospheric air.

NB. The argon atmosphere protects the de-gassed silver from reabsorbing oxygen and limits oxidation during the subsequent alloying operation.

5. ADDITION OF ARGENTIUM MASTER ALLOY

✓ **Only after the fine silver has been de-gassed and the argon protective atmosphere established:**

1. Add the specified quantity of Argentium Master Alloy to the molten fine silver.
2. Introduce the Master Alloy carefully to minimise splashing and turbulence.
3. Maintain the protective argon atmosphere throughout the addition.
4. Allow the Master Alloy to dissolve completely.

i **Introduce the Master Alloy as soon as reasonably practical** following de-gassing to minimise exposure of the alloying constituents to excessive temperature and oxidation.

6. HOMOGENISATION

1. Allow the Master Alloy to dissolve completely.
2. Use the induction furnace's electromagnetic stirring to assist mixing and homogenisation.
3. Avoid unnecessary mechanical stirring.
4. Maintain the melt at the required temperature for the minimum time to achieve a homogeneous composition.
5. Avoid excessive overheating or prolonged holding.

⊘ **DO NOT** repeat the vacuum de-gassing cycle after the Argentium Master Alloy has been added.

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7. POURING THE MELT

Molten alloy can be:

- made into grain (see section 8)
- poured into bars
- used directly for investment casting (*casting alloys MA-A940S-CAST & MA-A940S-CAST*)

✓ For further information, follow **Technical Information & Instructions** documentation available for each Argentium Silver alloy. ([CLICK HERE to view/download pdfs.](#))

i **IMPORTANT:** Any recycling of sprues and scrap **MUST** be processed using the same equipment, with inert gas (argon) protection.

8. GRAINING (OVER-PRESSURE SYSTEM)

Where the finished Argentium Silver Alloy is to be made into grain, the fully homogenised molten alloy should be granulated using a **controlled over-pressure granulation system**.

PREPARATION

1. Ensure the granulation system, crucible, nozzle and equipment are clean and dry.
2. Fill the granulation vessel with the required volume of clean water.
3. Check the over-pressure system, inert gas supply (*argon*), pressure controls and safety devices.
4. Confirm that the nozzle and outlet are clean and suitable for producing the required grain size.

GRANULATION

1. Once the Argentium Silver melt is fully homogenised, maintain the temperature required for granulation (approx. **1065°C / 1949°F**) and protective argon atmosphere.
2. Transfer the molten alloy to the over-pressure granulation chamber/system (in accordance with the equipment manufacturer's procedure).
3. Apply the **inert-gas over-pressure** to force the molten alloy through the granulation nozzle.
4. Maintain a consistent pressure and flow rate throughout the granulation process to achieve a uniform grain size and shape.
5. Allow the granulated alloy to cool completely in the water before recovery.

i **IMPORTANT:** Maintain a controlled inert-gas atmosphere and consistent over-pressure throughout granulation.

RECOVERY & DRYING

- Recover the grain from the granulation vessel and rinse with clean water (if required).
- **Dry the grain thoroughly** before weighing, packaging or storage and ensure that no moisture remains within the grain or packaging.
- Inspect the finished quality of the grain.

NB. If the grain is being sold commercially, it must be pickled and barrell polished to a bright finish before thoroughly rinsing and drying.

SAFETY

Always follow the induction furnace manufacturer's operating instructions and appropriate molten-metal safety procedures. Never introduce wet or contaminated materials, tools or moulds into contact with molten metal.