

# MATERIALS, EQUIPMENTS, TOOLS, ENGINEERING AND CONSULTING FOR FOUNDRY

**SA-FOUNDRY**



**SA-FOUNDRY Sp. z o.o.**

Technical solutions, equipments, materials and tools for foundry

sa-foundry.com

# ABOUT US



**SA-Foundry sp. z o.o.** is a team of specialists experienced in implementing advanced technologies for the manufacture of castings and semi-fabricated products made of improved non-ferrous metals and alloys (aluminum, copper, zinc, lead).

## We offer:

1. Consulting on casting techniques and equipment to ensure maximum production profitability.
2. Optimization of existing foundry technologies to reduce the rejection of castings and defects of non-ferrous metals and alloys.
3. Effective technologies, materials, tools and equipment for melt processing (finishing, degassing, modifying, protecting melt from oxidation, injecting inoculators of various purposes and dispersity) for castings making and recycling of non-ferrous metals and alloys.
4. High-quality materials (fluxes, addition alloys, chill paints, casting greases) for the production of castings and blanks from non-ferrous metals and alloys.
5. Modern efficient equipment for foundry production.
6. Engineering in mastering the foundry technology

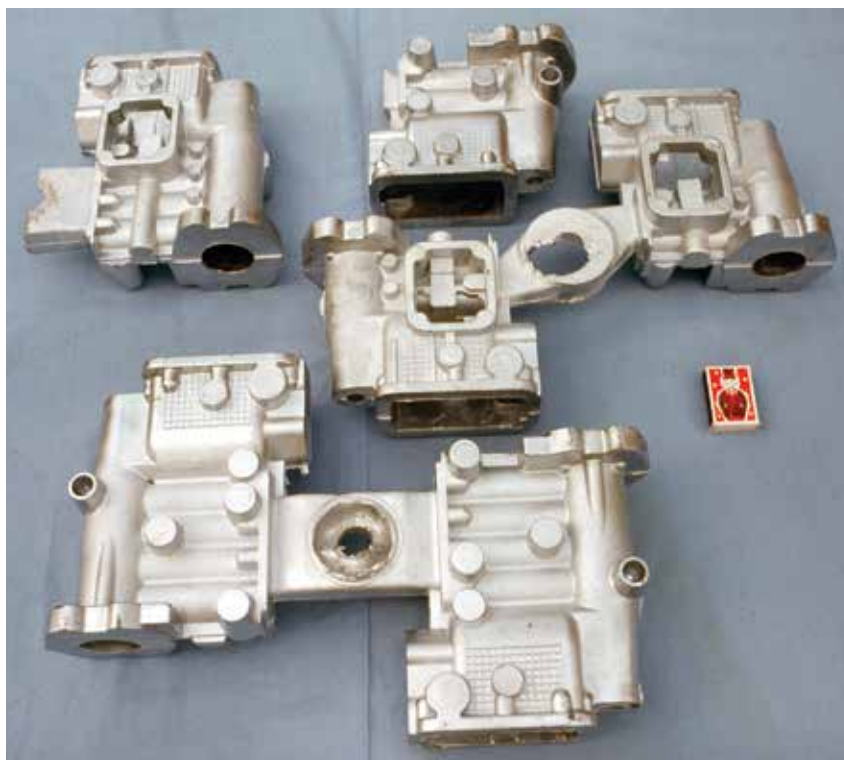
of high-strength aluminum alloys, pistons for various purposes, including pistons with a low-temperature coefficient of linear expansion.

7. Development and manufacturing of effective melting and thermal equipment for specific production purposes.

8. Materials for welding and soldering of non-ferrous metals and alloys for an individual (specific) joined material.

Based on many years of experience and advanced development we can offer you products adapted to your individual technological process and the specific equipment used, which will really improve the quality of castings, reduce rejects and production costs.

# O NAS



**SA-Foundry Sp. z o. o.** jest to zespół specjalistów, którzy mają wieloletnie doświadczenie we wdrażaniu zaawansowanych rozwiązań technologicznych do produkcji odlewów i półfabrykatów z metali nieżelaznych i stopów (aluminium, miedź, cynk, ołów) o ulepszonych właściwościach materiału odlewniczego.

## Oferujemy konsumentom:

1. Doradztwo w zakresie wyboru metody wykonywania odlewów i doboru sprzętu dla maksymalnej opłacalności produkcji.
2. Optymalizację istniejących technologii odlewniczych w celu ograniczenia odrzucania wadliwych odlewów z materiału odlewniczego podczas odlewania metali nieżelaznych i stopów.
3. Skuteczną technologię, materiały, narzędzia i sprzęt do przetwarzania stopów (oczyszczanie, odgazowywanie, modyfikowanie, zabezpieczanie stopu przed utlenianiem, wprowadzenie inokulatorów o różnych celach i rozproszeniu) podczas odlewania odlewów i recyklingu metali nieżelaznych i stopów.
4. Materiały jakościowe (topniki, ligatury, farby, smary do odlewów) do produkcji odlewów i półfabrykatów z metali nieżelaznych i stopów.
5. Nowoczesne skuteczne urządzenia do produkcji odlewniczej.
6. Inżynieria w opanowaniu technologii odlewania wysokowytrzymałych stopów aluminium, tłoków do różnych celów, w tym tłoków o niskim współczynniku rozszerzalności cieplnej liniowej.
7. Opracowanie i produkcję skutecznego urządzenia topiącego i ciepłego do określonych celów produkcyjnych.
8. Wytwarzanie materiałów do spawania i lutowania metali nieżelaznych i stopów dla poszczególnych (specjalnych) materiałów do złączenia.

Na podstawie wieloletniego doświadczenia i zaawansowanych rozwiązań technologicznych możemy zaoferować Państwu wyroby dostosowane do indywidualnego procesu technologicznego oraz ze względu na specyficzność stosowanego sprzętu, które z całą pewnością zapewnią poprawę jakości odlewów, zmniejszą zakres ilości odpadów i obniżą koszty produkcji.



# A. CONSULTING AND ENGINEERING FOR FOUNDRIES AND RECYCLING FACTORIES



More than 30 years of experience in the foundry industry and taking into account the modern science researches allow SA-FOUNDRY Sp. z o.o. to present effective solutions for non-ferrous metals foundries and recycling factories.

Our team of experts (among them Ph.D researchers and engineers with long-term experience) propose the wide range of consultations in the field of foundry and recycling of non-ferrous metals and alloys:

1. Selection the optimal technology, materials and equipments for new casting or recycling projects, for expansion projects and for modernization of existing foundries.
2. Selection the optimal technological parameters for increasing the productivity and decreasing the rejects for existing castings of non-ferrous metals and alloys.
3. Cast metals quality complex investigations (structure, mechanical and physical properties, cast defects analyzing).
4. Calculation and design of heating systems for

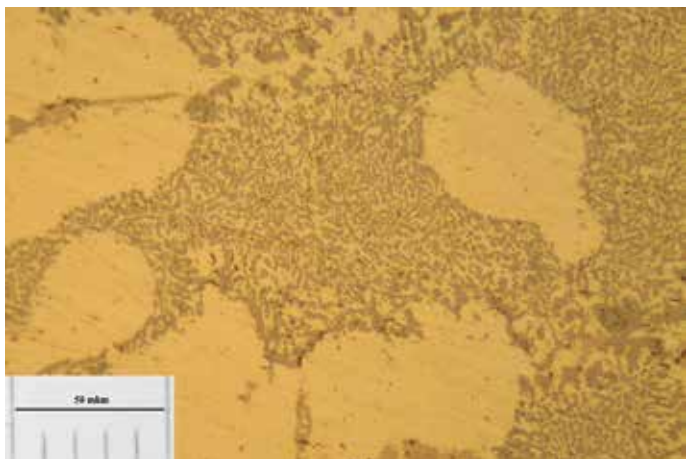
foundry (furnaces and preheating systems).

Testing of new products and technical solutions in our technological center, long-term experience and up-date knowledge give us the optimal solutions in accordance to the customer's technological operations with non-ferrous liquid metals and alloys during melting and casting in various conditions.



The optimal solutions for effective casting technologies (high-pressure die casting, low pressure and gravity die casting in permanent or sand molds) can be proposed for our customers.

We are in progress for new innovative solutions in the field of non-ferrous metals and alloys casting for foundries and for recycling factories.



## B. FLUXES FOR NON-FERROUS METALS AND ALLOYS



Well known practice for melting of non-ferrous alloys is fluxing operations of liquid metal for various functions:

- covering melt,
- drossing off,
- cleaning (refining) melt,
- degassing melt,
- Modifying cast structure.

More than 30 years of experience in liquid non-ferrous metals operations in accordance to the modern science researches allow us to present effective products for non-ferrous metals recycling factories and for foundries.

Among them the "ECO RECYCLING" line of fluxes for melting of non-ferrous metals in scrap recycling factories. The main advantage of these fluxes is good efficient / price ratio.

"ECO FOUNDRY" line of fluxes for non-ferrous metals

contains product solutions for operations with liquid metals in casting technology.

We are in progress for new innovative solutions in the field of fluxing treatment for recycling factories and for foundries.

Based on the researches in our technological center, long-term experience and up-date knowledge we are propose the optimal solutions for customer's technological operations with non-ferrous liquid metals during melting in various conditions.

## FLUXES FOR NON-FERROUS METALS AND ALLOYS

(cleaning, covering, degassing, modifying)

The main list of fluxes:

### 1. For aluminum alloys

SA-flux-0101	Flux Covering-Refining for aluminium foundry alloys (Eco-recycling line)	Powder flux for cleaning, drossing off and covering molten aluminium foundry (Al-Si) alloys
SA-flux-0102	Flux Covering-Refining for aluminium extrusion alloys (Eco-recycling line)	Powder flux for cleaning, drossing off and covering molten aluminium extrusion alloys
SA-flux-0103	Flux or concentrate for rotary furnaces (Eco-recycling line)	Powder flux or concentrate for drossing off, cleaning and covering molten aluminium alloys for tilting rotary furnaces
SA-flux-0104	Exothermic flux (Eco-recycling line)	Powder flux with exothermic effect for drossing off, cleaning and covering molten aluminium alloys
SA-flux-0105	Flux for Magnesium and Calcium removal (Eco-recycling line)	Powder flux for Magnesium and Calcium removal from aluminium alloys, cleaning, drossing off and covering molten aluminium alloys
SA-flux-0106	Flux for lining cleaning (Eco-recycling and Eco-foundry lines)	Powder flux for build up cleaning from furnaces and ladles lining in aluminium melting / holding furnaces and ladles
SA-flux-0107	Granular refining flux (Eco-foundry lines)	Granular flux for cleaning and drossing off molten aluminium alloys
SA-flux-0108	Degassing tablets (Eco-foundry lines)	Degassing tablets for aluminium alloys

### 2. For pure copper and copper-based alloys

SA-flux-0109	Flux Covering-Refining for copper (Eco-recycling and Eco-foundry lines)	Powder flux for cleaning, drossing off and covering molten pure copper and copper-based alloys
SA-flux-0110	Boron containing tablets for oxygen and hydrogen removal (Eco-recycling and Eco-foundry lines)	Boron containing tablets for oxygen and hydrogen removal from pure copper and copper-based alloys

### 3. For lead and lead-based alloys

SA-flux-0111	Flux Covering-Refining for lead (Eco-recycling and Eco-foundry lines)	Powder flux for cleaning, drossing off and covering molten pure lead and lead-based alloys
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And another products by customer's request.

Quality certificate: ISO 9001-2009

# SA-FLUX-0101

## Flux Covering-Refining powder flux for cleaning, drossing off and covering molten aluminium foundry alloys



- The metallic foam formation is minimized.
- Perfect melt cleaning for all types of furnaces and all types of aluminium alloys.

**Dosage:** average dosage 0,1% - 0,5% (by mass) or 1 – 5 kg of flux per 1000 kg of aluminium alloy.

**Appearance:** gray or white-gray powder. Smell is absent.

**Packing:** individual 1 kg plastic bags in 25 kg carton box.

**Storage:** up to 12 months in dry place.

**Quality certificate:** ISO 9001-2009.

**Description:** It is a powder flux used for removing non-metallic inclusions (oxide layers, carbides and others), drossing off and covering surface in aluminium melt. The dry and powder-type dross with low metallic content was obtained after cleaning operation by this flux. The dross does not stick on furnace lining and crucible surface.

**Applications:** drossing off aluminium melt for aluminium scrap recycling under melting procedure. Cleaning foundry aluminium alloys (Al-Si) for wide range of casting techniques (high pressure die casting, low pressure die casting, gravity casting in permanent and sand molds, others) and different furnace types.

### Method of use:

1. In case of aluminium scrap recycling Covering-Refining flux introduces in melt stepwise with every part of batch addition. The finish treatment is doing before melt pouring.
2. In case of aluminium foundry alloys cleaning for casting Covering-Refining flux introduces in melt by hand foundry plunger under melt surface.

For all applications the temperature of treatment must be above 720°C

### Main advantages:

- Dry and powder-type dross with low metallic content was obtained after using.

# SA-FLUX-0102

## Flux Covering-Refining powder flux for cleaning, drossing off and covering molten aluminium extrusion alloys



and all types of aluminium extrusion alloys.

**Dosage:** average dosage 0,1% - 0,5% (by mass) or 1 – 5 kg of flux per 1000 kg of aluminium alloy.

**Appearance:** gray or white-gray powder. Smell is absent.

**Packing:** individual 1 kg plastic bags in 25 kg carton box.

**Storage:** up to 12 months in dry place.

**Quality certificate:** ISO 9001-2009.

**Description:** It is a powder flux used for removing non-metallic inclusions (oxide layers, carbides and others), drossing off and covering surface in aluminium melt. The dry and powder-type dross with low metallic content was obtained after cleaning operation by this flux. The dross does not stick on furnace lining and crucible surface.

**Applications:** drossing off aluminium melt for aluminum scrap recycling under melting procedure. Cleaning pure aluminium and extrusion aluminium alloys during melting in various types of furnaces. Low percentage of sodium-based salts in accordance to the extrusion alloys requirements.

### Method of use:

1. In case of aluminium scrap recycling Covering-Refining flux introduces in melt stepwise with every part of batch addition.
2. The finish treatment is doing before melt pouring.

For all applications the temperature of treatment must be above 720°C

### Main advantages:

- Dry and powder-type dross with low metallic content was obtained after using.
- The metallic foam formation is minimized.
- Perfect melt cleaning for all types of furnaces



# SA-FLUX-0103

Flux or concentrate for rotary furnaces powder flux or concentrate for drossing off, cleaning and covering molten aluminium alloys for tilting rotary furnaces



**Description:** It is a powder flux used for drossing off and covering surface for aluminium recycling in tilting rotary furnaces. Also it is used for removing non-metallic inclusions (oxide layers, carbides and others) and decreases gas content in aluminium melt. The dry and powder-type dross with low metallic content was obtained after addition of this flux. The dross does not stick on furnace lining.

**Applications:** drossing off aluminium melt for aluminum scrap recycling under melting procedure in tilting rotary furnaces. Cleaning all type of aluminium alloys in tilting rotary furnaces. Aluminum melt surface covering. Can be in concentrate form by customer's request.

## Method of use:

1. After melting of first scrap flux introduces in dosage 2 - 3 %. After that mixing the flux in melt by furnace rotation or by hand instruments.
2. Add new part of scrap in furnace and after melting this part of scrap introduces next flux part in dosage of 2 - 4 %. Mixing the flux in melt by furnace rotation or by hand instruments. The dry and powder-type dross must be obtained.
3. Melt pouring.

The temperature of aluminium melt must be below 800°C for exothermic reaction avoidance.

## Main advantages:

- Dry and powder-type dross with low metallic content was obtained after using in rotary furnace.
- Perfect melt cleaning for all types of aluminium alloys.

## Dosage: average dosage:

- 4% (by mass) for compact aluminium scrap melting.
- 6% (by mass) for aluminium chip melting.
- 7% (by mass) for aluminum slag melting.

For right scrap preparation (without oil, organic and moisture) the dosage can be decreases.

**Appearance:** white or white-gray powder. Smell is absent.

**Packing:** 25 kg plastic bags.

**Storage:** up to 12 months in dry place.

**Quality certificate:** ISO 9001-2009.

# SA-FLUX-0104

## Exothermic Flux powder flux for drossing off, cleaning and covering molten aluminium alloys



- Perfect melt cleaning for all types of furnaces and all types of aluminium alloys.

**Dosage:** average dosage 0,1% - 0,5% (by mass) or 1 – 5 kg of flux per 1000 kg of aluminium alloy.

**Appearance:** gray or white-gray powder. Smell is absent.

**Packing:** individual 1 kg plastic bags in 25 kg carton box.

**Storage:** up to 12 months in dry place.

**Quality certificate:** ISO 9001-2009.

**Description:** It is a powder flux with exothermic effect used for drossing off, removing non-metallic inclusions (oxide layers, carbides and others) and covering surface in aluminium melt. The dry and powder-type dross with low metallic content was obtained after cleaning operation by this flux. The dross does not stick on furnace lining and crucible surface.

**Applications:** drossing off aluminium melt for aluminium scrap recycling under melting procedure. Cleaning all types of aluminium alloys for wide range of casting techniques and different furnace types. Metal yield is increasing (especially in crucible type furnaces) because of exothermic effect for scrap melting.

### Method of use:

1. In case of aluminium scrap recycling exothermic flux introduces in melt stepwise with every part of batch addition.
2. The finish treatment is doing before melt pouring.

For all applications the temperature of treatment must be above 720°C

### Main advantages:

- Dry and powder-type dross with low metallic content was obtained after using.
- The metallic foam formation is minimized.

# SA-FLUX-0105

Flux for Magnesium and Calcium removal from aluminium alloys powder flux for Magnesium and Calcium removal from aluminium alloys, cleaning, drossing off and covering molten aluminium alloys



**Description:** It is a powder flux used for Magnesium and Calcium removal from molten aluminium alloys for secondary aluminium alloys producers. Also it is removing non-metallic inclusions (oxide layers, carbides and others) and decreases gas content in aluminium melt. The dry and powder-type dross with low metallic content was obtained after addition of this flux.

**Applications:** effective Magnesium and Calcium removal from molten aluminium alloys, drossing off and cleaning aluminium melt for aluminum scrap recycling for secondary aluminium alloys preparation. Aluminum melt surface covering. Can be used for all types of melting furnaces. Reduction of Mg and Ca content is often question for secondary aluminium alloys producers. In past the chlorine gas was used. Today, worldwide, the special fluxes are using because of chlorine gas extremely dangerous.

## Method of use:

1. Add flux on melt surface.
2. Mixing the flux in melt by mechanical (electromagnetic) stirring or by hand instruments.
3. Waiting up to 10 min for products of reaction float on surface.
4. Dross removal and check Mg or Ca content. If it

is above the requirements repeat the flux addition.

5. Melt pouring.

The temperature of aluminium melt must be above 760°C.

Flux addition can be made through flux injection.

## Main advantages:

- Effective Magnesium and Calcium removal from aluminium melt in all types of furnaces.
- Dry and powder-type dross with low metallic content was obtained.
- Melt cleaning and covering for all types of aluminium alloys.

**Dosage:** average dosage range 5 – 10 kg of flux for removal 1 kg of Magnesium from aluminium melt (depend on method of addition, temperature, metal circulation and time for reaction).

**Appearance:** white or white-grey powder. Smell is absent.

**Packing:** 25 kg plastic bags.

**Storage:** up to 12 months in dry place.

**Quality certificate:** ISO 9001-2009.

# SA-FLUX-0106

Flux for lining cleaning powder flux for build up cleaning from furnaces and ladles lining in aluminium melting / holding furnaces and ladles



## Main advantages:

- Effective lining cleaning from build up.
- Dry and powder-type dross with low metallic content was obtained after using.
- Perfect melt cleaning for all types of furnaces and all types of aluminium alloys.

**Dosage:** average dosage 0,3% - 0,5% (by mass) or 3 – 5 kg of flux per 1000 kg of aluminium alloy.

**Appearance:** gray or pink-gray powder. Smell is absent.

**Packing:** individual 1 kg plastic bags in 25 kg carton box.

**Storage:** up to 12 months in dry place.

**Quality certificate:** ISO 9001-2009.

**Description:** It is a powder flux used for cleaning (removing) of build up from furnaces and ladles lining. Also for removing non-metallic inclusions (oxide layers, carbides and others), drossing off and covering surface in aluminium melt. The dry and powder-type dross with low metallic content was obtained after cleaning operation by this flux.

**Applications:** cleaning of build up (generated by dross sticking on lining surface) from furnaces and ladles lining. Cleaning aluminium alloys for wide range of casting techniques and different furnace types. Drossing off aluminium melt for aluminum scrap recycling.

## Method of use:

1. First part of flux introduces in furnace with batch charging in dosage 0,1% (by mass).
2. Second part of flux introduces in melt (dosage 0,2-0,4% by mass) after melting of the charged batch and stirring the melt.
3. After 5 minutes of melt rest the products of reaction will be floating to the melt surface.
4. The mechanical cleaning (removing) of build up from furnaces or ladles lining is possible after dross skimming and melt pouring.

For all applications the temperature of treatment must be above 720°C.



# SA-FLUX-0107

## Granular flux for cleaning and drossing off molten aluminium alloys



- Low smell and smoke emission under using.
- Dry and powder-type dross with low metallic content was obtained after using.
- The metallic foam formation is minimized.

**Dosage:** average dosage 0,1% - 0,2% (by mass) or 1 - 2 kg of flux per 1000 kg of aluminium alloy.

**Appearance:** white granular. Smell is absent.

**Packing:** 25 kg plastic bag in carton box.

**Storage:** up to 12 months in dry place.

**Quality certificate:** ISO 9001-2009.

**Description:** PF-2 is a granular flux used for removing non-metallic inclusions (oxide layers, carbides and others) and decreasing gas content in cast parts. The dry and powder-type dross with low metallic content was obtained after cleaning operation by this flux. The dross does not stick on furnace lining and crucible surface.

**Applications:** cleaning all type of aluminium foundry alloys for wide range of casting techniques (high pressure die casting, low pressure die casting, gravity casting in permanent and sand molds, others). Also for aluminium foundry alloys preparation.

### Method of use:

1. In case of aluminium foundry alloys preparation flux PF-2 introduces in melt stepwise with every part of batch addition. The finish treatment is doing before melt pouring.
2. In case of aluminium foundry alloys cleaning for casting flux PF-2 introduces in melt under rotor mixing equipment or by hand foundry plunger.

For all applications the temperature of treatment must be above 680°C.

### Main advantages:

- The average dosage of PF-2 granular flux lower than for powder fluxes.

# SA-FLUX-0108

## Degassing tablets degassing tablets (flux in form of tablets) for degassing molten aluminium alloys



**Description:** It is flux in form of tablet used for degassing aluminium alloys melt. The tablets release a quantity of Nitrogen gas for degassing procedure of aluminium melt. Also the cleaning of melt (non-metallic inclusions (oxide layers, carbides and others) removing) due to the inclusions float effect under degassing. The dry and powder-type dross with low metallic content was obtained after cleaning and degassing operations in case of using degassing tablets together with covering-refining fluxes.

**Applications:** degassing operation of aluminium melt under melting / holding procedure. Improving the aluminium melt cleaning (in case of degassing tablets and covering-refining fluxes mutual using) for wide range of casting techniques (high pressure die casting, low pressure die casting, gravity casting in permanent and sand molds, others) and different furnace types or ladles.

### Method of use:

1. The degassing tablets introduce in melt by degassing plunger tool under melt surface to the bottom of furnace crucible or furnace/ladle hearth.
2. The temperature of treatment must be in the range: 620°C – 750°C.
3. The degassing plunger must be in melt till ending of reaction.
4. After reaction the melt rest time must be 5-10

minutes. The melt can be pouring after skimming the dross.

### Main advantages:

- Effective degassing of aluminium melt.
- Improving aluminium melt cleaning.
- Increasing aluminium cast density.

**Dosage:** average dosage 0,1% - 0,2% (by mass) or 1 – 2 kg of tablets per 1000 kg of aluminium alloy.

**Appearance:** white or white-gray tablets. Smell is absent.

**Packing:** 250 gram tablets in 25 kg carton box.

**Storage:** up to 12 months in dry place.

**Quality certificate:** ISO 9001-2009.

# SA-FLUX-0109

## Flux Covering-Refining for copper powder flux for cleaning, covering and drossing off molten pure copper and copper-based alloys



**Description:** It is a powder flux used for removing non-metallic inclusions (oxide layers, carbides and others) in pure copper and copper-based alloys, drossing off and covering surface under melting, decreasing the gas pore defects in castings. The dry and powder-type dross with low metallic content was obtained after cleaning operation by this flux. Flux does not react with furnace lining.

**Applications:** cleaning, covering and drossing off melt of pure copper and copper-based alloys under melting procedure in copper scrap recycling. Cleaning pure copper and copper-based alloys for wide range of casting techniques (high pressure die casting, low pressure die casting, gravity casting in permanent and sand molds, others) and different types of furnaces.

### Method of use:

1. In case of copper scrap recycling covering-refining flux introduces in melt stepwise with every part of batch addition. The finish treatment is doing before melt pouring. Intensive stirring of melt promotes full reaction.
2. In case of copper-based alloys cleaning for casting covering-refining flux introduces in melt by hand foundry plunger under melt surface. Intensive stirring of melt promotes full reaction.

For all applications the temperature of treatment must be above 850°C.

### Main advantages:

- Dry and powder-type dross with low metallic content was obtained after using.
- Effective melt cleaning operation for all types of furnaces and all types of copper-based alloys.
- Decreasing the gas pore defects in cast parts.

**Dosage:** average dosage 0,05% - 0,2% (by mass) or 0,5 – 2 kg of flux per 1000 kg of copper-based alloy.

**Appearance:** gray or white-gray powder. Smell is absent.

**Packing:** individual 1 kg plastic bags in 25 kg carton box.

**Storage:** up to 12 months in dry place.

**Quality certificate:** ISO 9001-2009.

# SA-FLUX-0110

Boron containing tablets for oxygen and hydrogen removal boron containing tablets (flux in form of tablets) for oxygen and hydrogen removal from pure copper and copper-based alloys



**Description:** It is boron containing flux in form of tablets used for oxygen and hydrogen removal from copper-based alloys. The flux is suitable for pure copper and all copper-based alloys (brass, bronze, others). The tablets release a quantity (around 90% of tablet weight) of boron in melt. Well known that boron is one of the most effective deoxidizer for copper without harmful effect of reducing the electrical conductivity. Also the addition of boron in copper-based alloys is the grain refining effect. As result, the boron containing flux improves the mechanical and physical (first of all electrical conductivity) properties of pure copper and copper-based alloys.

**Applications:** oxygen and hydrogen removal operation in pure copper and copper-based melt under melting / holding procedure. Improving the mechanical properties of pure copper and copper-based alloys for wide range of casting techniques (continuous casting for electric wire production, high pressure die casting, low pressure die casting, gravity casting in permanent and sand molds, others) and different furnace types.

## Method of use:

1. The boron containing tablets introduce in melt by degassing plunger tool under melt surface to the bottom of furnace crucible or furnace hearth.

2. The temperature of treatment must be above 900°C.
3. The degassing plunger must be in melt till ending of reaction.
4. After reaction the melt rest time must be 1-3 minutes.
5. The melt can be pouring after skimming the dross.

## Main advantages:

- Effective oxygen and hydrogen removal from pure copper and copper-based alloys.
- Improving mechanical properties of pure copper and copper-based alloys.
- Increasing electrical conductivity of copper.

**Dosage:** average dosage 0,05 - 0,1% (by mass) or 0,5 – 1 kg of tablets per 1000 kg of copper-based alloys.

**Appearance:** white or white-gray tablets. Smell is absent.

**Packing:** 200 gram tablets in 25 kg carton box.

**Storage:** up to 12 months in dry place.

**Quality certificate:** ISO 9001-2009.



# SA-FLUX-0111

## Flux Covering-Refining for lead powder flux for cleaning, drossing off and covering molten pure lead and lead-based alloys



**Description:** It is a powder flux used for removing non-metallic inclusions (oxide layers, carbides and others) in pure lead and lead-based alloys, drossing off and covering surface under melting. The dry and powder-type dross with low metallic content was obtained after cleaning operation by this flux. Improving the mechanical properties of pure lead and lead-based alloys. Flux does not react with crucible or furnace lining.

**Applications:** cleaning, covering and drossing off melt of pure lead and lead-based alloys under melting procedure in lead scrap recycling. Cleaning pure lead and lead-based alloys for wide range of casting techniques and different types of furnaces.

### Method of use:

1. In case of lead scrap recycling covering-refining flux introduces in melt stepwise with every part of batch addition. The finish treatment is doing before melt pouring. Intensive stirring of melt promotes full reaction. After reaction the melt rest time must be 10 minutes. The melt can be pouring after skimming the dross.
2. In case of pure lead and lead-based alloys cleaning for casting covering-refining flux introduces in melt by hand foundry plunger under melt surface.

Intensive stirring of melt promotes full reaction. After reaction the melt rest time must be 10 minutes. The melt can be pouring after skimming the dross.

For all applications the temperature of treatment must be above 400°C.

### Main advantages:

- Dry and powder-type dross with low metallic content (lead content in dross decreases on 4-5 %) was obtained after using.
- Effective melt cleaning operation for all types of furnaces and all types of lead-based alloys.
- Increasing the mechanical properties of pure lead and lead-based alloys.

**Dosage:** average dosage 0,05% - 0,2% (by mass) or 0,5 – 2 kg of flux per 1000 kg of lead-based alloy.

**Appearance:** gray or white-gray powder. Smell is absent.

**Packing:** individual 1 kg plastic bags in 25 kg carton box.

**Storage:** up to 12 months in dry place.

**Quality certificate:** ISO 9001-2009.

## C. FOUNDRY TOOLS

SA-FOUNDRY Sp. z o.o. produces foundry tools in accordance to our long-term experience in foundry technologies and modern materials usage. The main list of our foundry tools is suitable for gravity casting, high pressure die casting, art casting, recycling plants and also for ferrous cast and metallurgy. Foundry tools are designed for effective technological operations with liquid metals in different types of furnaces. Working parts of foundry tools are made from steel by stamping.

Working surface of tools contacting with liquid metal can be protect with special coatings (Cillolin and Mikrocollid by Schafer from Germany or another).

Foundry handles are made from variable sections of steel with different types of ending according to the customer request. Different shapes and capacities of foundry tools can be possible by customer request .



### 1. DEGASSING / REFINING PLUNGER



Using for degassing, refining (cleaning) and modifying melt of non-ferrous alloys (aluminium, copper, zinc and lead – based alloys) by powder or tablet fluxes addition in melt.

Producing in three main sizes in accordance to the melt weight. The effective addition of degassing/modifying tablets and cleaning fluxes to the melt is due to the optimal shape and holes allocation.

## 1.1. Small degassing / refining plunger C-1

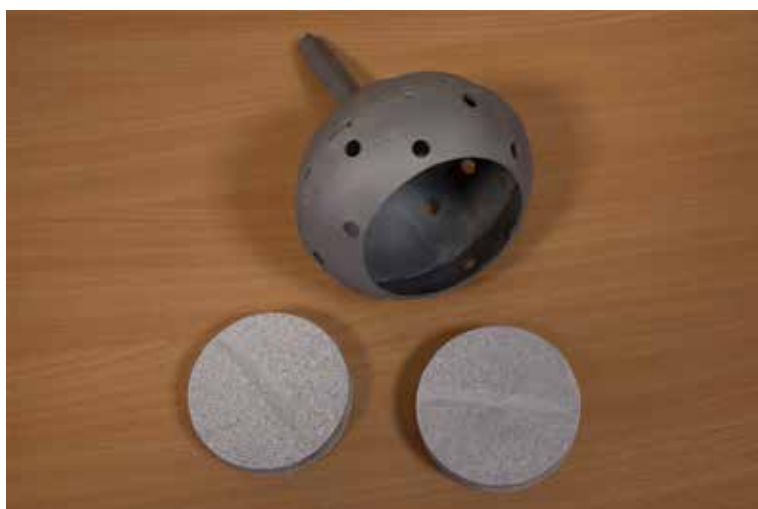


Applying for degassing, refining (cleaning) and modifying melt of non-ferrous alloys (aluminium, copper, zinc and lead – based alloys) by powder or tablet fluxes addition in melt.

Tool is made from 3 mm gauge steel by stamping. The shape: semi-sphere. The external dimensions: diameter 123 mm, height 49 mm.

Capacity of SMALL DEGASSING / REFINING PLUNGER is 250 gram of flux or one tablet (200-250 gram). It is appropriate for up to 250 kg of liquid melt treatment.

## 1.2. Medium degassing / refining plunger C-2



Applying for degassing, refining (cleaning) and modifying melt of non-ferrous alloys (aluminium, copper, zinc and lead – based alloys) by powder or tablet fluxes addition in melt.

Tool is made from 3 mm gauge steel by stamping. The shape: truncated sphere. The external dimensions: diameter 123 mm, height 84 mm.

Capacity of MEDIUM DEGASSING / REFINING PLUNGER is 500 gram of flux or two tablets. It is appropriate for up to 500 kg of liquid melt treatment. Two tablets (400 gram) is average dosage for 400 kg of copper-based melt.

## 1.3. Large degassing / refining plunger C-3



Applying for degassing, refining (cleaning) and modifying melt of non-ferrous alloys (aluminium, copper, zinc and lead – based alloys) by powder or tablet fluxes addition in melt.

Tool is made from 3 mm gauge steel by stamping. The shape: extended truncated sphere. The external dimensions: diameter 123 mm, height 144 mm.

Capacity of LARGE DEGASSING / REFINING PLUNGER is 1000 gram of flux or five tablets. It is appropriate for up to 1000 kg of liquid melt treatment.

## 2. DROSS (SLAG) SKIMMER



Foundry tool for dross (slag) skimming from liquid metals surface and also for stirring the melt. Tool is effective for skimming and stirring operations in all types of furnaces and transport ladles. Different shapes are possible.

### 2.1. Ladle-type dross (slag) skimmer L-1



Applying for dross (slag) skimming from liquid metals surface and also for stirring the melt in all types of furnaces and transport ladles.

Tool is made from 3 mm gauge steel by stamping. The shape: concave disk. The external dimensions: diameter 124 mm, height 33 mm.

The holes are optimal distribute for skimming operation without metal loss.

### 2.2. Shovel-type dross (slag) skimmer L-2



Tool is made from 3 mm gauge steel. The shape: plate.

The external dimensions: width 175 mm, length 150 mm.



### 3. POURING LADLES



Foundry tool for pouring liquid metals and alloys. Tool is made from steel by stamping with one or two spouts (for right or left hand). Different capacities and steel gauges are possible.

#### 3.1. Pouring ladle for non-ferrous metals AL-1000



Foundry tool for pouring liquid non-ferrous metals and alloys (aluminium, copper, zinc and lead – based alloys).

Tool is made from steel by stamping with two spouts (for right or left hand). Different capacities and steel gauges are possible.

Model AL-1000 in semi-sphere shape with diameter 126 mm and volume 452 cm<sup>3</sup>. The capacity: 1040 gram Al, 3980 gram Cu, 3200 gram Zn.

#### 3.2. AL-2000 casting spoon



Designed for casting of non-ferrous metal and alloy melts in casting and chill molds in foundry production.

Made of 4-mm thickness steel by hot stamping, it has two spouts, thus ensuring the casting of molds "for the left" and "for the right" hands.

AL-2000 has a half-sphere form: diameter is 195 mm, volume is 1000 cm<sup>3</sup>, capacity for aluminium is 2300 g, for copper – 8500 g, and for zinc – 7000 g.

The weight of the spoon is 1900 g.

### 3.3. Pouring ladle for ferrous metals AM-1



Foundry tool for samples pouring and for small cast pouring for steel and cast iron melt.

Tool is made from heavy gauge steel (up to 10 mm) by stamping. The shape: semi-sphere with diameter 160 mm and volume 1070 cm<sup>3</sup>. The capacity: 7490 gram of cast iron.

### 3.4. Small pouring ladle for ferrous metals AM-2



Foundry tool for samples pouring for chemical analyzes and mechanical properties testing of steel and cast iron melt in metallurgy.

Tool is made from steel (4 mm thickness) by stamping. The shape: semi-sphere with diameter 70 mm and volume 180 cm<sup>3</sup>. The capacity: 1260 gram of cast iron.

## 4. HANDLES FOR FOUNDRY TOOLS

Rigid handles are made from square section steel rod with different types of ending: for welding or screw connection with tools.



*Handles, connection "screw"*



*The tool assembly*

Handles can be made with different length and hand ending ("O" or "T"-type hand ending).

## 5. GENERAL-PURPOSE TOOLS

### 5.1. Tongs with flat mouth for operations with hot metal



Steel tongs are useful for various operations with hot metal parts and castings in foundries, heat treatment and forge processes.

Main properties:

- Overall length – 610 mm.
- The maximal width of gripping – 100 mm.
- Tongs weight – 1,9 kg.

The various shapes and dimensions are possible under request.



## 6. LADLE

### 6.1. Transport ladle for non-ferrous metals K1Ra14,7 (for one person using)



Foundry equipment for transportation and pouring of liquid non-ferrous metals and alloys (aluminium, copper, zinc and lead – based alloys).

Walls and bottom are made from 3 mm gauge steel. The external dimensions: diameter 150 mm (upper part), diameter 120 mm (bottom part), height 140 mm. Volume: 2,01 liters. Capacity: 4,7 kg of aluminium, 17,5 kg of copper.

Ladle can be covering by special protection coatings. Different capacities and shapes are possible.

### 6.2. Transport ladle for non-ferrous metals K2Ra125 (for two persons using)



Foundry equipment for transportation and pouring of liquid non-ferrous metals and alloys (aluminium, copper, zinc and lead – based alloys).

Walls and bottom are made from 3 mm gauge steel. The external dimensions: diameter 250 mm (upper part), diameter 230 mm (bottom part), height 240 mm. Volume: 10,86 liters. Capacity: 25 kg of aluminium, 78 kg of copper.

Two removable handles and main crucible body provides rigid construction for safe and accuracy melt pouring operation. Ladle can be lining or covering by special protection coatings. Different capacities and shapes are possible.



## 6.3. Hydraulic or electrical tilting transport ladles for non-ferrous metals and alloys

To date, the most flexible solution for the transportation of liquid metal is the use of transport ladles. We have gained experience in design of ladles for non-ferrous metals and alloy melts.



Depending on customer requirements, we can offer a wide range of optimal solutions including the following:

- Manual one- and two-handed ladles of various capacity.

- Heated ladles (usually electric) to control the melt temperature during melt operations (degassing / refining operations for instance) or pouring.
- Electrical drive tilting ladles (servo-drive).
- Hydraulic tilting ladles connected to a loader hydraulic pump and controlled by a loader operator with the possibility of ladle turn around a vertical axis (optional).

The presented range of possible solutions to the non-ferrous metal and alloy transportation and metal pouring can be adapted to different production volumes and available melting equipment.



## D. MELTIG AND HOLDING FURNACES FOR NON-FERROUS METALS AND ALLOYS

One of the most important stages in obtaining of founding or feedstock is the preparation of metal and alloy melt. Depending on the grade of melt, required capacity, melt purity requirements (non-metallic inclusions, gas saturation) and the available energy resources, we offer a wide range of furnaces including the following:

- Crucible stationary melting and holding furnaces (electric, gas and liquid fuel) with different capacities and maximum temperatures.
- Crucible tilting melting furnaces (electric, gas and liquid fuel) with different capacities and maximum temperatures.
- Crucibless (electric, gas and liquid fuel) stationary and tilting furnaces of the bath type (single-chamber and two-chamber) with different

capacities and the melt outflow device for melting and holding of the melt.

- Tilting rotary furnaces with an inclined rotation axis with different capacities are a highly efficient solution for the recycling of non-ferrous metal and alloy scrap and wastes.

Based on the engineering problems of our customers, we are ready to offer effective solutions to provide enterprises with the required quantity of the high-quality melt. We are ready to develop (in cooperation with the leading European manufacturers) and supply you with industrial melting and holding furnaces characterized by optimal performance, low energy consumption, high productivity and reasonable cost.

Some examples of our melting and holding furnaces:

### 1. Melting electric resistance crucible tilting furnace for brass, aluminium and zinc based alloys – model ETF-A80



AC 80 VO stabil crucible from Morgan (Noltina, Germany), crucible capacity: Cu - 80 kg, Al – 24 kg.

Furnace electric power – 20 kW, 3 phases. Melting rate (approximately) – 19 kg Al per hour.

Heating elements are made from modern Resistohm P145 wire in form of spirals on ceramic tubes for long term life time.

Furnace control cabinet with electronic PID regulator of temperature for precise temperature control and low electric energy consumption.

The furnace can be tilting by hand for pouring liquid metal into a casting mold or transporting ladle.

The furnace low electric energy consumption due to the modern fiber-type insulation materials.

## 2. Stationary melting / holding electric resistance furnace for aluminium, brass and zinc based alloys – model ESF-BU300



The furnace low electric energy consumption due to the modern fiber-type insulation materials.

BU 300 (capacity 300 kg of Al) or BU 350 (capacity 350 kg of Al) crucibles from Morgan (Noltina, Germany) can be installed into furnace.

Heating elements are made from modern Resistohm P145 wire in form of spirals on ceramic tubes for long term life time. Furnace electric power – 75 kW, 3 phases. Melting rate (approximately) – 80 kg Al per hour.

Furnace control cabinet with electronic PID regulator of temperature for precise temperature control and low electric energy consumption (average electric power consumption – 0,6-0,8 kW\*h per kg of aluminium melt).

## 3. Melting electric resistance crucible tilting furnace for aluminium, brass and zinc based alloys - model ETF-BU350



The furnace low electric energy consumption due to the modern fiber-type insulation materials. BU 350 stabil crucible from Morgan (Noltina, Germany), crucible capacity: 350 kg of Al. Furnace electric power – 63 kW, 3 phases. Melting rate (approximately) – 75 kg Al per hour.

Heating elements are made from modern Resistohm P145 wire in form of spirals on ceramic tubes for long term life time.

Furnace control cabinet with electronic PID regulator of temperature for precise temperature control and low electric energy consumption.



The furnace can be tilting by servomotor for pouring liquid metal into a casting mold or transporting ladle (safety and low energy expense). Rigid construction of the furnace body is made from structural steel.



## 4. Modern tilting rotary furnaces for non-ferrous metals and alloys recycling



The world recycling capacity of non-ferrous metals and alloys significantly increased during the last decade. For example, now in aluminium industry the recycling of aluminium scrap is the key process because of energy

efficient (the energy for aluminium recycling only 5 % in comparison with primary aluminium production).

The various furnaces are using for recycling aluminium scrap. Energy efficient is summarized in table 1.

Tabl 1

Furnace type	The energy consumption for melting 1000 kg of aluminium scrap
Theoretical energy consumption (efficiency - 100%)	~ 310 kW*h
Reverberatory gas furnace	~ 1280 kW*h
The shaft furnace	~ 500 - 630 kW*h
Rotary furnace with stationary axis	~ 1000 kW*h
Tilting rotary furnace	~ 550 kW*h

The main advantages of tilting rotary furnaces are following:

- The high energy efficient.
- High metal yield.
- High productivity.
- The possibility of working with low quality scrap including dross.
- High automation of recycling process.

Now the main scheme of melting aluminium scrap includes:

1. The gas or liquid fuel tilting rotary furnace for scrap melting.

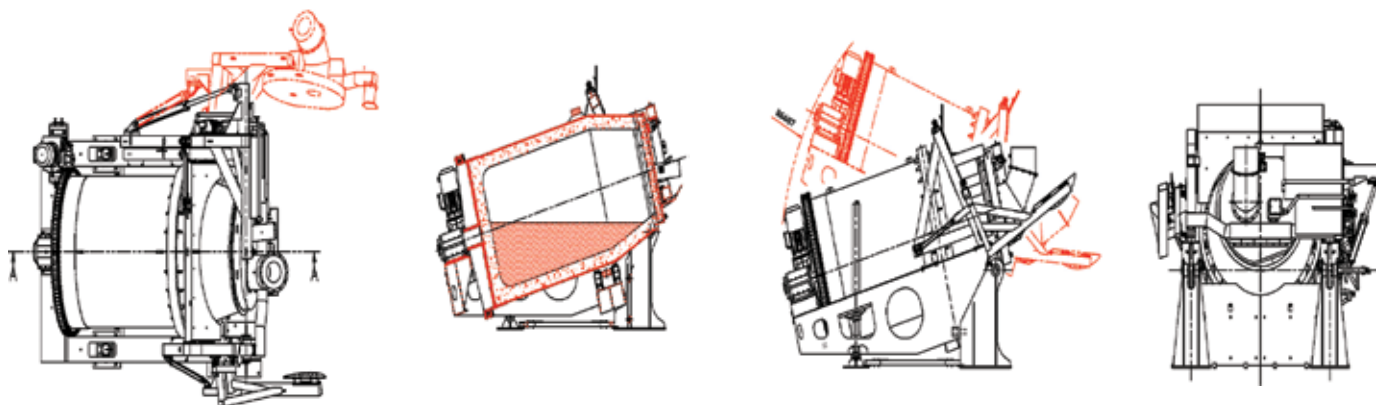
2. The gas/liquid fuel or electric holding furnace (usually reverberatory type) for technological treatment of melt before pouring (introducing the additives, refining, degassing, structure modification).

This scheme is worldwide using. The tilting rotary furnace is the "heart" of this complex.

The tilting rotary furnace capacity is varied in range of 1 - 21 ton.

For example, the main properties of furnace with capacity of 5 ton is shown below in table 2.





Technology scheme

Table 2: The main properties of furnace with capacity of 5 ton

	The furnace Type:	ARTF-5
	<b>Capacity</b>	
1.	Capacity for aluminium	5,000 kg
2.	Door opening diameter	1,400 mm
3.	Liquid capacity	2,5 m <sup>3</sup>
4.	Maximum charge weight (including flux)	5,750 kg
	<b>Productivity</b>	
5.	Melting time hours of one charge	~ 2
6.	Non melting time (charging, pouring and discharging slag hours)	~ 1
7.	Cycle time "tap to tap" hours	~ 3
8.	Number of cycles per day (24 hrs)	7 - 8
9.	Input per month	~ 800 ton
	<b>Burner</b>	
10.	Minimum burner power	372,1 kW min.
11.	Maximum burner power	1,860 kW max.
12.	Minimum gas consumption	38,8 m <sup>3</sup> /h min.
13.	Maximum gas consumption	193,9 m <sup>3</sup> /h max.
14.	Burner fan	2,500 m <sup>3</sup> /h
	<b>Mechanical</b>	
15.	Drive power	30 kW / 380V.
16.	Variable melting angle of tilt	0-15 degrees
17.	Rotation speed	

We can propose efficient technical solutions for non-ferrous metals and alloys recycling.

# E. THERMAL FURNACES FOR HEAT TREATMENT OF MATERIALS

An individual approach to the design and manufacturing of thermal furnaces enables to cover a wide range of process operations required in modern production including the following: hardening, tempering, annealing, strengthening, aging, heating under mechanical treatment, sintering, drying, thermochemical treatment.

The main types of the offered thermal furnaces are the following:

- chamber furnaces,
- bogie hearth furnaces,
- shaft furnaces,
- furnaces for thermochemical treatments of metals,
- bell-type furnaces,
- high temperature furnaces,
- drying chambers.

Obviously, use of modern thermal equipment enables to accurately implement the production process of blank manufacturing, while reducing the utilities costs, operating mode entering time, and other operating costs.

The main advantages of the offered thermal furnaces are the following:

- modern fire-resistant and heat-insulating materials based on ceramic fiber with low thermal

conductivity and low "thermal" inertia,

- modern furnace control systems based on microprocessor temperature controllers (PID control with automatic tuning) that enables to accurately maintain a temperature regime specified by technologists with minimal energy consumption.

- use of modern materials for heating elements and reliable construction of the elements themselves enables to achieve high performance.

Based on the technical challenges of our customers, we are ready to develop (in cooperation with European manufacturers) and supply you furnaces with optimum performance, low energy consumption, high productivity and reasonable cost.

We have also accumulated large experience in the projects of modernization and reconstruction of different available thermal equipment. In the most general case, we can offer the following:

- modernization or replacement of furnace control cabinet;
- calculation and modernization of heating elements;
- calculation and modernization of furnace lining.

## 1. Modern furnaces for heat treatment



Chamber furnace for metal heat treatment

Wide range of applications: tempering, annealing, hardening, quenching, solution annealing, forging, curing, preheating, ageing, drying, thermochemical treatment.

Based on our customer's requests we are flexible for design and producing (in cooperation with EU producers) of the optimal final furnaces with low energy consumption, high productivity and reasonable price.

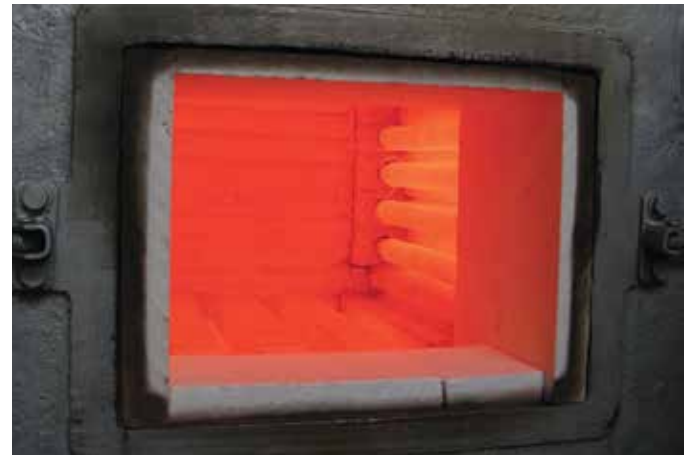
Some examples of our projects:



Shaft furnace with gastight retort and atmosphere circulation for heat treatment in protection atmosphere and thermochemical treatment of metals



Drying chamber



Modernization of existing electrical furnaces

## 2. Heating elements for industrial furnaces and heating systems



We can produce different heating elements for industrial furnaces and heating systems using appropriate software for calculation and design.

Producing by request allow us propose the individual products for various new or existing furnaces and heating systems.

## F. DEGASSING / REFINING MACHINES FOR MOLTEN ALUMINIUM TREATMENT



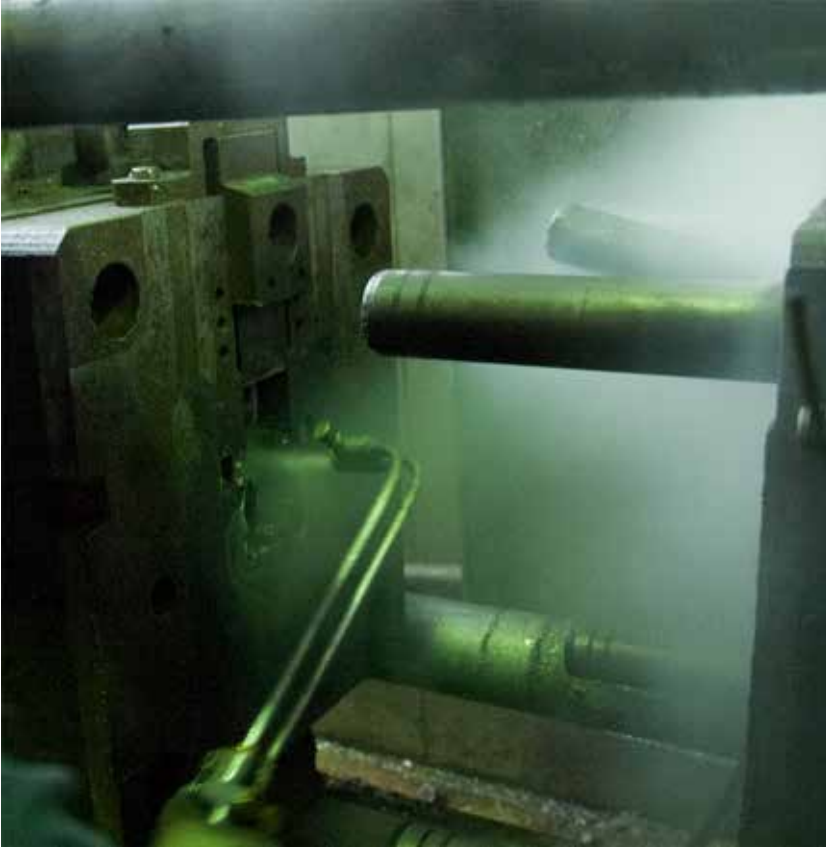
One of the most common process of aluminium melt degassing and refining is blowing of inert gas through the rotating rotor with or without flux addition.

The main advantages of this process:

1. Reduction in porosity. Low hydrogen content after treatment.
2. Decreasing of non-metallic impurities amount in the melt after treatment.
3. Possibilities of degassing operation in continues melt pouring technology.
4. Reduction in the production costs of melt treatments.
5. Reproducible results (hydrogen level) in foundries.
6. Low fume emission (environment friendly operation).

We propose different machines (with or without flux addition) for optimal technology of degassing and refining aluminium melt according to the customer requests and taking into account our foundry experience and actual science researches.

# G. PROTECTIVE COATINGS AND LUBRICANTS FOR CASTING OF NON-FERROUS AND FERROUS METALS



We propose wide range of special protective coatings and lubricants for following purpose:

1. Gravity die casting and low pressure die casting of non-ferrous metals and alloys.
2. Gravity die casting of cast iron.
3. High pressure die casting of non-ferrous metals and alloys.
4. Casting in sand molds of ferrous and non-ferrous metals and alloys.

We are flexible for customers requests for optimal technical solution concerning appropriate coatings and lubricants for foundries.



# H. LADLE PREHEATERS AND DRYERS – ELECTRIC OR GAS BURNER

According to our experience and researches we propose to the market electric or gas burner ladle preheaters and dryers. Ladle dryers and preheaters are used widely in metal melting applications on foundry and metallurgy foundries. These ladle preheaters and dryers can be used for:

- drying the new ladle refractory lining,
- ladle preheating prior to the molten metal is poured.



Handle electric foundry ladle preheater and dryer

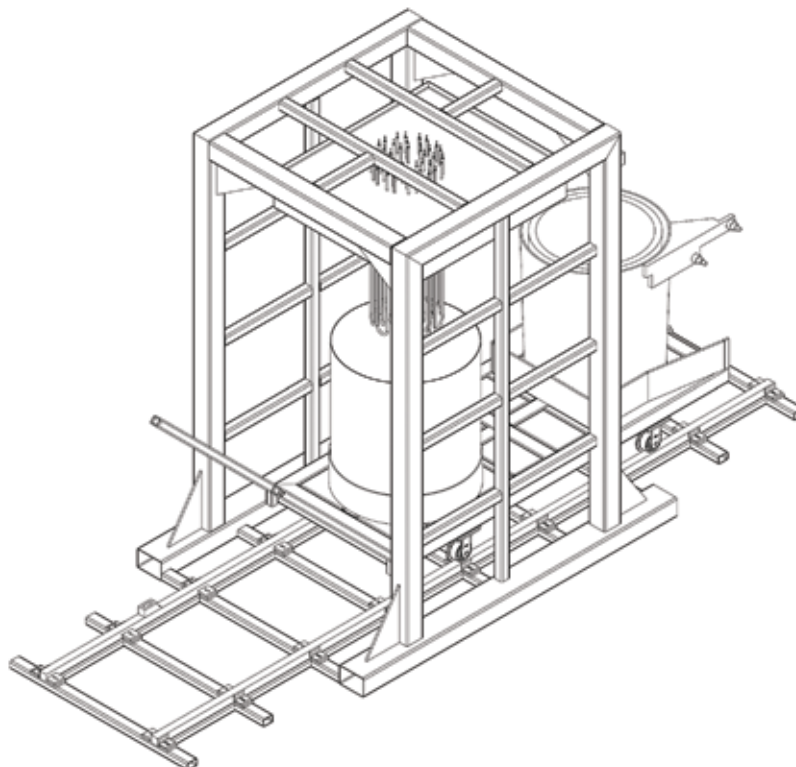
The main advantages of using electric ladle preheaters and dryers:

- Energy saving. More thermal efficiency (up to 80 % compared to the 5-15 % for simple burning and 20-30% for burners with recuperators). Lower operation costs.
- More precise temperature control and easier to operate.
- Increased ladle refractory lifetime (no thermal shock effect from burner).
- Reduced environment and pollution problems (reduced CO<sub>2</sub> emission).

The main advantages of using gas burner ladle preheaters and dryers:

- Fast heating rate.
- More simple and rigid construction.

All models of electric or gas burner ladle preheaters and dryers are designed by customer requests.



Automatic electric station for preheating and drying of foundry ladles

# I. Materials for welding and soldering / brazing of non-ferrous metals and alloys



A wide application of non-ferrous metals and alloys for manufacturing of industrial and household products, as a rule, requires the process of welding or soldering / brazing. Also, the main type of repair of damaged

parts of non-ferrous metals and alloys is welding and soldering / brazing.

Based on a wide range of customer tasks, we can offer modern materials for welding and soldering / brazing:

1. Welding materials in the shape of a rod or a wire for welding of aluminium alloys.
2. Materials in the shape of a rod for soldering aluminium alloys.
3. Materials for soft soldering of copper and copper alloys.
4. Materials for hard soldering (brazing) of copper and copper alloys.

# Contents

ABOUT US / O NAS	2
A. CONSULTING AND ENGINEERING FOR FOUNDRIES AND RECYCLING FACTORIES	4
B. FLUXES FOR NON-FERROUS METALS AND ALLOYS	5
SA-FLUX-0101 Flux Covering-Refining powder flux for cleaning, drossing off and covering molten aluminium foundry alloys	7
SA-FLUX-0102 Flux Covering-Refining powder flux for cleaning, drossing off and covering molten aluminium extrusion alloys	8
SA-FLUX-0103 Flux or concentrate for rotary furnaces powder flux or concentrate for drossing off, cleaning and covering molten aluminium alloys for tilting rotary furnaces	9
SA-FLUX-0104 Exothermic Flux powder flux for drossing off, cleaning and covering molten aluminium alloys	10
SA-FLUX-0105 Flux for Magnesium and Calcium removal from aluminium alloys powder flux for Magnesium and Calcium removal from aluminium alloys, cleaning, drossing off and covering molten aluminium alloys	11
SA-FLUX-0106 Flux for lining cleaning powder flux for build up cleaning from furnaces and ladles lining in aluminium melting / holding furnaces and ladles	12
SA-FLUX-0107 Granular flux for cleaning and drossing off molten aluminium alloys	13
SA-FLUX-0108 Degassing tablets degassing tablets (flux in form of tablets) for degassing molten aluminium alloys	14
SA-FLUX-0109 Flux Covering-Refining for copper powder flux for cleaning, covering and drossing off molten pure copper and copper-based alloys	15
SA-FLUX-0110 Boron containing tablets for oxygen and hydrogen removal boron containing tablets (flux in form of tablets) for oxygen and hydrogen removal from pure copper and copper-based alloys	16
SA-FLUX-0111 Flux Covering-Refining for lead powder flux for cleaning, drossing off and covering molten pure lead and lead-based alloys	17
C. FOUNDRY TOOLS	18
1. DEGASSING / REFINING PLUNGER	18
1.1. Small degassing / refining plunger C-1	19
1.2. Medium degassing / refining plunger C-2	19
1.3. Large degassing / refining plunger C-3	19
2. DROSS (SLAG) SKIMMER	20
2.1. Ladle-type dross (slag) skimmer L-1	20
2.2. Shovel-type dross (slag) skimmer L-2	20
3. POURING LADLES	21
3.1. Pouring ladle for non-ferrous metals AL-1000	21
3.2. AL-2000 casting spoon	21
3.3. Pouring ladle for ferrous metals AM-1	22
3.4. Small pouring ladle for ferrous metals AM-2	22
4. HANDLES FOR FOUNDRY TOOLS	23
5. GENERAL-PURPOSE TOOLS	24

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5.1. Tongs with flat mouth for operations with hot metal	24
6. LADLE	25
6.1. Transport ladle for non-ferrous metals K1Ra14,7 (for one person using)	25
6.2. Transport ladle for non-ferrous metals K2Ra125 (for two persons using)	25
6.3. Hydraulic or electrical tilting transport ladles for non-ferrous metals and alloys	26
 D. MELTIG / HOLDING FURNACES FOR NON-FERROUS METALS AND ALLOYS	 27
1. Melting electric resistance crucible tilting furnace for brass, aluminium and zinc based alloys – model ETF-A80	27
2. Stationary melting / holding electric resistance furnace for aluminium, brass and zinc based alloys – model ESF-BU300	28
3. Melting electric resistance crucible tilting furnace for aluminium, brass and zinc based alloys – model ETF-BU350	28
4. Modern tilting rotary furnaces for non-ferrous metals and alloys recycling	29
 E. THERMAL FURNACES FOR HEAT TREATMENT OF MATERIALS	 31
1. Modern furnaces for heat treatment	31
2. Heating elements for industrial furnaces and heating systems	32
 F. DEGASSING / REFINING MACHINES FOR MOLTEN ALUMINIUM TREATMENT	 33
 G. PROTECTIVE COATINGS AND LUBRICANTS FOR CASTING OF NON-FERROUS AND FERROUS METALS	 34
 H. LADLE PREHEATERS AND DRYERS – ELECTRIC OR GAS BURNER	 35
 I. Materials for welding and soldering / brazing of non-ferrous metals and alloys	 36
 Contents	 37

For notes



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