

**Chemical Metallurgical Products
for Application with
Ferrous and Non-Ferrous Alloys**



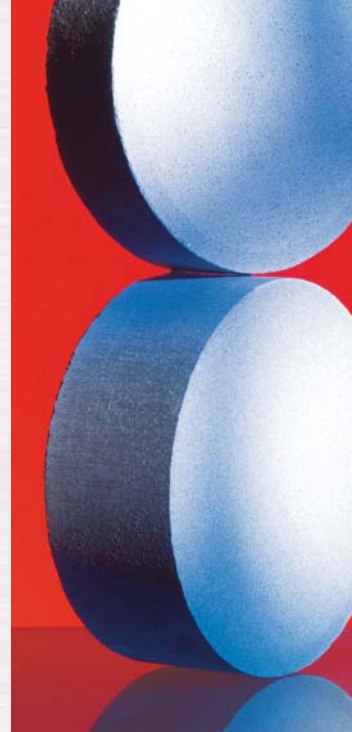
Most commercially melted metals react strongly with oxygen to form oxides during the melting process. These oxides, along with dirt, oil and refractory particles, etc. must be removed from the metal before casting to avoid defects.

Many molten metals are also susceptible to absorbing gases (for example, hydrogen gas in aluminium) which must also be controlled.

Fluxes have been used for these purposes since metal melting began, to improve the quality of metal and to increase the melting efficiency. Over recent years, the ongoing need to improve the environmental conditions in foundries has led to an emphasis on reduction of dust, fume, etc. in the workplace.

The HA Group has long-term experience in the production and innovation of fluxes used for the treatment of these metals. HA Group is continuing to advance the development of products with a balance of efficiency and environmental responsibility.

Furthermore the development of the ECOFLUX range of low-fluoride and fluoride-free fluxes provides a cost-effective, environmentally superior system of treating aluminium alloys.



What is Flux?

Basically flux consists of a mixture of salts and other compounds designed and blended together in order to conduct specific treatments or have certain effects upon or within the molten metal.

The flux treatments available are designed to achieve certain objectives, e.g. cleaning and oxide removal, degassing, modification, grain refining etc.

Why use Flux?

By using fluxes a higher quality metal can be achieved with improved mechanical properties.

Fluxes

- remove oxides
- separate metal from dross
- control hydrogen gas
- improve alloy structure
- maintain furnace and crucible cleanliness

About Flux



Drossing Fluxes

Most oxides will float on the melt surface due to surface tension effects. However, in the case of aluminium alloys, where the density of the oxide is similar to the base metal, oxides may also be held deep in the body of the metal. Typically these oxides are an outer shell of oxide with a central core of aluminium. Drossing fluxes act on the surface of the particle to break it apart and enable it to flow to the surface. At the surface the flux initiates a reaction in the dross which separates aluminium from the dross, thereby increasing the metal recovery from the furnace.

Refining / Cover Fluxes

These fluxes have a low melting point and are used to provide a fluid protective cover for the exposed metal surface during melting, thus reducing surface oxidation and hydrogen absorption. They are commonly used for melting fine or low grade material such as turnings, due to their high capacity to absorb oxides. For alloys containing magnesium, they also help to reduce magnesium losses by providing a protective barrier against oxidation. For copper base alloys, refining fluxes can protect against zinc losses and pick up of hydrogen or oxygen.

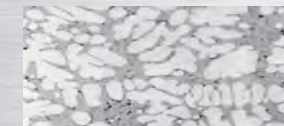
Degassing / Re-gassing Fluxes

Aluminium alloys readily dissolve hydrogen in the molten state. During solidification, the solubility of hydrogen in aluminium decreases, and the hydrogen will come out of solution. This may result in porosity in the casting, and for most processes such as sand or investment casting, degassing fluxes are used to reduce dissolved hydrogen levels to a minimum prior to pouring. Re-gassing fluxes are specific to the gravity diecasting process where a controlled amount of hydrogen may need to be re-introduced to counter shrinkage defects.

Flux Types



unmodified structure



modified structure

Silicon Modifying / Phosphorus Refining Fluxes

Aluminium-silicon alloys, such as those used to produce cylinder heads, manifolds and wheels, can have their mechanical properties improved by altering the form of the silicon rich phase within the structure. The term 'modification' applies to lower silicon (hypo-eutectic) aluminium alloys, and describes the conversion of needles (or plates with sharp sides) within the structure to a globular or

fibrous form by the addition of, most commonly, sodium, strontium or antimony. The simultaneous use of more than one refining element may lead to a malfunction of the modification or refining process.

Phosphorus refinement applies to higher silicon (hyper-eutectic) aluminium alloys where the silicon rich phase normally forms a coarse cuboid form. In this case phosphorus is used to produce an even dispersion of fine cuboids resulting in improved machinability and other mechanical properties.

Grain Refining Fluxes

These fluxes promote fine grain size within the aluminium alloy structure, and alter the size of the aluminium rich phase (alpha). By the addition of titanium and boron containing fluxes, a finer grain structure can be achieved with improved mechanical properties.

ECOFLUX Products

All of the products within the ECOFLUX range are environmentally improved for treating non-ferrous alloys. They are either fluoride-free or with low fluoride content.

The ECOFLUX products are designed to give a balanced reaction within the dross or slag layer, resulting in the minimum exothermic reaction necessary to initiate the separation of the metal from the dross and protect the melt from furnace gases.

ECOFLUX 14-series

These products give a dry cover on the melt, to combine optimum separation of the melt from the dross and ease of drossing off.

ECOFLUX 143

Low fluoride drossing flux, producing very dry, powdery dross. This product is recommended for use with rotary degassing systems.

ECOFLUX 146

Low fluoride, drossing flux. Suitable for use in crucible and reverberatory furnaces where the aluminium alloy is held at a wide range of temperatures from 720°C to 780°C.

ECOFLUX 15-series

The products of this series provide a liquid cover on the melt for optimum protection of the melt from oxidation and hydrogen pickup.

ECOFLUX 150

Fluoride-free, low melting point covering flux suitable for melting swarf, turnings and dirty scrap in reverberatory and induction furnaces. This flux grade is non-exothermic.

ECOFLUX 151

Low fluoride, low melting point covering flux suitable for melting swarf, turnings and dirty scrap in reverberatory and induction furnaces. Similar to ECOFLUX 150, but more reactive.

ECOFLUX 152

Fluoride-free, refining flux for contaminated charges and removal of oxide build-up from the walls of furnaces. It is a low melting point refining and cleansing flux which thickens as oxides and other impurities are absorbed. ECOFLUX 152 is suitable for melting swarf, turnings and dirty scrap. It may also be used as a wash-down flux to remove oxide build-up on furnace linings and crucibles, providing dry, easily removable dross.

ECOFLUX 154

Low fluoride variant of ECOFLUX 152, providing improved drossing action at low temperatures.

ECOFLUX 16-series

The products of the ECOFLUX 16-series are specifically developed for use with Flux Injection and 'Rotorject' Rotary Flux Injection Systems to combine the well-proven benefits of flux injection with the environmental advantages of the ECOFLUX range of products.

The HA Flux Injection and Rotorject Systems are simple to operate and generate less fume and toxic gasses than traditional methods. In addition to very efficient cleaning of the melt, another benefit of the process is a powerful degassing effect which eliminates the necessity for a separate degassing operation.

ECOFLUX 161

General purpose, low fluoride injection grade for cleaning and degassing. For use at 720°C and above.

ECOFLUX 163

Low fluoride, sodium and calcium free injection grade. Recommended for use on piston alloys, Al/Mg alloys and other alloys intolerant of sodium or calcium-free.

ECOFLUX 164

General purpose, low fluoride injection grade with recommended working range of 720°C - 780°C. It is a cleaning, degassing and drossing flux suitable for use with all aluminium alloys other than those which are intolerant of sodium.

ECOFLUX 165

General purpose injection grade, with excellent flow characteristics, especially suited to use in rotary flux injection systems at elevated temperatures. It is a cleaning, degassing and drossing flux suitable for use with all aluminium alloys other than those that are intolerant of sodium. ECOFLUX 165 has been specifically developed for use at high temperatures where continuous metal treatments result in higher than normal temperatures in the graphite shaft and impeller.

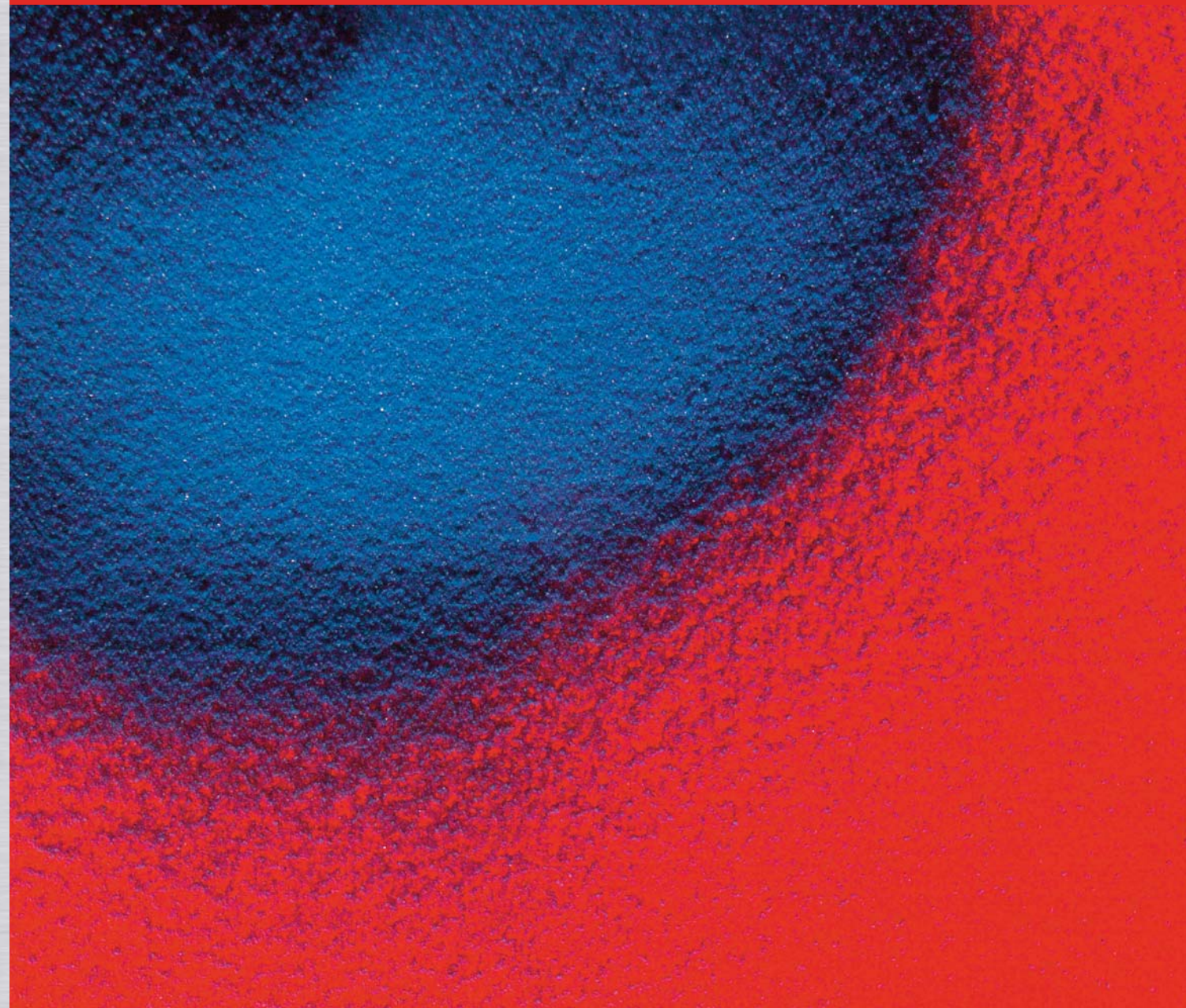


The traditional range of HA Group fluxes are designed to carry out a wide range of specialised metal treatments, including oxide removal, dross separation, hydrogen gas control and improvement of metal structures via the addition or removal of trace elements. In some cases ECOFLUX products can be used as an alternative depending on the type of metal treatment required.

HMC 37

General purpose cleaning and degassing injection flux, generating dry exothermic dross. Designed for use at relatively low temperatures up to 720°C.

Traditional Fluxes



COVER 134 / COVERLUX 0021

Low temperature drossing fluxes suitable for use at temperatures of 670°C and above for application with aluminium and its alloys apart from Al/Mg alloys with more than 2 % Mg. Producing very dry, powdery dross. These products are best suited for use in small units such as crucibles.

COVER 302

Commercially sodium-free and calcium-free cleansing and drossing flux for use with Al/Mg alloys and other alloys where sodium contamination must be avoided, e.g. phosphorus refined alloys. Traditional flux but with the benefit of a non-hazardous classification for supply! COVER 302 produces dry dross that absorbs aluminium and magnesium oxides and enables a clean separation of metal from dross.

COVERLUX KS 3

Drossing flux for application with aluminium and its alloys. Similar to COVERLUX 0021 but highly exothermic.

DEMAGGER B

Specialist flux for the removal of excess magnesium from aluminium alloys. DEMAGGER B is a magnesium removing flux suitable for use with aluminium alloys where the magnesium content is over specification. We recommend using this product as a manual (surface applied) flux.

ECOPURE AI 171

A versatile, fluoride-free, low melting point refining and cleansing flux, which gradually thickens as oxides and other impurities are absorbed. It is an effective remover of trace elements such as Ca, Na, Li, and Sr. Ecopure AI 171 may also be used as a wash-down flux to remove oxide build-up from furnace linings and crucibles.

ECOFLUX Series for Aluminium Alloys

For alloy	Grade	Form	Temp. Range °C	Function
Al	Ecoflux 143	P	740-800	Cleaning/Drossing
Al	Ecoflux 146	P	720-800	Cleaning/Drossing
Al	Ecoflux 150	P	680-800	Refining
Al	Ecoflux 151	P	680-800	Refining
Al	Ecoflux 152	P	680-800	Wall cleaning
Al	Ecoflux 154	P	680-800	Refining
Al	Ecoflux 161	P	720-780	Cleaning/Drossing
Al	Ecoflux 163	P	720-780	Drossing (Na-free)
Al	Ecoflux 164	P	720-780	Cleaning/Drossing
Al	Ecoflux 165	P	730-800	Cleaning/Drossing

Fluxes for Aluminium Alloys

For alloy	Grade	Form	Temp Range °C	Function
Al	Cover 134	P	670-760	Cleaning/Drossing
Al	Cover 302	P	720-780	Drossing (Na-free)
Al	Coverlux 0021	P	670-800	Cleaning/Drossing
Al	Coverlux G 21	G	670-800	Cleaning/Drossing
Al	Demagger B	P	750-800	Magnesium removal
Al	Diecasting Flux 5	G	660-800	Re-gassing
Al	Ecogas 16	T 200 g	720-760	Degassing
Al	Ecogas Al 4	T 200 g	660-800	Re-gassing
Al	Ecopure Al 170	P	690-750	Ca removal/Refining (Na-free)
Al	Ecopure Al 171	P	690-750	Ca removal/Refining
Al	Exomod Al SH 12	T 200 g	720-780	Na modification, quick
Al	HMC 37	P	670-720	Cleaning/Drossing
Al	HMC 61	P	720-780	Cleaning/Drossing
Al	Silifin 165	T 200 g	720-780	Grain refinement
Al	Silifin VM1655	T 500 g	720-780	Grain refinement
Al	Veralux SH10	T 200 g	720-780	Na modification

Form:

P = Powder T = Tablet
G = Granule CP = Capsule

Fluxes for Copper Based Alloys

For alloy	Grade	Form	Temp Range °C	Function
Cu	Aluminium Remover	P	n/a	Remove Al/Refining
Cu	Cudox Tubes	CP	n/a	Deoxidation
Cu	Cuprocover B505	P	n/a	Reducing for pure Cu
Cu	Ecopure Cu 512	P	n/a	Refining
Cu	Ecopure Cu 524	P	n/a	Protective for brasses, B-free
Cu	Ecopure Cu 525	P	n/a	Protective for Al-bronze, NaF-free
Cu	Ecopure Cu 526	P	n/a	Oxidising for Al-bronze, NaF-free
Cu	Linofeed 460	P	n/a	Exothermic feeding aid
Cu	Slag Coagulant	G	970 and above	Slag removal/Insulation

Fluxes for Lead, Magnesium and Zinc Alloys

For alloy	Grade	Form	Temp. Range °C	Function
Mg	Ecopure Mg 25	P	650-800	Protective/Refining
Mg	HMC 24	P	650-800	Protective/Refining
Mg	Inhibitor B	P	n/a	Sand inhibitor
Mg	Inhibitor S	P	n/a	Metal stream protection
Ni	Ecofeed Fe 431	P	n/a	Exothermic feeding aid
Pb	Ecopure Pb 1	P	480-520	Drossing for Pb/Ca alloys
Pb	Ecopure Pb 2	P	350-520	Drossing for all Pb alloys at low temp
Pb	Ecopure Pb 3	P	440-520	Drossing for Pb/Ca alloys at low temp
Zn	Ecopure Zn 21	P	380-460	Cleaning/Drossing

Exothermic Compounds

For alloy	Grade	Form	Temp Range °C	Function
Al	Exofeed Al 413	P	n/a	Exothermic feeding aid, larger risers
Al	Exofeed Al 415	P	n/a	Exothermic feeding aid, fast
Al	Luxotherm L9 LT	P	n/a	Exothermic feeding aid
Al	Luxotherm S	P	n/a	Exothermic feeding aid, slow

The granular flux range of HA Group is designed for manual application, with the benefits of reduced dust generation during application, as compared to powdered flux grades.

COVERLUX 21 G

Aluminium alloy cleansing and drossing flux, especially well-suited for use in the gravity diecasting process at very low temperatures.

DIECASTING FLUX 5

Re-gassing flux in granular form for gravity diecasting.

Fluxes for Al Alloys in Granular Form



Fluxes for Al Alloys in Tablet Form



HA Group's products in tablet or briquette form are designed to be plunged below the metal surface. In this form, accurate control of addition weights is achieved, and for some metallurgical applications such as hydrogen removal or grain refinement, introduction of the flux sub-surface is necessary to promote an efficient treatment.

Hydrogen Removal

ECOGAS 16

Aluminium alloy degassing tablet giving extremely low fume levels in operation. A grey coloured tablet or block. It is used to degas most aluminium alloys with the exception of alloys where the presence of sodium is detrimental. ECOGAS 16 is virtually fumeless in operation, thus avoiding the environmental problems associated with traditional degassers.

Hydrogen Addition

ECOGAS AI 4

Re-gassing agent for application with aluminium permanent-mould casting gives a controlled introduction of gas into molten aluminium in order to eliminate cracking and shrinkage defects, and also to improve the surface finish of diecastings.

Grain Refinement

SILIFIN 165

Grain refining agent for application with aluminium alloys. Hexachloro-ethane-free grain refining tablet based on salts of titanium and boron.

Used for most aluminium alloys except conductive alloys. Producing a paste-like dross which can be thickened slightly with COVERLUX 0021 for easy removal of the dross. Low fume levels in operation.

SILIFIN VM 1655

Grain refining agent for application with aluminium alloys with an increased boron content.

Modifying Fluxes

VERALUX SH 10

Sodium modification tablet of exothermic nature for application with hypo-eutectic and eutectic aluminium-silicon alloys. Provides an extended modification effect (typically 40 minutes) due to its high yield. The exothermic reaction time is approximately 3 minutes.

EXOMOD AI SH 12

Sodium modification tablet of exothermic nature for application with hypo-eutectic and eutectic aluminium-silicon alloys. Provides an extended modification effect (typically 40 minutes) due to its high yield. The exothermic reaction time is approximately 2 minutes.



Fluxes for Copper Based Alloys

EXOPURE Cu 526

Mildly oxidising flux in powder or tablet form, for use during crucible melting of tin bronzes, gunmetal, etc. where the quality of the ingot or returns is relatively clean. To eliminate pinholes due to hydrogen pick-up, bronzes and similar alloys should be melted under oxidising conditions to prevent hydrogen absorption. At the end of the melting cycle, the oxygen is removed using CUDOX TUBES.

ECOPURE Cu 524

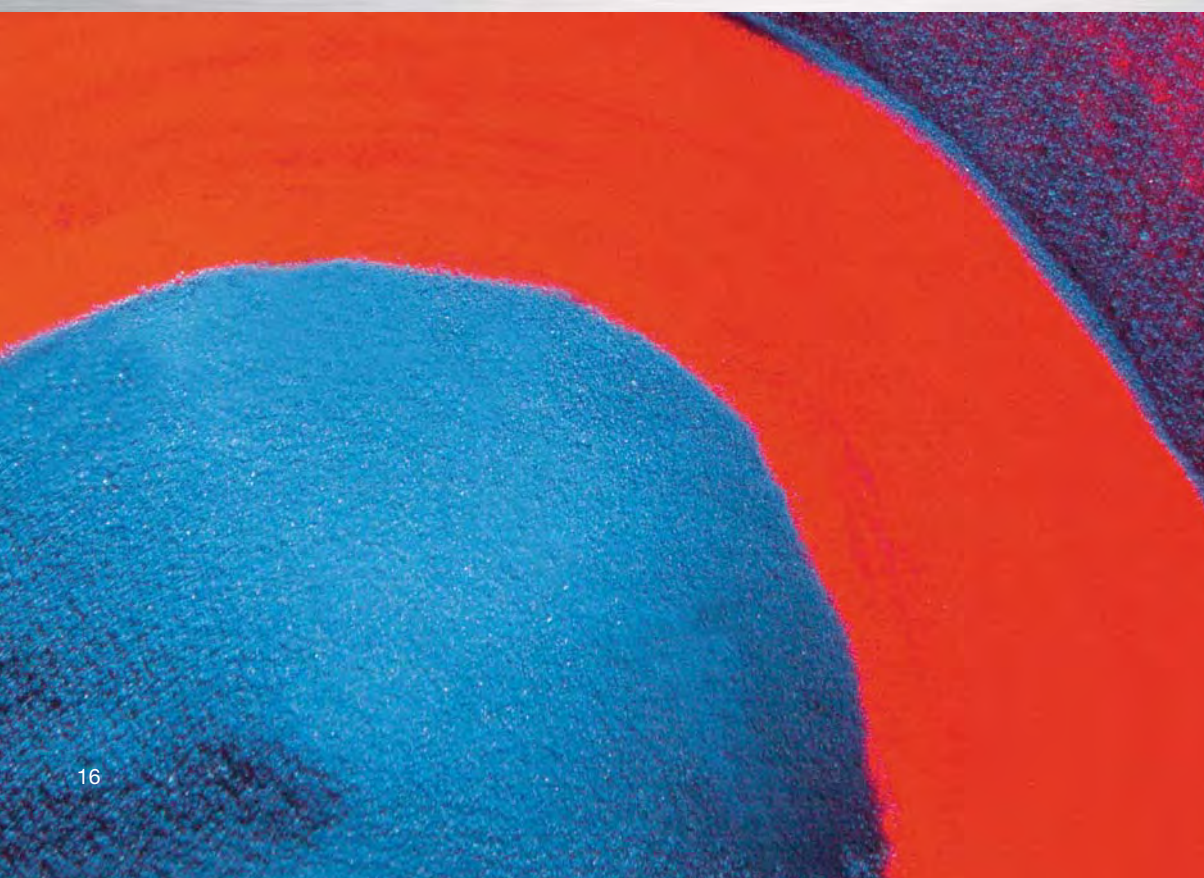
Grey granular refining and covering flux for use with a wide range of zinc-bearing copper based alloys including brass, gunmetal and tin bronzes. It produces a fluid slag to dissolve and remove dirt and other impurities in the process of recovering metal from swarf, drosses and other residues in crucible and reverberatory furnaces. It is important to maintain a complete cover over the molten metal to prevent oxidation during melting.

CUPROCOVER B505

Reducing flux for the melting of high conductivity copper and designed to minimise oxidation.

ECOPURE Cu 512

A neutral refining and covering flux for use with copper based alloys including commercial copper, brass, gunmetal, phosphor-bronze and tin bronzes. It produces a fluid slag to dissolve and remove dirt and other impurities in the process of recovering metal from swarf, drosses and other residues. It is important to maintain a complete cover over the molten metal to prevent oxidation during melting. It is best suited for use in large melting units such as reverberatory or rotary furnaces.



CUDOX TUBES

Copper tubes containing a high grade deoxidant, pre-packed in measured amounts, for treating copper based alloys. CUDOX TUBES contain deoxidants in granular form which enable the deoxidant to be immediately dissolved by the melt. Although phosphor-copper cake is a satisfactory deoxidant, it is not the best or the cheapest way of adding phosphorus because some evaporates and some is lost within the dross while the cake slowly melts. It is also difficult to add in precise amounts, which is essential if gas-free metal is to be obtained. CUDOX TUBES should not be used for treating high conductivity copper. Calcium boride or lithium based deoxidants should be used for this application.



ALUMINIUM REMOVER

An oxidising flux that effectively removes aluminium contamination from brasses and bronzes. ALUMINIUM REMOVER is a light grey powdered flux for treating brasses and bronzes.

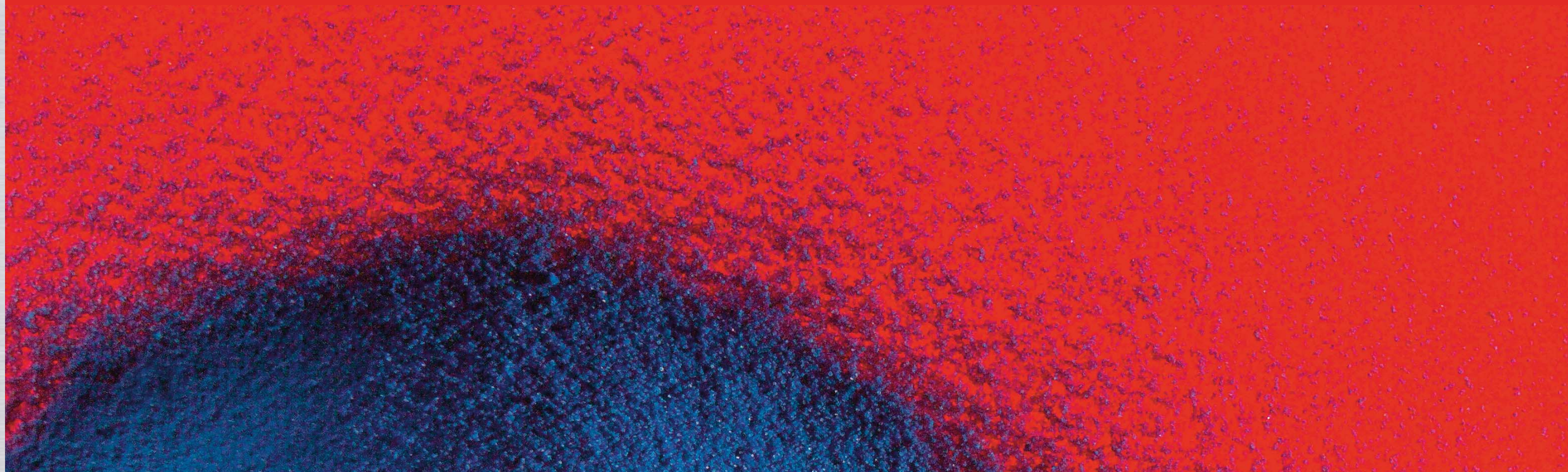
SLAG COAGULANT

A grey, granular powder suitable for use on casting ladles. It is a very efficient thermal insulator and coagulates the slag on ferrous and copper based alloys to form a viscous, crusty layer, which can easily be removed. SLAG COAGULANT contains processed metallic oxides in a definite physical phase, which exfoliates and melts at temperatures above 970°C.

EXOPURE Cu 525

A cleansing and protective flux for use with aluminium-bronze alloys and suitable for use in crucible furnaces. This flux initially provides a fluid, protective cover, which effectively reduces the formation of oxides and gas pick-up, therefore minimising aluminium (and zinc) losses. As the flux absorbs oxides, dry dross forms which can be easily removed.

Fluxes for Zinc and Magnesium-Aluminium Alloys



HA Group's fluxes for use on zinc alloys are designed to provide some protection against zinc evaporation, whilst also providing a good drossing action at zinc alloy treatment temperatures. Fluxes for magnesium alloys provide a highly protective fluid cover on the melt surface to prevent burning. They also contain self-sinking compounds to encourage settling of impurities to the bottom of the melt.

ECOPURE Zn 21

A grey, high grade, low fume, drossing off flux for use with zinc alloys. Ecopure Zn 21 gives a clean, efficient separation of the oxide and dirt from the melt at temperatures in the range 410°C - 460°C.

HMC 24

A powdered flux for use with magnesium-aluminium alloys. It is not recommended for use with magnesium-zirconium alloys. HMC 24 is a cleansing and protecting flux which contains self-sinking additives to assist removal of impurities. HMC 24 provides a liquid cover, which absorbs oxides and protects molten magnesium from oxidation. This product is hygroscopic so it is essential that after use all opened containers must be resealed as soon as possible.

INHIBITOR S

A yellow, powdered dusting flux used for treating magnesium alloys. It is intended for use as a dusting powder to inhibit burning of molten magnesium alloys. INHIBITOR S is suitable for use on all magnesium alloys. It should be dusted liberally over the exposed magnesium alloy at the pouring spout and also onto the metal stream during pouring. The INHIBITOR S powder removes oxygen in the vicinity of the molten alloy and also provides a thin protective film as a barrier to oxidation. It is recommended that the flux layer or crust formed on the molten alloy is left intact where possible since this will afford some protection against burning of the metal prior to pouring.

INHIBITOR B

Inhibiting sand additive to prevent burning of magnesium based alloys. This inhibiting material contains a blue dye to provide visual confirmation that it is present in the mould prior to pouring. Typical addition rates are 2 % by weight of sand but will vary slightly according to the casting thickness with increasing addition rates required for thick sections. We recommend that our customers produce a 'step mould' casting and cast the magnesium alloy in the mould to ensure adequate additions are being made in relation to the casting being produced.

The LINOFEED range of products are designed to produce high calorific values, high levels of insulation or combinations of both properties in order to promote the feeding of a wide range of alloy types and casting sizes.

LINOFEED 430

Thermite type carbon-free material specifically developed for use with manganese steels to prevent piping. LINOFEED 430 is a black speckled powder containing visible coarse metallic particles. It is an anti-piping compound, specially formulated for use with manganese steels but is also applicable to other ferrous alloys. As a thermite type material it generates very high temperatures in a molten slag and forms a metal bead. It may be added to the surface of alloy steel rolls immediately after casting to generate intense heat before the addition of ECOFEED Fe 433 which forms a highly insulating cover.

ECOFEED Fe 434

A grey non-carbonaceous, insulating, exfoliating compound suitable for use with a wide variety of steel rolls, ingot steels and alloy steels with large diameter risers and feeder heads. ECOFEED Fe 434 is a very efficient semi-crusting hot topping compound. It exfoliates 50 % of its volume, has high exothermic values and the heat retention properties are excellent. This low hazard product is free from compounds such as nitrates and fluorides that generate toxic fume.

LINOFEED 460

Fast firing hot topping compound for use with spheroidal graphite iron, small to medium diameter steel risers, brasses and bronzes. LINOFEED 460 is a red-brown coloured exothermic material of medium bulk density, generating intense heat and producing a highly insulating, self-supporting crust. LINOFEED 460 will assist the efficient feeding of a wide range of alloys, including cast iron and alloy steel casting risers, and can also be used with brasses and bronzes. Very satisfactory results can be obtained using LINOFEED 460 in conjunction with exothermic and insulating sleeves.

ECOFEED Fe 433

A low bulk density, low fume, carbon-free insulating compound. Forms a self-supporting crust that possesses excellent insulating properties. ECOFEED Fe 433 is a light grey powder and can be used on a wide variety of steel and iron risers with diameters between 70 and 500 mm. This low hazard product is free from compounds such as nitrates and fluorides that generate toxic fume.

Exothermic Compounds

ECOFEED Fe 431

Very fast firing material generating intense heat. ECOFEED Fe 431 is a metallic grey granular material of medium bulk density and produces a highly insulating, self-supporting crust. ECOFEED Fe 431 will assist the efficient feeding of a wide range of alloys, from copper base to stainless steel and including investment cast steel alloys.

EXOFEED Al 413

Metallic grey powder of medium bulk density. It is a high quality, exothermic hot topping compound for use with aluminium alloys and aluminium bronzes. Ignition of EXOFEED Al 413 takes place a few seconds after application to molten metal, producing a controlled high temperature burn to avoid the generation of excessive fume during use and also forms a self-supporting, insulating crust.



LUXOTHERM S / LUXOTHERM L9

Exothermic anti-piping compounds for application with aluminium and copper base alloys. LUXOTHERM L9 is the fast firing grade.

The above products represent our most popular grades, but other products are also available on request.

Shelf Life

In their original packaging and under normal climate and storage conditions the shelf life is 24 months from the date of manufacture.

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