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the quality

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demands of our customers



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## ARSAL 2125

### Highly compacted cleansing and skimming granules

for all hypoeutectic and eutectic aluminium, wrought and casting alloys  
such as e. g.: G-AlSi10Mg, G-AlSi7Mg, G-AlSi8Cu3, G-AlSi12 and G-AlZn10Si8

- 01 **Notes on Technology** Aluminium and aluminium, wrought and casting alloys have the tendency to form oxides and to absorb hydrogen in the liquid state and, in addition, to an undesired dross and aluminium oxide foam formation which has an extremely high portion of metal.
- The granules **ARSAL 2125** bind the oxides and transport them to the surface by a flotation process whereby a low-metal dross is obtained by the reduction of the surface tension. In addition to that during the treatment with an impeller the oxides are bound on the melt surface.
- ARSAL 2125** is a highly compacted preparation. Therefore, nearly no dust is released and it can also be used in the lower temperature range of the aluminium melt. The high degree of compaction permits an intensive reaction with the oxides which can easily be controlled thanks to the compactness of the granules (discoloration and dissolution).
- Types of compaction:**  
**ARSAL 2125** is produced as granules or flakes.
- The granules consist of small cylinders of approximately 0.3 g / grain. They enable an important control of the operating staff as they remain their shape and colour if they are not thoroughly stirred in the melt and therefore did not reach the reaction time.
  - Flakes look like small crushed stones, weight approximately 0.05 g / grain and have a large distribution area. The reaction time is comparable with that of the granules. They reach the temperature of the metal faster and lose their colour before reacting. Thus, an effective control is very difficult.
- 02 **Application Range** **ARSAL 2125** stands out by good storage stability and is applicable within a wide reaction range, i. e. it can also be used in the lower temperature range of the aluminium melt. It is applicable for all aluminium, wrought and casting alloys which may contain small quantities of sodium.
- 03 **Quality Characteristics** **ARSAL 2125**
- removes oxides from the melt by flotation and reduces the hydrogen content
  - produces a fine, powdery and low-metal dross
  - works in all types of furnaces and crucibles
  - permits the easy removal of adherences
  - is of very low smoke and odour emission
- 04 **Addition Rate** Depending on the level of impurities 0.05 – 0.25 % by weight or lower (rule of thumb: half the quantity compared with the powder addition).
- 05 **Product Application** Add **ARSAL 2125** in the pouring stream and stir it with a bell. When using it as cleansing preparation, submerge the required addition slowly and carefully into the melt. Gently stir the rising flotation products with a well pre-heated and coated tool until a fully reacted dross forms and then skim it off.
- ARSAL 2125** is highly suitable for the automatic addition with an impeller system (e. g. MBU of the company FUCO-HEG).
- 06 **Typical Properties** Appearance: blue granules / flakes  
Odour: odourless  
Reaction temperature: from approximately 580°C (higher temperatures accelerate the reaction)
- 07 **Packaging** 25 kg bags, 3-fold with plastics lining, special packaging available.
- 08 **Advice on Special Types of Danger** Not applicable.
- 09 **Storage and Shelf Life** Store in a cool place (below 32°C/90°F); keep container dry and tightly closed. The shelf life is at least 6 months if properly stored.

## PROBAT-FLUSS AL 3125

### **Sodium-free, highly compacted cleansing and skimming preparation**

potassium based, for all low-silicon and hypereutectic aluminium alloys such as e. g.: G-ALMg3, G-ALCu4Ti, G-ALSi17Cu4Ti and G-ALSi18CuNiMg

- 01 **Notes on Technology** Alloys with a small melting range, such as all AlMg- and AlCu-alloys, should not contain any sodium. Sodium can accumulate on the grain boundaries. Thus, it supports the formation of hot tears after the solidification.
- Such alloys can only be treated with preparations which do not release any sodium. **PROBAT-FLUSS 3125** binds oxides and transports them into the dross by a flotation process whereby a low metal-dross is obtained by the reduction of the surface tension.
- On top of that this product is a highly complex preparation which is very effective due to its high degree of compaction. During the treatment all ingredients simultaneously reach temperature. As a consequence of this they are quicker effective.
- 02 **Application Range** **PROBAT-FLUSS AL 3125** is applicable for all casting processes, however, preferably for alloys which are free from sodium. It stands out by good storage stability and a wide reaction range (between 580°C and 900°C, low temperatures need a longer reaction time).
- 03 **Quality Characteristics** **PROBAT-FLUSS AL 3125**
- removes oxides from the melt by flotation and reduces the hydrogen content
  - produces a fine, powdery and low-metal dross
  - works in all types of furnaces and crucibles
  - permits the easy removal of adherences
  - is of very low smoke and odour emission
  - suitable for the automatic dosing with an impeller system
- 04 **Addition Rate** Depending on the level of impurities 0.05 – 0.25 % by weight or lower (rule of thumb: half the quantity compared with the powder addition)
- 05 **Product Application** **PROBAT-FLUSS AL 3125** works in melting, holding and pouring furnaces as well as in crucibles. When using as a cleansing preparation, submerge the required addition into the melt (during the impeller treatment or when decanting). Gently stir with a well pre-heated and coated tool until a fully reacted dross forms and then skim it off.
- For the dross treatment, distribute **PROBAT-FLUSS AL 3125** on the surface and stir the preparation in the dross with a tool. Skim it off after a reaction time of three minutes. When it is used regularly (one to two times per shift) it impedes the formation of built-ups on the furnace walls and crucibles.
- During the impeller treatment oxides are bound and the share of metal in the dross is reduced essentially. Thus, more metal is available for the casting process (metal saving potential). The addition of the preparation in the pouring stream while decanting increases this effect.
- 06 **Typical Properties**
- |                       |  |
|-----------------------|--|
| Appearance:           | white flakes   |
| Odour:                | odourless  |
| Reaction temperature: | from approximately 580°C (higher temperatures accelerate the reaction) |
- 07 **Packaging** 25 kg bags, 3-fold with plastics lining, special packaging available.
- 08 **Advice on Special Types of Danger** Not applicable.
- 09 **Storage and Shelf Life** Store in a cool place (below 32°C/90°F); keep container dry and tightly closed. The shelf life is at least 6 months if properly stored.

## ARSAL 2120

### Cleansing and skimming preparation

for all hypoeutectic and eutectic aluminium alloys

such as e. g.: G-AlSi10Mg, G-AlSi7Mg, G-AlSi8Cu3, G-AlSi12 and G-AlZn10Si8

- 01 **Notes on Technology** During the melting of returns and ingots oxides are formed. These oxides adhere to the crucible and furnace walls, convert into corundum and destroy the walls.
- ARSAL 2120** reacts with the oxides in such a way that they can be easily removed from the walls. Simultaneously it reduces the surface tension so that the aluminium can flow out of the dross. As a consequence of this more aluminium is available for the casting process.
- ARSAL 2120** shows its cleaning effect by adhering to the oxides and transporting them to the surface.
- 02 **Application Range** **ARSAL 2120** is applicable for all casting processes. It stands out by good storage stability and a wide reaction range (between 580°C and 900°C, higher temperatures accelerate the reaction).
- 03 **Quality Characteristics** **ARSAL 2120**
- removes oxides from the melt by flotation and reduces the hydrogen content
  - produces a fine, powdery and low-metal dross
  - works in all types of furnaces and crucibles
  - permits the easy removal of adherences
  - is of very low smoke and odour emission
- 04 **Addition Rate** Depending on the level of impurities 0.1 – 0.5 % by weight or lower.
- 05 **Product Application** **ARSAL 2120** works in melting, holding and pouring furnaces as well as in crucibles. When using as a cleansing preparation, submerge the required addition slowly and carefully into the melt by using a bell. Gently stir the rising flotation products until a fully reacted dross forms and then skim it off.
- For the dross treatment, distribute **ARSAL 2120** on the surface and stir the preparation in the dross with a tool. Skim it off after a reaction time of three minutes. When it is used regularly (one to two times per shift) **ARSAL 2120** impedes the formation of built-ups on the furnace walls and crucibles.
- During the impeller treatment oxides are bound and the metal proportion is reduced essentially. Thus, more metal is available for the casting process (metal saving potential). The addition of the preparation in the pouring stream while decanting increases this effect.
- 06 **Typical Properties**
- |                       |  |
|-----------------------|--|
| Appearance:           | blue powder mix  |
| Odour:                | odourless  |
| Reaction temperature: | from approximately 580°C (higher temperatures accelerate the reaction) |
- 07 **Packaging** 25 kg bags, 3-fold with plastics lining, special packaging available.
- 08 **Advice on Special Types of Danger** Not applicable.
- 09 **Storage and Shelf Life** Store in a cool place (below 32°C/90°F); keep container dry and tightly closed. The shelf life is at least 6 months if properly stored.



## ARSAL 2120i

### Cleansing and skimming preparation

for all hypoeutectic and eutectic aluminium alloys

such as e. g.: G- $\text{AlSi10Mg}$ , G- $\text{AlSi7Mg}$ , G- $\text{AlSi8Cu3}$ , G- $\text{AlSi12}$  and G- $\text{AlZn10Si8}$   
special preparation for the application with a spraying device (flux injector)

- 01 **Notes on Technology** The injection of **ARSAL 2120i** under the melting surface is a highly effective method to remove oxidic impurities. By doing this an intensive contact with the melt is achieved which leads to a quick reaction.
- ARSAL 2120i** is a highly efficient preparation that can be also used in the lower temperature range of the aluminium melt. This product is ideal for the use in a spraying device thanks to its fine ingredients.
- 02 **Application Range** **ARSAL 2120** is applicable for all casting processes. It stands out by good storage stability and a wide reaction range (between 580°C and 900°C, higher temperatures accelerate the reaction).
- 03 **Quality Characteristics** **ARSAL 2120i**
- can be sprayed into the melt or dross with a spraying device (flux injector)
  - removes oxides from the melt by flotation and reduces the hydrogen content
  - produces a fine, powdery and low-metal dross
  - works in all types of furnaces and crucibles
  - permits the easy removal of adherences
  - is of very low smoke and odour emission
- 04 **Addition Rate** Depending on the level of impurities 0.1 – 0.5 % by weight or lower.
- 05 **Product Application** **ARSAL 2120i** works in melting, holding and pouring furnaces. When using as cleansing preparation, inject the required addition carefully into the melt with nitrogen or argon. Skim off the rising flotation products and the fully reacted dross with a well pre-heated and coated tool.
- For the dross treatment, inject **ARSAL 2120i** under the surface with nitrogen or argon. Skim the dross off after a short reaction time.
- When it is used regularly (one to two times per shift) **ARSAL 2120i** impedes the formation of built-ups on the furnace walls and crucibles. Oxides are bound and the metal proportion in the dross is reduced essentially. Thus, more metal is available for the casting process (metal saving potential)
- 06 **Typical Properties** Appearance: blue, fine powder mix  
Odour: odourless  
Reaction temperature: from approximately 580°C (higher temperatures accelerate the reaction)
- 07 **Packaging** 25 kg bags, 3-fold with plastics lining, special packaging available.
- 08 **Advice on Special Types of Danger** Not applicable.
- 09 **Storage and Shelf Life** Store in a cool place (below 32°C/90°F); keep container dry and tightly closed. The shelf life is at least 6 months if properly stored.

## PROBAT-FLUSS AL 2126

### Sodium-free cleansing and skimming preparation

potassium based, for all low-silicon and hypereutectic aluminium alloys

such as e. g.: G- $\text{AlMg}_3$ , G- $\text{AlCu}_4\text{Ti}$ , G- $\text{AlSi}_{17}\text{Cu}_4\text{Ti}$  and G- $\text{AlSi}_{18}\text{CuNiMg}$  as well as aluminium wrought alloys

- 01 **Notes on Technology** Alloys with a small melting range, such as all  $\text{AlMg}$ - and  $\text{AlCu}$ -alloys, should not contain any sodium. Sodium can accumulate on the grain boundaries. Thus, it supports the formation of hot tears after the solidification.
- Such alloys can only be treated with preparations which do not release any sodium. **PROBAT-FLUSS 2126** binds oxides and transports them into the dross by a flotation process whereby a low metal-dross is obtained by the reduction of the surface tension.
- On top of that this product is a highly complex preparation which is very effective due to its high degree of compaction. During the treatment all ingredients simultaneously reach temperature. As a consequence of this they are quicker effective.
- 02 **Application Range** **PROBAT-FLUSS AL 2126** is applicable for all casting processes, however, preferably for alloys which are free from sodium. It stands out by good storage stability and a wide reaction range (between  $580^\circ\text{C}$  and  $900^\circ\text{C}$ , low temperatures need a longer reaction time).
- 03 **Quality Characteristics** **PROBAT-FLUSS AL 2126**
- removes oxides from the melt by flotation and reduces the hydrogen content
  - produces a fine, powdery and low-metal dross
  - works in all types of furnaces and crucibles as it is free from any sodium
  - permits the easy removal of adherences
  - is of very low smoke and odour emission
  - suitable for the automatic dosing with an impeller system
- 04 **Addition Rate** Depending on the level of impurities 0.1 – 0.5 % by weight or lower.
- 05 **Product Application** **PROBAT-FLUSS AL 2126** works in melting, holding and pouring furnaces as well as in crucibles. When using as a cleansing preparation, submerge the required addition into the melt (during the impeller treatment or when decanting). Gently stir with a well pre-heated and coated tool until a fully reacted dross forms and then skim it off.
- For the dross treatment, distribute **PROBAT-FLUSS AL 2126** on the surface and stir the preparation in the dross with a tool. Skim it off after a reaction time of three minutes. When it is used regularly (one to two times per shift) it impedes the formation of built-ups on the furnace walls and crucibles.
- During the impeller treatment oxides are bound and the metal proportion in the dross is reduced essentially. Thus, more metal is available for the casting process (metal saving potential). The addition of the preparation in the pouring stream while decanting increases this effect.
- 06 **Typical Properties**
- |                       |  |
|-----------------------|--|
| Appearance:           | white powder mix   |
| Odour:                | odourless  |
| Reaction temperature: | from approximately $580^\circ\text{C}$ (higher temperatures accelerate the reaction) |
- 07 **Packaging** 25 kg bags, 3-fold with plastics lining, special packaging available.
- 08 **Advice on Special Types of Danger** Not applicable.
- 09 **Storage and Shelf Life** Store in a cool place (below  $32^\circ\text{C}/90^\circ\text{F}$ ); keep container dry and tightly closed. The shelf life is at least 6 months if properly stored.

## PROBAT-FLUSS AL 224

### **Intense cleansing and skimming preparation with a pre-modifying effect**

for all hypoeutectic and eutectic aluminium alloys

such as e. g.: G-AlSi10Mg, G-AlSi7Mg, G-AlSi8Cu3, G-AlSi12 and G-AlZn10Si8

- 01 **Notes on Technology** Mainly sand casting parts must be thoroughly cleaned from oxides as they support the formation of pores. Furthermore, a pre-modification prevents a pasty solidification of the eutectic. Thus, it impedes the formation of shrinkage cavities and simplifies the modification.
- PROBAT-FLUSS AL 224** binds oxides and transports them to the surface by a flotation process whereby a low metal dross is obtained by the reduction of the surface tension.
- On top of that this product is a highly efficient preparation for heavily polluted melts and can also be used in the lower temperature range of the aluminium melt.
- 02 **Application Range** **PROBAT-FLUSS AL 224** is applicable for all casting processes. It is preferably used in such cases where no supporting effect, e. b. by an impeller treatment, is possible.
- PROBAT-FLUSS AL 224** stands out by good storage stability and a wide reaction range (between 580°C und 900°C).
- 03 **Quality Characteristics** **PROBAT-FLUSS AL 224**
- removes oxides from the melt by flotation and reduces the hydrogen contents
  - produces a fine, powdery and low-metal dross
  - works in all types of furnaces and crucibles
  - permits the easy removal of adherences
  - is of very low smoke and odour emission
  - forms a pre-modified structure
- 04 **Addition Rate** Depending on the level of impurities 0.2 – 0.5 % by weight or lower.
- 05 **Product Application** **PROBAT-FLUSS AL 224** works in melting, holding and pouring furnaces as well as in crucibles. When using as cleansing preparation, submerge the required addition slowly and carefully into the melt. Gently stir the rising flotation products with a well pre-heated and coated tool until a fully reacted dross forms and than skim it off.
- For the dross treatment, distribute **PROBAT-FLUSS AL 224** on the surface and stir the preparation in the dross with a tool. Skim it off after a reaction time of three minutes. When used regularly (one to two times a shift), **PROBAT-FLUSS AL 224** impedes the formation of built-ups on furnace walls and crucibles.
- Oxides are bound and the metal proportion in the dross is reduced essentially. Thus, more metal is available for the casting process (metal saving potential). The addition of **PROBAT-FLUSS AL 224** in the pouring stream while decanting increases this effect.
- 06 **Typical Properties** Appearance : blue powder mix  
Odour: odourless  
Reaction temperature: from approximately 580°C (higher temperatures accelerate the reaction)
- 07 **Packaging** 25 kg bags, 3-fold with plastics lining, special packaging available.
- 08 **Advice on Special Types of Danger** Not applicable.
- 09 **Storage and Shelf Life** Store in a cool place (below 32°C/90°F); keep container dry and tightly closed. The shelf life is at least 6 months if properly stored.



## PROBAT-FLUSS AL MGEX

### Highly efficient cleansing preparation

for the removal of alkaline and alkaline earths,

such as e. g.: magnesium, calcium, sodium, lithium and other subversive elements

- 01 **Notes on Technology** Accompanying elements, such as lithium, calcium and maybe sodium, strontium and magnesium often have undesired effects on the casting result. The elimination respectively the reduction of these elements in the melt, as well as of other alkaline and earth alkaline, can be carried out by the formation of compounds similar to cryolite without using any chlorine.
- 02 **Application Range** **PROBAT-FLUSS AL MGEX** is applicable for all wrought and casting alloys. It reacts quickly and can be easily worked under the metal melt.
- 03 **Quality Characteristics** **PROBAT-FLUSS AL MGEX**
- reduces elements, such as sodium, lithium, calcium und magnesium
  - removes oxides from the melt
  - works in all types of furnaces and crucibles
  - is free from chlorine
  - is of very low smoke and odour emission
- 04 **Addition Rate** The effectiveness of the treatment with **PROBAT-FLUSS AL MGEX** highly depends on the local conditions. Thus, the temperature, the ratio bath surface / bath volume, the level of impurity and the possibility of an intensive and thorough mixing play a significant role for the effectiveness of the treatment.
- The addition of 1 kg / t **PROBAT-FLUSS AL MGEX** reduces the magnesium content by 0.01 up to 0.02 % on average (5 - 10 kg flux binds 1 kg Mg). In case of an extremely low magnesium content, the additional quantity must be increased. Much less material is required for the removal of calcium or sodium.
- 05 **Product Application** The metal surface should be skimmed off roughly before the treatment. Stir in carefully **PROBAT-FLUSS AL MGEX**. This can be done by means of an immersion bell or by injecting the powder with the aid of an injector. After that the melt should be given a quiet period of at least 5 up to 10 minutes before skimming it off. This application can be repeated as often as wanted.
- 06 **Typical Properties**
- |                       |  |
|-----------------------|--|
| Appearance:           | white powder mix   |
| Odour:                | odourless  |
| Reaction temperature: | from approximately 680°C (higher temperatures accelerate the reaction) |
- 07 **Packaging** 25 kg bags, 3-fold with plastics lining, special packaging available.
- 08 **Advice on Special Types of Danger** Not applicable.
- 09 **Storage and Shelf Life** Store in a cool place (below 32°C/90°F); keep container dry and tightly closed. The shelf life is at least 6 months if properly stored.

## PROBAT-FLUSS OFENREINIGER 200

### Removal of corundum built-ups from furnace walls

for brick lined or rammed furnace walls

- 01 **Notes on Technology** Oxidic impurities agglomerate and deposit on furnace walls. In the course of time, they change to corundum which adheres fixedly to the furnace wall. These built-ups attack the furnace walls and reduce the capacity of the furnace. If they are not removed, they infiltrate small surface irregularities and cracks and destroy the walls due to which the isolation effect is reduced. **PROBAT-FLUSS OFENREINIGER 200** softens the corundum built-ups on the wall. After the treatment these built-ups can be pushed off by means of a tool.
- 02 **Application Range** **PROBAT-FLUSS OFENREINIGER 200** is suitable for all ramming mixtures and brick linings. It can be used in shaft, holding and dosing furnaces as well as in launders.
- 03 **Quality Characteristics** **PROBAT-FLUSS OFENREINIGER 200**
- diffuses between adherences and walls and weakens the bond of the corundum with the wall
  - permits the removal of built-ups in the molten metal area as well as in the boundary areas
  - does not chemically attack the furnace walls
  - can be sprayed on easily with corresponding spraying devices
- 04 **Addition Rate** An addition rate of 1 - 4 kg/m<sup>2</sup> in dependence on the thickness of the oxidic impurities is recommended for the cleaning of the inner surfaces of the furnace.
- 05 **Product Application** **PROBAT-FLUSS OFENREINIGER 200** should be used in a warm furnace which is almost empty. The furnace temperature should be set as high as possible (800-900°C). The heating aggregates should be switched off during the treatment. A spraying device (injector) is highly suitable for the even application of the product. If such a device is not available the material can also be thrown in the furnace by using a shovel. The reaction time should be at least 20 minutes or better 2 hours while the furnace door is closed.
- The built-ups often fall off automatically when the furnace cools down. More stubborn built-ups are softened enough so that they can be easily removed with a suitable scrapping tool. These scrapping works can be carried out after the furnace had cooled down.
- An additional cleaning may be required for particularly hard and large oxidic built-ups.
- 06 **Typical Properties**
- |                      |  |
|----------------------|--|
| Appearance:          | fine light grey powder mix   |
| Odour:               | odourless  |
| Reaction temperature | from approximately 730°C (higher temperatures accelerate the reaction and should be used preferably) |
- 07 **Packaging** 25 kg bags, 3-fold with plastics lining, special packaging available.
- 08 **Advice on Special Types of Danger** R8 / R20 / R 21 / R 22.
- 09 **Storage and Shelf Life** Store in a cool place (below 32°C/90°F); keep container dry and tightly closed. The shelf life is at least 6 months if properly stored. Thickenings can be softened by slight knocking on the bag.

## PROBAT-FLUSS IMPRÄGNIERER 200

### Preparation for the application onto furnace walls

to prevent the formation of built-ups and reaction products on the rammed lining

- 01 **Notes on Technology** Oxidic impurities agglomerate and deposit on furnace walls. In the course of time, they change to corundum which adheres fixedly to the furnace wall. These built-ups attack the furnace walls and reduce the capacity of the furnace.
- PROBAT-FLUSS IMPRÄGNIERER 200** produces a protective film and impedes in this way the formation of built-ups on furnace walls.
- 02 **Application Range** **PROBAT-FLUSS IMPRÄGNIERER 200** is suitable for all ramming mixtures and brick linings. It can be applied without any problems on the hot furnace wall by means of a spraying device (injector).
- 03 **Quality Characteristics** **PROBAT-FLUSS IMPRÄGNIERER 200**
- protects the furnace walls
  - is highly effective also at low addition rate
  - does not chemically attack the furnace walls
  - can be sprayed on easily with corresponding spraying devices
- 04 **Addition Rate** 1 - 3 kg/m<sup>2</sup> inner surfaces of the furnace.
- 05 **Product Application** **PROBAT-FLUSS IMPRÄGNIERER 200** should be evenly applied on the warm furnace walls after the cleaning.
- This can be carried out by a shovel or a spraying device (injector). The furnace should not be overheated. The reaction time should be at least 10 up to 20 minutes. After the impregnation the furnace can be filled and used as usual.
- 06 **Typical Properties**
- |                       |  |
|-----------------------|--|
| Appearance:           | fine light grey powder mix   |
| Odour:                | odourless  |
| Reaction temperature: | from approximately 700°C (higher temperatures accelerate the reaction and should be used preferably) |
- 07 **Packaging** 25 kg bags, 3-fold with plastics lining, special packaging available.
- 08 **Advice on Special Types of Danger** Not applicable.
- 09 **Storage and Shelf Life** Store in a cool place (below 32°C/90°F); keep container dry and tightly closed. The shelf life is at least 6 months if properly stored. Thickenings can be softened by slight knocking on the bag.



## DEGASAL T 200

### Nitrogen based degassing tablets

for aluminium and aluminium alloys

such as e. g.: all AISi alloys, AlMg and AlCu alloys as well as all wrought alloys

- 01 **Notes on Technology** **DEGASAL T 200** are tablets which clean and degas the melt by releasing nitrogen.
- Modification-effective elements, such as sodium, strontium and antimony, are hardly influenced by the cleaning with these tablets. The unpleasant smoke and odour emissions, which usually occur when using fluxes which release chlorine, are completely avoided as this preparation releases nitrogen. Thus, these tablets can also be used in furnaces with top heating on the condition that no aluminium splashes can reach the top heating. Therefore it is preferably used in foundries which do not have any exhausting device and have to work particularly environmentally-friendly (residential areas).
- As a general rule **DEGASAL T 200** is used when after the usual melt treatment an additional cleaning is necessary for safety reasons. Particularly in bale-out furnaces, where ingots are added to the melt, the preparation is responsible for an intensive homogenization of the melt
- 02 **Application Range** **DEGASAL T 200** is applicable for all casting processes and for all aluminium alloys. It is mainly used where no supportive effect is possible, e. g. by an impeller treatment.
- This preparation stands out by good storage stability and a wide reaction range (between 680 – 900°C).
- 03 **Quality Characteristics** **DEGASAL T 200**
- removes hydrogen and oxides from the melt
  - improves the casting quality essentially
  - works in all types of furnaces and crucibles
  - prevents unpleasant smoke and odour emissions
  - does not influence the modification-effective elements
  - ensures a good mixing of the melt
- 04 **Addition Rate** Depending on the level of impurities 1 tablet per 100 kg melt or less (< 0.2 %).
- 05 **Product Application** The treatment temperature generally is between 680°C and 750°C. Submerge the tablets by means of a clean, pre-heated and well coated immersion bell into the melt. Previously the dross on the melt should be removed. After the very intensive reaction the melt should be given a quiet period for some minutes before the impurities are thoroughly skimmed off again.
- 06 **Typical Properties**
- |                       |  |
|-----------------------|--|
| Appearance:           | white-grey tablets of 200g   |
| Odour:                | odourless  |
| Reaction temperature: | from approximately 680°C (higher temperatures accelerate the reaction) |
- 07 **Packaging** 162 tablets of 200g packed in cardboard box.
- 08 **Advice on Special Types of Danger** Not applicable.
- 09 **Storage and Shelf Life** Store in a cool place (below 32°C/90°F); keep container dry and tightly closed. The shelf life is at least 6 months if properly stored.

## EUTEKTAL T 201

### Modification tablets of high sodium release

for hypoeutectic and eutectic AlSi alloys

such as e. g.: G-AlSi7Mg, G-AlSi10Mg, G-AlSi12, G-AlSi8Cu4 (226)

- 01 **Notes on Technology** The modification with sodium by using **EUTEKTAL T 201** leads to a spheroidization of the silicon which has been eutectically solidified. The structure changes from a lamellar or granular structure to a microfine precipitation of the structure that has been modified. In this way all technological properties are influenced in a positive manner.
- The sodium modification with these tablets leads to a spheroidization of the eutectic silicon that is predominantly independent of the cooling speed without leading to an increase of the gas level of the melt. Thus, it can be used in the sand as well as in the gravity die casting.
- The solidification morphology of the eutectic is also transformed by **EUTEKTAL T 201** from the spongy to the smooth walled type of solidification. A highly reduced trend towards shrinkage cavity formation and a dense structure for gases results from this.
- 02 **Application Range** **EUTEKTAL T 201** can be used in all casting processes and is mainly used for the sand and gravity die casting. The usage makes sense in all casting alloys with a silicon content of 7% up to 12%.
- 03 **Quality Characteristics** **EUTEKTAL T 201**
- effects a safe modification of the melt
  - does not gas the melt
  - modifies the melt within 30 seconds
  - leads to the modification effect immediately after the treatment
  - ensures a homogeneous distribution of the sodium
- 04 **Addition Rate** Gravity die casting 0.02 up to 0.12 % of the weight and sand casting 0.10 up to 0.20 % of the weight (approximately 1 tablet per 100 kg melt).
- 05 **Product Application** Place **EUTEKTAL T 201** on the surface of the melt after the cleaning and degassing of the melt and immerse the tablets down to the bottom with a clean, well pre-heated and coated immersion bell immediately following the ignition. After 30 seconds the turbulences subside and the tablet has fully reacted. Remove the immersion bell, beat out the rest of the tablet and skim off the surface.
- The melt can be treated with **PROBAT-FLUSS MONOTAB NS** covering tablets to compensate the sodium melting losses in the pouring- or holding furnace.
- 06 **Typical Properties** Appearance : grey tablets of 200g  
Odour: odourless  
Reaction temperature: from approximately 720°C ( higher temperatures accelerate the reaction)
- 07 **Packaging** 180 tablets of 200g packed in cardboard box .
- 08 **Advice on Special Types of Danger** Not applicable.
- 09 **Storage and Shelf Life** Store in a cool place (below 32°C/90°F); keep container dry and tightly closed. The shelf life is at least 6 months if properly stored.

## PROBAT-FLUSS MONOTAB NS

### Tablet for maintaining the sodium modification

of hypoeutectic and eutectic AlSi alloys

such as e. g.: G-AlSi7Mg, G-AlSi10Mg, G-AlSi12, G-AlSi8Cu4 (226)

- 01 **Notes on Technology** **PROBAT-FLUSS MONOTAB NS** is a tablet which is placed on the surface of the melt to compensate the modification loss. Sodium burns out rapidly, because it is practically not soluble in aluminium. A high temperature and a large surface increase the burn-out speed.
- PROBAT-FLUSS MONOTAB NS** releases sodium evenly and over a long period of time. The released quantity corresponds to the burn-out in the aluminium melt. Thus, it is ensured that the modification effect is kept constant.
- 02 **Application Range** **PROBAT-FLUSS MONOTAB NS** is applicable for all casting processes and mainly used for the sand and gravity die casting.
- The tablets are put on the melt surface and slowly release sodium into the melt. They are also used for the low pressure casting. It makes sense to use them for all casting alloys with a silicon content of more than 7%.
- 03 **Quality Characteristics** **PROBAT-FLUSS MONOTAB NS**
- maintains the set sodium content
  - maintains the modification level
  - leads to a fine precipitation of the eutectic silicon
  - covers the melt evenly
  - also supports the strontium modification
- 04 **Addition Rate** Depending on the bath size, tablets of 0.2 up to 0.6% per weight should be placed on the bath surface.
- 05 **Product Application** The treatment temperature should be between 680° and 750°C. The tablets are put on the bath surface where they can be effective over several hours. After that they can be removed with the dross.
- 06 **Typical Properties**
- |                       |                         |
|-----------------------|-------------------------|
| Appearance:           | whitish tablets of 200g |
| Odour:                | odourless               |
| Reaction temperature: | between 690°C and 780°C |
- 07 **Packaging** 162 tablets of 200g packed in cardboard box .
- 08 **Advice on Special Types of Danger** Not applicable.
- 09 **Storage and Shelf Life** Store in a cool place (below 32°C/90°F); keep container dry and tightly closed. The shelf life is at least 6 months if properly stored.

## MIKROSAL AL T 100

### Titanium-boron based grain refining preparation for $\alpha$ -aluminium

for all aluminium alloys

e. g.: AlMg and AlCu alloys, all AlSi and wrought alloys

- 01 **Notes on Technology** A highly effective grain refining of the aluminium is obtained by **MIKROSAL AL T 100**.
- The effect of this preparation is obtained by the formation of finest  $TiB_2$  crystals in the melt. These crystals act as crystallizer for the solidifying aluminium and they are highly effective because they are formed in the melt. Simultaneously a degassing and purifying effect is obtained by additional components.
- 02 **Application Range** A grain refining of the melt by means of **MIKROSAL AL T 100** is imperative for all alloys with a low Si content in order to avoid hot tears and anodizing mistakes.
- 03 **Quality Characteristics** **MIKROSAL AL T 100**
- ensures a completely dense and micro-shrinkage-free casting
  - improves the casting quality essentially
  - increases the technological values
  - ensures a clean and irreproachable surface of the casting part
  - permits an essentially better flow of the melt
  - has an additional cleansing effect
- 04 **Addition Rate** 0.1 to 0.2 % by weight (e. g.. 1 tablet for 100 kg melt).
- 05 **Product Application** Care is to be taken that the recommended addition of **MIKROSAL AL T 100** is put into the lower third of the melt. A uniform effect within the entire melt is obtained by the constant stirring of the immersion belt. If there is not more reaction, the dross can be skimmed off.
- 06 **Typical Properties**
- |                       |   |
|-----------------------|---|
| Appearance:           | white-grey tablets of 200 g   |
| Odour:                | odourless   |
| Reaction temperature: | ex approximately 720°C (higher temperature accelerate the reaction) |
- 07 **Packaging** 162 tablets of 200g packed in cardboard box.
- 08 **Advice on Special Types of Danger** Not applicable.
- 09 **Storage and Shelf Life** Store in a cool place (below 32°C/90°F); keep container dry and tightly closed. The shelf life is at least 6 months if properly stored.

## PROBAT-FLUSS BEGASER T 200

### Tablets for the effective gassing of aluminium melts

suitable for all casting alloys in the sand casting, gravity die casting and low-pressure casting

- 01 **Notes on Technology** To complement the high demand for quality in the production of castings, a uniform and homogenous structure is required. In case of casting parts, which are difficult to cast, draws and shrinkage holes connected with one another often occur due to the volumetric decrease. These draws and shrinkage holes result in leakiness, insufficient mechanical values and, hence, in the failure of the component.
- By the controlled increase of the hydrogen portion in the melt, hydrogen pores will form during the solidification. These pores are closed and are normally not connected with each other. They counteract the volumetric decrease due to their gas pressure and avoid in this way the formation of draws.
- 02 **Application Range** **PROBAT-FLUSS BEGASER T 200** reacts in the melt by the release of hydrogen which collects in fine pores. Because of this, the hydrogen content and the density index are increased. Thus, casting parts tending to shrinkage holes can be produced.
- 03 **Quality Characteristics** **PROBAT-FLUSS BEGASER T 200**
- prevents the formation of shrinkage holes
  - avoids the formation of draws
  - reduces the rejects
  - increases the share of hydrogen in the melt
  - increases the density index
- 04 **Addition Rate** ½ to 2 tablets per 100 kg of aluminium, depending on the requirements.
- 05 **Product Application** At normal casting temperature **PROBAT-FLUSS BEGASER T 200** should be placed on the melt surface and then submerged to the bottom of the melt by means of an immersion bell. The tablets maintain in the melt until the reaction is completed. After that the tablet rest can be disposed of together with the dross.
- 06 **Typical Properties**
- |                       |   |
|-----------------------|---|
| Appearance:           | whitish tablets   |
| Odour:                | odourless   |
| Reaction temperature: | ex approximately 720°C (higher temperature accelerate the reaction) |
- 07 **Packaging** 144 tablets of 200g packed in cardboard box .
- 08 **Advice on Special Types of Danger** Not applicable.
- 09 **Storage and Shelf Life** Store in a cool place (below 32°C/90°F); keep container dry and tightly closed. The shelf life is at least 6 months if properly stored.



## PROBAT-FLUSS LUNKERPULVER 200

**Compound for the application on the feeder of the aluminium casting part**

to increase the feeding effect

Applicable for all casting alloys in the sand casting

- 01 **Notes on Technology** Thick-walled casting parts are often difficult to feed. Therefore, the feeder must be so designed that it can hold sufficient mass in order to keep the metal in liquid state over a sufficient period of time so that thick-walled parts can still be fed safely. If the feeder is not sufficiently designed, then shrinkage holes will be the result and the casting part must be disposed of as scrap. A relatively simple remedy is to keep the feeder in the liquid state over an extended period of time.
- To achieve this, **PROBAT-FLUSS LUNKERPULVER 200** is scattered onto the surface of the feeder and the heat of the liquid metal ignites the powder. An exothermic reaction is started, which produces sufficient heat, keeping the feeder in the liquid state over an extended period of time so that its function as re-feeding is kept until the casting has completely solidified.
- 02 **Application Range** **PROBAT-FLUSS LUNKERPULVER 200** is suited for all casting alloys used in the sand casting and should be scattered after the pouring of the metal.
- 03 **Quality Characteristics** **PROBAT-FLUSS LUNKERPULVER 200**
- is an exothermically reacting powder
  - develops much heat keeping the metal liquid over an extended period of time
  - impedes the cooling down of the feeder on the surface
  - impedes the shrinkage hole formation
  - can be easily removed after the reaction
  - is of very low smoke emission
- 04 **Addition Rate** Depending on the diameter of the riser respectively feeder the powder layer should be several centimetres.
- 05 **Product Application** **PROBAT-FLUSS LUNKERPULVER 200** ignites after having scattered it, immediately after the pouring into the mould, on the feeder or riser. The completely reacted powder remains on the aluminium until the complete solidification of the casting has been obtained and then can be removed easily.
- 06 **Typical Properties** Appearance: dark red powder  
Odour: odourless  
Reaction temperature: ex approximately 600°C (higher temperature accelerate the reaction)
- 07 **Packaging** 25 kg paper bags, 3-fold with plastic lining.
- 08 **Advice on Special Types of Danger** Not applicable.
- 09 **Storage and Shelf Life** Store in a cool place (below 32°C/90°F); keep container dry and tightly closed. The shelf life is at least 6 months if properly stored.

## PROBAT-FLUSS MIKRO 100

**Preparation to prevent shrinkage holes and the formation of homogenously distributed micro pores**  
applicable for all casting alloys in the sand casting, gravity die casting and low-pressure casting

- 01 **Notes on Technology** Not all casting parts can be fed so good that the formation of shrinkage holes can be avoided. However, shrinkage holes lead to leaky casting parts and decrease the strength values. Micro pores compensate the shrinkage during the solidification to a great extent and impede leakiness and the decrease of the strength values.
- PROBAT-FLUSS MIKRO 100** compensates the formation of shrinkage holes and creates the condition for the development of the micro pores.
- This preparation is a metallic master alloy adding nuclei to the metal on which the hydrogen can precipitate in micro pores. The size of the formed pores depends on the solidification speed of the metal in the casting part.
- 02 **Application Range** **PROBAT-FLUSS MIKRO 100** can be added to the crucible, the launder or the runner already at a temperature from 700°C after the cleaning of the melt. The rod dissolves immediately without any residues. A thorough mixing of the melt after the last cleaning process has proved to be very effective.
- 03 **Quality Characteristics** **PROBAT-FLUSS MIKRO 100**
- is a metallic master alloy in form of rods
  - does not require long reaction times
  - impedes the shrinkage hole formation in the gravity die and sand casting
  - leads to fine micro pores
  - increases the density index without contribution to impurities
  - dissolves immediately in the melt without any residues
- 04 **Addition Rate** 1 – 3 kg/t of the metal mass, depending on the alloy. As a general rule 1 kg/t has proved to be very effective.
- 05 **Product Application** **PROBAT-FLUSS MIKRO 100** can be used in the pouring furnace, in the crucible or in the ladle.
- After the last cleaning process it must be added to the melt and foam, which can partially form, must be thoroughly stirred into the melt by means of a ladle otherwise the effectivity is reduced. The effect lasts over several hours and is also remarkable after a remelting process. After an intensive cleaning, the melt is in its original condition again.
- 06 **Typical Properties** Appearance: aluminium rod in form of an eight  
Odour: odourless  
Reaction temperature: ex approximately 700°C (higher temperature accelerate the reaction)
- 07 **Form of delivery** Rods of 1m of length (approximately 300 g).
- 08 **Packaging** loose rods, bundled
- 09 **Advice on Special Types of Danger** Not applicable.
- 10 **Storage and Shelf Life** No special requirements.

## PROBAT-FLUSS VLP 200

### Preparation for the grain refining of primarily solidified silicon

in eutectic and hypereutectic aluminium casting alloys

applicable for all casting alloys, e. g. AlSi12, AlSi17Cu4Mg, AlSi18CuNiMg

- 01 **Notes on Technology** Eutectic and hypereutectic casting alloys must be treated with phosphorous in order to get a granular structure and to obtain a refining as well as an even distribution of the primarily solidified silicon. The refining itself is obtained by aluminium phosphide.
- When adding conventional master alloys, then the aluminium phosphide must first of all form in the melt, whereas **PROBAT-FLUSS VLP 200** already contains these crystallizers and thereby is effective very rapidly, also at low temperature.
- 02 **Application Range** **PROBAT-FLUSS VLP 200** can be added to the crucible or to the launder already beginning from a temperature of 700°C. The addition into the launder or during the cleaning of the melt with an impeller has proved to be very effective.
- 03 **Quality Characteristics** **PROBAT-FLUSS VLP 200**
- is a metallic master alloy in form of rods
  - does not require long reaction times
  - can be used even at low temperature
  - provides a granular structure
  - refines the primary silicon
  - provides a homogenous, even distribution of the silicon
  - dissolves immediately in the melt, without leaving any residues
- 04 **Addition Rate** 0.5 – 2.5 kg/t of the metal weight. An effect is already obtained at 0.5 kg/t (0.1Gew.-%) The iron content increases function-conditionally due to the addition. However, this content is normally below the tolerance limit and does not influence the alloy.
- 05 **Product Application** **PROBAT-FLUSS VLP 200** can be added like grain refining wires. Usual wire advancing machines can be used. The charge by hand is easy as well by adding rod sections to the melt during the melt treatment or cleaning with an impeller.
- 06 **Typical Properties** Appearance : aluminium rods  
Odour : odourless  
Reaction temperature: ex approximately 700°C ( higher temperature accelerate the reaction)
- 07 **Form of delivery** Rods of 1m of length (approximately 300 g).
- 08 **Packaging** loose rods, bundled
- 09 **Advice on Special Types of Danger** Not applicable.
- 10 **Storage and Shelf Life** No special requirements.

## CILLOLIN AL 223 + 223 G + 223 GD

### Heat conducting gravity die coating

with improved sedimentation characteristics

- 01 **Notes on Technology** The choice of the coating for the mobile and rigid parts of a gravity die has an essential influence on the quality of the casting. The structure of the used coating directly influences the fluidity and thus the mould filling of the melt which flows into the gravity die. The coating affects the formed casting surface and regulates the solidification by its thermal conductivity. Requirements for the coating are a good processability, a uniform consistency and a good adhesive strength.
- 02 **Application Range** **CILLOLIN AL 223 (223 G, 223 GD)** is suitable for use on steel and grey cast iron dies in the Al gravity die casting.
- 03 **Quality Characteristics** **CILLOLIN AL 223 (223 G, 223 GD)**
- very good thermal conductivity
  - ensures excellent adhesion, especially regarding movable parts of the die
  - produces a uniform surface structure on the casting part and prevents cold laps
  - reduces the downtime caused by cleaning and recoating
  - ensures the highest level of dimensional accuracy
  - prevents sedimentation from occurring too rapidly by means of a thixotropic agent
  - facilitates the removal of completed casting parts from the die
  - in that order AL 223 – AL 223 G – AL 223 GD improved fluidity of the melt by increasing depth of roughness of the casting surface
- 04 **Addition Rate** Dilute with softened water at a ratio of 1 : 3 up to 1 : 5.
- 05 **Product Application** Before application, blast the gravity die thoroughly, heat up to a temperature of at least 150°C or better 230°C, and apply the ready-to-use coating thinly and uniformly.
- CILLOLIN AL 223 (223 G, 223 GD)** can be sprayed onto another isolating basic coating.
- 06 **Typical Properties** Appearance : grey black, pasty  
Odour : neutral  
Reaction temperature: at least 150°C up to 300°C
- 07 **Packaging** Concentrate – homogenized in cans of 40, 15, 8 and 1 kg.
- 08 **Advice on Special Types of Danger** Irritation of the eyes is possible (3.3/2A H319).
- 09 **Storage and Shelf Life** Protect from temperatures below 5°C. The shelf life is at least 6 months if properly stored.

## CILLOLIN AL 285 + 285 G + 285 GN

### Heat conducting gravity die coating

with improved sedimentation characteristics

- 01 **Notes on Technology** The choice of the coating for the mobile and rigid parts of a gravity die has an essential influence on the quality of the casting. The structure of the used coating directly influences the fluidity and thus the mould filling of the melt which flows into the gravity die. The coating affects the formed casting surface and regulates the solidification by its thermal conductivity. Requirements for the coating are a good processability, a uniform consistency and a good adhesive strength.
- 02 **Application Range** **CILLOLIN AL 285 (285 G, 285 GN)** is suitable for use on steel and grey cast iron dies in the low pressure Al gravity die casting and in the gravity casting.
- 03 **Quality Characteristics** **CILLOLIN AL 285 (285 G, 285 GN)**
- low thermal conductivity
  - reduces the downtime caused by cleaning and recoating
  - increases the productivity
  - produces a uniform surface structure on the casting part and prevents cold laps
  - prevents sedimentation from occurring too rapidly by means of a thixotropic agent
  - ensures excellent adhesion, especially regarding movable parts of the die
  - ensures the highest level of dimensional accuracy
  - facilitates the removal of completed casting parts from the die
  - in that order AL 285 – AL 285 G – AL 285 GN improved fluidity of the melt by increasing depth of roughness of the casting surface
- 04 **Addition Rate** Dilute with softened water at a ratio of 1 : 3.
- 05 **Product Application** Before application, blast the gravity die thoroughly, heat up to a temperature of at least 150°C or better 230°C, and apply the ready-to-use coating thinly and uniformly.
- To increase the level of isolation, additional layers can be applied. Before pouring, the gravity die must be heat up sufficiently.
- 06 **Typical Properties** Appearance : white, pasty  
Odour : neutral  
Reaction temperature: at least 150°C up to 300°C
- 07 **Packaging** Concentrate – homogenized in cans of 40, 15, 8 and 1 kg.
- 08 **Advice on Special Types of Danger** Irritation of the eyes is possible (3.3/2A H319).
- 09 **Storage and Shelf Life** Protect from temperatures below 5°C. The shelf life is at least 6 months if properly stored.



## CILLOLIN AL 2812 + 2812 G + 3500 G

### Semi-isolating gravity die coating

with improved sedimentation characteristics

- 01 **Notes on Technology** The choice of the coating for the mobile and rigid parts of a gravity die has an essential influence on the quality of the casting. The structure of the used coating directly influences the fluidity and thus the mould filling of the melt which flows into the gravity die. The coating affects the formed casting surface and regulates the solidification by its thermal conductivity. Requirements for the coating are a good processability, a uniform consistency and a good adhesive strength.
- 02 **Application Range** **CILLOLIN AL 2812 (2812 G, 3500 G)** is suitable for use on steel and grey cast iron dies in the low pressure Al gravity die casting and in the gravity casting.
- 03 **Quality Characteristics** **CILLOLIN AL 2812 (2812 G, 3500 G)**
- middle heat conductivity (semi-isolating)
  - reduces the downtime caused by cleaning and recoating
  - increases the productivity
  - produces a uniform surface structure on the casting part and prevents cold laps
  - prevents sedimentation from occurring too rapidly by means of a thixotropic agent
  - ensures excellent adhesion, especially regarding movable parts of the die
  - ensures the highest level of dimensional accuracy
  - facilitates the removal of completed casting parts from the die
  - in that order AL 2812 – AL 2812 G – AL 3500 G improved fluidity of the melt by increasing depth of roughness of the casting surface
- 04 **Addition Rate** Dilute with softened water at a ratio of 1 : 3.
- 05 **Product Application** Before application, blast the gravity die thoroughly, heat up to a temperature of at least 150°C or better 230°C, and apply the ready-to-use coating thinly and uniformly.
- To increase the level of isolation, additional layers can be applied. Before pouring, the gravity die must be heat up sufficiently.
- 06 **Typical Properties** Appearance: reddish, pasty  
Odour: neutral  
Reaction temperature: at least 150°C up to 300°C
- 07 **Packaging** Concentrate – homogenized in cans of 40, 15, 8 and 1 kg .
- 08 **Advice on Special Types of Danger** Irritation of the eyes is possible (3.3/2A H319).
- 09 **Storage and Shelf Life** Protect from temperatures below 5°C. The shelf life is at least 6 months if properly stored.



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## CILLOLIN AL 286

### Isolating gravity die coating

with improved sedimentation characteristics

- 01 **Notes on Technology** The choice of the coating for the mobile and rigid parts of a gravity die has an essential influence on the quality of the casting. The structure of the used coating directly influences the fluidity and thus the mould filling of the melt which flows into the gravity die. The coating affects the formed casting surface and regulates the solidification by its thermal conductivity. Requirements for the coating are a good processability, a uniform consistency and a good adhesive strength.
- 02 **Application Range** **CILLOLIN AL 286** is suitable for use on steel and grey cast iron dies in the low pressure Al gravity die casting and in the gravity casting, particularly for styling surfaces.
- 03 **Quality Characteristics** **CILLOLIN AL 286**
- low heat conductivity
  - reduces the downtime caused by cleaning and recoating
  - increases the productivity
  - produces a uniform surface structure on the casting part and prevents cold laps
  - prevents sedimentation from occurring too rapidly by means of a thixotropic agent
  - ensures excellent adhesion, especially regarding movable parts of the die
  - ensures the highest level of dimensional accuracy
  - facilitates the removal of completed casting parts from the die
  - particularly for smooth surfaces
- 04 **Addition Rate** Dilute with softened water at a ratio of 1 : 3.
- 05 **Product Application** Before application, blast the gravity die thoroughly, heat up to a temperature of at least 150°C or better 230°C, and apply the ready-to-use coating thinly and uniformly.
- To increase the level of isolation, additional layers can be applied. Before pouring, the gravity die must be heat up sufficiently.
- 06 **Typical Properties** Appearance: white, pasty  
Odour: neutral  
Reaction temperature: at least 150°C up to 300°C
- 07 **Packaging** Concentrate – homogenized in cans of 40, 15, 8 and 1 kg .
- 08 **Advice on Special Types of Danger** Irritation of the eyes is possible (3.3/2A H319).
- 09 **Storage and Shelf Life** Protect from temperatures below 5°C. The shelf life is at least 6 months if properly stored.



## CILLOLIN AL 160

### Heat conducting, fully colloidal gravity die coating

with improved sedimentation characteristics

- 01 **Notes on Technology** The choice of the coating for the mobile and rigid parts of a gravity die has an essential influence on the quality of the casting. The structure of the used coating directly influences the fluidity and thus the mould filling of the melt which flows into the gravity die. The coating affects the formed casting surface and regulates the solidification by its thermal conductivity. Requirements for the coating are a good processability, a uniform consistency and a good adhesive strength.
- 02 **Application Range** **CILLOLIN AL 160** is suitable for use on steel and grey cast iron dies in the AI gravity die casting.
- 03 **Quality Characteristics** **CILLOLIN AL 160**
- particularly suitable for mobile parts of a gravity die, e. g. core-pulls
  - reduces the downtime caused by cleaning and recoating
  - increases the productivity
  - produces a uniform surface structure on the casting part and prevents cold laps
  - prevents sedimentation from occurring too rapidly by means of a thixotropic agent
  - ensures excellent adhesion, especially regarding movable parts of the die
  - ensures the highest level of dimensional accuracy
  - facilitates the removal of completed casting parts from the die
- 04 **Addition Rate** Dilute with softened water at a ratio of 1 : 3 up to 1 : 10.
- 05 **Product Application** Before application, blast the gravity die thoroughly. The coating can be applied on the cold or hot gravity die; thereby the ready-to-use coating must be applied thinly and uniformly.
- 06 **Typical Properties**
- |                      |                              |
|----------------------|------------------------------|
| Appearance:          | black, pasty                 |
| Odour:               | neutral                      |
| Reaction temperatur: | cold or warm, at least 300°C |
- 07 **Packaging** Concentrate – homogenized in cans of 25, 10, 5 and 1 kg.
- 08 **Advice on Special Types of Danger** Not applicable.
- 09 **Storage and Shelf Life** Protect from temperatures below 5°C. The shelf life is at least 6 months if properly stored.



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## CILLOLIN AL 500

### Isolating coating for launders

alcohol-based

- 01 **Notes on Technology** Coatings should prevent the melt from adhering to the tool or thermocouples so that these tools are protected and have a long life span. Such protective layers should be free from any moisture, because in contact with the melt they are enriched by oxides and hydrogen.
- An alcohol-based, anhydrous coating is the best guarantor to prevent the absorption of hydrogen as an extremely dry coating remains on the material due to the rapid evaporation of the alcohol. Simultaneously the melt should flow off the material without leaving any residues as the adhering oxides influence the melt in a negative way when getting again into contact with the metal.
- The launder systems also should be completely free from water-containing coverings, because there is the danger of hydrogen absorption due to their relatively large surface. Alcohol-based coatings are the best guarantor for an absolutely dry coating. Simultaneously fine cracks in the brickwork are tightly closed which extends the life span of the launders.
- 02 **Application Range** **CILLOLIN AL 500** is preferably applied on tools (approximately 30 – 50°C) or on launder and pouring systems rammed-up with refractory material.
- 03 **Quality Characteristics** **CILLOLIN AL 500**
- closes effectively small cracks
  - produces a completely dry launder surface
  - can be applied easily
  - can be stirred-up easily
- 04 **Addition Rate** No dilution necessary.
- 05 **Product Application** **CILLOLIN AL 500** is applied undiluted with a brush on the surface which should be treated.
- Smaller tools can be immersed. If the coating has become too concentrated due to evaporation, it can be diluted with Isopropanol.
- 06 **Typical Properties**
- |                       |                          |
|-----------------------|--------------------------|
| Appearance:           | light-grey, viscous      |
| Odour:                | like alcohol             |
| Reaction temperature: | at least 30°C up to 50°C |
- 07 **Packaging** Cans of 50 and 1 kg.
- 08 **Advice on Special Types of Danger** R 11
- 09 **Storage and Shelf Life** Store away from ignition sources. The coating should be stirred-up from time to time to prevent depositing of the solid ingredients. The shelf life is at least 6 months if properly stored.

## PYRONOL

### Special coating

for feed tubes, pyrometer protective tubes, crucibles, pouring tools, risers and gating systems subjected to high thermal stresses

- 01 **Notes on Technology** The feed tubes used in the low pressure die casting are exposed to high thermal, mechanical and chemical burdens. The coatings used for the protection of these highly exposed parts should have a high ability to withstand stress and a high abrasion resistance.
- 02 **Application Range** **PYRONOL** products are special ready-to-use coatings for the effective isolation of feed tubes for the low pressure die casting, pyrometer protective tubes as well as steel and pouring crucibles, ladles and other casting tools.
- 03 **Quality Characteristics** **PYRONOL**
- has an exceptional thermal stability and protects from the contact with aluminium
  - impedes oxidic adhesions
  - easy application as PYRONOL can be applied cold on the surface which should be protected
  - long life span: contains thixotropic agent and has low sedimentation characteristics
  - can be removed easily in cold state to clean the tool
- 04 **Addition Rate** No dilution necessary.
- 05 **Product Application** **PYRONOL** is delivered ready-to-use. However, it should be stirred by a suitable tool before application. Thus, the coating is homogenized for approximately 1 day.
- First of all the coating is thinly applied on the inner and outer side of the cold feed tube. To increase the elasticity, a suitable glass-fibre fabric can be applied and pressed air-tightly on the outer side of the feed tube. In case of high thermal burdens 2 up to 3 coatings can be applied smoothly. After the application of the last glass-fibre fabric the tube is to be dried at normal air temperature.
- After the coating is dried, the surface can be re-coated with **PYRONOL** and the tube must dry again at normal temperature. Before using the tubes, they must be heated up slowly to a temperature of approximately 150-200°C over the furnace or by means of a gas flame.
- 06 **Typical Properties**
- |                       |  |
|-----------------------|--|
| Appearance:           | grey-brown, pasty  |
| Odour:                | neutral  |
| Reaction temperature: | ex approximately 150 - 200°C (higher temperatures accelerate the reaction) |
- 07 **Packaging** Cans of 40, 15, 8 and 1 kg .
- 08 **Advice on Special Types of Danger** Not applicable.
- 09 **Storage and Shelf Life** Protect from temperatures below 5°C. The shelf life is at least 6 months if properly stored.

## CILLOLIN AL 225

### Special coating

for gravity dies and gate stones in the vertical continuous casting

- 01 **Notes on Technology** The gravity dies and gate stones, which get into contact with the liquid aluminium in the vertical continuous casting, are exposed to high thermal, mechanical and chemical burdens. The coatings used for the protection of these highly exposed parts should have a high ability to withstand thermal stress, a high abrasion resistance and excellent sliding properties.
- 02 **Application Range** **CILLOLIN AL 225** is a special ready-to-use coating for the effective coating of gravity dies and gate stones in the vertical continuous casting.
- 03 **Quality Characteristics** **CILLOLIN AL225**
- has an excellent thermal stability and protects from the contact with aluminium
  - good sliding properties
  - easy application as CILLOLIN AL 225 can be applied cold on the surfaces which should be protected
  - long life span: contains thixotropix agent and has low sedimentation characteristics
  - low-emission
  - has a good heat conductivity
- 04 **Addition Rate** No dilution necessary.
- 05 **Product Application** **CILLOLIN AL 225** is delivered ready-to-use. However, it should be stirred by a suitable tool before application.
- 06 **Typical Properties** Appearance: brilliant black, pasty  
Odour: neutral
- 07 **Packaging** Cans of 25 and 1 kg.
- 08 **Advice on Special Types of Danger** Not applicable.
- 09 **Storage and Shelf Life** Protect from temperatures below 5°C. The shelf life is at least 3 months if properly stored.



## CILLOLIN MG 785 + 785 W

### Special Coating

for magnesium sand casting moulds

- 01 **Notes on Technology** Undesired reactions between the sand mould and the magnesium melt often happen during the casting of magnesium. **CILLOLIN MG** must be applied on the sand mould surface and impedes a penetration of the magnesium into the mould surface. Thus, a smooth, metallic surface of the casting which was produced in the mould is achieved.
- 02 **Application Range** **CILLOLIN MG** is a read-to-use special coating for the effective coating of sand mould surfaces in the magnesium casting.
- 03 **Quality Characteristics** **CILLOLIN MG**
- is not moistened by magnesium melts and rejects them
  - impedes the tarnishing of casting surfaces
  - produces a smooth, metallic and shiny surface
  - long life span: contains thixotropix agent and has low sedimentation characteristics
  - low-emission
  - deliverable as **MG 785** alcohol-based and as **785 W** water-based for the optimal adjustment on the drying conditions of moulds and cores which depend on the geometry
- 04 **Addition Rate**
- 05 **Product Application** **CILLOLIN MG** is delivered ready-to-use. However, it should be stirred by a suitable tool before application. If required it can be diluted with alcohol or water.
- 06 **Typical Properties** Appearance: grey  
Odour: like alcohol or neutral
- 07 **Packaging** Concentrate – homogenized in cans of 40, 15, 8 and 1 kg .
- 08 **Advice on Special Types of Danger** Irritation of the eyes is possible (3.3/2A H319).
- 09 **Storage and Shelf Life** Protect from temperatures below 5°C. The shelf life is at least 3 months if properly stored.



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**ADVICE ON SPECIAL TYPES OF DANGER – RISK PHRASES**

(Appendix I No. 1.3 to the Ordinance on Hazardous Substances)

R1	Explosive when dry.
R2	Risk of explosion by shock, friction, fire or other sources of ignition.
R3	Extreme risk of explosion by shock, friction, fire or other sources of ignition.
R4	Forms very sensitive explosive metallic compounds.
R5	Heating may cause an explosion.
R6	Explosive with or without contact with air.
R7	May cause fire.
R8	Contact with combustible material may cause fire.
R9	Explosive when mixed with combustible material.
R10	Flammable.
R11	Highly flammable.
R12	Extremely flammable.
R13 (obsolete)	Extremely flammable liquefied gas. (The Ordinance on Hazardous Substances of 26 <sup>th</sup> October 1993 does not contain this risk phrase any more).
R14	Reacts violently with water.
R15	Reacts violently with water, liberating extremely flammable gases.
Merck R 15.1	Reacts with acid, liberating extremely flammable gases.
R16	Explosive when mixed with oxidising substances.
R17	Spontaneously flammable in air.
R18	In use, may form flammable/explosive vapour air-mixture.
R19	May form explosive peroxides.
R20	Harmful by inhalation.
R21	Harmful in contact with skin.
R22	Harmful if swallowed.
R23	Toxic by inhalation.
Riedel-de Haen R 23K	Also toxic by inhalation.
R24	Toxic in contact with skin
Riedel-de Haen R 24K	Also toxic in contact with skin.
R25	Toxic if swallowed.
Riedel-de Haen R 25K	Also toxic if swallowed.
R26	Very toxic by inhalation
Riedel-de Haen R 26K	Also very toxic by inhalation.
R27	Very toxic in contact with skin.
Riedel-de Haen R 27A	Very toxic in contact with the eyes.
Riedel-de Haen R 27K	Also very toxic in contact with skin.
Riedel-de Haen R27AK	Also very toxic in contact with the eyes.
R28	Very toxic if swallowed.
Riedel-de Haen R 28K	Also very toxic if swallowed.
R29	Contact with water liberates toxic gases.
R30	Can become highly flammable in use.
R31	Contact with acids liberates toxic gases.
Merck R 31.1	Contact with bases liberates toxic gases.
R32	Contact with acids liberates very toxic gases.
R33	Danger of cumulative effects.
R34	Causes burns.
R35	Causes severe burns.
R36	Irritating to eyes.
Riedel-de Haen R 36A	Irritating to tears.
R37	Irritating to respiratory system.
R38	Irritating to skin.
R39	Danger of very serious irreversible effects.
R40	Possible risks of irreversible effects.
R41	Risk of serious damage to eyes.
R42	May cause sensitisation by inhalation.
R43	May cause sensitisation by skin contact.
R44	Risk of explosion if heated under confinement.
R45	May cause cancer.

R 46	May cause heritable genetic damage.
R 47 (obsolete)	May cause birth defects. (The Ordinance on Hazardous Substances of 26 <sup>th</sup> October 1993 does not contain this risk phrase any more).
R 48	Danger of serious damage to health by prolonged exposure.
R 49	May cause cancer by inhalation.
R 50	Very toxic to aquatic organisms.
R 51	Toxic to aquatic organisms.
R 52	Harmful to aquatic organisms.
R 53	May cause long-term adverse effects in the aquatic environment.
R 54	Toxic to flora.
R 55	Toxic to fauna.
R 56	Toxic to soil organisms.
R 57	Toxic to bees.
R 58	May cause long-term adverse effects in the environment.
R 59	Dangerous for the ozone layer.
R 60	May impair fertility.
R 61	May cause harm to the unborn child.
R 62	Possible risk of impaired fertility.
R 63	Possible risk of harm to the unborn child.
R 64	May cause harm to breast-fed babies.
R 65	Harmful: may cause lung damage if swallowed.
R 66	Repeated exposure may cause skin dryness or cracking.
R 67	Vapours may cause drowsiness and dizziness.

## COMBINED RISK PHRASES

R 14/15	Reacts violently with water, liberating extremely flammable gases.
R 15/19	Contact with water liberates toxic, extremely flammable gas.
R 20/21	Harmful by inhalation and in contact with skin.
R 21/22	Harmful in contact with skin and if swallowed.
R 20/22	Harmful by inhalation and if swallowed.
R 20/21/22	Harmful by inhalation, in contact with skin and if swallowed.
R 21/22	Harmful in contact with skin and if swallowed.
R 23/24	Toxic by inhalation and in contact with skin.
R 24/25	Toxic in contact with skin and if swallowed.
R 23/25	Toxic by inhalation and if swallowed.
R 23/24/25	Toxic by inhalation, in contact with skin and if swallowed.
R 24/25	Toxic in contact with skin and if swallowed.
R 26/27	Very toxic by inhalation and in contact with skin.
R 27/28	Very toxic in contact with skin and if swallowed.
R 26/28	Very toxic by inhalation and if swallowed.
R 26/27/28	Very toxic by inhalation, in contact with skin and if swallowed.
R 36/37	Irritating to eyes and respiratory system.
R 37/38	Irritating to respiratory system and skin.
R 36/38	Irritating to eyes and skin.
R 36/37/38	Irritating to eyes, respiratory system and skin.
R 39/23	Toxic: danger of very serious irreversible effects through inhalation.
R 39/24	Toxic: danger of very serious irreversible effects in contact with skin.
R 39/25	Toxic: danger of very serious irreversible effects if swallowed.
R 39/23/24	Toxic: danger of very serious irreversible effects through inhalation and in contact with skin.
R 39/23/25	Toxic: danger of very serious irreversible effects through inhalation and if swallowed.
R 39/24/25	Toxic: danger of very serious irreversible effects in contact with skin and if swallowed.
R 39/23/24/25	Toxic: danger of very serious irreversible effects through inhalation, in contact with skin and if swallowed.
R 39/26	Very toxic: danger of very serious irreversible effects through inhalation.
R 39/27	Very toxic: danger of very serious irreversible effects in contact with skin.
R 39/28	Very toxic: danger of very serious irreversible effects if swallowed.
R 39/26/27	Very toxic: danger of very serious irreversible effects through inhalation and in contact with skin.
R 39/26/28	Very toxic: danger of very serious irreversible effects through inhalation and if swallowed.

<b>R 39/27/28</b>	Very toxic: danger of very serious irreversible effects in contact with skin and if swallowed.
<b>R 39/26/27/28</b>	Very toxic: danger of very serious irreversible effects through inhalation, in contact with skin and if swallowed.
<b>R 40/20</b>	Harmful: possible risk of irreversible effects through inhalation.
<b>R 40/21</b>	Harmful: possible risk of irreversible effects in contact with skin.
<b>R 40/22</b>	Harmful: possible risk of irreversible effects if swallowed.
<b>R 40/20/21</b>	Harmful: possible risk of irreversible effects through inhalation and in contact with skin.
<b>R 40/20/22</b>	Harmful: possible risk of irreversible effects through inhalation and if swallowed.
<b>R 40/21/22</b>	Harmful: possible risk of irreversible effects in contact with skin and if swallowed.
<b>R 40/20/21/22</b>	Harmful: possible risk of irreversible effects through inhalation, in contact with skin and if swallowed.
<b>R 42/43</b>	May cause sensitisation by inhalation and skin contact.
<b>R 48/20</b>	Harmful: danger of serious damage to health by prolonged exposure through inhalation.
<b>R 48/21</b>	Harmful: danger of serious damage to health by prolonged exposure in contact with skin.
<b>R 48/22</b>	Harmful: danger of serious damage to health by prolonged exposure if swallowed.
<b>R 48/20/21</b>	Harmful: danger of serious damage to health by prolonged exposure through inhalation and in contact with skin.
<b>R 48/20/22</b>	Harmful: danger of serious damage to health by prolonged exposure through inhalation and if swallowed.
<b>R 48/21/22</b>	Harmful: danger of serious damage to health by prolonged exposure in contact with skin and if swallowed.
<b>R 48/20/21/22</b>	Harmful: danger of serious damage to health by prolonged exposure through inhalation, in contact with skin and if swallowed.
<b>R 48/23</b>	Toxic: danger of serious damage to health by prolonged exposure through inhalation.
<b>R 48/24</b>	Toxic: danger of serious damage to health by prolonged exposure in contact with skin.
<b>R 48/25</b>	Toxic: danger of serious damage to health by prolonged exposure if swallowed.
<b>R 48/23/24</b>	Toxic: danger of serious damage to health by prolonged exposure through inhalation and in contact with skin.
<b>R 48/23/25</b>	Toxic: danger of serious damage to health by prolonged exposure through inhalation and if swallowed.
<b>R 48/24/25</b>	Toxic: danger of serious damage to health by prolonged exposure in contact with skin and if swallowed.
<b>R 48/23/24/25</b>	Toxic: danger of serious damage to health by prolonged exposure through inhalation, in contact with skin and if swallowed.
<b>R 50/53</b>	Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
<b>R 52/53</b>	Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

## SAFETY ADVICE CONCERNING DANGEROUS CHEMICAL SUBSTANCES (S-PHRASES)

<b>S1</b>	Keep locked up.
<b>S 2</b>	Keep out of reach of the children.
<b>S 3</b>	Keep in a cool place.
<b>S 4</b>	Keep away from living quarters.
<b>S 5</b>	Keep contents under ..(appropriate liquid to be specified by the manufacturer).
<b>Merck S 5.1</b>	Keep under water.
<b>Merck S 5.2</b>	Keep under petroleum.
<b>Merck S 5.3</b>	Keep under paraffin oil.
<b>Riedel-de Haen S 5A</b>	Keep under paraffin oil..
<b>Riedel-de Haen S 5B</b>	Keep under petroleum.
<b>Riedel-de Haen S 5C:</b>	Keep under protection liquidity.
<b>S 6</b>	Keep under ..(inert gas to be specified by the manufacturer).
<b>Merck S 6.1</b>	Keep under nitrogen.

<b>Merck S 6.2</b>	Keep under argon.
<b>Merck S 6.3</b>	Keep under carbon dioxide.
<b>Riedel-de Haen S 6A</b>	Keep under inert gas.
<b>Riedel-de Haen S 6B</b>	Keep under nitrogen.
<b>Riedel-de Haen S 6C</b>	Keep under argon.
<b>S 7</b>	Keep container tightly closed.
<b>S 8</b>	Keep container dry.
<b>S 9</b>	Keep container in a well-ventilated place.
<b>S 10 (obsolete)</b>	Keep content moistly. (The Ordinance on Hazardous Substances of 26 <sup>th</sup> October 1993 does not contain this safety phrase any more).
<b>S 11(obsolete)</b>	Avoid the access of air. (The Ordinance on Hazardous Substances of 26 <sup>th</sup> October 1993 does not contain this safety phrase any more).
<b>S 12</b>	Do not keep the container sealed.
<b>S 13</b>	Keep away from food, drink and animal feeding stuffs.
<b>S 14</b>	Keep away from ..(incompatible materials to be indicated by the manufacturer).
<b>Merck S 14.1</b>	Keep away from reducing agents, heavy metal compounds, acids and alkaline metals.
<b>Merck S 14.2</b>	Keep away from oxidizing and acid substances as well as from heavy metal compounds.
<b>Merck S 14.3</b>	Keep away from iron.
<b>Merck S 14.4</b>	Keep away from water and alkaline solutions.
<b>Merck S 14.5</b>	Keep away from acids.
<b>Merck S 14.6</b>	Keep away from alkaline solutions.
<b>Merck S 14.7</b>	Keep away from metals.
<b>Merck S 14.8</b>	Keep away from oxidizing and acid substances.
<b>Merck S 14.9</b>	Keep away from combustible organic substances.
<b>Merck S 14.10</b>	Keep away from acids, reducing agents and combustible substances.
<b>Merck S 14.11</b>	Keep away from combustible material. (corresponds to S17!).
<b>S 15</b>	Keep away from heat.
<b>S 16</b>	Keep away from sources of ignition -- No smoking.
<b>S 17</b>	Keep away from combustible material.
<b>S 18</b>	Handle and open container with care.
<b>S 20</b>	When using, do not eat or drink.
<b>S 21</b>	When using, do not smoke.
<b>S 22</b>	Do not breathe dust.
<b>S 23</b>	Do not breathe gas/fumes/vapour/spray (appropriate wording to be specified by the manufacturer).
<b>Merck S 23.1</b>	Do not breathe gas.
<b>Merck S 23.2</b>	Do not breathe vapour.
<b>Merck S 23.3</b>	Do not breathe aerosol.
<b>Merck S 23.4</b>	Do not breathe smoke.
<b>Merck S 23.5</b>	Do not breathe vapour / aerosol.
<b>Riedel-de Haen S 23A</b>	Do not breathe gas.
<b>Riedel-de Haen S 23B</b>	Do not breathe smoke.
<b>Riedel-de Haen S 23C</b>	Do not breathe aerosol.
<b>S 24</b>	Avoid contact with the skin.
<b>S 25</b>	Avoid contact with the eyes.
<b>S 26</b>	In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
<b>S 27</b>	Take off immediately all contaminated clothing.
<b>S 28</b>	After contact with skin, wash immediately with plenty of ..(to be specified by the manufacturer).
<b>Merck S 28.1</b>	After contact with the skin, wash immediately with plenty of water.
<b>Merck S 28.2</b>	After contact with the skin, wash immediately with plenty of water and soap.
<b>Merck S 28.3</b>	After contact with the skin, wash immediately with plenty of water and soap; preferably also wash with polyethylene glycol 400.
<b>Merck S 28.4</b>	After contact with the skin, wash immediately with plenty of polyethylene glycol 400 and ethanol (2:1); after that wash with plenty of water and soap.
<b>Merck S 28.5</b>	After contact with the skin, wash immediately with plenty of polyethylene glycol 400.
<b>Merck S 28.6</b>	After contact with the skin, wash immediately with plenty of polyethylene glycol 400 and ethanol (2:1); after that wash with plenty of ..
<b>Merck S 28.7</b>	After contact with the skin, wash immediately with plenty of water and acid soap.
<b>Riedel-de Haen S 28A</b>	After contact with the skin, wash immediately with plenty of copper sulphate solution 2%.
<b>Riedel-de Haen S 28B</b>	After contact with the skin, wash immediately with plenty of polyethylene glycol.
<b>Riedel-de Haen S 28C</b>	After contact with the skin, wash immediately with plenty of polyethylene glycol / ethanol (1:1).



<b>Riedel-de Haen S 28D</b>	After contact with the skin, wash immediately with plenty of water and soap.
<b>S 29</b>	Do not empty into drains.
<b>S 30</b>	Never add water to this product.
<b>S 31 (obsolete)</b>	Keep away from explosive substances. (The Ordinance on Hazardous Substances of 26 <sup>th</sup> October 1993 does not contain this safety phrase any more).
<b>S 33</b>	Take precautionary measures against static discharges.
<b>S 34 (obsolete)</b>	Avoid shock and friction. (The Ordinance on Hazardous Substances of 26 <sup>th</sup> October 1993 does not contain this safety phrase any more).
<b>S 35</b>	This material and its container must be disposed of in a safe way.
<b>Merck S 35.1</b>	This material and its container must be disposed of by treating them with 2 % caustic soda.
<b>S 36</b>	Wear suitable protective clothing.
<b>S 37</b>	Wear suitable gloves.
<b>S 38</b>	In case of insufficient ventilation, wear suitable respiratory equipment.
<b>S 39</b>	Wear eye/face protection.
<b>S 40</b>	To clean the floor and all objects contaminated by this material, use ..(to be specified by the manufacturer).
<b>Merck S 40.1</b>	Clean the floor and all contaminated objects with plenty of water.
<b>Riedel-de Haen S 40A</b>	Clean the floor and all contaminated objects with iodine coal.
<b>S 41</b>	In case of fire and/or explosion, do not breathe fumes.
<b>S 42</b>	During fumigation/spraying wear suitable respiratory equipment (appropriate wording to specified by the manufacturer).
<b>S 43</b>	In case of fire, use ..(indicate in the space the precise type of fire-fighting equipment. If water increases the risk, add - 'Never use water').
<b>Merck S 43.1</b>	Use water for blowing out.
<b>Merck S 43.2</b>	Use water or a powder extinguishing agent for blowing out.
<b>Merck S 43.3</b>	Use a powder extinguishing agent for blowing out. Don't use water.
<b>Merck S 43.4</b>	Use carbon dioxide for blowing out. Do not use water.
<b>Merck S 43.6</b>	Use sand for blowing out. Do not use water.
<b>Merck S 43.7</b>	Use common salt for blowing out. Do not use water.
<b>Merck S 43.8</b>	Use sand, carbon dioxide or a powder extinguishing agent. Do not use water.
<b>Riedel-de Haen S 43A</b>	Use sand for blowing out (never use water).
<b>S 44 (obsolete)</b>	If you feel unwell, seek medical advice (show the label when possible) (The Ordinance on Hazardous Substances of 26 <sup>th</sup> October 1993 does not contain this safety phrase any more).
<b>S 45</b>	In case of accident or if you feel unwell, seek medical advice immediately (show the label when possible).
<b>S 46</b>	If swallowed, seek medical advice immediately and show container/label.
<b>S 47</b>	Keep at temperature not exceeding ..°C (to be specified by the manufacturer).
<b>FU-Sicherheitsdatenbank S 4730</b>	Do not keep at temperatures above 30°C.
<b>FU-Sicherheitsdatenbank S 4740</b>	Do not keep at temperatures above 40°C.
<b>S 48</b>	Keep wetted with ..(appropriate material to be specified by the manufacturer).
<b>Merck S 48.1</b>	Keep wetted with water.
<b>Riedel-de Haen S 48A</b>	Keep wetted with water.
<b>S 49</b>	Keep only in the original container.
<b>S 50</b>	Do not mix with ..(to be specified by the manufacturer).
<b>Merck S 50.1</b>	Do not mix with acid.
<b>Merck S 50.2</b>	Do not mix with alkaline solution.
<b>Merck S 50.3</b>	Do not mix with strong acids, strong bases, heavy metals and other fluxes.
<b>S 51</b>	Use only in well ventilated areas.
<b>S 52</b>	Not recommended for interior use on large surface areas.
<b>S 53</b>	Avoid exposure -- obtain special instructions before use.
<b>S 54 (obsolete)</b>	Before releasing to sewage plants seek the permission of the corresponding authorities. (The Ordinance on Hazardous Substances of 26 <sup>th</sup> October 1993 does not contain this safety phrase any more).
<b>S 55 (obsolete)</b>	Before releasing to the canalisation or in bodies of water treat according to the state of the art. (The Ordinance on Hazardous Substances of 26 <sup>th</sup> October 1993 does not contain this safety phrase any more).
<b>S 56</b>	Dispose of this material and its container at hazardous or special waste collection point.
<b>S 57</b>	Use appropriate container to avoid environmental contamination.
<b>S 58 (obsolete)</b>	Dispose of as hazardous waste.

(The Ordinance on Hazardous Substances of 26<sup>th</sup> October 1993 does not contain this safety phrase any more).

- S 59** Refer to manufacturer/supplier for information on recovery/ recycling.  
**S 60** This material and its container must be disposed of as hazardous waste.  
**S 61** Avoid release to the environment Refer to special instructions/Safety data sheets.  
**S 62** If swallowed do not induce vomiting: seek medical advice immediately and show this container or label.  
**S 63** In case of accident by inhalation: remove casualty to fresh air and keep at rest.  
**S 64** If swallowed, rinse mouth with water (only if the person is conscious).

## COMBINED SAFETY PHRASES

- S 1/2** Keep locked up and out of reach of the children:  
**S 3/7** Keep container tightly closed and keep in a cool place.  
**S 3/7/9 (obsolete)** Keep container tightly closed and in a cool and well-ventilated place.  
**S 3/9 (obsolete)** Keep container in a cool and well-ventilated place.  
**S 3/9/14** Keep in a cool, well-ventilated place away from... (incompatible materials to be indicated by the manufacturer).  
**S 3/9/14/49** Keep only in the original container in a cool, well-ventilated place away from ..(incompatible materials to be indicated by the manufacturer).  
**S 3/9/49** Keep only in original container in a cool, well-ventilated place.  
**S 3/14** Keep in a cool place away from ..(incompatible materials to be specified by the manufacturer).  
**S 7/8** Keep container tightly closed and dry.  
**S 7/9** Keep container tightly closed and in a well-ventilated place.  
**S 7/47** Keep container tightly closed and at temperature not exceeding ..°C (to be specified by the manufacturer).  
**S 20/21** When using, do not eat, drink or smoke.  
**S 24/25** Avoid contact with skin and eyes.  
**S 29/56** Do not empty into drains, dispose of this material and its container at hazardous or special waste collection point.  
**S 36/37** Wear suitable protective clothing and gloves.  
**S 36/37/39** Wear suitable protective clothing, gloves and eye/face protection.  
**S 36/39** Wear suitable protective clothing and eye/face protection.  
**S 37/39** Wear suitable gloves and eye/face protection.  
**S 47/49** Keep only in the original container at a temperature not exceeding ..°C (to be specified by the manufacturer).



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