COVERAL* PRODUCTS FOR MELT TREATMENT OF ALUMINIUM ALLOYS

+ Optimised melt quality
+ Customised product range
+ Improved mechanical properties
+ Environmentally friendly
+ Cost effective treatment
Aluminium foundries deal with a huge number of different alloys and use various processes to produce a variety of castings. To acknowledge this high diversity, Foseco has developed a wide range of products for the melt treatment of aluminium alloys. A team of technical experts who can advise and help you to develop an optimised process supports all Foseco products.

Melt treatment
Melt treatment is an important step in foundries to ensure a high casting quality. The melt shop has to supply aluminium in a defined composition at required temperature but also at the right purity and hydrogen level. The degree of grain refining and modification are additional parameters to characterise a melt.

In recent years economical aspects have become more and more important; the need to reduce metal content in the dross has increased due to the high price of the raw material and energy on the world market. The issue of refractory or crucible life in contact with fluxes began to be questioned and the chemical product development has been focused on this subject as well.

Committed to aluminium foundries

Grain refining
- In-situ formation of nuclei, such as TiB₂, in the melt
- Fine grain structure improves the solidified structure and reduces shrinkage porosity
- Grain refining improves mechanical properties of the casting, such as elongation

Modification
- Improvement in hot tear resistance and feeding
- Reduction in shrinkage porosity
- Sodium is the most effective modification agent

Cleaning, degassing and covering
- Cleaning fluxes remove oxides and other non-metallic inclusions from the melt
- Drossing fluxes provide a dry dross with a low metal content
- Covering fluxes protect the melt against oxidation and hydrogen pick-up
- A low hydrogen content in the melt reduces gas porosity in the casting
- Removal of impurities improves mechanical properties and avoids distortions during heat treatment and machining
Recommendations for the melt treatment of aluminium alloys

<table>
<thead>
<tr>
<th>Type of alloy</th>
<th>Grain refining</th>
<th>Modification</th>
<th>Cleaning</th>
<th>Drossing</th>
</tr>
</thead>
<tbody>
<tr>
<td>AlSi</td>
<td>COVERAL 2812</td>
<td>COVERAL 2818</td>
<td>COVERAL 2712</td>
<td>COVERAL 2510</td>
</tr>
<tr>
<td>AlSiMg</td>
<td>COVERAL 2818</td>
<td>COVERAL 2712</td>
<td>COVERAL 2715</td>
<td>COVERAL 2510</td>
</tr>
<tr>
<td>AlSiCu</td>
<td>COVERAL 2712</td>
<td>COVERAL 2220</td>
<td>COVERAL 2410</td>
<td>COVERAL 2510</td>
</tr>
<tr>
<td>AlZn</td>
<td>COVERAL 2818</td>
<td>COVERAL 2712</td>
<td>COVERAL 2715</td>
<td>COVERAL 2510</td>
</tr>
<tr>
<td>AlSi modified with Antimony or Strontium (sodium free products)</td>
<td>COVERAL GR 2818</td>
<td>COVERAL 2712</td>
<td>COVERAL 2715</td>
<td>COVERAL 2510</td>
</tr>
<tr>
<td>AlSiCu</td>
<td>COVERAL 2712</td>
<td>COVERAL 2220</td>
<td>COVERAL 2410</td>
<td>COVERAL 2510</td>
</tr>
<tr>
<td>AlSi13</td>
<td>COVERAL 2712</td>
<td>COVERAL 2220</td>
<td>COVERAL 2410</td>
<td>COVERAL 2510</td>
</tr>
<tr>
<td>AlSi12CuNi</td>
<td>COVERAL 2712</td>
<td>COVERAL 2220</td>
<td>COVERAL 2410</td>
<td>COVERAL 2510</td>
</tr>
<tr>
<td>Hypereutectic alloys (sodium and calcium free products)</td>
<td>COVERAL GR 6511</td>
<td>COVERAL GR 6512</td>
<td>COVERAL 05</td>
<td>COVERAL 05</td>
</tr>
<tr>
<td>AlCu</td>
<td>COVERAL 2812</td>
<td>COVERAL 2812</td>
<td>COVERAL 2812</td>
<td>COVERAL 2812</td>
</tr>
<tr>
<td>AlCu</td>
<td>COVERAL 2812</td>
<td>COVERAL 2812</td>
<td>COVERAL 2812</td>
<td>COVERAL 2812</td>
</tr>
<tr>
<td>AlMg</td>
<td>COVERAL 2818</td>
<td>COVERAL 2818</td>
<td>COVERAL 2818</td>
<td>COVERAL 2818</td>
</tr>
<tr>
<td>AlMg</td>
<td>COVERAL 2818</td>
<td>COVERAL 2818</td>
<td>COVERAL 2818</td>
<td>COVERAL 2818</td>
</tr>
</tbody>
</table>

Special applications
- Furnace cleaners and fluxes for furnace wall protection
  - COVERAL OR 1
  - COVERAL 88
- Fluoride free flux
  - COVERAL GR 2002
- Fluxes for element removal such as sodium, calcium or magnesium
  - COVERAL MTS 1591
  - ELIMAG 3
- Gassing agents to get a controlled hydrogen level to the melt
  - HYDRAL 40
  - DYCASTAL* 40
- Degassing tablets
  - NITRAL 10
  - NITRAL 10 MG

Easy application at reduced emission level

All products are applicable with FDU rotor degassing
COVERAL GR
Granulated products

COVERAL GR granular fluxes are an environmentally friendly range of fluxes for melt treatment of aluminium alloys. Powder fluxes possess certain disadvantages such as dust generation during application, toxic emissions, and problems of inconsistent efficiency due to their morphology. In order to overcome these disadvantages, fluxes in dust free granular form have been developed.

Applications
- Grain refining
- Sodium modification
- Cleaning
- Drossing / covering
- Element removal

Features and benefits
- No dust
- Low addition rates
- Easily applied
- Low fume
- All alloys and furnaces

Comparison of powder and granular flux cleaning efficiency

COVERAL powder addition rate: 0.35% of metal weight
COVERAL GR addition rate: 0.10% of metal weight

Environmental aspects

<table>
<thead>
<tr>
<th></th>
<th>Powder</th>
<th>Granular</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concentration in mg/m³</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total particulate</td>
<td>1.5</td>
<td>0.46</td>
</tr>
<tr>
<td>Total Cl</td>
<td>0.73</td>
<td>0.72</td>
</tr>
<tr>
<td>F</td>
<td>11</td>
<td>3.4</td>
</tr>
<tr>
<td>NOx</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>SOx</td>
<td>8.5</td>
<td>1.6</td>
</tr>
</tbody>
</table>

For all details about the trial (procedures, parameters and complete results) shown on this page please refer to Foundry Practice 247 (2008).