Calderys' GMSA solutions for the foundries of tomorrow

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The background situation

The modern foundry is facing multiple challenges when it comes to reducing its impact on the environment. While it was already possible to reduce emissions by using Calderys' bentonite-based system of molding sand binders **ENVIBOND®**, customers also need to focus on the reduction of carbon footprint and the improvement of dumping or recycling behavior of the molding sand.

The request from the customers

New ways of sand treatment (recycling) or utilization after the use in the foundry is getting extremely important and will affect the competitiveness and future of the foundry industry.

This is the challenge our foundry customers have for us.

Analysis of the customer request

The usual range of the carbon content in the molding sand is **2-5%**. Through various discussions with foundry customers, Calderys has found that most of the foundries are targeting values of **> 3%** to achieve a balance with the carbon content of the iron alloys.

The foundry market is looking for the reduction of the carbon part of the molding sand (TC) to **< 2%** and corresponding reduction of organic carbon to **< 1,5%** for easier recycling or utilization of the used molding sand (return sand).

Description of the solution developed by Calderys

Calderys' R&D team are focused on developing and testing products were we can substitute carbon containing additives by at least **50%** with functional inorganic components ensuring stable molding sand properties, easy steering and good castings surface. This is how **ENVIBOND®** got created as a start.

Calderys believes that the **ENVIBOND®** product range and its future developments, combined with advanced expertise will ensure the future of the green molding sand additives technology, their benefits towards the environment serving the foundry industry as a whole.

Benefits brought by the solution

The Calderys team has developed the **ENVIBOND®** product range which has since then been used in many foundries. It allows the reaching of low loss of ignition (LOI) into the molding sand as per the example on the right side, here at **2.3%**.

Based on our experience in the industry, being able to reach low total carbon (TC) of below **1.6%** and low total organic carbon (TOC) of below **0.9%** on the disposal sand, would ensure good working conditions and low cost sand disposal while offering easier access to sand disposal sites.

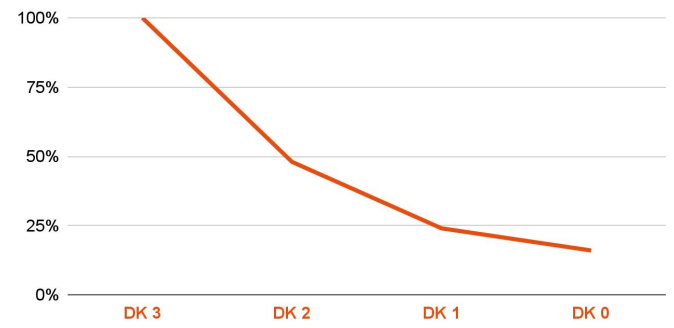
Moisture [%]:	**3,38**	Compactibility [%]:	**33**	Bulk density [kg/l]:	**1,006**
Test specimen [g]:	**151,5**	Permeability:	**121**	Compression strg. [N/cm2]:	**21,1**
Splitting strength [N/cm2]:	**3,5**	Wet tensile strength	**0,41**	AFS clay [%]:	**11,0**
Active clay [%]:	**8,2**	L.O.I. [%]:	**2,3**	Shear strength [N/cm2]:	**5,2**
L.O.I. sand [%]:	**0,8**	L.O.I. fines [%]:	**1,5**		
Inert dust [%]:	**1,3**	Sulphur content [%]:	**0,05**	pH Value:	**9,8**
Conductivity [µS/cm]:	**493,0**	Degr. of oolitization [%]:	**6,1**	Active carbon [%]:	**0,32**
Volatiles [%]:	**1,5**	AFS-No.:	**57**	average grainsize [mm]:	**0,261**
spec. surface [cm²/g]:	**99**	Particle < 0,125 mm [%]:	**3,100**	Gleichmäßigkeitsgrad:	**69**

Benefits brought by the solution

The reduction of LOI to **< 3%** and TOC to **< 1%** will allow foundries to reduce the classification of their Disposal from Class “DK I ” or even “DK 0 ”, which means a reduction of disposal cost of minimum **50%** (upper and lower graphs, right side).

The substitution of organic carbon by alternative components will allow the further reduction of BTEX emissions, smell/odour and significant improvement of working conditions.

Cost %



Parameter	DK0	DK I	DK II	DK III
Amount of organics (mass %)				
LOI (550°C)	≤ 3	≤ 3	≤ 5	≤ 10
TOC	≤ 1	≤ 1	≤ 3	≤ 6
Solids (mg/kg) db				
BTEX	≤ 6	←		
PCB	≤ 1			
Hydrocarbons	≤ 500	←		
PAH/EPA	≤ 30	←		

Product presentation

ENVIBOND® is a bentonite-based system of molding sand binders.The additives in the product enable an excellent compression of the casting form, and guarantee a lower wettability of the mold surface, and therefore a good casting surface. The special inorganic components in **ENVIBOND®**, which are processed according to a patented method, increase the adsorption of core gases and odors released in the molding sand.

Our next generation of **ENVIBOND®** will result in the reduction of total carbon, mainly organic carbon, and by repercussion with a favorable impact on the total carbon footprint of the GMSA additives.

Services - Expertise

We offer routine analyses of your molding sand materials in our laboratories with an upcoming online access to the results via a secure portal. Specific analysis results are available in updated table or graph form. Customers benefit from a variety of data, including the carbon footprint of materials Calderys provides. The analysis allow the Calderys foundry experts to make recommendations on ways to optimize the disposal of the molding sand, helping foundries in their energy transition.

Thank you for your attention

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