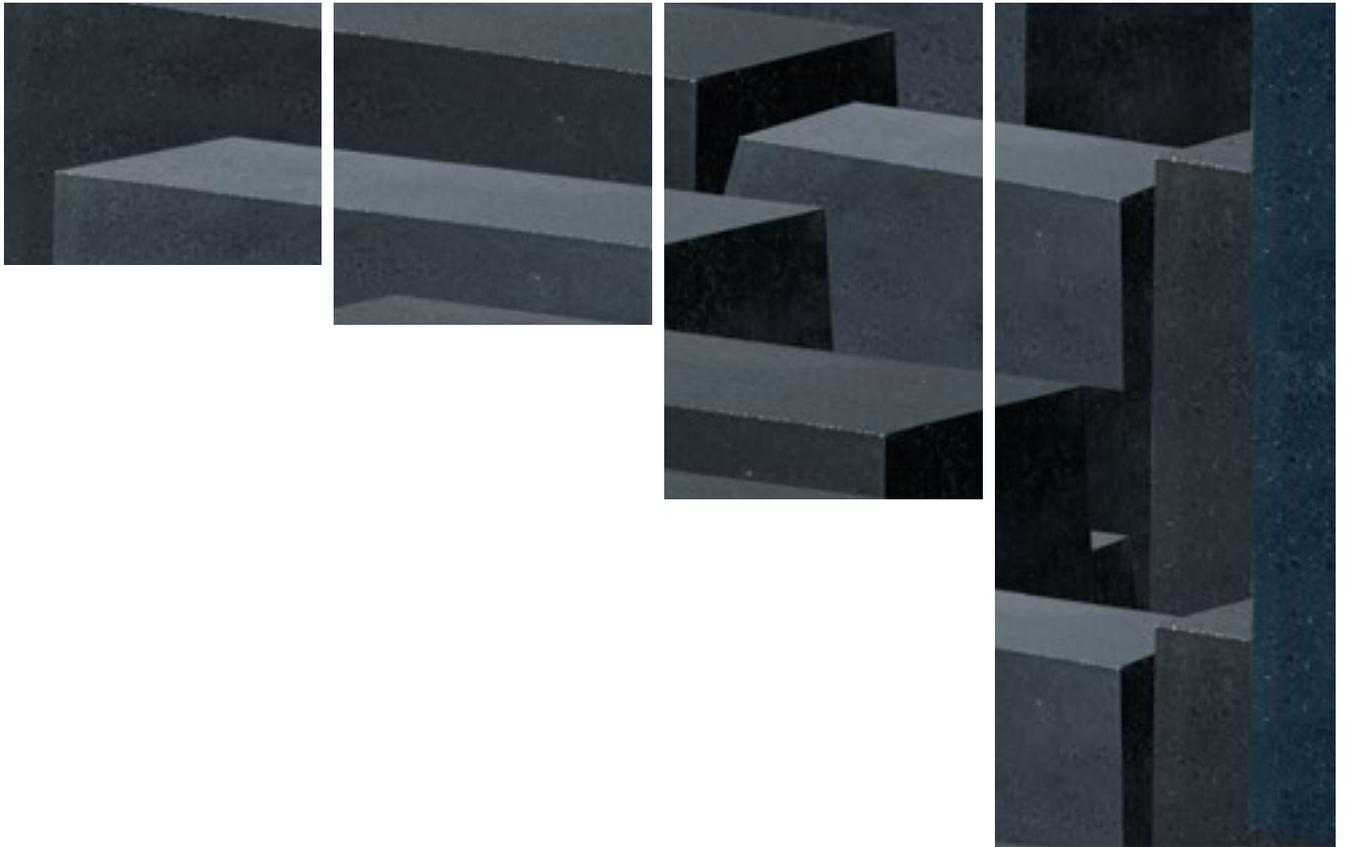


REFRAFLEX®

Your bond of the future



Ihr Ziel ist unser Antrieb.

Results first.

Of the end of the pitch era.

Our bonding agent REFRAFLEX® is used in all of our MACARBON® bricks. Consequently, there is no longer any valid reason to continue using pitch-based or classic resin-based refractory materials. All the more, if you are no longer prepared to accept their disadvantages – and honestly, we assume that is the case.



REFRAFLEX® is the first synthetic resin bonding agent that is better than pitch bonding, simply because it works without pitch. It is also better than conventional phenol-based synthetic resin, because the carbon that is produced during coking does not become stiff and brittle, but is crystalline like graphite, so that

the refractory material yields under stress, instead of compensating it with macro cracks. Therefore, REFRAFLEX® offers all the advantages of a pitch bonding agent, but without its main disadvantage: Because of the characteristic polycyclic aromates, pitch is no longer tolerable in the steel industry.

For Refratechnik Steel it was important to meet the technical challenge and develop a process that combines the advantages of both bonding systems while eliminating their disadvantages. With REFRAFLEX® we have been successful.



The before and after effect: Classic resin bonding versus REFRAFLEX® bonding

The following pictures show the macroscopic and structural differences between resin bonding and a REFRAFLEX® bond based on the same resin using macro pictures and scanning electron microscope pictures. For this, suitable samples were coked for six hours each at differing temperatures in the coking bed.

Even at the macroscopic level, the difference between the glass carbon shining like paint and the scaly, metallic shine of the graphite from the REFRAFLEX® bond can be recognized.

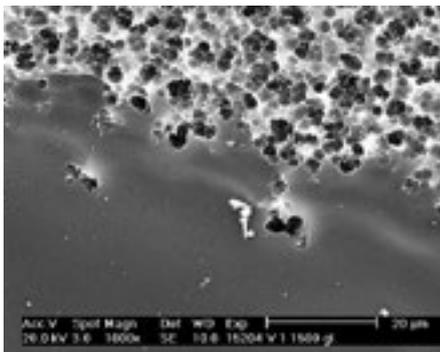
Through the heat treatment at 1500 °C spherical areas can be seen with the normal resin bonding next to amorphous phases, which indicate the beginning of the crystallization or vaporization processes. With the REFRAFLEX® bond on the other hand, these amorphous structures are no longer present. The lamellar layered structure of a well graphitized carbon is much more recognizable, which makes the refractory brick so flexible that it does not crack from stresses.



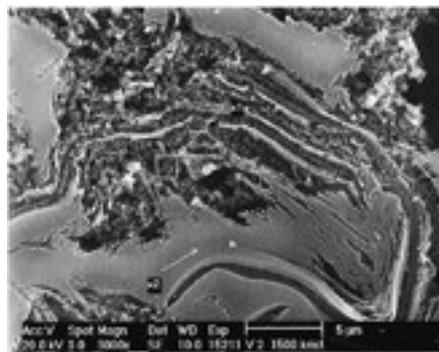
Bond sample coked at 1500 °C,
pure resin



Bond sample coked at 1500 °C,
REFRAFLEX®



Normal resin bonding after 1500 °C
coking temperature



REFRAFLEX® bond after 1500 °C
coking temperature

Refratechnik Steel GmbH
Schiesstrasse 58
40549 Düsseldorf
Germany
Phone +49 211 5858 0
Fax +49 211 5858 49
steel@refra.com
www.refra.com