Heat-reflecting ceramic coating for industrial furnaces

CERACOAT Types ITC 100, 213, 296 A

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Energy savings at high-temperature processes

Deployment of better insulating materials for industrial furnace constructions and use of the waste gas heat for other processes with usually high capital expenditure

alternative concept?
ceramic interlayer, which works like a barrier between furnace chamber and isolation
**CERACoAT** is a ceramic coating with a high heat reflection.

**CERACoAT** works at the hot inner side of the furnace.

<table>
<thead>
<tr>
<th><strong>CERACoAT</strong> is not</th>
<th>it is a</th>
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<tbody>
<tr>
<td>alternative / replacement for good isolation material</td>
<td>ceramic interlayer</td>
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<tr>
<td>high-emission-coating</td>
<td>heat-reflection-coating</td>
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</table>
What is CERACOAT ITC?

- mixings from naturally substances like mullite, cyanite, quartz, oxide of different transition metal
- no organic additives
- mortar-like, viscous to paste-like consistence
- inodorous
- light alkaline
- not harmful
- thermic stability tested till 1500 °C

ITC 100 bei 1500°C
Deployment

- Deployed in the seventies in the USA

- Originally developed for the pottery industry, to improve the quality of the products, to save energy and to remake old stoves
Deployment

- Continous expansion of the applications brought success in many other countries and industries:
  - porcellain manufacturers and potteries
  - brick manufacturer
  - steel industry / foundries
  - aluminum industry
  - heat treatment and hardening plants
  - galvanizing plants
  - refineries

- 2010: begin of developing the european market

- Scientific proofs of the charactereistics in cooperation with the ceramic institute Koblenz (Fachhochschule Koblenz) and the University Duisburg-Essen (under the direction of Prof. Dr. Wolfgang Bauer)
The ITC series summarizes a family of high temperature reflecting ceramic coatings:

**ITC 100 HT:**
Our most versatile high temperature coating. Achieves outstanding energy savings and extends the life of the furnace.

**ITC 213:**
Specially deployed coating for application on metall and graphite. Can also be used as primer for ITC 296A on metalls.

**ITC 296A:**
High-purity top-coating, which reinforces the effect of ITC 100 HT and ITC 213. It also increases the life of the ITC 100 HT and ITC 213 coatings, which are exposed to molten metal.

**ITC 200:**
Repair mass for overhauling of broken, peaky and cracked stones, refractory concrete or burner ports.
Aim of the CERACOAT ITC series is:

- better use of the inserted total energy
- an equal temperature distribution
- the improvement of the product quality
- the encapsulation of may existing harmful fiber
Products of the ITC series raise the reflection effect of coated refractory material in measurable magnitude.

Origin: measuring Prof. Dr. Bauer
The high reflectivity raises after one-time heating to ca. 1,200 °C especially in furnaces, with working temperatures up to 700°C.

Origin: measurings Prof. Dr. Bauer
insulating brick, uncoated
insulating brick, coated with Ceracoat
steel, coated with Ceracoat
Following effects are produced by the ITC series:

- higher heat reflectance in the furnace chamber and on the product
- faster heating of the product at constant energy consumption or
- less energy consumption at the same production processes or
- higher production at the same energy consumption
Following effects are produced by the ITC series:

- steady temperature distribution in the furnace

- The coating produces a higher temperature inside the furnace chamber. The return to „normal“ operating temperature is occured by limiting the exhaust pipes and new adjustment of the burners.

Reconfiguration of the furnace according to the changed conditions optimizes the energy consumption
Field Report 1:

Coating of a galvanisation furnace with **CERACOAT** at the time of changing the boiler
Field Report 1:

Coating of a galvanisation furnace with at the time of changing the boiler

Results:

- Energysavings detectable: ca. 6% to 9% overall consumption
- no temperatur chocking in the furnace chamber
- steady temperature distribution in the galvanising bath
Field Report 2:

Coating of a multi-purpose chamber furnace with Ceracoat, indirect gas-heated, no recuperation, process temperature 950°C

Results:

- detectable energysavings of 18% After limiting the exhaust and adjusting the burners
Field Report 3:

Coating with CERACOAT of an annealing furnace from a gear box manufacturer, 13 m, indirect gas-heated, with recuperation, single burner controller, process temperature 960°C

Results:

- 16% energysaving by higher flow capacity, without any changes at the furnace or at the burner system.
- another 14% of energysaving can be reached after limiting the exhaust and adjusting the burners.
- total savings 30%
Summary

- energy savings by heat reflection
- increased production and efficiency
- increased product quality by steady temperature distribution
- possible saving of equipment
- health protection by encapsulation of ceramic fiber (ceramic fibers are classified as harmful)
Summary

- reduction of NO$_x$—ejection by lower energy consumption at increased production

- can be applied to all common insulation materials—old or new

- extends the life of the furnace insulation, generally

- no loss of activity, even after perennial use
Thank you for your attention

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