CERAMIC LONG-LIFE COATINGS FOR BRASS FAUCET CASTING

USE OF NANOCOMP BC COATINGS AND NANOCOMP Z-Ex ZINC REMOVER

Semi-permanent Coatings for Brass permanent mould casting

Nanocomp BC is a semi-permanent coating system for brass GDC/LPDC casting with an insulation effect that can be adjusted by choosing the appropriate product as well as by adjusting the coat thickness. Thanks to its insulation in critical areas or the entire mold, defects such as cracks can be prevented. The coating can be used to control solidification. One coating layer can be used for many castings, with its functions restorable by simple touch-ups. BC coatings are resistant to temperature shocks, water bath cooling and against the brass melt.

Properties:

- Conductive or insulating setting by product choice and coating layer thickness
- Melt-repellent, melt resistant
- Water-repellent after first casting
- Ideal roughness for mold filling and polishing procedure
- Insensitive to thermal shock, temperatures up to 1200°C and zinc deposits
- Good adhesion on copper alloy and ferrous molds

Product range

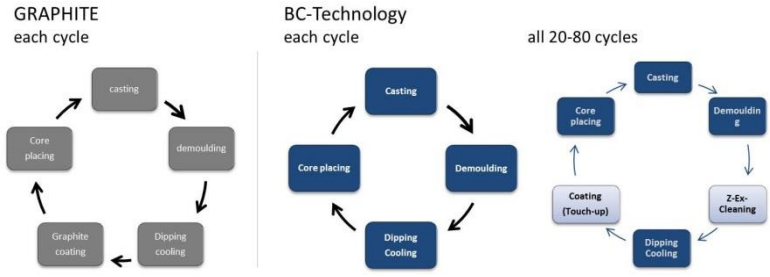
Coating	*Graphite*	nanocomp BC11	nanocomp BC13	nanocomp BC15
Roughness	●●	●	●●	●●●●●
Insulation	●●	● - ●●●	●● - ●●●●●	●●●●●●
Mold filling	●●●●●	●●●●	●●●●●	●●●●●●
Adhesion to mold	n.a.	●●●●●	●●●●	●●●●●
Release effect	●●●●●●	●●●●●●	●●●●●	●●●
Non-stick-effect	●●●	●●●●●●	●●●●●	●●●
Wear resistance	● (n.a.)	●●●●	●●●●●	●●●●
Application temp.	>100°C	> 80°C	>120°C	>120°C
Crack sensitiveness	●●●●	●●	●	●
Coat layer thickness	50-150µm	20-50µm	20-80µm	20-80µm

nanocomp Z-Ex Zinc deposit remover

This zinc deposit remover for high temperature application is part of the Nanocomp BC product range. It performs on tight ceramic Nanocomp BC coatings, which cannot be penetrated by melt contaminants. It dissolves the zinc deposits to be then washed away in the cooling water bath. The removal of zinc is required to allow touch-up of coating. Zinc deposits on castings are avoided.

Functional Principle of the Nanocomp BC-Technology

The process management for ceramic coatings is similar to the one in aluminium mold casting. A coating is chosen and applied, ensuring mold filling and quality of the casting over several castings. The coatings have been designed to resist the harsh conditions in brass casting. Once the coating layer is degraded, it can be restored several times by coat application, until the layer too thick, requiring sandblasting. Several hundred pieces can be produced in this way without shotblasting intervention (see instructions on application of coating in the respective data sheet).



It is only after a great number of castings, that any interventions are necessary with the BC technology. The time needed for these interventions is similar to the one needed for graphite application – which is required for every single run.

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User information

- Mold preparation
- Coating application (new application)
- Production (interventions during production)
- Touch-up
- Cleaning / new application
- Control and correction measures / Prevention of casting defects

Mold preparation

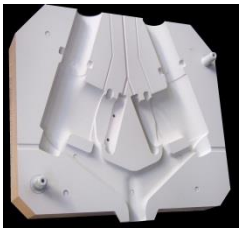
Cleaning: the molds need to be free from deposits, graphite and other repellent substances. Adhesion can be promoted by a slight roughness obtained by shotblasting.

Mold temperature at application: The mold should be heated to the temperature given in the respective product data sheet. Higher temperatures are recommended for thicker coating layers. Should the temperature of the mold be too low at the time of application, bound humidity can be released during the casting process. This does not lead to explosions, but can cause porosities or negative effects on the casting surface. The freshly coated mold must not be water-cooled, as the coating has to be sintered by the melt, after which it is water-repellent.

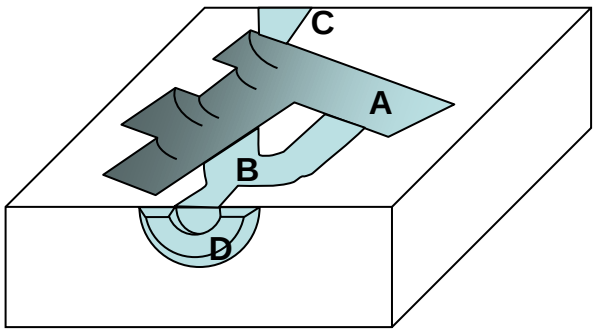
Valid for all coating types: a mold temperature <100°C can result in spontaneous evaporation.

Dipping/cooling bath: pure water required (no graphite content), demineralized water recommended

Application



The interface to the riser pipe (D) needs to be coated thinly in order to protect the mold. If this surface is not coated, cracks can form In the mold. Furthermore, all surfaces having contact with the melt need to be coated.



The gating system (B) needs a thin layer, to prevent zinc deposits on the mold contours (A). In the case of mold filling problems, the coating application should be thinner. The ventilation pipes (C) should also be provided with a thin layer of coating.

The contour of the casting (A) as a rule should be coated with ~30µm. In areas that are prone to cracks, BC should be applied with a higher thickness, which prevents cracks and other casting defects.

Only the contour of the casting (A) should be touched up, if necessary. → Touch-up

Production

Production with the coated tool can start directly after application.

Process temperature of the mold: The temperature of the mold should be slightly but reliably above 100°C for casting. In the event of gas porosities on the surface of the cast parts, the mold temperature needs to be elevated. In the event of excessive zinc deposits the mold temperature should be reduced. The ideal mold temperature for casting is between 100°C and 130°C.

Mold filling:

The operator monitors mold filling. The first filling is often above average. If necessary, the mold has to be (manually) prevented from flowing over. A stable level is reached after the second or third casting. If that is not the case, the feed pressure needs to be adjusted.

Form filling may become critical after a great number of castings → see „Touch-up"

Further observations at cast-part inspection → correction measures

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Touch-up of the coating

A) Removal of zinc deposits with nanocomp Z-Ex
B) Reapplication of the coating

The speed of degradation depends primarily on the mold design and the process parameters. Some parts require touch-up after 20 runs, others after 100. The foundryman recognizes this need by suboptimal mold filling and/or very smooth casting contours. Touch-up in this context means reapplication of the coating in the thickness of a few µm to restore the roughness of the coating.

Zinc deposits

The greyish-black deposit in the contours of the mold is a mixture of various substances, among them metallic zinc, which is the reason this mix is referred to as zinc deposit. This deposit affects the mold filling and therefore has to be removed before touch-up of the coating.

Measures for touch-up of the coating:

1.) The cast part is released from the mold, after which the latter rapidly cools down to below 200°C.
2.) The mold is then put in maintenance position to the operator. If present, core sand residues are removed.
3.) nanocomp Z-Ex is sprayed into the contours. For this purpose, a spray bottle having a sufficient flow rate or a spray gun with a small nozzle* is suitable. All contours with melt contact have to be sprayed generously, which takes just a few seconds (when using the spray gun).
4.) The mold is dipped just as in the normal production process, washing off the zinc deposits loosened by Z-Ex.
5.) The mold is again put in maintenance position. The surface is recognizably cleaned from dark deposits. Then the BC coating is reapplied by spraying in a very fine layer.
6.) The production process is resumed with the next step: putting the cores in.

Remarks

- The spray gun* should have a nozzle of 0.5-0,8mm and should be operated with a relatively high pressure (4-6bar). The flow rate is adjusted in such a way as to prevent excess overspray (loss).
- Zinc deposits affect mold filling, even when the coating is intact. If possible, the mold should be cleaned more often without coat application, in the same procedure as described above, leaving out step no. 5.
- A touch-up of the coating without previous cleaning will not be successful.
- Gloves and googles should be worn when applying the coating (see safety data sheet)
- For correct application please refer to the respective product data sheets of the individual BC products.

The touched-up coating will provide the same performance as a freshly applied coating.

Cleaning

Mechanical cleaning:

After the fourth to 8th touch-up, the layer thickness of the coating may become too thick, affecting the heat balance of the mold and resulting in spalling. Another reason requiring the complete cleaning of the mold by shot-blasting may be an accumulation of resin condensates of the core.

At this stage, the process begins anew with the mold preparation. Within the cycle, the residual heat of the mold should be monitored.

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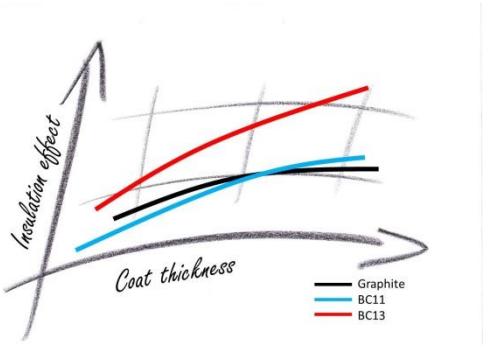
Control and correction measures

No mold filling: If the surface becomes smooth during the production cycle, a touch-up is necessary to reestablish roughness. Should the mold filling reduce without roughness decreasing, the mold filling parameters should be optimized. (speed / pressure). Mold filling tends to be excellent in the first two runs (danger of overflowing), but stabilizes after the third run.

Zinc deposits in the contours (A): The mold is too hot. The formation of zinc deposits is reduced at temperatures slightly above 100 °C (before casting). Cooling time needs to be increased, in order to obtain a lower mold temperature. After removal of the zinc deposits, production can be resumed. Zinc deposits can be removed by spraying Nanocomp Z-Ex into the mold's contours before water bath. → Touch-up

Prevention of casting defects

The Nanocomp BC coating system provides the foundryman with another tool to control mold filling and solidification, helping to increase productivity and to prevent casting defects.



Cracks

Cold cracks are caused by mechanical tension after solidification and cannot be influenced by the coating. The hot cracks often encountered in brass casting form during solidification and are categorized as shrinkage defect. In the event of cracks, the insulation should be adjusted by a greater layer thickness of the coating. If this measure is not successful, a coating with a higher insulation effect should be tested. Under certain conditions, an accelerated heat removal may help to prevent cracks. As with shrinkage, the geometry in the shrinkage area is decisive.

Pores / bubbles on the surface:

The mold is too cold. The water contained in the coating leads to outgassing. The minimal mold temperatures at first application of the coating need to be ensured. If they are significantly below the required level, the defects are often not recognizable during casting. Another consequence may be porosity near to the surface. If the temperature levels are obeyed, the coating is free of humidity and does not absorb humidity at the given process temperatures: porosities are prevented.

Pertaining documents

Please refer to the safety and product data sheet for precise information on application and handling of the individual products. Make sure to read them carefully.

For requesting these documents, write an email to sales@ceranovis.com.

Support

Ceranovis will be happy to assist you in the implementation of the BC technology on site.

- LOW CONSUMPTION OF COATING MATERIAL
- INCREASED PRODUCTIVITY
- REDUCED SCRAP RATE
- REDUCED CONTAMINATION
- IMPROVED WORKING CONDITIONS

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