AXALTA COATING SYSTEMS

Energy Solutions
Voltacast

Tips for processing and handling
of our potting/casting resins

For the successful handling and processing of two component potting/casting resins in industrial practice, it is mandatory to consider a few important aspects regarding material storage and preparation, depending on the chemistry of the used potting/casting material.
This technical guideline will help the user of our different Voltacast grades avoid common mistakes in the handling and processing of our Voltacast potting/casting resins in order to achieve the desired potting/casting result.

Chemistry of our Voltacast potting/casting resins

The currently existing Voltacast – product range consists of polyurethane based potting/casting systems.
All Voltacast – potting/casting resins are two component systems consisting of a resin component and a correspondent hardener component.

Both components have to be mixed and homogenized in the mixing ratio given for each different Voltacast grade. Due to chemical reaction of the type "A+B → C" (polyaddition reaction) a duroplastic material with system specific end properties is obtained. Here, the hydroxyl groups of the base resins in the resin component react with the isocyanate groups from the hardener component.

This reaction can be accelerated either by elevated curing temperatures or by adding special catalysts to the resin component before the mixing process.

Preparation of filled potting/casting resins

Most resin components of two component potting/casting materials consist of reactive basic resins, additives and inorganic fillers and pigments (the latter is only as far as a certain color of the material is required). These inorganic fillers improve the mechanical properties of the cured material, the thermal conductivity and, in some cases, can be used as flame retardants in self-extinguishing potting/casting systems.

The given mixing ratio for each potting/casting material refers to the composition of the resin component, containing a certain amount of reactive base resins and of non-reactive fillers/pigments. Thus the amount of hardener component fits exactly to the amount of resin component so that the reactive base resins have an equivalent amount of hardener for a complete curing reaction (so called stoichiometric mixing ratio).

The inorganic fillers usually have a higher density than the reactive case resins. Thus they tend to form a deposit in the resin component after a longer period of storage.

Due to the influence of gravity, this sedimentation cannot be avoided at all. By choosing suitable additives for the resin component, it is possible to keep the sedimented inorganic fillers soft. Thus it will be easy to re-homogenize the more or less separated resin component in its original container before any further processing within the given expiry date of the material. Different resin components show, also when stored under correct conditions, different sedimentation behavior. This sedimentation behavior is influenced by different gravity of different inorganic fillers and the viscosity of the resin component itself. A lower viscosity of the resin component and/or a higher filler density will generally result in stronger deposit forming than a higher viscosity of the resin component and/or a lower filler density.

As well, a longer storage time of the resin component (in the unopened original containers) results in a stronger deposit and a less soft deposit. Re-homogenization of the more or less separated resin component in the original container may require a longer time here.

Inappropriate storage of filled resin components- also in sealed original containers – can result in increased sedimentation of the inorganic fillers within the expiry date shown on the container labels. In extreme cases, a hard deposit can be formed – re-homogenization, even with specially suited mixers, can be difficult or even impossible.

Especially higher storage temperatures over a longer period can result in a more or less solid deposit. The storage temperature (min. and max.) of our different Voltacast grades is shown on the container labels. Please note, that this storage temperature range is generally also valid for transportation, mainly if the transport requires a longer time.

Re-homogenization of a more or less separated resin component must be done in the original container by using a suitable stirrer (e.g. conical stirrers). You will find a list of suppliers of stirrers for 30 l cans, drums and IBC's (containers) under chapter *"Manufacturers of mixing and dosing equipment and for the preparation of two component potting/casting resins"*.
The re-homogenization process has to be continued, unless no deposit is left in the resin component container. A suitable and reliable way for checking this is the determination of the resin component density. If the determined resin component is in line with the density given in the technical data sheet, the re-homogenization process is finished.

The resin component density can be determined either by the use of a density bottle (pycnometer) or, more easily, by the use of an immersed body (plummet) acc. to DIN EN ISO 2811-2.
In both cases, the temperature of the re-homogenized resin component has to be in line with the temperature for density testing given in the technical data sheet.
As the plummet method acc. to DIN EN ISO 2811-2 is easy to realize, it is the preferred method for density determination in our production as well.

After a proper re-homogenization, the resin component is ready for further processing, e.g. filling the material directly from a 20 kg can or from a drum or IBC via suitable pumps into the storage tank of an automatic mixing and dosing machine. Usually a stirrer in that storage tank rotating at a low rpm rate keeps the re-homogenized resin component homogenous over the time.
Please note, that these stirrers being part of the mixing and dosing

machine are not suited for the re-homogenization of the separated resin component itself. They should only keep the re-homogenized material homogenous. Thus the re-homogenization process is a mandatory first step before any further use of the (filled) resin component.

Processing a not fully re-homogenized resin component results in deviations from the given mixing ratio, as the ratio of inorganic fillers and reactive base resins are not in line with this ratio from the initial formulation.

The content of inorganic fillers of a not correctly re-homogenized resin component will be either too low (mainly within material from the top of the original container) or too high (material from the bottom of the container – filler deposit). In both cases, the ratio between hardener and reactive base resins is not correct (stoichiometric) even if the ratio by weight of both components is in line with the given mixing ratio from the technical data sheet. This will finally result in an insufficient potting/casting result – parts being potted/casted this way will be finally rejected.

Handling of polyurethane based Voltacast potting/casting resins – special features

Regarding the preparation of filled resin components please refer to the previous chapter.

In addition to this chapter, please note that the resin component of our polyurethane based Voltacast potting/casting resins is sensitive to humidity. Thus it must not be exposed to ambient air containing humidity longer than necessary, e.g. for the re-homogenization process. Under middle European climatic conditions (air temperature, relative humidity), a re-homogenization requiring several minutes of stirring the material can be regarded as non-critical, as the resin components of our polyurethane based Voltacast materials contain additives, giving a sufficient protection against the effect of humidity.

Nevertheless, these additives are not capable of absorbing an unlimited amount of humidity from the air as these additives become saturated. Thus, the Voltacast resin components should not be exposed to the surrounding air (e.g. by leaving the once opened original container open) longer than necessary.

A resin component with humidity saturated additives containing further unabsorbed humidity cannot be distinguished optically from material, which is in technically good condition. After mixing this material with the hardener component, the hardener partially reacts with the free unabsorbed humidity in the resin component by forming carbon dioxide. This carbon dioxide results more or less in a foaming of the resin-hardener mixture.

In practice, the re-homogenized content of e.g. a 20 kg can should be transferred completely as soon as possible into the storage tank of a mixing- and dosing equipment. If, in case of manual processing only a part of the re-homogenized resin component is needed, the original container with the remaining material must be closed with the lid and the fitting clamping ring. The clamping ring presses the lid with the integrated gasket onto the rim of the container and gives air tight sealing.

If the resin component is delivered in a 200-250 kg drum with lid and clamping ring, the material in the drum has to be re-homogenized with a stirrer suitable for 200 l drums. After re-homogenization, the (still open) drum has to be placed under a suitable barrel agitator station. This barrel agitator station is usually part of a mixing and dosing machine setup and seals the open drum with a lid, containing an internal gasket.

For material (resin component) delivered in large containers (so called IBC's), a special container agitator is required for re-homogenization as well as for keeping the re-homogenized material homogenous. This container agitator must seal the upper container opening air tight. Air flowing into the container from outside has to be dried by the use of a so called silica gel filter (observe the color indicator of the silica gel showing the degree of humidity saturation).

The hardener components of our polyurethane based Voltacast potting/casting resins do not contain any fillers but they are sensitive to humidity. Thus the original containers of the hardener components have to be closed air tight except when taking out the hardener component.

When processing our polyurethane based Voltacast materials with automatic mixing and dosing machines, the compressed air needed for running most of these machines must be dried separately. Nearly every mixing and dosing machine has, in its central supply line for compressed air, a silica gel filter for this purpose. As the active dryer silica gel is saturated with humidity after a longer service time, silica gel contains a color indicator showing the degree of humidity saturation by changing its color. Consider the silica gel always to be active and not saturated with humidity.
The hardener components of polyurethane based Voltacast potting/casting resins is sensitive to temperatures below + 5 °C. Below this temperature, the hardener components tend to crystallize partially. Thus, the recommended storage temperature range of the product is shown on the container label.

Safety information for the processing of Voltacast potting/casting resins

Regarding the relevant regulations for safe handling and processing of the different Voltacast components please refer to the current version of the material safety data sheet. The current version of the material safety data sheet is provided by us free of charge

Manufacturers of mixing and dosing equipment and for the preparation of two component potting/casting resins

For re-homogenizing the content of smaller container sizes up to 20 kg, drilling machines with a suitable stirrer (for dispersion paints) can be used. These stirrers can be obtained in every building supplies store.

For larger containers as 200 l – drums or IBC's special equipment is required. You can find a list of suppliers for stirring equipment in *appendix II*.

For industrial processing of our Voltacast potting/casting resins, the use of automatic mixing and dosing equipment is recommended. Most of the specialized suppliers also offer automation technology as well as customer specific solutions.

You can find a list of mixing and dosing machine manufacturers in *appendix I*.

Appendix I

Mixing and dosing machine manufacturers for processing of two component systems in alphabetical order

bdtronic GmbH
Ahornstraße 4
97990 Weikersheim
phone: 0 79 34/1 04-0
www.bdtronic.com
info@bdtronic.com

Hilger & Kern GmbH Industrietechnik
Sparte Dosiertechnik
Käfertaler Straße 253
68167 Mannheim
phone: 06 21/37 05-0
www.hilger-kern.de
info@hilger-kern.de

Scheugenpflug AG
Gewerbepark 23
93333 Neustadt a. d. Donau
phone: 0 94 45/95 64-0
www.scheugenpflug.de
info@scheugenpflug.de

Verfahrenstechnik Hübers GmbH
Schlavenhorst 39
46395 Bocholt (Westf.)
phone: 0 28 71/2 81-0
www.huebers.de
info@huebers.de

Wilhelm Hedrich
Vakuumanlagen GmbH & Co. KG
Greifenthaler Straße 28
35630 Ehringshausen-Katzenfurt
phone: 0 64 49/9 29-0
www.hedrich.com
hedrich@hedrich.com

This list neither claims to be complete nor should be an evaluation from our side regarding manufacturers not mentioned in this list.

Appendix II

Suppliers of special mixing units for re-homogenizing of filled material components in alphabetical order

Collomix Rühr- und Mischgeräte GmbH
Daimlerstraße 9
D-85080 Gaimersheim
phone: +49 / (0)8458 / 3298-0
info@collomix.de
www.collomix.de

(supplier of gyroscopic mixers, especially suited for hobbocks)

Visco Jet Rührsysteme GmbH
Daimlerstraße 1
D-79761 Waldshut-Tiengen
phone: +49 / (0)7741 / 96567-0
info@viscojet.com
www.viscojet.com

(supplier of conical agitators for 200 l drums and IBC's)

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