

## TECHNICAL DATA SHEET

# ZrO<sub>2</sub>

## Aqueous dispersion

Aqueous zirconium dioxide dispersion for industrial formulation development. A fine inorganic phase for coatings and ceramic systems.

|                                       |                      |                     |                         |
|---------------------------------------|----------------------|---------------------|-------------------------|
| SUBSTANCE<br><b>Zirconium dioxide</b> | CAS-NO.<br>1314-23-4 | EC-NO.<br>215-227-2 | CARRIER<br><b>Water</b> |
|---------------------------------------|----------------------|---------------------|-------------------------|

### 01 Description

ZrO<sub>2</sub> is an aqueous zirconium dioxide dispersion for industrial formulation development. It provides a fine inorganic phase for coatings and ceramic systems. Product behaviour depends on oxide content, particle or aggregate size, surface charge, stabilizer, crystal phase, dopant content and compatibility with the application matrix.

### 02 Fields of application

**Protective coatings:** fine barrier and reinforcement phase.

**Refractory and precision-investment-casting systems:** inorganic binder.

**Engineering ceramics and zirconia-toughened alumina:** microstructure and grain-growth control.

**Catalyst and washcoat formulations:** binder and support-property modifier.

Optical high-refractive-index and YSZ applications require separately specified grades.

### 03 Recommended starting levels

| APPLICATION / SYSTEM                                        | STARTING LEVEL AND BASIS                                                       | PARTICLE FUNCTION AND EXPECTED SYSTEM RESPONSE                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------------------------------------------------|--------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Epoxy protective coatings</b>                            | <b>1-4 wt%</b> active ZrO <sub>2</sub> , based on epoxy solids; start at 2 wt% | <p><b>FUNCTION</b> Fine barrier and reinforcement phase; fills microvoids and increases diffusion-path tortuosity when well dispersed.</p> <p><b>EXPECTED RESPONSE / CHECK</b> Barrier performance and corrosion impedance can improve at an intermediate loading; excess loading can agglomerate and create porosity. Verify carrier compatibility, viscosity, film defects, adhesion, water uptake and EIS.</p> |
| <b>Alumina-based engineering ceramics / ZTA</b>             | <b>10-20 wt%</b> active ZrO <sub>2</sub> , based on total ceramic solids       | <p><b>FUNCTION</b> Dispersed ceramic phase for microstructure and grain-growth control; transformation toughening is phase- and firing-dependent.</p> <p><b>EXPECTED RESPONSE / CHECK</b> Evaluate slurry rheology, green density, shrinkage, fired phase, grain size, strength and fracture toughness. Use only after crystal phase and stabilization are confirmed.</p>                                         |
| <b>Refractory and precision-investment-casting slurries</b> | No universal dosage; calculate from required active binder solids              | <p><b>FUNCTION</b> Colloidal inorganic binder and ceramic precursor.</p> <p><b>EXPECTED RESPONSE / CHECK</b> Builds green strength after drying and ceramic bonding after firing. Set the level from refractory surface area, slurry rheology, wetting and shell strength.</p>                                                                                                                                    |

Numerical levels refer to active ZrO<sub>2</sub>. Product addition as supplied [%] = target active ZrO<sub>2</sub> [%] × 100 / released product ZrO<sub>2</sub> content [%]. The values are starting points for formulation screening, not ZrO<sub>2</sub> performance specifications. The coating range is derived from a published surface-modified ZrO<sub>2</sub>/epoxy benchmark; the ZTA range is a typical final ceramic composition. Determine the optimum dosage by application-related test series.

## 04 Technical data \*

| PROPERTY                             | VALUE / METHOD                                                   |
|--------------------------------------|------------------------------------------------------------------|
| Chemical identity / identifiers      | Zirconium dioxide · CAS 1314-23-4 · EC 215-227-2                 |
| Product form / carrier               | Aqueous dispersion; appearance to be released; carrier: water    |
| ZrO <sub>2</sub> content             | To be released · test method and basis to be stated              |
| pH value                             | To be released · test method and temperature to be stated        |
| Density / viscosity                  | To be released · temperature, method and shear rate to be stated |
| Particle / aggregate size            | To be released · method and sample preparation to be stated      |
| Charge / stabilizer / phase / dopant | To be released · analytical basis to be stated                   |
| Storage stability / redispersibility | To be released · test conditions to be stated                    |

\*) Entries marked “To be released” are placeholders, not product values. Replace them with released nanoSaar data before external issue. Typical values do not constitute specification limits unless agreed separately.

## 05 Processing instructions

Homogenize the container before use. Add under stirring and avoid local pH or electrolyte shocks. Calculate dosage from the active ZrO<sub>2</sub> content. For coating systems, first confirm that the aqueous carrier is compatible with the binder and cure package. For ceramic, refractory and catalyst slurries, monitor total solids, rheology, sedimentation, redispersibility, green strength and firing behaviour. Use a concentration ladder. Protect the product from freezing.

### 06 Packaging

Sample size: upon request  
Commercial packaging: to be agreed; net weight according to order confirmation

### 07 Storage

Store in tightly closed original containers. Protect from frost, extreme heat and contamination. Homogenize before use.  
Storage temperature range and shelf life: to be released.

### 08 Labelling

Classification and labelling are stated in the current safety data sheet. This TDS does not replace the SDS.  
Follow the handling and exposure-control measures specified in the SDS.

## 09 Special note

The stated starting levels do not constitute a product-performance specification. This grade is not presented as a transparent high-refractive-index optical dispersion or as yttria-stabilized zirconia. Ceramic toughening, ionic-conductivity and optical claims require a separately specified particle size, crystal phase, dopant content, surface chemistry and supporting application data.

## 10 – NOTES AND DISCLAIMER

The information in this document is provided in good faith and reflects the manufacturer's knowledge at the date of issue. It does not constitute a specification, guarantee or warranty. Product suitability for a particular formulation, process, substrate and intended use must be established by the user through appropriate testing. Nothing in this document relieves the user from complying with applicable legal, safety and regulatory requirements. nanoSaar Production GmbH may revise this document without prior notice.

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