The one-of-a-kind Ceram coating from Wilo.
Ceram coating from Wilo.
Effective protection from abrasion and corrosion.

Wilo Ceram is only available for Wilo pumps and units. This special version in the form of a unique 2-component coating offers the best possible protection against aggressive media compared with other coatings. Thanks to its increased resistance to abrasion and corrosion, it effectively prevents wear and chemical corrosion and always ensures optimal functionality and performance.

Thanks to Wilo Ceram, maintenance-related downtimes are greatly reduced and the service life of pumps and units is considerably increased. Far-sighted? We call it Pumpen Intelligenz.
**Ceram coating from Wilo.**

**Technical data.**

**Description**
Sprayable, solvent-free, 2-component polymer coating material with portions of aluminum oxide: for corrosion protection of our products even when under great mechanical stress.

**Composition**
Solvent-free epoxy polymer with solvent-free polyamine hardener and various extenders.

**Properties**
- Tough and hard, durable coating with high mechanical and chemical resistance, as well as good wear resistance
- Excellent wet adhesion as single- or multi-layered coating on steel surfaces
- Replaces tar-containing coatings
- Cost-savings thanks to the long service life, low maintenance and easy reparability.
- Tested by the "Bundesanstalt für Wasserbau" (German Federal Institute for Hydraulic Engineering) (BAW).
- Solvent-free.
- High gloss finish after hardening
- Later coating and repair possible

<table>
<thead>
<tr>
<th>Designation</th>
<th>Temperature range</th>
<th>Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sewage, alkaline (PH 11)</td>
<td>+20 °C/+40 °C</td>
<td>1/1</td>
</tr>
<tr>
<td>Sewage, weakly acidic (PH 6)</td>
<td>+20 °C/+40 °C</td>
<td>1/1</td>
</tr>
<tr>
<td>Sewage, strongly acidic (PH 1)</td>
<td>+20 °C/+40 °C</td>
<td>2/3</td>
</tr>
<tr>
<td>Ammonium hydroxide (5 %)</td>
<td>+40 °C</td>
<td>3</td>
</tr>
<tr>
<td>Decanol (fatty alcohol)</td>
<td>+20 °C/+50 °C</td>
<td>1/1</td>
</tr>
<tr>
<td>Ethanol (40 %)</td>
<td>+20 °C</td>
<td>1</td>
</tr>
<tr>
<td>Ethanol (96 %)</td>
<td>+20 °C</td>
<td>3</td>
</tr>
<tr>
<td>Ethylene glycol</td>
<td>+20 °C</td>
<td>1</td>
</tr>
<tr>
<td>Heating oil, diesel</td>
<td>+20 °C</td>
<td>1</td>
</tr>
<tr>
<td>Compressor oil</td>
<td>+20 °C</td>
<td>1</td>
</tr>
<tr>
<td>Methyl ethyl ketone (MEK)</td>
<td>+20 °C</td>
<td>3</td>
</tr>
<tr>
<td>Caustic soda (5 %)</td>
<td>+20 °C/+50 °C</td>
<td>1/2</td>
</tr>
<tr>
<td>Sodium chloride solution (10 %)</td>
<td>+20 °C</td>
<td>1</td>
</tr>
<tr>
<td>Hydrochloric acid (5/10/20 %)</td>
<td>+20 °C</td>
<td>2/2/3</td>
</tr>
<tr>
<td>Sulphuric acid (10/20 %)</td>
<td>+20 °C</td>
<td>2/3</td>
</tr>
<tr>
<td>Nitric acid (5 %)</td>
<td>+20 °C</td>
<td>3</td>
</tr>
<tr>
<td>Toluene</td>
<td>+20 °C</td>
<td>2</td>
</tr>
<tr>
<td>Cooling and industrial water</td>
<td>+50 °C</td>
<td>1</td>
</tr>
<tr>
<td>Xylene</td>
<td>+20 °C</td>
<td>1</td>
</tr>
</tbody>
</table>

Key: 1 = resistant, 2 = resistant for 40 days, 3 = spill resistant (immediate cleaning recommended)
Total layer thickness: at least 400 µm

Technical data for C1, C2, C3 on request
Wilo Ceram offers all-round protection for all unit components, whether they are inside or on the surface. Depending on the field of application, different Wilo Ceram coatings are offered, which are applied using various methods. For use in special fluids, the individual Ceram versions can also be combined with each other.

**Ceram C0** is used both for the outer coating as well as for the interior coating. This is applied using the airless method in one layer with a thickness of 0.4 mm.

**Outer and interior coating**
- To protect against heavy corrosion
- Increased efficiency thanks to lower friction losses

**Impeller and suction port coating**
- A perfect combination, e.g. C2 + C1 against strong abrasive corrosion in the case of moderately stressed pump components
- Can also be used in seawater and brackish water, as well as in industrial sewage areas

**Pump housing, inside**
- A perfect combination, e.g. C3 + C1 as a cost-effective alternative compared to special materials
- Later coating/repairs possible
Sewage and sewage treatment plant pumps are constantly being exposed to aggressive fluids. Corrosion and abrasion, as well as UV light, heat, cold, salt, condensate and the alkalinity influence the surfaces and material structures of the units, sometimes with considerable impairment to the performance. This significantly reduces the hydraulic efficiency of a pump (see graph). This not only results in a higher energy consumption, but also leads to a greatly reduced service life due to the displacement of the load locus for the motor and hydraulics.

A specific application case uses just the example of an impeller coated with Ceram – to illustrate the performance and the associated potential for savings. In a kaolin plant, the fluid is so abrasive due to the large amount of very small-grain sand that a cast-iron impeller, which normally has an operating time of about 100,000 h with no problems, already had to be replaced after 500 hours of operation.

In a test period of 15 months, a total of four cast iron impellers were therefore replaced. This resulted in the following:
- Acquisition costs
- Loss in efficiency due to the corroded material
- This resulted in increasing energy costs
- Downtimes due to removal and installation

Under the same conditions in exactly the same time period, an impeller coated with Ceram was used. This impeller only had to be replaced after about 2000 hours of operation. The coating could withstand the high mechanical load for four times as long.

If one takes the overall costs over the entire service life of the pump into account, the investment costs for a unit coated with Ceram are less than 11 % and thus negligible. In addition, there is a high savings potential due to fewer repairs being required, resulting in fewer system downtimes. Therefore, a Ceram coating already pays for itself within the first 500 hours of operation, i.e. within the first year.
Whether in the municipal water and sewage management, in the offshore area or industry: Everywhere where pumps and systems are exposed to aggressive fluids, Wilo Ceram offers long-lasting protection. Companies all over the world trust the one-of-a-kind coating from Wilo. For a good reason: Wilo Ceram increases the service life of all mechanical components, lowers the energy costs noticeably, thanks to the higher efficiencies, and is therefore very convincing with their minimum life cycle cost.

Ceram coating from Wilo.
Used world-wide.
2.05 SHOP PAINTING

1. Ceram CO – Our standard paint system is Ceram CO. It is a ceramic coating that is spray applied and is black in color. The following specifications are included in our base specifications:

   A. Primer and Finish Paint - Shop apply to all exterior ferrous surfaces of the pump and motor. Shop apply to exterior and interior surfaces of elbow

      1. Minimum solids by volume: 97%

      2. Type: Solvent-free ceramic coating, impregnated with aluminum oxides

      3. Total Dry Film Thickness: 400 microns (15.7 mils) minimum

      4. Minimum Adhesion: 14 Newtons per square millimeter (2,030 psi) per ISO 4624.

      5. Minimum Hardness: 110 on Buchholz Indentation scale

      6. Resistance: Level 1 (continuous duty) for sewage with pH of 6-11, Level 1 for saltwater, Level 3 (not recommended) for 10% hydrochloric acid.

   B. Surface Preparation - Prepare all surfaces to receive coating system.

      1. Method: Blasting per ISO 12944-4

      2. Standard Cleanliness Grade: 2.5

      3. Minimum Peak to Valley Height: 70 microns (2.75 mils)

2. Further Use Of Ceramic coatings - Wear on impellers and volutes in raw sewage can be lessened by applying a coating of Ceram CO on the interior of the volute and on the impeller.
Ceram C0 data sheet

General information

WILO products are used for many different pumped liquids and installation sites. We want our coatings to offer an even higher degree of protection against wear and corrosion. For this purpose, we mainly use our Ceram coatings. However, only an intact coating provides the best possible protection.

Therefore check the coating after all installation and maintenance work, and repair any minor damage immediately. In the event of major damage, please consult the manufacturer.

Description

Ceram C0 is a sprayable, solvent-free, two-component ceramic-based coating material which protects our products from corrosion under particularly harsh mechanical conditions.

Solvent-free epoxy polymer with solvent-free polyamine hardener and various extenders.

- A tough, hard and long-lasting coating with high mechanical and chemical resistance and excellent resistance to abrasion.
- Excellent wet adhesion and compatibility with corrosion protection as a single-layer coating on steel surfaces.
- Very good adhesion to steel surfaces.
- Replaces coatings containing tar.
- Cost-effective thanks to its durability, low maintenance and easiness to repair.
- Tested by the Federal Waterways Engineering and Research Institute (BAW).
- Solvent-free.
- High-gloss coating when hardened.

Composition

Properties

Technical data

<table>
<thead>
<tr>
<th></th>
<th>ASTM D 792</th>
<th>DIN EN ISO 6272</th>
<th>g/cm³</th>
<th>N/mm²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density (mixture)</td>
<td>1.4</td>
<td>60</td>
<td>1.4</td>
<td>60</td>
</tr>
<tr>
<td>Adhesion / steel</td>
<td>ASTM D 4624</td>
<td>ISO 4624</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Impact resistance / hardness</td>
<td>9</td>
<td>J</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature resistance: dry, long-term</td>
<td>60</td>
<td>°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature resistance: dry, short-term</td>
<td>120</td>
<td>°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature resistance: wet / fluid</td>
<td>Depends on pumped fluid</td>
<td>Information on request</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>Solid content (mixture)</td>
<td>Volume</td>
<td>97</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Weight</td>
<td>98</td>
<td>%</td>
<td></td>
</tr>
</tbody>
</table>

Table D–1: Technical data
### Resistance

<table>
<thead>
<tr>
<th>Pumped fluid</th>
<th>Temperature</th>
<th>Resistance rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste water, alkaline (pH 11)</td>
<td>+20°C</td>
<td>1</td>
</tr>
<tr>
<td>Waste water, alkaline (pH 11)</td>
<td>+40°C</td>
<td>1</td>
</tr>
<tr>
<td>Waste water, slightly acidic (pH 6)</td>
<td>+20°C</td>
<td>1</td>
</tr>
<tr>
<td>Waste water, slightly acidic (pH 6)</td>
<td>+40°C</td>
<td>1</td>
</tr>
<tr>
<td>Waste water, very acidic (pH 1)</td>
<td>+20°C</td>
<td>2</td>
</tr>
<tr>
<td>Waste water, very acidic (pH 1)</td>
<td>+40°C</td>
<td>3</td>
</tr>
<tr>
<td>Ammonium hydroxide (5%)</td>
<td>+40°C</td>
<td>3</td>
</tr>
<tr>
<td>Decanol (fatty alcohol)</td>
<td>+20°C</td>
<td>1</td>
</tr>
<tr>
<td>Decanol (fatty alcohol)</td>
<td>+50°C</td>
<td>1</td>
</tr>
<tr>
<td>Ethanol (40%)</td>
<td>+20°C</td>
<td>1</td>
</tr>
<tr>
<td>Ethanol (96%)</td>
<td>+20°C</td>
<td>3</td>
</tr>
<tr>
<td>Ethylene glycol</td>
<td>+20°C</td>
<td>1</td>
</tr>
<tr>
<td>Heating oil/diesel</td>
<td>+20°C</td>
<td>1</td>
</tr>
<tr>
<td>Compressor oil</td>
<td>+20°C</td>
<td>1</td>
</tr>
<tr>
<td>Methyl ethyl ketone (MEK)</td>
<td>+20°C</td>
<td>3</td>
</tr>
<tr>
<td>Sodium hydroxide solution (5%)</td>
<td>+20°C</td>
<td>1</td>
</tr>
<tr>
<td>Sodium hydroxide solution (5%)</td>
<td>+50°C</td>
<td>2</td>
</tr>
<tr>
<td>Sodium chloride solution (10%)</td>
<td>+20°C</td>
<td>1</td>
</tr>
<tr>
<td>Hydrochloric acid (5%)</td>
<td>+20°C</td>
<td>2</td>
</tr>
<tr>
<td>Hydrochloric acid (10%)</td>
<td>+20°C</td>
<td>2</td>
</tr>
<tr>
<td>Hydrochloric acid (20%)</td>
<td>+20°C</td>
<td>3</td>
</tr>
<tr>
<td>Sulfuric acid (10%)</td>
<td>+20°C</td>
<td>2</td>
</tr>
<tr>
<td>Sulfuric acid (20%)</td>
<td>+20°C</td>
<td>3</td>
</tr>
<tr>
<td>Nitric acid (5%)</td>
<td>+20°C</td>
<td>3</td>
</tr>
<tr>
<td>Toluene</td>
<td>+20°C</td>
<td>2</td>
</tr>
<tr>
<td>Water (cooling/industrial water)</td>
<td>+50°C</td>
<td>1</td>
</tr>
<tr>
<td>Xylene</td>
<td>+20°C</td>
<td>1</td>
</tr>
</tbody>
</table>

Table D-2: Resistance

Total layer thickness: at least 400µm

Key: 1 = resistant; 2 = resistant for 40 days; 3 = resistant against overflow, immediate cleaning recommended
In order to achieve the best results with this product, proper preparation of the surface is of critical importance. The exact requirements change depending on the application, expected period of service and original surface condition.

Make sure it is clean, dry and free of grease. The best results are attained by removing rust by blasting in accordance with DIN EN ISO 12944-4, standard cleanliness grade Sa 2.5 – 3. The roughness should be at least 50µm deep. A test certificate for the blasting equipment must be available.

Please ask for our advice on preparing other surfaces.

The material is supplied in the agreed mixing ratio. Mix all the hardener component into the basic component, preferably using a mechanical mixer, also mixing around the walls and bottom of the container. Only mix as much material as can be applied during the pot life.

The mixing ratio is 4:1 by weight.

The surface and air temperatures must be at least +10°C, and the relative air humidity at most 80%. The temperature of the surface to be coated must be at least 3°C above the dew point. Low temperatures slow down hardening and make application more difficult. For the coating to harden completely, the surface temperature must be above the minimum hardening temperature. High air humidity or temperatures below the dew point can cause condensation to form on the substrate or the coating surface. This can cause problems of adhesion to the surface and between layers. These object conditions must be maintained during the application and hardening period. If the temperature or humidity approach the threshold values, we recommend the use of heating or drying equipment. Ceram C0 can be applied on small surfaces by roller or brush.

This table shows the practical hardening time from the start of mixing.

<table>
<thead>
<tr>
<th>Temperature</th>
<th>16°C</th>
<th>20°C</th>
<th>25°C</th>
<th>32°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pot life (minutes)</td>
<td>30</td>
<td>20</td>
<td>15</td>
<td>10</td>
</tr>
</tbody>
</table>

Table D-3: Pot life

Ceram C0 is applied in layers of 400µm to around 1000µm, depending on the media and intended duration of protection.

Theoretical yield: 1.8 m²/kg at 400µm or 0.9 m²/kg at 800µm.

Theoretical consumption: 0.60 kg/m² at 400µm or 1.15 kg/m² at 800µm.

In practice, consumption depends on the surface properties and the application method.

Use the following formula to determine how much is needed to cover a given surface:

\[
\text{Density} \times \text{area (m}^2\text{)} \times \text{average thickness (mm)} = \text{consumption (kg)}
\]

Another layer of Ceram C0 can applied after around 16 hours up to 24 hours at +20°C. The surfaces must be clean, dry and free of oil or grease. If this interval is exceeded, the coating must be blasted. In hot sunshine, the repeat coating interval is much shorter. Take suitable measures to prevent this.

This table shows the practical hardening time from the start of mixing.

<table>
<thead>
<tr>
<th>Temperature</th>
<th>15°C</th>
<th>25°C</th>
<th>30°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand dry</td>
<td>8 hours</td>
<td>4.5 hours</td>
<td>4 hours</td>
</tr>
</tbody>
</table>

Table D-4: Hardening time
Ceram C0 data sheet

Material needed
- Cleaning agent for cleaning the surface
- Abrasive paper for roughening the surface (select the roughness according to the surface)
- Paintbrush for applying the coating (select the size according to the extent of the damage)
- 2 component coating (Ceram C0 + hardener)
- Vessel for mixing the two components

Working steps
1. Lift the WILO machine from the basin, place it on a secure surface and clean it.
2. Thoroughly clean the damaged area with suitable cleaning agent.
3. Roughen the surface around the damaged area.
4. Mix the 2 component coating (Ceram C0 + hardener) in a 4 to 1 ratio in a suitable vessel.
5. Wait 10 to 15 minutes.
6. Apply the finished Ceram C0 coating to the damaged area with a suitable paintbrush. Make sure the coating is of at least the minimum thickness: 400µm

   If you are using a combination of different Ceram types (e.g. C2+C1), please consult the manufacturer.

7. After repairing the damage, let the Ceram C0 completely dry. See “Hardening time”.

Cleaning tools
Use a commercial solvent (acetone, alcohol or methyl ethyl ketone) to clean your tools immediately after use. Once the material has dried, it can only be removed by abrasion.

Storage
Store at temperatures between 10°C and 32°C, slight deviations during transport are acceptable. The containers can be stored unopened for 12 months.

Safety precautions
Before using any products, read the material DIN safety data sheet (MSDS) or the safety regulations regarding them. Observe all applicable safety regulations when working in enclosed rooms.

<table>
<thead>
<tr>
<th>Light load</th>
<th>1 day</th>
<th>13 hours</th>
<th>10 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full load</td>
<td>6 days</td>
<td>3 days</td>
<td>2 days</td>
</tr>
<tr>
<td>Chemically resistant</td>
<td>10 days</td>
<td>6 days</td>
<td>4 days</td>
</tr>
</tbody>
</table>

Table D-4: Hardening time
Ceram: Second skin. For particularly strong protection.

Ceram coating from Wilo
Atmospheric and fluid-related influences

Atmospheric influences → Corrosion

Fluid-related influences → Corrosion und abrasion
Atmospheric and fluid-related influences

> In case of strictly atmospheric influence a so-called heavy corrosion-protection (e.g. Intertol Poxitar) is sufficient.

> Ambiance charged by the fluid, e.g. submerged equipment, requires a higher protection
  > as to diffusion of steam
  > as to additional mechanical (abrasive) contamination, e.g. sand
Coating Technology.

Ceram coating from Wilo
Innovative coatings

> With the one-of-a-kind Ceram technology Wilo made a decisive contribution to ensure a long-term protection of pumps and pump components by coatings.

What is Ceram?
What is Ceram?

> Ceram is a composite material.

> Composite materials are substances consisting of several materials.

> Ceram is a solvent-free, 2-component polymer coating material with portions of aluminum oxide.
What is Ceram?

Wilo Ceram = an aluminum oxide/polymer composite material

Examples for composite materials:
- fibers
- coal
- aramid
- nylon
- fiber glass
- aluminum oxide
- metals
- quartz
- glass

Examples for polymers:
- epoxy
- phenol
- polyester
- triester

Wilo uses …
What is Ceram?

> Whereas Ceram shows a monolithic homogeneous layer (diamond model), the working life of other coatings (e.g. Inertol Poxitar) with several layers (onion-skin model) depends on the adhesion between the different layers.

Diamond model

Onion-skin model

15 N/mm²

5 N/mm²
Ceram vs. conventional coating structure

Comparison Ceram – tar-epoxy coating:
> 6 times better adhesion as conventional coating

- Ceram CO 400µm
  - Monolithic, homogeneous coat
  - Adhesion 15 N/mm²

- Zink dust ground coat 50 µm
  - Adhesion 2,5 N/mm²

- 3 layers tar-expoxy each 110 µm
  - Adhesion 5 N/mm²

Metal
Ceram vs. conventional coating structure

High-wear test

Test set-up: Ceram C0
1. Sand blasting
2. One layer 400 µm, Ceram

> Tot. thickness of layer abt. 400 µm

Test set-up: Inertol Poxitar
1. Sand blasting
2. One layer 50 µm, Friazink
3. Three layers, 110 mm Inertol Poxitar

> Tot. thickness of layer abt. 380 µm
Ceram vs. conventional coating structure

High-wear test

> Test time: 1 hour
> Fluid: 140 liter of water
> Sand 5 liter, 0.6 – 1.2 mm grain

Result:
- **Ceram C0**: 6% of the coating have been removed
- **Inertol Poxitar**: 94% of the coating have been removed
References.

Ceram coating from Wilo
> Because of regulations like the Kyoto convention the CO₂-exhausts of industrial companies must be decreased. Shell is exhausting the CO₂ in very big amounts. Market gardeners and nurseries are using CO₂ as fertilizer. They have their own gas driven motors to produce heat, electricity and CO₂ what they all use in their green- and glasshouses. Because of this the Dutch companies Koninklijke Volker Wessels Stevin NV and Hoek Loos BV set up the joint venture 'OCAP CO₂ VOF' and built a plant. This plant compresses the CO₂ with 4 big compressors, transport the gas through an existing pipe line, starting in Rotterdam, to distribution stations and finally to the end user.

> The cooling of the compressors is a process in two stages. In the first step we pump the water with the 3 FA-pumps from the „Oude Maas“ River through the heat exchanger and back to the river. In the second step 4 WILO NP-pumps provide a cooling circuit between the heat exchanger and the compressors.
Tuzla Municipal Waste Water Treatment Plant, engineered for a flow rate of 150,000 m³/day, is a complete biological treatment and sea discharge facility. The plant has been in operation since 1998 and is serving a total of 4.5 Mio population residing in Gebze, Darıca, Çayırova, Tuzla, Pendik, Kartal and Maltepe regions in city of Istanbul.

Waste water collected from this area is brought in via two separate closed channels and then (channel dia. 4.5 m each) lifted from an elevation of -8.47 m. to the treatment plant by two pumping stations.

One of these pumping stations is called ISKI X5 Pendik Pumping Station where 3 Wilo submersible waste water pumps with Ceram coating are installed.
Since 1976 the Central Sewage Treatment Plant Jena has treated the municipal sewage mechanically and since 1981 also biologically with a capacity of a population equivalent of 145,000.

The max. intake quantity of mixed water (municipal sewage and rain water) is abt. 4,700 m³/h. For this a pumping station with three Wilo sewage pumps was installed. These pumps lift the incoming mixed water in a big storm water retaining basin for storm water treatment.

Each pump has a tot. flow rate of max. 470 l/s, is operated via a frequency converter and has a long-term protection against corrosion and abrasion provided by the Wilo Ceram coating.
In the year 2004 a new sewage pumping station was built in Virginia.

The pumping station was equipped with 3 Wilo submersible pumps with Ceram coating.

The submersible pumps are in dry sump installation. The submersible motors are cooled by an internal circulation cooling.

Via a special heat exchanger the heat loss of the motor is directly dissipated to the pumped liquid in the pump casing. This intensive cooling system has the effect that the motor while continuously operating at rated output also works safely when emerged.
New INFLUENT PUMP STATION Trenton, TN.
*The pumping station was equipped with 2 Wilo 10” FA25.93T submersible pumps with Ceram coating.
*Client elected use of Ceram CO impeller coating in lieu of Cast Stainless Steel impellers.
*Representative: BAR Environmental
   Josh Spradlin
*Engineer: JR Wauford and Company

New INFLUENT PUMP STATION, EQ PUMP STATIONS - MORRISTOWN, TN.
Pumping stations were equipped with various size WILO submersible pumps, wetpit and drypit applications, with Ceram CO coating.
*Client elected use of Ceram CO impeller coating in lieu of HARDENED HIGH CHROME impellers.
*Representative: BAR Environmental
   Bobby Clemmer
*Engineer: LDA ENGINEERING
Life Cycle Costs.

Ceram coating from Wilo
Ceram in daily use!

High charge by the liquid every day.

*Sewage pump FA 08.53W*
*With Ceram C0 coating*

> Application: Industrial sewage treatment plant.
> After six months and one cleaning procedure: just as good as new!
Ceram coating

Maximum efficiency through an optimised service life.

Acquisition costs and energy –
Impeller with Ceram coating (1 life cycle)

Acquisition costs, energy and replacement –
Impeller without Ceram coating (4 life cycles)

Profit zone for the customer

Save up to € 1,000,–* of your operating costs.

* In case of constant energy costs 0.15 €/kWh in 10 years.
Ceram coating

Higher hydraulic efficiency and increased resistance to abrasion.

Pay-back already after 500 working hours.

The impeller with Ceram coating will be replaced after 2,000 hrs only – and that with relatively stable efficiency course.

The cast iron impeller must be already replaced after 500 hrs.
Ceram coating

> Solvent-free – less impact on the environment

> Free of pores – as produced without air pockets

> Very high wear resistance – due to good inside adhesion and high filling

> High adhesive strength – strong resistance to hydrodynamic attack

> High wet adhesion – good mechanical features even with chemical load
Just well coated.

Ceram coating from Wilo
Quality and working life of a coating multi-layer - onion skin model - $L \sim d^3$

4. Layer tar-epoxy 110 µm
   adhesion 5N/mm²

3. Layer tar-epoxy 110 µm
   adhesion 5N/mm²

2. Layer tar-epoxy 110 µm
   adhesion 5N/mm²

1. Zinc-dust priming 50 µm
   adhesion 2.5N/mm²

Metal

In case of several layers the working life depends on the adhesion between the different layers (model onion-skin)
Quality and working life of a coating single layer – diamond model - \( L \sim d^3 \)

The working life \( L = \text{proportional } d \) (\( d = \text{thickness of layer} \)), if you have one layer (diamond model)
**Comparison, tar-epoxy coating – Ceram C0 liquid ceramic**

The structure of a conventional tar-epoxy coating with a total thickness of layer of abt. 380 µm

<table>
<thead>
<tr>
<th>Layer</th>
<th>Description</th>
<th>Adhesion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Zinc-dust priming 50 µm</td>
<td>abt. 2,5 N/mm²</td>
</tr>
<tr>
<td>2.</td>
<td>Layer tar-epoxy 110 µm</td>
<td></td>
</tr>
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<td>3.</td>
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</tbody>
</table>

Red line = **potential weak points**

Blue line = **rated break point**

Metal
Comparison, tar-epoxy coating – Ceram C0 liquid ceramic

The coating structure of the Ceram C0 liquid ceramic with a total thickness of layer of abt. 400 µm

- Ceram C0
  - High surface finish due to airless – spraying method
  - Nominal thickness of layer: 400 µm
  - Adhesion: abt. 15 N / mm²

Metal