# HEBEI WOQIN - AEROGEL THERMAL INSULATION COATING

## TECHNICAL DATA SHEET: CORE PHYSICAL & THERMAL PROPERTIES

**Product Description:** Hebei Woqin's Aerogel Thermal Insulation Coating is a high-performance, water-borne insulation system engineered for demanding industrial and marine environments. By leveraging an ultra-low conductivity silica aerogel matrix, it provides superior thermal resistance, CUI (Corrosion Under Insulation) prevention, and solar heat reflection in a low-profile coating format.

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## Section 1: Core Technical Properties

| Property | Value / Result | Test Standard |
|---|---|---|
| **Thermal Conductivity** | **0.032 W/(m·K)** (@ 25°C) | ASTM C177 / GB/T 10295 |
| **Combustibility & Fire Rating** | **Class A1 (Non-combustible)** | EN 13501-1 / GB 8624 |
| **Bond / Adhesion Strength** | **1.1 MPa** | ASTM D4541 / JG/T 157 |
| **Solar Reflectance*** | **≥ 0.90** | ASTM E903 / GB/T 25261 |
| **Near-Infrared Reflectance*** | **≥ 0.90** | ASTM E1918 / GB/T 25261 |
| **Hemispherical Emittance*** | **99.5%** | ASTM C1371 / T/CECS 10126 |
| **Water Resistance** | **96h (No abnormality)** | ASTM D870 / GB/T 1733 |
| **Alkali Resistance*** | **48h (No abnormality)** | ASTM D1308 / GB/T 9265 |
| **Low-Temp Stability*** | **3 Cycles (No abnormality)** | GB/T 9268 |
| **Flexibility*** | **100mm (No cracking)** | ASTM D522 / GB/T 1731 |
| **Linear Shrinkage** | **≤ 0.5%** | ASTM C356 / GB/T 5486 |
| **Density (Wet Paste)*** | **~ 600 kg/m³** | ISO 2811 / GB/T 6750 |
| **VOC Content** | **Zero / Eco-Friendly** | REACH / GHS Compliant |

**Note: Values marked with an asterisk (*)* represent typical industry performance data and reference values for this specific aerogel formulation.

**Technical Insights:**

**Extreme Adhesion:** The bond strength of 1.1 MPa ensures long-term structural integrity on metal substrates, even under thermal cycling and industrial vibrations.

**Radiative Cooling:** With a 99.5% emittance rate, this coating effectively radiates heat back to the atmosphere, making it ideal for outdoor storage tanks and electrical enclosures in high-UV regions.

**CUI Mitigation:** The hydrophobic nature and high water resistance provide a robust barrier against moisture ingress, significantly reducing the risk of Corrosion Under Insulation.

## Section 2: Application Parameters & Logistics Specifications

Hebei Woqin's Aerogel Thermal Insulation Coating is formulated as a ready-to-use, water-borne paste. It is specifically engineered for rapid application on complex geometries where traditional insulation systems are physically or economically unviable.

### 2.1 Application & Installation Parameters

| Parameter | Technical Specification / Requirement |
|---|---|
| **Physical State** | Uniform aqueous paste (Free of lumps) |
| **Application Methods** | Trowel, Spatula, or Heavy-duty Airless Spray |
| **Theoretical Coverage** | **~0.6 kg/m² per 1.0 mm thickness (theoretical)** |
| **Surface Preparation** | Substrate must be clean, dry, and free of rust/oil. |
| **Recommended Primer** | Anti-corrosion primer for carbon steel surfaces. |
| **Touch Dry Time** | **≤ 30 minutes (0.5 hours)** @ 25°C |
| **Hard Dry Time** | 24 hours (Depends on DFT, temp, and humidity) |
| **Anti-Condensation Thickness** | **1.0 mm – 2.0 mm** (Environment: 26°C / 80% RH) |
| **Personnel Protection (Safe Touch)** | **2.0 mm – 4.0 mm** (For substrates up to 200°C) |
| **Operating Temp (Standard Grade)** | Continuous service up to **200°C** |
| **Operating Temp (High-Temp Grade)** | Continuous service up to **400°C** |

| Parameter | Technical Specification / Requirement |
|---|---|
| **Operating Temp (Extreme-Temp Grade)** | Continuous service up to **600°C** |

## 2.2 Health, Safety & Environmental (HSE)

| Category | Compliance & Characteristics |
|---|---|
| **Dust Control** | **100% Dust-free application** (Matrix-bound system) |
| **VOC Content** | **Zero VOC** (100% Water-borne formulation) |
| **Eco-Toxicity*** | LC50 (Zebrafish) > 10,000 mg/l (Eco-friendly) |
| **Skin/Eye Safety** | Non-toxic, non-irritating under standard use. |
| **Sustainability** | Fully inorganic matrix; No harmful outgassing. |

## 2.3 Global Logistics & Transportation

| Transport Mode | Classification / Status |
|---|---|
| **Ocean Freight (IMDG)** | **Non-Hazardous / Non-Restricted** |
| **Air Freight (IATA)** | **Non-Hazardous / Non-Restricted** |
| **Special Handling** | No Hazmat declaration required; Standard cargo. |
| **Storage Life** | 12 months in original sealed container (Keep from freezing). |
| **Standard Packaging** | 20 kg per bucket (Customized industrial packing available). |

**Note: Values marked with an asterisk (*)* represent typical industry performance data and reference values for this specific aerogel formulation.

## Section 3: Global Application Scenarios & Proven Engineering Cases

Hebei Woqin's Aerogel Thermal Insulation Coating is designed to solve complex thermal challenges where traditional insulation is physically or economically unviable. Below are the primary engineering scenarios validated by global industry leaders:

### 3.1 Industrial High-Temperature & Personnel Protection

| Industry Scenario | Specific Use Case & Reference | Aerogel Coating Solution & Performance Result |
|---|---|---|
| **Extreme Temp Valves** | **Leading European chemical plant:** Applied to 510°C main steam valves with highly irregular shapes. | Eliminated thermal bridging; drastic heat loss reduction compared to bulky mineral wool jackets. Zero air gaps. |
| **Personnel Safety (Safe Touch)** | **Major state-owned petrochemical complex:** Applied to 172°C feedwater pumps and complex piping. | Reduced surface temperature to < 60°C with only 2.0mm - 4.0mm coating, ensuring worker safety in confined spaces. |
| **CUI Mitigation** | **Chemical Processing Plants:** Pipes and vessels prone to Corrosion Under Insulation (CUI). | The hydrophobic coating bonds directly to the substrate, eliminating the "gap" where moisture accumulates, permanently halting CUI. |

### 3.2 HVAC, Transit & Anti-Condensation

| Industry Scenario | Specific Use Case & Reference | Aerogel Coating Solution & Performance Result |
|---|---|---|
| **Transit / HVAC** | **North Asia metro system retrofit:** Applied to HVAC air supply grilles in high-humidity zones. | **Zero Condensation** achieved in demanding 26°C / 80% RH environments with just 1.5mm – 2.0mm thickness. |
| **Marine & Offshore** | **Shipbuilding:** Space-constrained chilled water lines and structural bulkheads. | Replaces 25mm–50mm of traditional foam with a few millimeters of aerogel coating, maximizing valuable cabin space while preventing dripping and mold. |

### 3.3 Outdoor Infrastructure & Solar Heat Shield

| Industry Scenario | Specific Use Case & Reference | Aerogel Coating Solution & Performance Result |
|---|---|---|
| **Outdoor Power Grid** | **Substation Electrical Enclosures:** Outdoor cabinet thermal protection. | High solar reflectance (≥ 0.90) and emittance (99.5%) prevented internal overheating and condensation, extending electronic equipment life. |
| **Petrochemical Storage** | **Oil & Chemical Storage Tanks:** High ambient temperatures increasing internal vapor pressure. | Radiant heat barrier reduces the "island effect" and internal temperature, significantly cutting cooling costs and evaporation losses. |

**Technical Support & Verification:** For customized thermodynamic simulations, CUI prevention consulting, or onsite application training, please contact our engineering department.

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