SIO-8161H Waterborne Ultra High Temperature Nano Ceramic Coating

Product Overview:
SIO-8161H is a waterborne, ultra-high temperature resistance (1500°C) nano-silicon ceramic coating engineered with advanced heat-resistant inorganic binders and specialty functional additives. The coating forms a dense and durable protective film with outstanding hardness, extreme temperature resistance, corrosion resistance, weatherability, and abrasion resistance. It can be applied to aluminum, cast aluminum, stainless steel, copper, iron, and phosphated iron surfaces. Standard colors include black and gray, with customized colors available upon request.

Applicable Substrates:
Carbon steel, stainless steel, cast iron, aluminum alloy, titanium alloy, high-temperature alloy steel, microcrystalline glass, and ceramics.
Note: Different substrates exhibit varying thermal expansion coefficients. Depending on the actual service environment, the coating formulation may be adjusted accordingly. Within a certain design range, the thermal expansion behavior of the coating can be tuned to match specific substrates.

Operating Temperature:
SIO-8161H offers exceptional high-temperature resistance, withstanding up to 1500°C (2732°F), and supports continuous long-term operation above 1000°C. Temperature performance may vary slightly depending on substrate type. The coating also demonstrates excellent thermal shock resistance and stability under rapid cold-hot cycling.

Product Features:

1. Safe, environmentally friendly, and non-toxic.
2. Ceramic ensures a dense, smooth, vitrified surface that is both energy-saving and aesthetically pleasing.
3. Special functional nano-composite ceramic coating effectively reduces coking at high temperatures.
4. Dense surface, resistant to salt spray, acids, and alkalis, with hydrophobic properties.
5. Wear-resistant surface (resists 10,000 cycles of scrubbing with 5.5 kg force using scouring pad), hardness 9H, hydrophobic with non-stick properties (water- and oil-based stains are easily wiped).
6. With a coating thickness around 25 μm, it demonstrates high-temperature resistance, excellent thermal shock, and cold-hot resistance.
7. High coating adhesion, excellent waterproof and moisture resistance.
8. Resistant to high-temperature corrosion and thermal shock (no cracking or peeling during service life under temperature fluctuations).

Applications:

1. Boiler components, water walls, boiler pipes, valves, heat exchangers, radiators.
2. Microcrystalline glass, instruments, medical equipment, pharmaceutical devices, bio-genetic equipment.
3. High-temperature devices and sensor components.
4. Metallurgical equipment surfaces, mold surfaces, casting equipment surfaces.
5. Electric heaters, tanks, cabinets.
6. Small household appliances.

7. Fan blades, power plants, chemical plants, and high-temperature metallurgical components.

Coating Data:

- **Color**: Clear, black, and other colors within a certain range
- **Gloss**: Glossy
- **Volume Solids**: 50% ± 3%
- **Typical Thickness**: Dry film 20–40 µm (1.6–2.4 mil), equivalent to wet film 83–125 µm (3.3–5 mil)
- **Theoretical Coverage**: At 50 µm dry film thickness and the stated volume solids, 9.60 m^2/L
- **Practical Coverage**: At 2 mil dry film thickness and the stated volume solids, 385 ft^2/US gallon
- **Spray Method**: Two-coat wet-on-wet process
- **Drying Time**: Bake at 280°C for 15 minutes

Coating Test Data:

Test Item	Technical Requirement	Test Method	Result
Appearance & Film Thickness	Matte white, smooth, uniform; 15–20 µm	Appearance gauge	25 µm
Cross-Cut Test	Use cross-cut knife to create 100 squares on three positions; tape test 3 times, no peeling	Cross-cut tester	Pass (Grade 0)
Alcohol Resistance	Rub industrial alcohol with 1 kg force for 15 s, 15 cycles	Alcohol test	Pass
Abrasion Resistance	Scrub with 5.5 kg force 10,000 cycles	Abrasion tester	Pass
Salt Spray	48 h salt spray, no oxidation or rust	Salt spray test	Pass
Impact Test	Drop 0.3–0.5 kg hammer from 0.5 m, no cracking on surface	Impact hammer	Pass
Chemical Resistance	Rub alcohol, cooking oil, detergent, oyster sauce with 1 kg force for 1 min, rest 30 min; no discoloration or peeling	1 kg force	Pass
Coating Hardness (Cold)	9H pencil, 0.8 mm tip, 5–10 N force, 6.5 mm stroke; no substrate exposed	Pencil scratch tester	9H
Coating Hardness (Hot)	Bake at 120°C for 1 h, then 9H pencil test	Pencil scratch tester	9H
Temperature Resistance	Bake at 850°C for 30 min, no yellowing	High-temp oven	Pass

Application Instructions:

1. Blast the workpiece with ~40 mesh brown steel grit, then remove dust, oil, and clean.
2. Preheat the workpiece to ~40–50°C before spraying.
3. Apply two-coat wet-on-wet process.
4. Maturation: (i) Redisperse Part A on a roller until no sediment (~10 min–2 h); (ii) Mix A:B = 2:1, add all of Part B into colored Part A, roll/mix at 130–150°C for 3–4 h, then store in freezer at ~0°C. Use only required amount, return unused material to freezer.
5. Filter the coating with 300–400 mesh.
6. Substrate preheat: ~40°C during spraying.

7. Baking/Curing: Ambient–120°C for 10 min (surface dry), ramp to 280°C over 10 min, hold at 280°C for 10–15 min.
8. Recommended coating thickness: 20–25 µm.

Net Weight: Standard packaging 20.0 kg per drum.

Storage:
Store sealed away from light, at 5–30°C; shelf life 3 months. After opening, use within 1 month for best results. (Nano-particles have high surface energy and activity, easily agglomerate; dispersants and surface treatments maintain stability for a limited period.)

Special Notes:

1. Ensure the workpiece surface is dry and clean before spraying.
2. Apply coating in a single pass only.