



120 Valley Court
Oak Ridge, TN 37830
Ph: 865-482-5717
FAX: 865-482-1281
zypcoatings.com

Zypcoat HTO

Hafnium Oxide - Titanium Oxide Water-Based Coating

Zypcoat® HTO is a water-based coating of Hafnium Oxide (HfO₂) and Titanium Oxide (TiO₂) blended in the molar ratio 2/3 HfO₂ to 1/3 TiO₂, which allows the formation of a special solid solution of Hf-Ti-O that has the very unique expansion (CTE, coefficient of thermal expansion) property of near zero expansion¹. The Zypcoat HTO (66.7HfO₂ * 33.3TiO₂) leads to a solid solution that is a stable solid to over 2000 C with no polymorphic transformation: the solid solution exhibits electrical resistivity of circa 7x10⁶ Ω-cm². Also, the Zypcoat HTO yields a well-bonded coating when applied to most highly-refractory substrates and is non-reactive with many ceramics and alloys, solid or molten. After heating to 1300 C - 1600 C on an Alumina substrate, the coating is over 97% HfO₂ - TiO₂, with the remainder being Al₂O₃, which is most likely also in solid solution with the Hafnia/Titania.

Key Attributes

- Non-reactivity with many solid or molten metals/alloys
- Use temperature estimated to be 2000 C in all atmospheres
- On heatup to 1300 C - 1600 C, forms unique solid solution of HfO₂ - TiO₂, which has near-zero CTE and high thermal conductivity

Ideal Use

- Very-high-temperature areas
- Aerospace, nuclear, and demanding applications
- Barrier coating to prevent diffusion, reactions, and sticking of parts during heat treating

Use Notes

1. Re-suspend if needed.
2. Use full strength, or dilute as desired with water, Ethyl Alcohol or isopropyl Alcohol.
3. Clean surfaces to be painted of any oils, dirt, scale, etc.
4. Apply a thin layer by brush. If more layers desired, drying at 60-150 C or higher is suggested between layers.
5. Allow to thoroughly dry before use.

Safety Information

- Consult SDS before use.
- Avoid breathing of spray/vapors.
- For Industrial Use only.



Specifications

Active Ingredient	Hafnia, Titania (HfO ₂ , TiO ₂)
Max Use Temperature with All Atmospheres	2000 C (3632 F)
Fired Composition	97% 66.7HfO ₂ * 33.3TiO ₂ , 3% Al ₂ O ₃
Liquid Carrier	Water
Binder Phase	Al ₂ O ₃
Specific Gravity	1.9
Color	White
Shelf Life (months)	>12
Coverage (ft ² /gal)	100 to 400
Coating pH	2-3
H-F-R Ratings	1-1-0
Substrate Use	All

Sizes

Standard Sizes: 8 oz. and 1 pint Nalgene container

References

1. S. R. Skaggs, "Zero and Low Coefficient of Thermal Expansion Polycrystalline Oxides," Report LA-6918-MS, Los Alamos Scientific Laboratory of the University of California, Los Alamos, New Mexico (1977).
2. C. E. Holcombe, M. K. Morrow, D. D. Smith, and D. A. Carpenter, "Survey of Low Expanding High Melting Mixed Oxides," Report Y-1913, Union Carbide Oak Ridge Y-12 Plant, Oak Ridge, Tennessee (1974)

CAUTION: DO NOT CONTACT WET COATINGS WITH MOLTEN METAL.

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