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

Comparison of High Temperature Coatings

VERY HIGH USE TEMPERATURE R&D COATINGS – Comparison of Properties

YTTRIUM OXIDE

Type Y	Water-based, pH 7	Washcoating for all substrates	Most non-reactive coating	Not for Air Inert: 2000 C Vac: 2000 C Vac with C: 1500 C
Y Aerosol	Solvent-based	Low Adherence for all substrates	Easy to apply/dry	OK in Air: 1900 C Inert: 1900 C Vac: 1900 C Vac with C: 1500 C

HAFNIUM-TITANIUM OXIDE, $66.7HfO_2*33.3TiO_2$

Zypcoat HTO	Water-based, pH 2-3	Good Adherence mainly for ceramics	High stability, near-zero CDE	>2000 C all atmospheres

ZIRCONIUM DIOXIDE

Type YSZ	Water-based, pH 2-3	Good Adherence for Ceramics/Metals	Yttria stabilized	Air: 2000 C Inert: 2000 C Vac: 2000 C Vac with C: 1400 C
Type ZO	Water-based, pH 2-3	Good Adherence for all substrates	Calcia stabilized	Air: 1800 C Inert: 1800 C Vac: 1800 C Vac with C: 1400 C
Z Aerosol	Solvent-based	Low Adherence for all substrates	Easy to apply/dry Calcia stabilized	Air: 1900 C Inert: 1900 C Vac: 1900 C Vac with C: 1500 C

YAG, $3Y_2O_3*5Al_2O_3$

Zypcoat YAG	Water-based, pH 3-4	Good Adherence for all substrates	High stability coating	Air: 1700 C Inert: 1700 C Vac: 1700 C Vac with C: 1400 C
YAG Bondcoat	Water-based,pH2-3	High Adherence for all substrates	50% Phosphate bond Less stability, more erosion resistance	Air: 1400 C Inert: 1400 C Vac: 1400 C Vac with C: Not recommended

ALUMINUM OXIDE

Type A1	Water-based, pH 2-3	Good Adherence for all substrates	100% Al_2O_3 coating	Air: 1800 C Inert: 1800 C Vac: 1800 C Vac with C: 1500 C
A Aerosol	Solvent-based	Low Adherence for all substrates	Easy to apply/dry	Air: 1800 C Inert: 1800 C Vac: 1800 C Vac with C: 1500 C

RECENTLY DEVELOPED HIGH-TEMPERATURE COATINGS – Comparison of Properties

(Roughly in order of preference of testing with very reactive materials)

YTTRIA-CALCIUM ZIRCONATE			
Type Y-CZ Water-based, pH 8-9	Good Adherence for all substrates	High stability with very reactive molten metals	>2000 C all atmospheres
CALCIUM ZIRCONATE			
Zypcoat CZO Water-based, pH 2	Good Adherence for all substrates	High stability compound 100% $CaZrO_3$	>2000 C all atmospheres
BARIUM ALUMINUM SILICATE (Celsian)			
Zypcoat BAS Water-based, pH7-8	Good Adherence for all substrates	High stability compound 100% $BaAl_2Si_2O_8$ @>1000 C	>=1650 C all atmospheres
ALUMINA-ZIRCONIA-SILICA			
Zypcoat FZM Water-based, pH2-3	Good Adherence for ceramics	Good with metals, slags, glass 100% FZM	>1650 C all atmospheres
CeraSeal FZM Water-based, pH 2	Excellent Toughness with Alumina and similar CTE ceramics	Dense sealant/surface >75% FZM	1400 C all atmospheres
MAGNESIUM ALUMINATE (Spinel)			
Zypcoat MAO Water-based, pH3-4	Good Adherence for all substrates	Stable with Al-Mg melts and with Ferrous melts 100% $MgAl_2O_4$	1500 C all atmospheres
YTTRIUM PHOSPHATE ($Y_2O_3 – P_2O_5$)			
Zypcoat YPO Water-based, pH 2	Good Adherence for all substrates	>90% YPO_4 Usable with metals, slags, glass	1500 C Air, Inert Vac with C: Not recommended
LANTHANUM PHOSPHATE ($La_2O_3 – P_2O_5$)			
PrimeStop LPO Water-based, pH 3-4	Good Adherence for all substrates	>85% $LaPO_4$ Usable with metals, slags, glass Ideal for molten Al-Li alloys	1500 C Air, Inert Vac with C: Not recommended