

WEARTECH® SHS™ 8000W

Severe Abrasion, Wire Arc Spray

Application Process

THSP-ASW Twin Wire
Arc Spraying

Material Chemistry (wt%)

Chromium	< 22%
Boron	< 5%
Molybdenum	< 5%
Niobium	< 5%
Carbon	< 2%
Manganese	< 1%
Silicon	< 1%
Iron	Balance

Microhardness (HVO .3)

1000-1200 typical

Microhardness (Average)

Elevated Temperature

1030 kg/mm ²	70° F
912 kg/mm ²	300° F
620 kg/mm ²	600° F
309 kg/mm ²	1200° F
117 kg/mm ²	1400° F

Wear Resistance

ASTM G65-04 Procedure B
2,000 cycles
Typical mass loss 0.18 g

Elevated Temp Erosion

Using coal fired boiler fly ash
for 20 min at 30° impact angle
(α) at 1200° F

volume loss (mm³)
 $\alpha = 30^\circ$

SHS8000W	1.50
Competitor 1	3.05
1018 steel plate	8.47

Bond Strength

ASTM C633-01
8 ksi (55MPa) typical

Coating Description

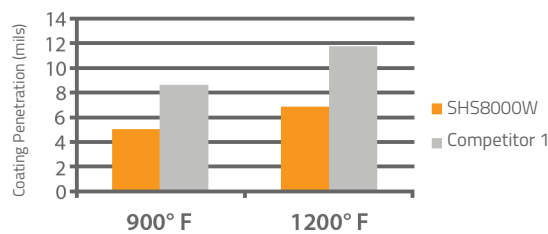
SHS8000W is a glass forming iron based alloy that forms a nanocomposite comprised of a mixed amorphous and nanoscale microstructure when sprayed as a coating. SHS8000W features high wear resistance, elevated temperature erosion resistance and a unique high hardness/toughness combination.

Key Performance Characteristics

- Excels in elevated temperature environments where fly ash and bed ash erosion occurs
- Superior bond strength without necessity of bond coat
- Excellent abrasion resistance
- Hardness increases as a function of time and temperature

SHS8000W coatings exhibit excellent combinations of corrosion and wear resistance, superior bond strength and high impact resistance. Superior bond strength values signify that this material has exceptional adhesion and cohesion. This also highlights the material's extremely low residual stress (even at high thicknesses) inherent in this coating type. The probability of "pull-out" of individual particles during wear, erosion and other service conditions is extremely low. Low coating permeability results in a highly corrosion resistant barrier. Low oxide content contributes to high bond strength due to the very limited presence of internal voids and other defects. These characteristics provide predictable coating performance across a broad variety of service environments. SHS8000W is especially resistant to elevated temperature oxidation, erosion and corrosion for protecting boiler tubes in coal fired boilers.

High Temperature Erosion
Bituminous Coal Ash



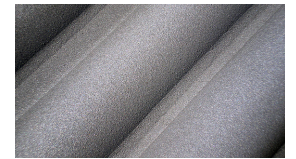
Elevated Temperature Erosion Resistance

SHS8000W combines erosion with high hardness in elevated temperature environments where fly ash and bed ash erosion occurs. Based on results from aggressive accelerated elevated temperature erosion tests with highly erosive fly ash from a coal fired boiler at 30° and 90° impact angles, SHS8000W coatings can provide increased lifetime over carbon steel substrate and leading industry standard protective coatings.

Industrial Uses

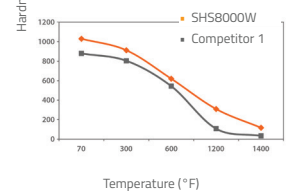
Power Generation
Oil & Gas

Power Industry Application



SHS8000W coatings can increase boiler tube service lifetime

Elevated Temperature Microhardness



SHS8000W excels in elevated temperature environments

WEARTECH® SHS™ 8000W

Severe Abrasion, Wire Arc Spray

Coating Properties

Density (g/cm ³)	7.30
Porosity/Oxides	< 5%
Coefficient of Friction	0.316
Thermal Expansion	
Temperature	Slope
100-500° C	8.53
Thermal Conductivity	
Temperature	(W/mK)
23° C	4.280
50° C	4.678
75° C	5.055
100° C	5.269
125° C	5.505
150° C	5.707

Impact Resistance

Drop Impact Testing:
No delamination/cracking
at 480 in-lbs

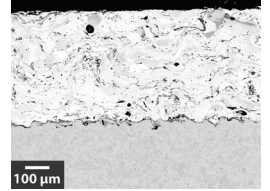
Impact Resistance

Impact testing on SHS8000W coatings was performed using a Gardner Impact testing machine with a 12 lb. test weight and 0.5 in. diameter impact punch dropped from 40 in height. As-sprayed and heat-treated (one hour soak at 600° C, water quenched) coatings of 0.020 in. thickness were tested. The as-sprayed and heat-treated coatings survived 480 in-lbs impact and demonstrated the ability to deform with the substrate without chipping, cracking or delaminating.

Universal Applicability

When SHS8000W is sprayed directly onto substrate alloys using conventional twin wire thermal spray equipment and standard substrate preparation practices, and without a bond coat, extremely high bond strength is achieved. In ASTM C633-01 Adhesion/Cohesion Bond Strength Tests, extremely high bond strength is achieved for SHS8000W coatings on plain carbon steel, far exceeding bond strength of conventional coating materials.

SEM Micrograph



SEM micrograph of SHS8000W coating on a mild substrate

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