WEARTECH® SHS™7570W

Abrasion & Corrosion Resistance, Wire Arc Spray

Application Process

THSB-ASP Twin Wire Arc Spraying

Material Chemistry (wt%)

Chromium	< 25%
Molybdenum	< 15%
Boron	< 5%
Tungsten	< 5%
Carbon	< 2%
Manganese	< 2%
Silicon	< 2%
Iron	Balance

Microhardness (HVO .3)

950 - 1150 kg/mm²

Wear Resistance

ASTM G65-04 Procedure B

Typical mass loss 0.20 g

Bond Strength

ASTM C633-01

8 ksi (55 MPa) typical

Coating Properties

Density (g/cm³)	7.59
Porosity/Oxides	< 5%

Impact Resistance

Drop Impact Testing:

No delamination/cracking at 480 in-lbs

Coating Description

SHS7570W is an iron based steel alloy with a nanoscale microstructure that features exceptional combined wear, impact and corrosion resistance in high chlorine, salt fog, concentrated salt and seawater environments.

Key Performance Characteristics

- Excellent corrosion resistance and high wear and impact resistance
- Especially resistant to corrosion in high chloride and seawater
- Alternative to nickel superalloys and stainless steels
- Cost-effective option for rebuilding worn out components and parts

SHS7570W coatings exhibit excellent corrosion resistance, high wear resistance, high impact resistance and superior bond strength. Superior bond strength values of these coatings signify that this material has exceptional adhesion and cohesion. High adhesion values highlight the extremely low residual stress (even at high thicknesses) that is an inherent factor in this coating type. High cohesion values mean that the probability of "pull-out" of individual particles is extremely low during wear, erosion and other service conditions. Low porosity means low coating permeability, resulting in a highly corrosion resistant barrier. Low oxide content is another key ingredient contributing to the high bond strength of SHS7570W 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. SHS7570W develops extreme passive film stability at a range of pH in both oxidizing and reducing environments. SHS7570W is especially resistant to corrosion in high chlorine and seawater environments, making it a viable alternative that offers significantly better wear performance than nickel superalloys and stainless steels.

Excellent Corrosion Resistance

SHS7570W forms a nearly perfect metallic glass coating. In the X-ray diffraction diagram to the right, the broad amorphous hump and almost complete lack of Bragg diffraction peaks indicates that the as-sprayed SHS7570W coating structure is primarily a metallic glass, representing the ultimate in uniformity. This extreme, almost atomic-level homogeneity makes it very difficult for the electrochemical system to set up specific sites for anodic attack. Simultaneously, the chemistry of SHS7570W has been optimized so that an extremely stable passive protective oxide layer forms in a wide range of both oxidizing and reducing environments. The combined approach of optimizing the passive film stability and the extreme refinement of the coating microstructure results in high corrosion resistance in a variety of environments, including seawater.

Industrial Uses

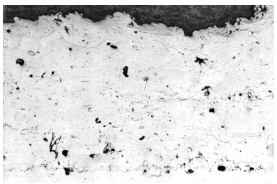
Power Generation

Oil & Gas

Corrosion Resistance

SHS7570W coating resisted corrosion for two years on the hull of an Alaskan ice breaker tugboat

Coating Microstructure



Optical micrograph at 100x of a typical SHS7570W coating

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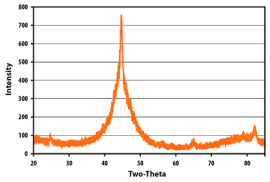
Damage Tolerance

SHS7570W coatings exhibit excellent corrosion resistance in seawater solutions and salt fog environments. SHS7570W coatings are also hard (HV300 950 - 1150 kg/mm² HVO .3) and wear resistant, with properties superior to other high corrosion materials such as nickel superalloys and stainless steels. This allows SHS7570W to exhibit damage tolerance in a wide variety of conditions. Since the majority of material failures occur at the surface from damage due to wear/abrasion, corrosive attack or the creation of defects leading to fatigue crack initiation, applying SHS7570W to the surfaces of parts, devices and machines will vastly extend service lifetime, reduce total ownership costs and spawn entirely new material applications in demanding environments and in ways previously not possible.

X-Ray Diffraction Diagram



The broad amorphous hump is indication that the as-sprayed SHS7570W coating structure is a metallic glass

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WEARTECH® SHS® 7570W

Severe Abrasion

KEY FEATURES

- Excellent corrosion resistance and high wear and impact resistance
- Especially resistant to corrosion in high chloride and seawater
- Alternative to nickel and superalloys and stainless steels

TYPICAL APPLICATIONS

- Oil & Gas
- Power Generation
- Pulp & Paper

Diameter in (mm)	25 lb (11.3 kg) Spool PLW
1/16 (1.6)	W7570-160X11 (ED035664*)

** EDO numbers have been discontinued and replaced by the Weartech part numbers for the cross selling program.*

MECHANICAL PROPERTIES

Vickers Hardness (HV0.3)	Wear Resistance	Bond Strength ksi (MPa)
950-1150	ASTM G65-04 Procedure B 0.20 g mass loss	ASTM C633-01 Glue Failure 8 (55)

DEPOSIT COMPOSITION

%Fe	%C	%Cr	%B	%Mo	%W	%Mn	%Si
Balance	<2	<25	<5	<15	<5	<2	<2

TYPICAL OPERATING PROCEDURES

Tip Size in (mm)	Air Cap	Positioner	Amperes (Amps)	Voltage (V)	Air Motor (psi)	Atomizing Air (psi)	Arc Jet Air (psi)	Transverse Rate in/min (m/min)	Standoff in (mm)
1/16 (1.6)	Blue	Short Cross	200	32	50	70	80	276 (7)	6 (152)

** This procedure was developed on a TAFA 8830/8835 system. Changes in equipment, materials, and substrates may change optimum procedures. Listed procedures should only be used as a starting point.*

IMPORTANT: SPECIAL VENTILATION AND/OR EXHAUST REQUIRED

Fumes from the normal use of some welding products can contain significant quantities of components - such as chromium and manganese - which can lower the 5.0 mg/m³ maximum exposure guideline for general welding fume.

BEFORE USE, READ AND UNDERSTAND THE SAFETY DATA SHEET (SDS) FOR THIS PRODUCT AND SPECIFIC INFORMATION PRINTED ON THE PRODUCT CONTAINER.

Material Safety Data Sheets (MSDS) and Certificates of Conformance are available on our website at www.lincolnelectric.com

TEST RESULTS

Test results for mechanical properties, deposit or electrode composition and diffusible hydrogen levels were obtained from a weld produced and tested according to prescribed standards, and should not be assumed to be the expected results in a particular application or weldment. Actual results will vary depending on many factors, including, but not limited to, weld procedure, plate chemistry and temperature, weldment design and fabrication methods. Users are cautioned to confirm by qualification testing, or other appropriate means, the suitability of any welding consumable and procedure before use in the intended application.

CUSTOMER ASSISTANCE POLICY

The Lincoln Electric Company is manufacturing and selling high quality welding equipment, consumables, and cutting equipment. Our challenge is to meet the needs of our customers and to exceed their expectations. On occasion, purchasers may ask Lincoln Electric for information or advice about their use of our products. Our employees respond to inquiries to the best of their ability based on information provided to them by the customers and the knowledge they may have concerning the application. Our employees, however, are not in a position to verify the information provided or to evaluate the engineering requirements for the particular weldment. Accordingly, Lincoln Electric does not warrant or guarantee or assume any liability with respect to such information or advice. Moreover, the provision of such information or advice does not create, expand, or alter any warranty on our products. Any express or implied warranty that might arise from the information or advice, including any implied warranty of merchantability or any warranty of fitness for any customers' particular purpose is specifically disclaimed.

Lincoln Electric is a responsive manufacturer, but the selection and use of specific products sold by Lincoln Electric is solely within the control of, and remains the sole responsibility of the customer. Many variables beyond the control of Lincoln Electric affect the results obtained in applying these types of fabrication methods and service requirements.

Subject to Change – This information is accurate to the best of our knowledge at the time of printing. Please refer to www.lincolnelectric.com for any updated information.

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