

WEARTECH[®] SHS[™] 9800U

Severe Abrasion, Flux-Cored (FCAW-S) Wire

Application Process

FCAW-S/GMAW-C

Weld Overlay for Hardfacing

Material Chemistry (wt%)

Chromium	< 21%
Boron	< 7%
Molybdenum	< 6%
Niobium	< 6%
Carbon	< 2%
Manganese	< 2%
Silicon	< 2%
Iron	Balance

Rockwell C (HRC) Hardness

68 - 71 HRC

Wear Resistance

ASTM G65-04 Procedure A

Typical 0.12g mass loss

Weld Deposit Properties

Density (g/cm³) 7.36

Impact Resistance

Drop Impact Testing:

Passed multiple impacts

at 165 ft-lbs

Overlay Description

SHS9800U is an iron based steel alloy with a near nanoscale (submicron) microstructure that includes chromium, molybdenum and niobium in the material chemistry, resulting in an overlay wear solution well suited for the toughest jobs in the most extreme service environments.

Key Performance Characteristics

- 68 - 71 HRC single and double pass weld deposits
- Exceptional resistance to severe sliding abrasion
- Provides longer lasting wear life than most chrome carbide and complex carbide alloys
- Improved impact resistance results from complex borocarbide phases surrounded by ductile phases that form during welding

SHS9800U is a multicomponent steel alloy with a unique uniform glass-forming melt chemistry that allows high undercooling to be achieved during welding. This results in considerable refinement of the crystalline microstructure down to a near nanosize (submicron) range. Unlike conventional weld overlay materials which are macrocomposites containing hard particles and general carbides in a binder, the refined microstructure of SHS9800U does not incorporate distinct hard particles in a binder and is a uniformly hard matrix when welded. This allows SHS9800U to provide vastly improved hardness and wear resistance that lasts significantly longer than conventional macrocomposites. Additionally, SHS9800U is an iron-based alloy without tungsten carbide particulates.

High Hardness

SHS9800U maintains maximum hardness performance of 68 - 71 HRC from the weld interface throughout the entire overlay in single pass applications allowing the overlay to be fully protective throughout the volume.

High Wear Resistance

SHS9800U weld deposits should be limited to two layers maximum for most applications. Both single and double layers provide exceptional wear resistance of typical 0.12 g mass loss in ASTM G65-04 dry sand rubber wheel abrasion tests.

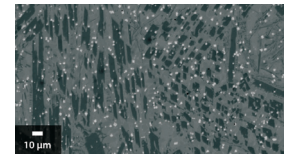
Damage Tolerance

The superior toughness of SHS9800U occurs from the in-situ formation of high-volume fraction of refined complex borocarbide phases during welding which are surrounded by ductile phases. The borocarbide phases, which form during solidification, are completely wetted by the matrix and prevent premature pull-out, delamination and crack nucleation. The refined nature of the borocarbide phases allows the reduction of stress concentration sites and the ductile matrix supplies effective crack blunting and bridging, resulting in improved impact resistance.

Industrial Uses

Mining

Structure



SHS9800U features a near nanoscale microstructure with grain sizes less than 400 nm

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.

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WEARTECH® SHS® 9800U

Severe Abrasion

KEY FEATURES

- Exceptional resistance to severe sliding abrasion
- Provides longer lasting wear life than most chrome carbide and complex carbide alloys
- Improved impact resistance results from complex borocarbide phases surrounded by ductile phases that form during welding
- Limited to 2 layers max

TYPICAL APPLICATIONS

- Wearplate
- ID Clad Pipe
- Slurry Transport
- Crusher Rolls
- Ore Chutes
- Screw Augers

DIAMETERS / PACKAGING

Diameter in (mm)	25 lb (11.3 kg) Spool	25 lb (11.3 kg) Spool PLW	33 lb (15 kg) Spool	33 lb (15 kg) Spool PLW	50 lb (22.7 kg) Fiber Spool PLW
0.045 (1.1)	ED035649	ED035650	ED035647	ED035648	ED035858
1/16 (1.6)					
3/32 (2.4)					
7/64 (2.8)					
Diameter in (mm)	55 lb (25 kg) Coil	280 lb (127 kg) Speed Feed Drum	400 lb (227 kg) Speed Feed Drum	500 lb (227 kg) Speed Feed Drum	
0.045 (1.1)	ED035646 ED035645	ED035973	ED035859	ED035860 ED035924	
1/16 (1.6)					
3/32 (2.4)					
7/64 (2.8)					

MECHANICAL PROPERTIES⁽¹⁾

Rockwell Hardness (R _c)	Wear Resistance
68-71	ASTM G65-04 Procedure A 0.12 g mass loss

DEPOSIT COMPOSITION⁽¹⁾

	%Fe	%C	%Cr	%B		
Requirements	Balance	<2	<21	<7		
	%Mo	%Nb	%Al	%Mn	%Si	
Requirements	<6	<6	<5	<2	<2	

TYPICAL OPERATING PROCEDURES

Diameter, Polarity ESO - in (mm)	Current (Amps)	Voltage (Volts)	Wire Feed Speed m/min (ipm)	Shielding Gas	Flow Rate (cfh)
0.045 in (1.1mm), DC+ ½ - ¾ (15) GMAW-C ¾ - 1 (20) FCAW-S	~135	24	7.0 (275)	75 Ar - 25 CO ₂	35 - 45
1/16 in (1.6mm), DC+ ½ - ¾ (15) GMAW-C ¾ - 1 (20) FCAW-S	~220	24	7.0 (275)	75 Ar - 25 CO ₂	45 - 60
3/32 in (2.4mm), DC+ ¾ - 1 (20) GMAW-C ¾ - 1.25 (25) FCAW-S	~375	25	7.0 (275)	75 Ar - 25 CO ₂	55 - 70
7/64 in (2.8mm), DC+ ¾ - 1 (20) GMAW-C 1 - 1¼ (40) FCAW-S	~450	26	5.7 (225)	75 Ar - 25 CO ₂	60 - 80

⁽¹⁾ Composition and properties depend upon dilution. Single layer deposit properties depend upon base metal and/or build-up material.

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/m ³ maximum exposure guideline for general welding fume.
BEFORE USE, READ AND UNDERSTAND THE MATERIAL SAFETY DATA SHEET (MSDS) 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.

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