



IntegriMat
Engineered Materials. Integrated Solution.

IntegriMat Inc.

Tungsten Carbide Wear Engineering Division

IntegriClad™ Flexible Welding Rope Series

*NiCrBSi-based self-fluxing matrix with controlled carbide architecture
for extreme wear applications*



**Designed for oxy-acetylene hardfacing of components exposed to severe abrasion,
erosion, and corrosion.**

**IntegriClad™
Edge**

IntegriClad™ Edge

Crushed Cast
Tungsten Carbide

**IntegriClad™
Spher**

IntegriClad™ Spher

Spherical Fused
Tungsten Carbide

**IntegriClad™
Hybrid**

IntegriClad™ Hybrid

Engineered Blend of
spherical and crushed
cast tungsten carbide.



IntegriClad™ Flexible Welding Rope Series

Technical Overview & Material System

■ GENERAL DESCRIPTION

IntegriClad™ flexible welding ropes are nickel-based composite hardfacing materials reinforced with tungsten carbide particles. The system is designed for oxy-acetylene application, providing a combination of high wear resistance and good metallurgical bonding with steel substrates.

The IntegriClad™ product family comprises three carbide architectures—Edge (crushed cast tungsten carbide), Spher (spherical fused tungsten carbide), and Hybrid (combined carbide system)—allowing the selection of the optimum solution for different wear conditions.

The nickel-based self-fluxing matrix ensures good wetting, controlled dilution, and dense deposits with minimal porosity.

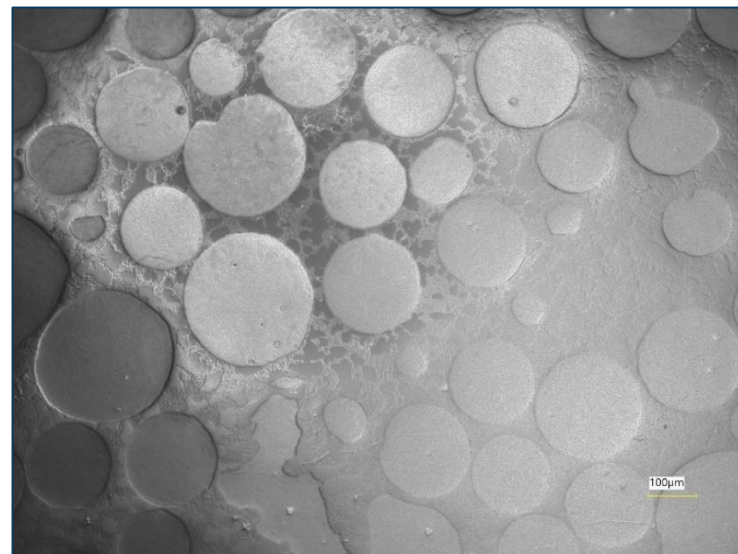


Figure 1. Typical carbide distribution in the nickel-based matrix (IntegriClad™ Spher).

■ KEY TECHNICAL DATA

Property	Value
Matrix	NiCrBSi self-fluxing alloy system
Carbide Type	CTC / SFTC / hybrid (CTC +SFTC)
Carbide Content	65%
Weld Deposit Density	12.7 g/cm ³
Matrix Hardness (HV0.1)	~425–470 HV
Carbide Hardness (HV0.1)	2100–3100 HV
Overall Deposit Hardness	50-63 HRC
Service Temp.	≤ 500°C
Recommended Process	Oxy-acetylene



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INDUSTRIAL APPLICATIONS

IntegriClad™ flexible welding ropes deliver superior wear resistance in demanding industrial applications, including stabilizers, augers, decanter screws, and mixer blades, ensuring extended service life under abrasive and erosive conditions.



Oil & Gas



Manufacturing



Aerospace



Mining



Energy & Power Generation



Construction & Structural Steel



Heavy Equipment
& Machinery



Metal Fabrication
& Welding



Maintenance & Inspection Services

Mining mixer paddles protected using IntegriClad™ Hybrid hardfacing technology.

Representative industries served by IntegriClad™ welding rope systems.

PRODUCT DELIVERY FORMAT

Available in industrial spool configurations for convenient storage, transportation, and application.



✓ 5kg / Plastic Spool D300



✓ 15kg / Wooden Spool D400

Standard Supply Options

Rope diameters: Ø4, Ø5, Ø6, Ø8 mm

Standard spool weights: 5 kg and 15 kg

Carbide Content Packaging: Plastic (D300) or Wooden (D400)

Customization: Custom packaging and Spool configurations available upon request.



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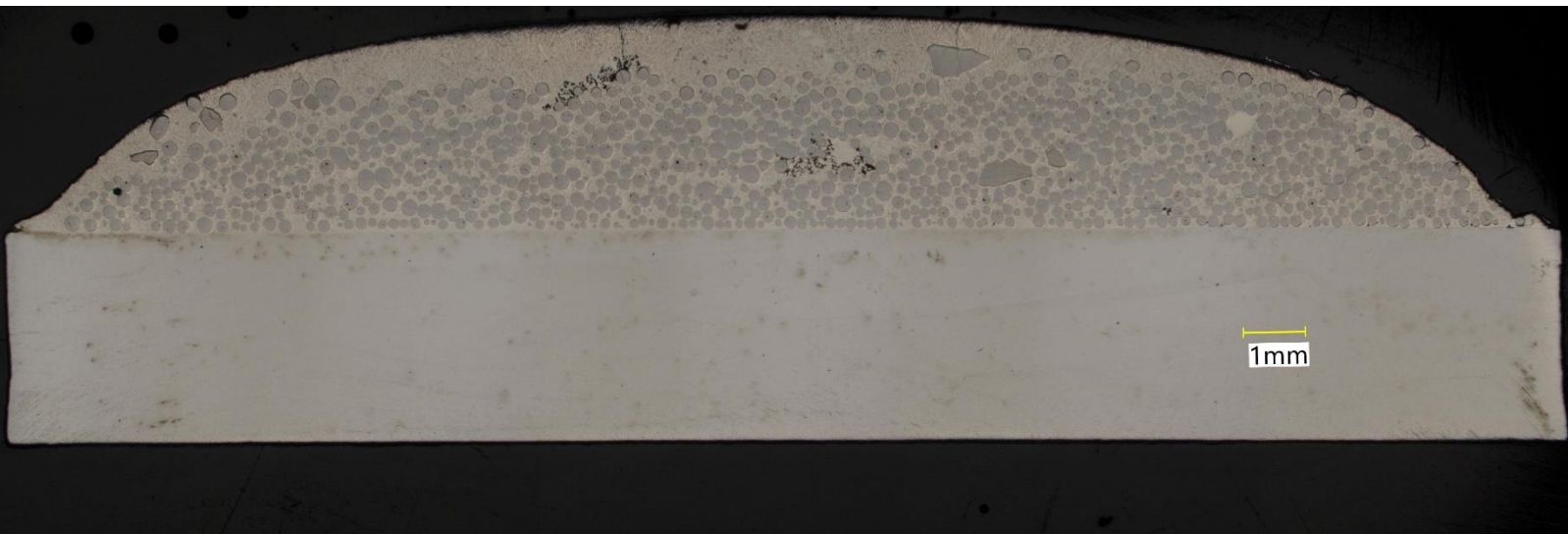
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■ ENGINEERING VALIDATION & MICROSTRUCTURAL ANALYSIS

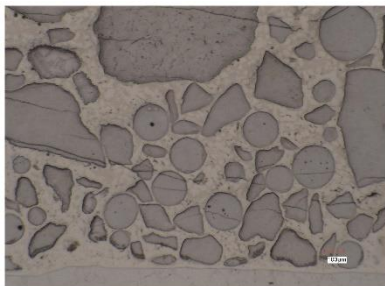
The performance of IntegriClad™ flexible welding ropes has been validated through metallographic analysis and cross-sectional examination of deposited overlays. Cross-sectional analysis demonstrates uniform carbide distribution, sound metallurgical bonding, controlled dilution, and low porosity, thereby confirming the integrity and consistency of the deposited wear-resistant layer.



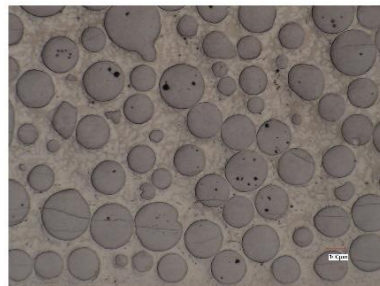
IntegriClad™ welding rope, Ni-based bonding powder layer, and deposited overlay sample prior to metallographic preparation.



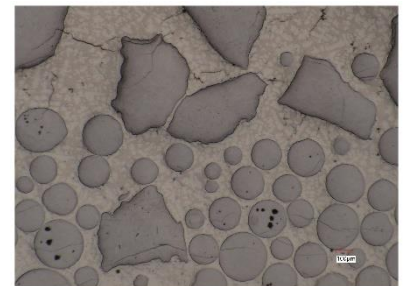
Cross-sectional macrograph showing sound metallurgical bonding, controlled dilution, and a low-porosity wear-resistant overlay of IntegriClad™ Spher.



IntegriClad™ Edge microstructure



IntegriClad™ Spher microstructure



IntegriClad™ hybrid microstructure



■ TECHNICAL SPECIFICATIONS & MATERIAL SYSTEM

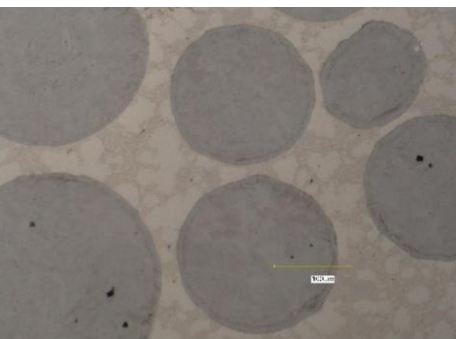
IntegriClad™ engineered welding ropes for wear-resistant hardfacing applications

Property	IntegriClad™ Edge	IntegriClad™ Spher	IntegriClad™ Hybrid
Carbide Type	Crushed Cast WC	Spherical Fused WC	Blend (75% Crushed Cast WC + 25% Spherical Fused WC)
Carbide Hardness	2100–2500 HV0.1	2600–3100 HV0.1	75% Crushed Cast WC (2100–2500 HV0.1) + 25% Spherical Fused WC (2600–3100 HV0.1)
Wear Behavior	High abrasion resistance, economical	Extreme wear resistance	Balanced wear + toughness

■ ROPE DIAMETER & DEPOSITION RANGE

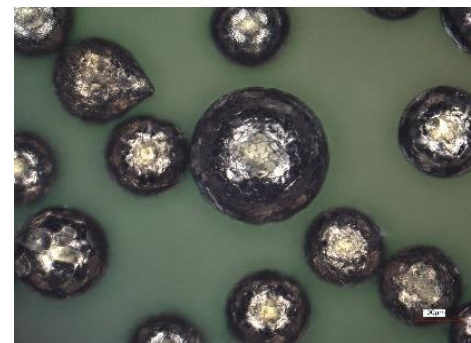
Rope Diameter (mm)		Ø4	Ø5	Ø6	Ø8
Typical Carbide Size (mm)	IntegriClad™ Edge	0.1–0.6	0.1–0.7	0.1–0.7	0.1–0.8
	IntegriClad™ Spher	0.1–0.4	0.1–0.4	0.1–0.4	0.1–0.4
Typical Overlay Thickness (mm)		2–4	3–6	4–8	5–10
Recommended Use		Precision hardfacing, thin overlays, repair of small components	General-purpose wear protection, medium-duty applications	Heavy-duty hardfacing, larger components, higher deposition rate	Severe wear protection, mining, crushers, large wear parts

Nominal Deposit Composition is standardized for all IntegriClad™ welding rope grades, with tungsten (W), nickel (Ni), chromium (Cr), and carbon (C) contents maintained at the specified levels.



Cross-sectional micrograph of an IntegriClad™ Spher deposited overlay

Element	Composition (wt.%)
W	Balance
Ni	25-30
Cr	5.0-8.0
C	3.8-4.0



Spherical fused tungsten carbide particles

Spherical fused tungsten carbide particles produced by induction spheroidization, providing excellent sphericity, flowability, and uniform distribution throughout the deposited overlay.



Oxy-Acetylene Hardfacing Process – Technical Guidelines

Recommended procedures for achieving optimum metallurgical bonding, maximum wear resistance, and reliable service performance using oxy-acetylene hardfacing.

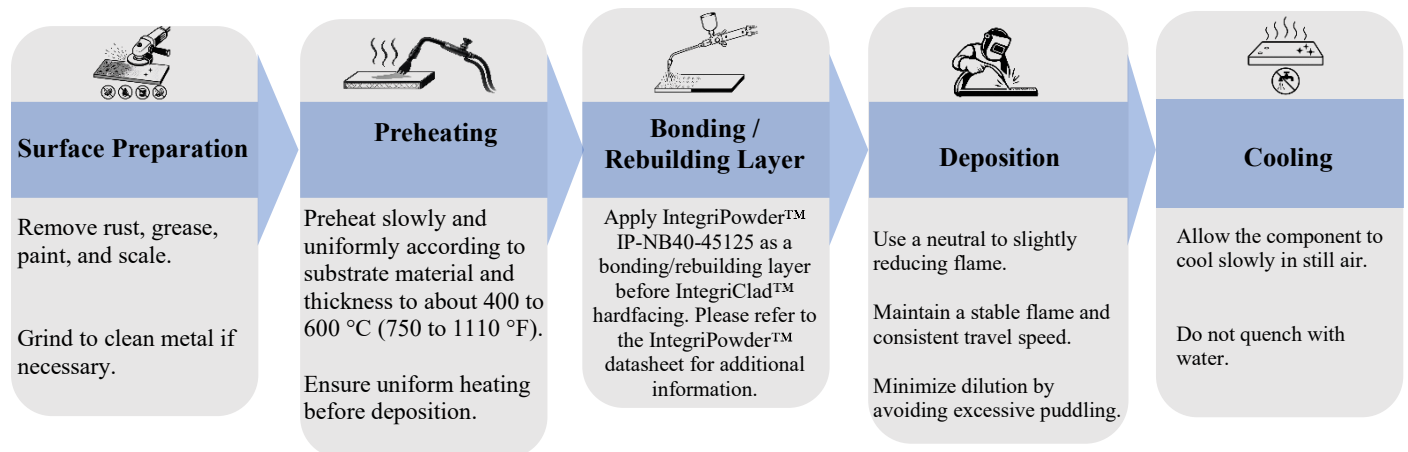
- Ni-based matrix and excellent wetting characteristics
- low welding temperature of approximately 950–1050 °C (1740–1920 °F).
- Controlled carbide retention
- Smooth, low-porosity deposits
- Low heat input minimizes dilution
- Suitable for field and workshop repairs

Recommended welding parameters

Parameter	Recommended Value	Notes
Carrier Gas	Oxygen	Standard oxidizer
Carrier Gas Pressure	5 – 7 bar (70 – 100 psi)	Stable flame control
Fuel Gas	Acetylene	Neutral to slightly reducing flame
Fuel Gas Pressure	0.7 – 1.0 bar (10 – 14 psi)	Avoid excess carburization
Nozzle Size	6 – 9 mm	Based on rope diameter

Welding Procedure

Follow the recommended procedure below to achieve optimum bonding, maximum wear resistance, and superior overlay quality using oxy-acetylene hardfacing.



Safety Guidelines

Personal Protective Equipment

- Welding helmet with appropriate shade
- Heat-resistant gloves
- Protective clothing
- Safety footwear
- Eye protection
- Respiratory protection where ventilation is insufficient

Safe Working Practices

- Work in a well-ventilated area.
- Keep flammable materials away from the welding zone.
- Handle hot workpieces with appropriate tools.
- Follow local welding safety regulations.

Best Practices

- ✓ After cleaning and preheating, apply IntegriPowder™ IP-NB40-45125 as a bonding/rebuilding layer to enhance metallurgical bonding and minimize surface oxidation before IntegriClad™ hardfacing.
- ✓ Use multiple layers when additional thickness is required.
- ✓ Avoid excessive heat input to preserve carbide integrity.
- ✓ Store welding ropes in a clean, dry environment.
- ✓ Grind only if dimensional tolerance requires it. Deposits

Engineering Note

Welding parameters including preheat temperature, flame adjustment, travel speed, and overlay thickness should be selected according to the substrate material, component geometry, and service conditions. For application-specific recommendations, please contact the IntegriMat Engineering Team.



Engineered Wear Protection

IntegriClad™ welding ropes provide high wear resistance through a controlled carbide–Ni matrix system. The structure ensures strong metallurgical bonding, low dilution, and stable deposition behavior. Optimized for abrasion, erosion, and moderate impact in industrial environments.



Industrial Applications

IntegriClad™ products are used in mining, oil & gas, cement, steel, energy, and heavy equipment industries. Suitable for wear parts, material handling systems, and maintenance applications requiring long service life and reliability.



Quality Assurance

Produced under controlled conditions to ensure consistent carbide distribution and stable matrix composition. The process provides uniform overlays with controlled dilution and reliable bonding to the substrate.

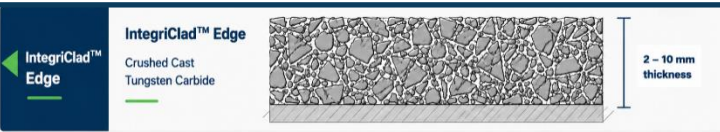


Production Consistency

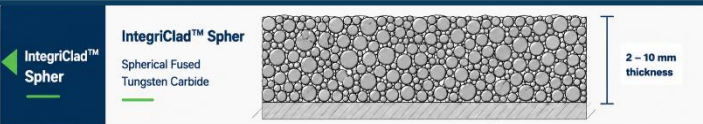
Each batch is manufactured with controlled carbide morphology and a stable Ni-based binder system. This ensures repeatable structure, consistent deposition behavior, and uniform wear performance across all rope types and diameters.



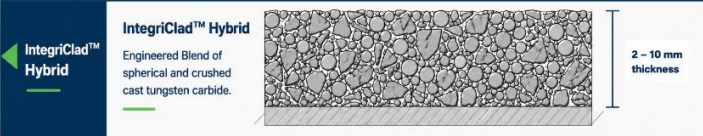
Ordering Information & Product Codes



Product Name	Order No.	Standard Package	Rope Diameter (mm)	Carbide Particle Size (mm)
IntegriClad™ Edge	IC-ED-04-A	5 kg/ 15 kg	4	0.1-0.6
	IC-ED-05-B	5 kg/ 15 kg	5	0.1-0.7
	IC-ED-06-B	5 kg/ 15 kg	6	0.1-0.7
	IC-ED-08-C	5 kg/ 15 kg	8	0.1-0.8



Product Name	Order No.	Standard Package	Rope Diameter (mm)	Carbide Particle Size (mm)
IntegriClad™ Spher	IC-SP-04-S	5 kg/ 15 kg	4	0.1-0.4
	IC-SP-05-S	5 kg/ 15 kg	5	0.1-0.4
	IC-SP-06-S	5 kg/ 15 kg	6	0.1-0.4
	IC-SP-08-S	5 kg/ 15 kg	8	0.1-0.4



Product Name	Order No.	Standard Package	Rope Diameter (mm)	Carbide Particle Size (mm)
IntegriClad™ Hybrid	IC-HY-04-A	5 kg/ 15 kg	4	0.1-0.6
	IC-HY-05-B	5 kg/ 15 kg	5	0.1-0.7
	IC-HY-06-B	5 kg/ 15 kg	6	0.1-0.7
	IC-HY-08-C	5 kg/ 15 kg	8	0.1-0.8

PRODUCT CODE EXPLANATION

IC - XX - DD - Y

IC	= IntegriClad
XX	= Product Architecture ED (Edge) / SP (Spher) / HY (Hybrid)
DD	= Rope Diameter (mm) 04 / 05 / 06 / 08
Y	= Carbide Grade A (0.1-0.6) / B (0.1-0.7) / C (0.1-0.8) / S (0.1-0.4)

PACKAGING



- Standard packages: 5 kg & 15 kg
- Plastic spool (D300)
- Wooden spool (D400)
- Custom packaging available upon request



ORDERING NOTE

All products are manufactured under strict quality control to ensure consistent carbide distribution, stable deposition behavior, and reliable metallurgical bonding. Performance may vary depending on substrate condition, component geometry, and welding parameters.