

DUROXITE[®]

THE LATEST IN OVERLAY TECHNOLOGY

PLATE - PIN - PIPE



DUROXITE® FIGHTS WEAR, GUARANTEED

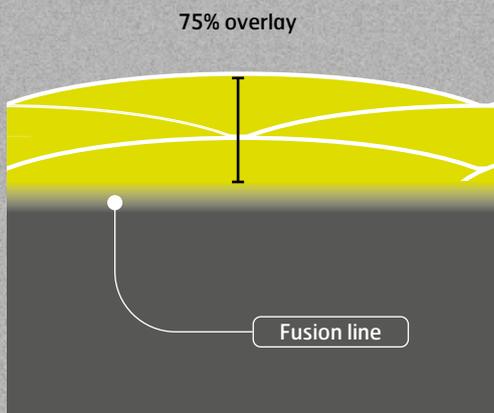
Duroxite® overlay products can add weeks, months, even years of trouble-free operations to your most extreme wear situations.

The Duroxite® product range is targeted at different types of wear, such as abrasion, impact, heat, metal-to-metal and erosion wear. Duroxite® is particularly well suited to fighting sliding wear from exceptionally hard particles such as minerals containing quartz.

By welding chromium or complex carbides, or other abrasion-resistant materials on top of mild or quenched and tempered steel, an extremely wear-resistant compound material is created.

The overlay surface is characterized by transverse (across the weld beads) cracks that form naturally to relieve residual stress in the plate during welding. The transverse cracks in Duroxite® overlay plates are controlled to form a staggered cracking pattern which improves bendability. The transverse cracks stop at the base metal and will not propagate further.

GUARANTEED OVERLAY THICKNESS, GUARANTEED OVERLAY PROPERTIES



Duroxite® overlay plates and pipes are delivered with an overlay thickness guaranteed within $\pm 10\%$. This is consistent throughout the material and between individual plates and pipes.

The wear properties of Duroxite® are also guaranteed throughout the overlay down to 75% of the overlay thickness.

The remaining 25% of overlay is the transition layer necessary to maintain good bonding to the base material.



DUROXITE®

Duroxite® is delivered as plate, pipe, pin, wire and electrodes, ready for installation on your equipment or for fabrication, maintenance and repairs in your workshop or on site.

DUROXITE® EMPOWERS YOUR INDUSTRY

The performance of Duroxite® saves money and improves productivity in a wide range of applications through higher output and less maintenance.

Duroxite® overlay is the natural choice for industries active in quarries, mining, cement, energy, steel mills, recycling and many other areas where abrasive materials require extremely hard surfaces.

QUARRIES



AGRICULTURE



CEMENT



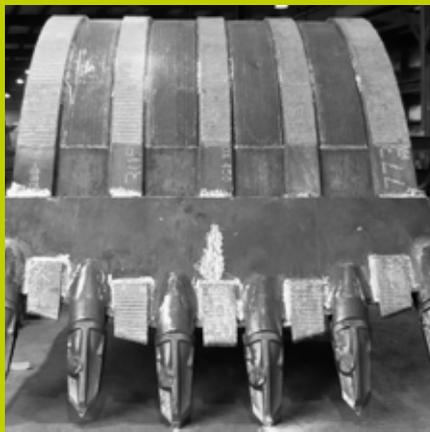
CONCRETE



CONSTRUCTION



MINING



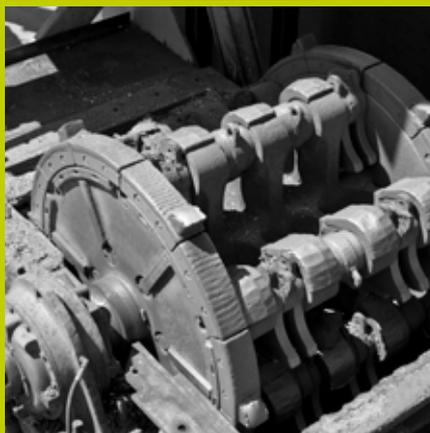
OIL SANDS



POWER



RECYCLING



STEELMAKING



OVERLAY PRODUCTS

PLATE								
		SLIDING WEAR	SEVERE SLIDING WEAR					
		DUROXITE® 100	DUROXITE® 101 HARDOX® BASE PLATE	DUROXITE® 200	DUROXITE® 201 HARDOX® BASE PLATE			
PRODUCT DESCRIPTION	<p>A chromium-rich overlay deposited on a mild steel backing plate for sliding wear and moderate to low impact applications up to 350 °C (660 °F)</p>		<p>A chromium-rich overlay deposited on Hardox® 450 base plate.</p>		<p>A complex carbide overlay deposited on a mild steel backing plate for severe sliding wear and moderate impact applications up to 600 °C (1100 °F).</p>		<p>A complex carbide overlay deposited on Hardox® 450 base plate.</p>	
PROPERTIES	<p>Bulk hardness: Single pass 55-57 HRC, double pass 59-62 HRC, triple plus passes 60-64 HRC</p> <p>Carbide hardness: 1700 HK</p> <p>Volume fraction of primary carbides: 30-50%</p> <p>ASTM G65-Procedure A weight loss: 0.18 g max.</p>		<p>Bulk hardness: Double or multiple passes 59-64 HRC</p> <p>Carbide hardness: 1700 HK</p> <p>Volume fraction of primary carbides: 30-50%</p> <p>ASTM G65-Procedure A weight loss: 0.18 g max.</p>		<p>Bulk hardness: Single pass 57-60 HRC, double pass 60-65</p> <p>Carbide hardness: 2500-3000 HK</p> <p>Volume fraction of primary carbides: 30-40% with 7-10% of multi-alloy complex carbides</p> <p>ASTM G65-Procedure A weight loss: 0.12 g max.</p>		<p>Bulk hardness: 60-65 HRC</p> <p>Carbide hardness: 2500-3000 HK</p> <p>Volume fraction of primary carbides: 30-40% with 7-10% of multi-alloy complex carbides</p> <p>ASTM G65-Procedure A weight loss: 0.12 g max.</p>	
TYPICAL APPLICATIONS	<p>Chutes/hoppers, liners for truck beds, dozer blades, shovel buckets, dragline buckets, excavators, separator guide vanes, discharge cones for clinker storage bins, chutes for sintering ore conveying, outlet ducts for clinker grinding mills, receiving hoppers, dredging pipes and pumps, suction pipelines, pump discharges, fan blade/housings, coke vibrating screen plates, coal handling chutes, coal feeder liners, crusher screen plates, classifier cones, journal liners, silo bunkers.</p>		<p>Loader bucket liners, bucket lip and side shrouds, jaw shrouds, heel pads, dewatering conveyors, and coal discharge chutes.</p>		<p>Chutes, liner plates, conveyor sides, underground skips, cement furnace components, sinter plant parts, fan blades, mixer blades, gyratory mantles, coal and cement pulverizer rolls, raw material crushing components, molding panels, ore sintering, crushing, riddling, blast furnace hoppers, throats, and ovens.</p>		<p>Screen plates, loader bucket liners, feeding systems for ball mills, loader bucket liners, bucket lip shrouds, bucket side shrouds, chutes, liners, skip liners, cement furnace components, sinter plant parts, fan blades, mixer blades, gyratory mantles, coal and cement pulverizer rolls, raw material crushing components, molding panels, and coal discharge chutes.</p>	



DOWNLOAD
DUROXITE® DATASHEETS ARE
AVAILABLE BY SCANNING
THE QR CODE, OR VISIT
www.duroxite.com

PLATE		PIPE		PIN
EXTREME SLIDING WEAR	HIGH IMPACT AND SLIDING WEAR	SLIDING WEAR	SEVERE SLIDING WEAR	HEAT AND METAL-TO-METAL WEAR
DUROXITE® 300	DUROXITE® 500	DUROXITE® 100 PIPE	DUROXITE® 200 PIPE	DUROXITE® 400 PIN
An ultra-fine complex borocarbide overlay deposited on a mild steel backing plate for extreme sliding wear applications up to 600°C (1100°F)	An ultra-fine complex borocarbide overlay deposited on a mild steel backing plate for a combination of wear and high impact applications up to 600°C (1100°F)	A chromium-rich overlay deposited on a mild steel pipe for sliding wear applications.	An overlay material with primary chromium-rich carbides and refined multiple-alloy complex carbides is deposited on a mild steel pipe for severe sliding wear applications.	A tool steel overlay deposited on a Q&T bar for metal-to-metal applications up to 480°C (900°F)
Bulk hardness: Single and double pass 67-70 HRC Volume fraction of borocarbides: 60-70% ASTM G65-Procedure A weight loss: 0.10 g max.	Bulk hardness: Single and double pass 67-70 HRC Volume fraction of borocarbides: 60-70% ASTM G65-Procedure A weight loss: 0.18 g max.	Bulk hardness: Double or multiple passes 59-64 HRC Carbide hardness: 1700 HK Volume fraction of primary carbides: 30-50% ASTM G65-Procedure A weight loss: 0.18 g max.	Bulk hardness: Single pass 57-60 HRC, double pass 60-65 HRC Carbide hardness: 2500-3000 HK Volume fraction of primary carbides: 30-40% with 7-10% of multi-alloy complex carbides ASTM G65-Procedure A weight loss: 0.12 g max.	As-welded overlay hardness: 52-54 HRC Work hardening hardness: up to 58 HRC Maximum service temperature: 480°C (900°F)
Crusher rolls, skip liners, conveyor chains, excavator bucket liners, fan blades, deflector blades, cranks, crushers, surge bins, feed chutes, slurry pipes, slurry pumps, ore chutes, screw augers, wear liner plates, ash handling equipment liners, grain shredding hammers, sugar mill knives, row crop sweeps, fracking blender pumps, snow plow shoes, demolition tools.	Earthmoving equipment, crushing equipment, mining equipment, shovel buckets, skip liners, conveyor chains, feeder line plate, bucket lips, hardbanding, augers, scraper blades, muller tires, mixer tires, brick dies, tamper feet, tillage tools, chisel plows, surge bins, feed chutes, slurry pipes, slurry pumps, spoon section liner plates, ash handling equipment liners, cane knives and shredders.	Slurry pumps, chutes, dredging pipes, cullet glass, air ducts, carbon injection pipes, suction lines, and troughs.	Slurry pumps, chutes, dredging pipes, air ducts, carbon injection pipes, suction lines, and troughs.	Dragline bucket components, dragline shovels, clam shell buckets, sheave pins, backhoe pins, crusher shafts.

WHEN EXTREME IS THE NORM

Duroxite[®] 300

A high-performance and cost-effective alternative to tungsten carbide overlay.

The specially formulated materials in Duroxite[®] 300 result in a product with better impact resistance and a long service life when exposed to extremely severe sliding wear.

Duroxite[®] 300 performs exceptionally well in both wet and dry abrasive environments. It can also absorb 25% more impact energy than a traditional chromium overlay plate as measured in a continuous high impact lab test.

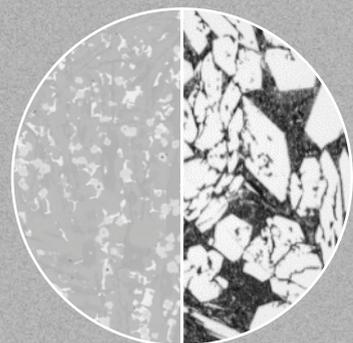
In addition, the overlay thickness for Duroxite[®] 300 is reduced resulting in a lighter weight product compared to traditional overlays while increasing service life.

EXTREME SLIDING WEAR



UNIQUE HARDFACING MATERIAL IN THE OVERLAY

The overlay in Duroxite[®] 300 contains a uniquely high volume of an ultra-fine complex borocarbide phase with a grain size refined down to 500 nm. The borocarbides are approximately 200 times finer than traditional chromium carbides.



Duroxite[®] 300 borocarbide phase (left) versus traditional chromium carbide phase

Extreme wet application performance confirmed in SJE test

In a Slurry Jet Erosion (SJE) test, a sample is placed in a holder at a fixed angle and is abraded with a stream of slurry to represent wear in wet environments.

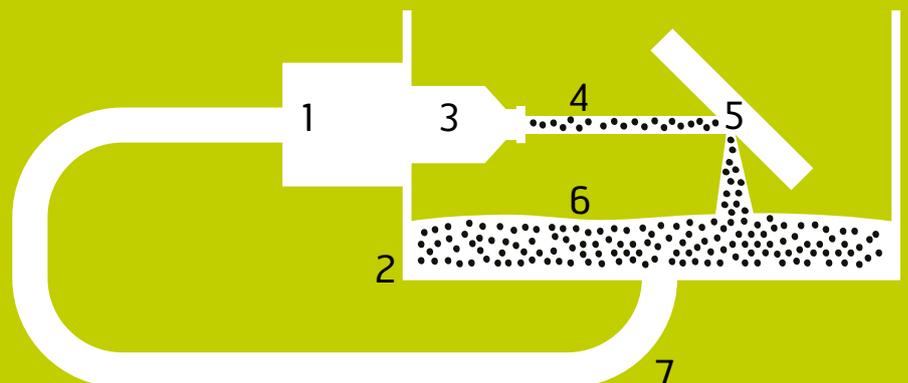
1.2 kg AFS 50-70 silica sand is mixed with 12 kg of water for the test slurry. The slurry is forced through a 5 mm nozzle 100 mm from the sample at 16 m/s for 2 h.

Samples that lose less volume during the test are more erosion resistant. Duroxite® 300 outperformed traditional CCO as shown by the lower weight loss in this test.

SJE WEIGHT LOSS TEST		
OVERLAY PRODUCTS	TYPICAL WEIGHT LOSS (g) AT 20° IMPINGEMENT ANGLE	TYPICAL WEIGHT LOSS (g) AT 45° IMPINGEMENT ANGLE
Duroxite® 300	0.0329	0.0591
Traditional CCO	0.0689	0.0995

Slurry Jet Erosion (SJE) test rig

- 1) Slurry pump
- 2) Test chamber
- 3) Nozzle
- 4) Abrasive jet
- 5) Specimen
- 6) AFS 50-70 sand and water
- 7) Recirculation tube



Duroxite[®] 400 pins

Duroxite[®] 400 is a hardfacing overlay pin product designed to withstand heat up to 480 °C (900 °F) and metal-to-metal wear.

Duroxite[®] 400 can last up to three times longer than induction hardened and manganese pins. Common applications are as pins in dragline buckets, shovels, and backhoes, and as sheaves and crusher shafts. Duroxite[®] 400 pins have a typical hardness of 52-54 HRC that is consistent through the hardened depth of 12-13 mm (0.47-0.51") and work hardens up to 58 HRC. Induction hardened pins are typically only hardened 3.5-4 mm deep (0.14-0.16") and the hardness falls gradually from the surface to the hardened depth. Duroxite[®] 400 is available in diameters up to 280 mm (11") and lengths up to 2.74 m (9').



DUROXITE[®] 400 IN LIMESTONE QUARRY

A dragline bucket's 127 mm (5") diameter Duroxite[®] 400 hitch pin showed only 2 mm (0.08") of wear after 5800 hours of operation over two years.

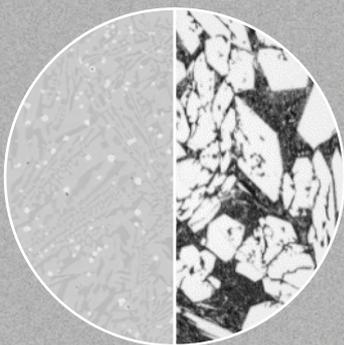


Duroxite® 500

Designed for applications involving abrasive wear and high impact in dry and wet environments.

The applications suitable for Duroxite® 500 involve rock sizes up to around 0.5 x 0.5 m (20" x 20") dropping from 5 m (16') or lower. The overlay contains a uniquely high volume of ultra-fine chromium-niobium-rich complex borocarbide phase with a grain size refined down to 500 nm. The complex borocarbides are completely wetted in a ductile matrix preventing premature pull-out delamination, crack nucleation, or bridging.

The special microstructure of Duroxite® 500 results in a product with significantly improved service life that maintains high toughness in sliding wear and high impact applications. Lab testing shows that the impact resistance of Duroxite® 500 can be up to 6 times higher than chromium carbide overlays.



Duroxite® 500 borocarbide phase (left) versus traditional chromium carbide phase

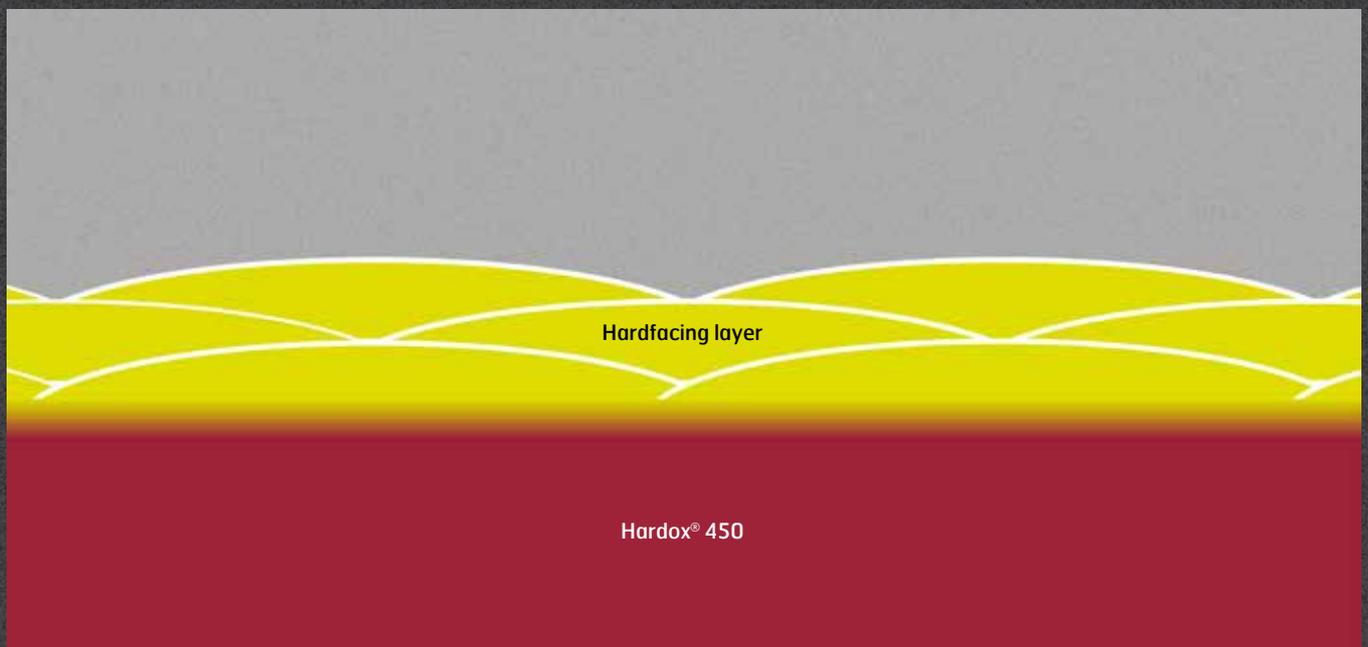
HIGH IMPACT AND SLIDING WEAR



Duroxite[®] with Hardox[®] 450 wear plate

**Duroxite[®] 101 for sliding wear and
Duroxite[®] 201 for severe sliding wear
both have Hardox[®] 450 as base plate.**

Welding a hardfacing layer on top of this quenched and tempered wear steel has distinctive advantages. One is the high yield strength of Hardox[®] steel. It makes the Duroxite[®] plate highly resistant against deformation from dynamic or static forces acting on the plate. Another advantage is the hardness of the base plate you get when using Hardox[®] 450. If the hardfacing layer should be worn through, it will give a wear safety margin compared to using a mild steel base plate.



OVERLAY EXCELLENCE

Duroxite® achieves its groundbreaking wear performance from a combination of SSAB's metal expertise, a solid knowledge from a wide range of applications, optimized overlay materials, and state-of-the-art production equipment.

The production techniques for Duroxite® are developed by SSAB and monitored at SSAB's state-of-the-art R&D testing facility, to ensure that wear resistance, welding, cutting, bending, impact, and other properties of all Duroxite® products meet your strictest requirements.



PROVEN PERFORMANCE

Duroxite® is tough on wear wherever it is applied. Here are a few examples where Duroxite® makes a difference.

If you want to know more about Duroxite® for your particular business, please visit www.duroxite.com to find the closest contact.

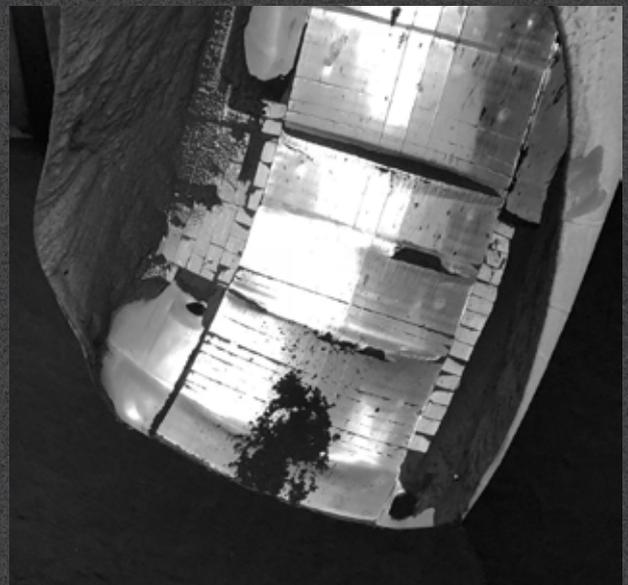
SLIDING WEAR

- Wear part:** Drum mixer paddles of **Duroxite® 101**
- Industry:** Concrete – Canada
- Application:** **Drum mixer**
Replacing 1" polyurethane paddles with Duroxite® 101 6 mm on 10 mm (1/4" on 3/8")
- Service life:** 5 times longer



SEVERE SLIDING WEAR

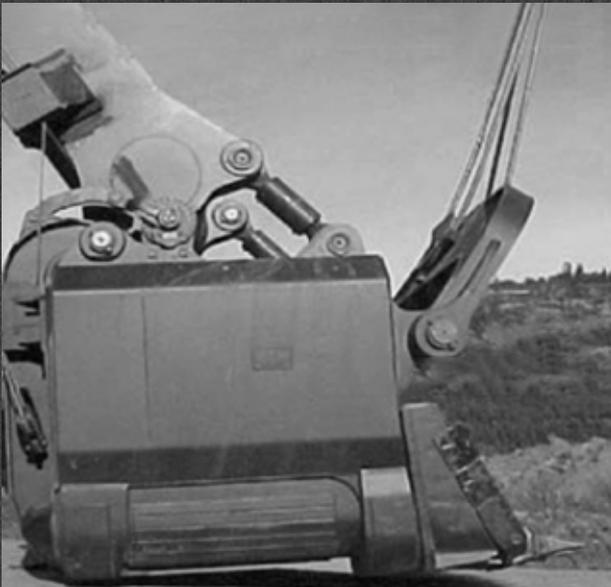
- Wear part:** Liner plate made of **Duroxite® 200**
- Industry:** Coal terminal – Canada
- Application:** **Coal chute**
Replacing a competitor's CCO 6 mm on 6 mm (1/4" on 1/4") with Duroxite® 200 6 mm on 6 mm (1/4" on 1/4")
- Service life:** Increased from 6 to 30 months





- Wear part:** Conveyor liner plate using **Duroxite® 300**
- Industry:** Steel foundry – Mexico
- Application:** **Conveyor**
The original conveyor liner made of cast Mn with tungsten carbide, 38 mm (1.5"), wore out after 3 months. It's replaced by Duroxite® 300 6 mm on 12 mm (1/4" on 1/2") welded on 20 mm (3/4") Hardox® 600. After 3 months, this liner plate only showed 0.254 mm (0.01") wear
- Service life:** About 2 years for Duroxite® 300

EXTREME SLIDING WEAR



- Wear part:** Bail pin made of **Duroxite® 400 Pin**
- Industry:** Copper mine – USA
- Application:** **Electric rope shovel bucket**
The previously used induction hardened 4340 pin was replaced by a Duroxite® 400 overlay pin
- Service life:** Increased from 800 to 3,500 hours

HEAT AND METAL-TO-METAL WEAR



- Wear part:** Liner plate made of **Duroxite® 500**
- Industry:** Copper mine – China
- Application:** **Belt machine**
Duroxite® 500 6 mm on 41 mm (1/4" on 1-5/8") replaced the ZG M13 50 mm (2") cast liner plate
- Service life:** Increased from 15 to 45 days

HIGH IMPACT AND SLIDING WEAR

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www.duroxite.com

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