DUROXITE®

THE LATEST IN OVERLAY TECHNOLOGY

DUROXITE® FIGHTS WEAR, GUARANTEED

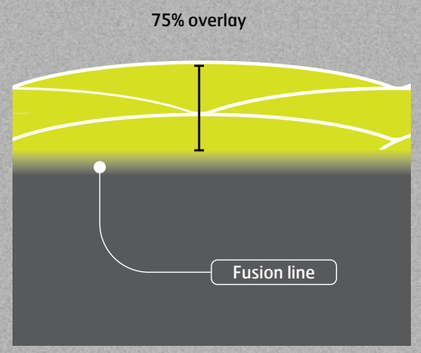
Duroxite® overlay products from Hardox Wearparts can add weeks, months, even years of trouble-free operations to your most extreme wear situations.

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.

Duroxite® is delivered as plate, pipe, pin and wire, ready for installation on your equipment or further fabrication in your workshop. The products are available through the worldwide network of Hardox Wearparts wear service centers.

GUARANTEED OVERLAY THICKNESS, GUARANTEED OVERLAY PROPERTIES



Duroxite® overlay plates and pipes are delivered with an overlay thickness guaranteed within ±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.

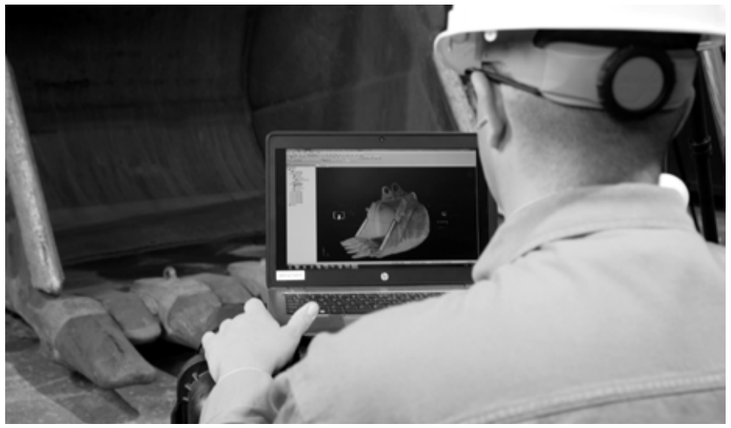
The remaining 25% of overlay is the transition layer necessary to maintain good bonding to the base material.

- **Overlay thickness guaranteed within ± 10% for plates and pipes**
- **Wear properties guaranteed down to 75% of the overlay thickness**
- **High consistency throughout the material and between individual plates and pipes**

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.



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.

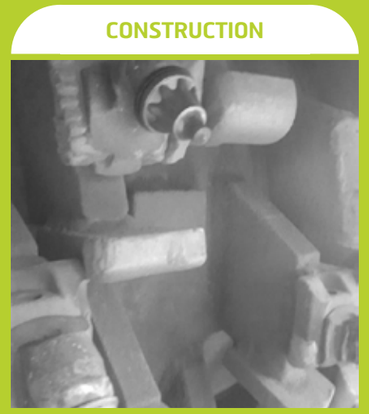
QUARRIES

AGRICULTURE

CEMENT

CONCRETE

CONSTRUCTION

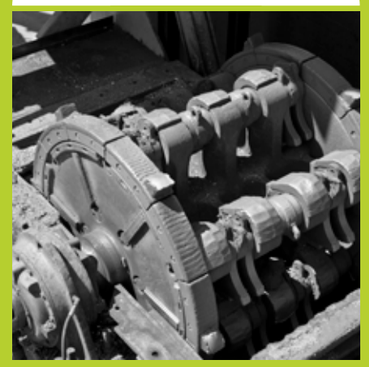


MINING

OIL & SAND

POWER

RECYCLING



STEEL MAKING

OVERLAY OVERVIEW

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

HARDOX®
WEAR PLATE

Hardox® is the world's no.1 abrasion-resistant (AR) steel, providing a unique combination of hardness and toughness. When used as a base plate Hardox® increases the impact resistance of the overlay plate and gives a greater wear safety margin compared to using a mild steel base plate.

	SLIDING WEAR				SEVERE SLIDING WEAR
	DUROXITE® 100	**DUROXITE® 101 HARDOX® BASE PLATE**	**DUROXITE® 100 PIPE**	**DUROXITE® 100 WIRE**	**DUROXITE® 200**
PRODUCT DESCRIPTION	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)	A chromium-rich overlay deposited on Hardox® 450 base plate.	A chromium-rich overlay deposited on a mild steel pipe for sliding wear applications.	A flux cored open-arc wire for hardfacing components subject to sliding wear applications.	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).
PROPERTIES	**Bulk hardness:** Single pass 55-57 HRC, double pass 59-62 HRC, triple plus passes 60-64 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 55 to 57 HRC, double pass 56 to 59 HRC, triple pass 58 to 63 HRC **Carbide hardness:** 1700 HK **Volume fraction of primary carbides:** 30-50% **ASTM G65-Procedure A weight loss:** 0.18 g max.	**Bulk hardness:** Double or multiple passes 59-62 HRC **Carbide hardness:** 1700 HK **Volume fraction of primary carbides:** 30-50% **ASTM G65-Procedure A weight loss:** 0.18 g max.	**Chemical composition (wt. %):** 4.7 C, 0.2 Mn, 0.6 Si, 27.0 Cr, Balance, Fe **Surface hardness:** Three-layer deposit on mild steel 60-62 HRC **ASTM G65-Procedure A weight loss:** 0.18 g max.	**Bulk hardness:** 60-65 HRC **Carbide hardness:** 2500-3000 HK **Volume fraction of primary carbides:** 30-50% **ASTM G65-Procedure A weight loss:** 0.12 g max.
TYPICAL APPLICATIONS	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	Slurry pumps, chutes, dredging pipes, cullet glass, air ducts, carbon injection pipes, suction lines, troughs	Crusher hammers, gyratory crusher cones and mantles, dredging pumps, slurry pipes, dragline, bucket liners, coal pulverizer rolls, coke hammers, sand dredging parts, mining and earthmoving components, and sorting screens.	Loader bucket liners, bucket lip and side shrouds, jaw shrouds, heel pads and dewatering conveyors, coal discharger chutes	Chutes, liner plates, conveyors sides, underground mine skips, cement furnace components, sinter plant parts, fan blades, mixer blades, crews, gyratory mantles, coal and cement pulverizer rolls, raw material crushing components, molding panels, ore sintering, crushing, riddling, blast furnace hoppers, throats, and ovens

			EXTREME SLIDING WEAR	HEAT AND METAL-TO-METAL WEAR	HIGH IMPACT AND SLIDING WEAR
	DUROXITE® 201 HARDOX® BASE PLATE	**DUROXITE® 200 WIRE**	**DUROXITE® 300**	**DUROXITE® 400**	**DUROXITE® 500**
PRODUCT DESCRIPTION	A complex carbide overlay deposited on Hardox® 450 base plate.	A flux cored open-arc wire for hardfacing components subject to severe sliding wear applications.	An ultra-fine complex borocarbide overlay deposited on a mild steel backing plate for extreme sliding wear applications up to 600˚C (1100˚F)	A tool steel overlay deposited on a Q&T bar for metal-to-metal applications up to 480˚C (900˚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)
PROPERTIES	**Bulk hardness:** 60-65 HRC **Carbide hardness:** 2500-3000 HK **Volume fraction of primary carbides:** 30-50% **ASTM G65-Procedure A weight loss:** 0.12 g max.	**Chemical composition (wt. %):** 5.3 C, 0.5 Mn, 0.2 Si, 22.0 Cr, 6.5 Nb, Balance, Fe **Surface hardness:** Three-layer deposit on mild steel: 62-67 HRC **ASTM G65-Procedure A weight loss:** 0.12 g max.	**Bulk hardness:** Single and double pass 67 to 70 HRC **Volume fraction of borocarbides:** 60-70% **ASTM G65-Procedure A weight loss:** 0.07 g max.	**As-welded overlay hardness:** 52-54 HRC **Work hardening hardness:** up to 58 HRC **Maximum service temperature:** 480°C (900°F)	**Bulk hardness:** Single and double pass 67 to 70 HRC **Volume fraction of borocarbides:** 60-70% **ASTM G65-Procedure A weight loss:** 0.18 g max.
TYPICAL APPLICATIONS	Buckets and teeth, railway ballast tampers, dredge buckets and lips, dragline buckets, coke hammers, rippers, sizing screens, crushing equipment, brick industry components, Muller tyres, catalyst lift pipes, pump impellers, fan blades, rockwool rolls	Screen plates, loader bucket liners, feeding systems for ball mills, loader bucket liners, bucket lip shrouds, bucket side shrouds, chutes, liner plates and skip liners, cement furnace components, sinter plant parts, fan blades, mixer blades, crews, gyratory mantles, coal and cement pulverizer rolls, raw material crushing components, molding panels, coal discharger chutes	Crusher rolls, skip liners, slurry pipes, slurry pumps, conveyor chains, excavator bucket liners, fan blades, deflector blades, cranker 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	Dragline bucket components, dragline shovels, clam shell buckets, sheave pins, backhoe pins, crusher shafts	Earthmoving equipment, Crushing equipment, Mining equipment, Shovel buckets, Skip liners, Slurry pumps, 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

PROVEN PERFORMANCE

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

If you are looking for benefits for your particular business, please visit www.hardoxwearparts.com for additional applications.

EXTREME SLIDING WEAR

Wear part: Conveyor liner plate using **Duroxite® 300**

Industry: Steel foundry – Mexico

Application: Conveyor
The original conveyor liner made of casting Mn with tungsten carbide 38mm (1.5") worn out after three months. It's replaced by Duroxite 300 12 mm + 6 mm (1/4" on 1/2") welded on 20mm (¾") Hardox 600. After three months, this liner plate onlyshowed 0.254 mm (0.01") wear.

Service life: The service life of Duroxite 300 plate is about 2 years.

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 (¼" on 3/8")

Service life: **5 times** longer service life

HEAT AND METAL-TO-METAL WEAR

Wear part: Bail pin made of **Duroxite® 400 Pin**

Industry: Coal mine – USA

Application: Dragline bucket
The previously used induction hardened 4340 pin was replaced by a Duroxite® 400 overlay pin.

Service life: Increased service life from 800 to **3,500 hours**

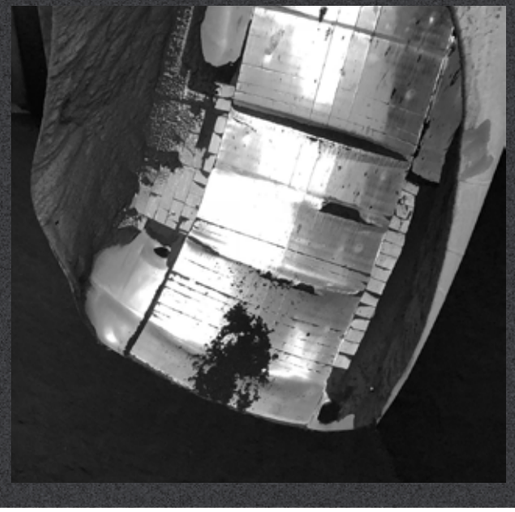
SEVERE SLIDING WEAR

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 (¼" on ¼") with Duroxite 200 6mm + 6mm (¼" on ¼")

Service life: Increased service life from 6 to **30 months**



HIGH IMPACT AND SLIDING WEAR

Wear part: Liner plate made of **Duroxite® 500**

Industry: Copper mine – China

Application: Belt machine
Duroxite® 500 6 mm on 41 mm (¼" on 1-5/8") replaced the ZG M13 cast liner plate (50 mm)

Service life: Increased from 15 to **45 days**

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.

Duroxite® 500

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

Duroxite® 500 can replace cast materials, titanium carbide overlay products or ceramic materials. The applications suitable for Duroxite® 500 involve rock sizes of up to around 0.5 m x 0.5 m dropping from 5 m or lower.

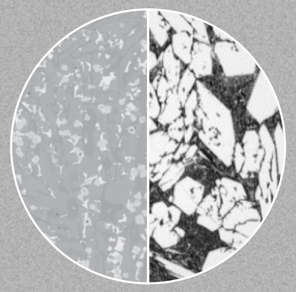
The overlay contains a unique high volume of ultra-fine chromium-niobium-rich complex borocarbide phase with a grain size refined down to 500 nm. The complex borocarbides are completely wetted in a ductile matrix preventing premature pull-out delamination, crack nucleation and bridging.

This 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.

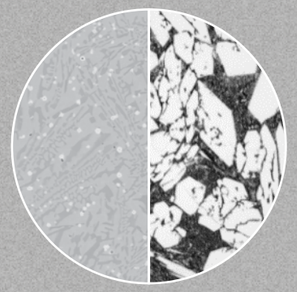
EXTREME SLIDING WEAR

UNIQUE HARDFACING MATERIAL IN THE OVERLAY

Duroxite® overlay consists of specially formulated abrasive materials. The overlay 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



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

HIGH IMPACT AND SLIDING WEAR

DUROXITE® IN FABRICATION

Duroxite® is designed to be hard, without giving you a hard time in the workshop.

Even the most worn-out equipment can be rebuilt and repaired to perform as new. With our broad product offering, including Hardox wear plate and Duroxite®, and top-of-the-line processing equipment, you are able to restore products of practically any condition, size and design.

INSTALLING DUROXITE®

No special equipment is needed to install Duroxite® products. Welding and bolting are the common methods for installing Duroxite® overlay plate or wear parts onto your equipment.

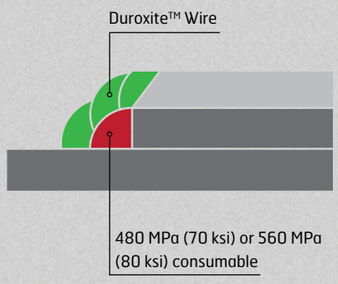
When joining base metal use 480 MPa (70 ksi) or 560 MPa (80 ksi) consumables. Any surface exposed to severe wear should be protected with hard-surfacing consumables. Cap welding a Duroxite® product with Duroxite® Wire ensures the weld will have the same wear resistance, resulting in a consistent service life for the entire overlay product.

SAFETY PRECAUTIONS

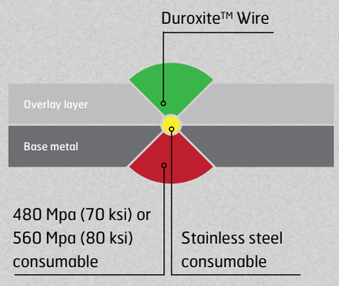
When welding or cutting Duroxite products, smoke is produced containing harmful fumes and gases that are chemically highly complex and difficult to easily classify. The major toxic component in the fumes and gases produced in the process is hexavalent chromium. The proper exhaust ventilation equipment and fume-extraction torches are recommended, as well as suitable protective clothing and respiratory protection for operators.

WELDING AND BOLTING DUROXITE® TO YOUR SUBSTRATE

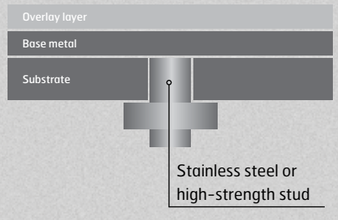
Joining Duroxite® plate on mild steel



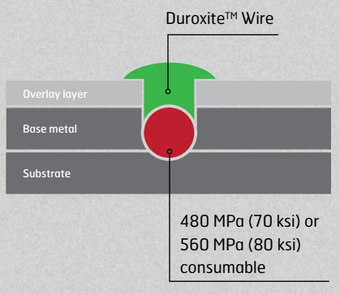
Joining Duroxite® plates end to end



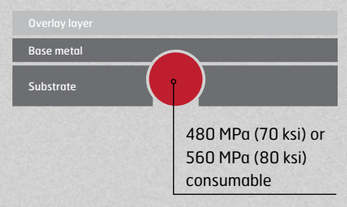
Stud welding of Duroxite® plate from base metal side



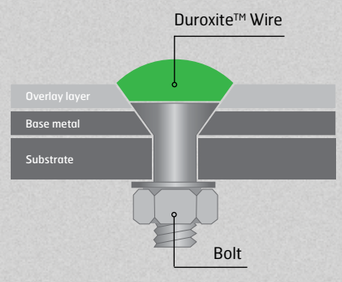
Plug welding of Duroxite® plate from overlay side



Plug welding of Duroxite® plate from base metal side



Bolting Duroxite® plate through countersunk hole



CUTTING

Duroxite® can be cut by plasma, laser, water jet, arc gouge, and abrasive saw cutting. It cannot be cut by oxy-fuel flame cutting. Duroxite® should be cut from the base metal side only to avoid carbon contamination. When beveling, Duroxite® overlay plate can be burned from the hard side. Cutting speeds need to be reduced when cutting carbides.

RECOMMENDED CUTTING SPEED AT DIFFERENT PLASMA CURRENTS AND THICKNESSES

Plate thickness	Duroxite® 100				Carbon steel
	130 amps	200 amps	260 amps	400 amps	360 amps
6 mm on 3 mm 1/8" on 1/4"	1920 mm/min 75 inches/min	2655 mm/min 105 inches/min	3080 mm/min 120 inches/min	3540 mm/min 140 inches/min	4200 mm/min 165 inches/min
6 mm on 6 mm 1/4" on 1/4"	1920 mm/min 75 inches/min	2655 mm/min 105 inches/min	3080 mm/min 120 inches/min	3540 mm/min 140 inches/min	4200 mm/min 165 inches/min
10 mm on 10 mm 3/8" on 3/8"	1010 mm/min 40 inches/min	1265 mm/min 50 inches/min	1735 mm/min 65 inches/min	2440 mm/min 95 inches/min	4200 mm/min 165 inches/min
12 mm on 12 mm 1/2" on 1/2"	552 mm/min 20 inches/min	1225 mm/min 45 inches/min	1465 mm/min 55 inches/min	1800 mm/min 70 inches/min	4200 mm/min 165 inches/min

FORMING

Duroxite® is typically formed with overlay to the inside but can be roll formed with overlay to the outside. Avoid bending plate parallel to the welding bead direction. The staggered cracking pattern on the overlay surface ensures good formability when bending. For bending radius recommendations, see chart on right.

The table covers bending radius recommendations for Duroxite® 100, 101, 200 and 201. Specific forming recommendations for Duroxite® 300 can be found on www.duroxite.com.

THICKNESS	MIN INSIDE RADIUS HARD LAYER FACE IN	MIN OUTSIDE RADIUS HARD LAYER FACE OUT
3 mm on 6 mm 1/8" on 1/4"	200 mm 8"	900 mm 36"
3 mm on 10 mm 1/8" on 3/8"	300 mm 12"	900 mm 36"
6 mm on 6 mm 1/4" on 1/4"	300 mm 12"	1200 mm 48"
10 mm on 10 mm 3/8" on 3/8"	400 mm 15"	1500 mm 60"
13 mm on 13 mm 1/2" on 1/2"	500 mm 20"	1800 mm 72"

MACHINING

Machining Duroxite® with conventional methods is not recommended. It can be finished by grinding. Countersunk holes can be precisely produced by EDM (Electrical Discharge Machining). Pre-machined mild steel inserts can be used if extra machining is required.

LEARN MORE AT
www.duroxite.com

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