DUROXITE®

DUROXITE® 500

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General Product Description

Duroxite® 500 is an iron-based steel alloy overlay deposited on a mild steel backing plate. It is designed for a good combination of sliding wear and high impact applications for both dry and wet (slurry) abrasive environments. It works well at ambient or elevated temperatures up to 1100 °F (600 °C). The product is available in single and double layers.

Duroxite® 500 consists of specially formulated abrasive materials employing a uniform glass-forming melt chemistry that allows high undercooling to be achieved. 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 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. Duroxite® 500 has a better combination of impact and wear resistance than those of traditional chromium carbide overlay.

Key Benefits

- Duroxite® 500 is mainly designed to withstand the applications involving abrasion wear and high impact.
- Duroxite® 500 overlay contains ultra-fine complex borocarbides which is 200 times finer comparing with primary carbides in traditional chromium carbide overlay (Duroxite® 100).
- The wear resistance of Duroxite® 500 is very similar to that of Duroxite® 100 with the weight loss in ASTM G65-procedure A, 0.18g maximum. Duroxite® 500 also maintains a consistent wear resistance from surface down to 75% of the overlay.
- The impact resistance of Duroxite® 500 is six times better than that of Duroxite® 100 in the lab test.
- Has uniform through-thickness hardness of 67 to 70 HRC for single and multiple-layer overlay.
  Maintains a high hardness of approximately 60 HRC after exposure to high temperatures up to 1100 °F (600 °C).

Typical Applications

Duroxite® 500 is suitable for use in the mining, power generation, cement, oil sand, steel production, waste handling, and pulp and paper industries. Some specific applications include:

Mining	Earthmoving equipment, Crushing equipment, Mining equipment, Shovel buckets, Skip liners, Slurry pumps, Conveyor chains, Feeder line plate, bucket lips, hardbanding
Cement	Augers, scraper blades, muller tires, mixer tires, brick dies, tamper feet, tillage tools, chisel plows
Oil Sand	Surge bins, Feed chutes, Slurry pipes, Slurry pumps
Dredging	Slurry pipes
Power	Spoon section liner plates, Ash handling equipment liners
Agriculture	Cane knives and shredders

For more information on applications see the Duroxite® Product brochure.

DUROXITE® 500

Standard Dimensions

Standard overlay thicknesses				Standard plate sizes	
Single pass		Multiple passes			
Metric unit	Imperial unit	Metric unit	Imperial unit	Metric unit	Imperial unit
3 mm on 6 mm	1/8'' on 1/4''	6 mm on 6 mm	1/4'' on 1/4''	1.2 m x 2.4 m 1.5 m x 3.0 m 1.8 m x 3.0 m	4' x 8' 5' x 10' 6' x 10'
		6 mm on 8 mm	1/4'' on 5/16''		
		6 mm on 10 mm	1/4'' on 3/8''		
		6 mm on 12 mm	1/4'' on 1/2''		

Custom thicknesses and other plate sizes are available upon request.

Mechanical Properties

Surface Hardness

Number of overlay passes	Typical surface hardness [1]
Single and double passes	67 to 70 HRC (925 to 1075 HV)

[1] Surface hardness is measured on machined flat surface just below overlay surface.

Wear Properties

Number of overlay passes	ASTM G65 – Procedure A weight loss [2]	
	Surface	75% depth of overlay [3]
Single pass	0.25 g maximum	0.25 g maximum
Double passes	0.18 g maximum	0.18 g maximum

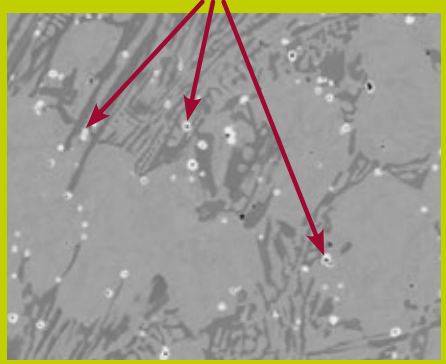
[2] ASTM G65 is a standard test measuring sliding abrasion resistance using a dry sand/rubber wheel apparatus. ASTM G65–Procedure A is the most severe test method.

[3] ASTM G65 wear test is conducted at 75 % depth of the overlay materials to ensure consistently good wear resistance from top surface through to the depth of 75 % of the overlay.

Microstructure

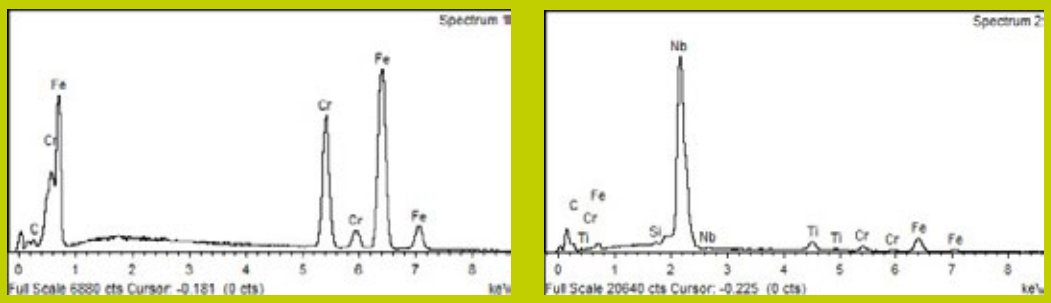
Duroxite® 500 overlay contains an ultra-fine complex borocarbide phase down to approximately 500 nm in a ductile matrix. The typical volume fraction of borocarbides is maintained between 60 to 70% to form a uniform hard matrix. The SEM (Scanning Electron Microscopy) / EDS (Energy Dispersive Spectrometry) analysis of the Duroxite® 500 overlay confirms that the refined borocarbides are niobium-rich borocarbides, and chromium-rich borocarbides dispersed in an iron-based matrix. The ultra-fine borocarbides are approximately 200 times finer than the traditional chromium carbides.

Ultra-refined complex borocarbides in 500 nm



DUROXITE® 500

SEM / EDS spectrum showing Nb-riched borocarbides



Tolerances

Thickness

Overall and overlay thickness tolerances can be guaranteed within ±10% of specified thickness.

Flatness

Plate flatness tolerance can be guaranteed within ±3 mm (±1/8") over 1.5 m (5') plate length for plate dimensions equal to or less than 1.5 m (5') x 3.0 m (10'). For plates greater than 1.5 m (5') wide by 3.0 m (10') long, the plate flatness tolerance can be guaranteed within ±25 mm (±1").

Delivery Conditions

Duroxite® 500 is supplied in an as-welded condition.

Fabrication and Other Recommendations

Welding, cutting, forming and machining

Recommendations can be found in the Duroxite® Product brochure, or consult your local technical support representative for more information.