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.
**Mechanical Properties**

**Surface Hardness**

<table>
<thead>
<tr>
<th>Number of overlay passes</th>
<th>Typical surface hardness[^2]</th>
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<tbody>
<tr>
<td>Single and double passes</td>
<td>67 to 70 HRC (925 to 1075 HV)</td>
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</table>

[^2]: Surface hardness is measured on machined flat surface just below overlay surface.

**Wear Properties**

<table>
<thead>
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<tbody>
<tr>
<td>Single pass</td>
<td>0.25 g maximum</td>
<td>0.25 g maximum</td>
</tr>
<tr>
<td>Double passes</td>
<td>0.18 g maximum</td>
<td>0.18 g maximum</td>
</tr>
</tbody>
</table>

[^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.
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.