



Chromium Carbide Overlay (CCO) Wear Plate

MODERATE ABRASION RESISTANT WEAR PLATE

Chromium Carbide Overlay (CCO) Wear Plate, also known as chrome carbide overlay plate or hardfacing wear plate, is a bimetallic composite material designed for extreme abrasion resistance. It consists of a mild or low-carbon steel base plate (typically Q235/Q345 or equivalent) metallurgically bonded with one or more layers of highly wear-resistant chromium carbide alloy overlay. The overlay is applied through hardfacing processes such as open arc welding or submerged arc welding, forming a dense matrix of hard chromium carbide particles (primarily Cr_7C_3) embedded in a tougher austenitic or martensitic matrix. This creates a durable surface that resists sliding abrasion, impact, and erosion far better than conventional wear steels like AR400/500 or Hardox.





CONTENTS

Introduction 1

 Key Features & Performance 1

 Standards 1

 Standard & Custom Sizes 1

 Processing Services 1

Quantity Contral 2

 Chemical Composition 2

Manufacturing Process 3

 01/ Step 1: Cutting 3

 02/ Step 2: Fit-Up and Welding 3

 03/ Step 3: Correction and Straightening 3

 04/ Step 4: Installation of Stiffeners and Connection Details 3

 06/ Step 6: Protective Coating Application 4

Designed for moderate impact and severe abrasion 4

 Cutting 4

 Welding 4

 Bending 4

Customized size plate 5

Chromium Carbide Overlay Wear Pipe 6

Applications 7

 Ideal for strong abrasive wear environments 7

 Typical Applications by Industry 7

..... Get in Touch

..... 8



Introduction

Chromium Carbide Overlay (CCO) wear plates, also known as chrome carbide hard facing plates, bimetallic wear plates, clad plates, or composite wear-resistant plates, are premium abrasion-resistant solutions manufactured by depositing a high-chromium, high-carbon alloy overlay onto a mild steel backing plate via automatic open-arc or submerged-arc welding. This metallurgical fusion ensures excellent bonding strength, preventing delamination even under extreme heat and impact.

Key Features & Performance

- ◆ Base Plate: Q235/Q345 mild steel – provides excellent toughness, weldability, and structural support.
- ◆ Overlay Layer: Contains 25–40% Chromium (Cr) and 3.0–5.5% Carbon (C).
- ◆ Hardness: HRC 58–65.
- ◆ Microstructure: Primary carbides (Cr₇C₃) with volume fraction $\geq 40\text{--}50\%$, delivering superior wear resistance.
- ◆ Wear Resistance: High abrasion resistance (AR), significantly outperforming conventional wear steels.
- ◆ Impact Resistance: Medium level.
- ◆ Flatness Tolerance: ± 3 mm/m.
- ◆ Heat Resistance: Strong metallurgical bond resists high temperatures without separation or corrosion.



Manufacturing Techniques

Hard facing via open-arc or submerged-arc welding, cladding, and overlaying.

Standards

ASTM, AISI, BS, DIN, GB, JIS.

Standard & Custom Sizes

Width: 1400 mm, 2100 mm, or custom

Length: 3000 mm, 3400 mm, 3500 mm, or custom

Common Thickness Configurations (Overlay + Base): 3+3, 4+4, 5+5, 6+4, 8+5, 10+10, 12+8, 16+4, 16+9 mm, etc.

Tolerance: $\pm 1\%$ (Custom thicknesses available.)

Processing Services

Cutting, bending, punching, welding, and custom fabrication.



Quantity Contral

Our factory boasts a highly professional quality inspection team composed of experts holding bachelor's degrees in materials science, led by seasoned leaders with master's degrees in the field. This elite team conducts rigorous, regular testing on raw materials, production processes, and finished products — all in strict accordance with our company's uncompromising quality standards!

In our state-of-the-art laboratory, we deploy cutting-edge equipment to guarantee the superior quality of every overlay plate:

- ◆ Advanced Rockwell hardness testers
- ◆ Precision portable spectrometers
- ◆ High-accuracy portable hardness testers
- ◆ Reliable portable ultrasonic thickness gauges

We go even further with our dedicated abrasion resistance testing machines and a full suite of metallographic analysis instruments. This allows us to thoroughly examine metallurgical microstructures and deliver exceptional wear resistance performance that exceeds industry expectations.

Quality isn't just a process for us — it's our passion and our promise! Every plate that leaves our factory is engineered for ultimate durability, reliability, and outstanding performance in the toughest conditions.



Chemical Composition

Element	Welding Wire/Flux (Wt%)	Final Overlay Layer (Wt%)	Notes
Carbon (C)	2.5-5.5%	>2.0-6.0%	Primary hardener
Chromium (Cr)	15-40%	>15-45%	Forms hard Cr ₇ C ₃ carbides (volume fraction 30-60%)
Silicon (Si)	0.5-2.5%	>0.3-2.0%	Improves flow
Manganese (Mn)	0.5-4.0%	0.5-4.0%	Enhances toughness
Molybdenum (Mo)	Trace/+	Trace/+	Improves high-temp performance
Niobium (Nb)	Trace/+	Trace/+	Refines carbides
Zirconium (Zr)	≤2.0%	<2.0%	Grain refiner (in some alloys)

Remarks: The chemical compositions listed in this table are Typical Ranges. The specific compositions will be fine - tuned according to the hardness required by the customer and the usage environment.



Manufacturing Process

Produced via open-arc (self-shielded) or submerged-arc hard facing. Alloy powder/flux-cored wire deposits the chromium-rich layer, creating stress-relief cracks (normal and beneficial for flexibility). Your certificate specifies open arc self-shielded welding wire and stacked packing.



01/ Step 1: Cutting

Steel plates are cut to the precise shapes and dimensions specified in the engineering drawings using advanced cutting equipment (e.g., plasma, laser, or oxy-fuel cutting).

02/ Step 2: Fit-Up and Welding

Cut components are accurately positioned, tack-welded for temporary assembly, and then transferred to automated or semi-automated welding stations. Each weld is first visually inspected for surface defects. Weld quality is subsequently verified using non-destructive testing methods such as ultrasonic testing (UT) or magnetic particle inspection (MPI) to ensure full penetration and structural integrity.

03/ Step 3: Correction and Straightening

Welding-induced heat can cause distortion or warping of components. Prior to further processing, all pieces undergo dimensional inspection and, if necessary, are straightened or corrected (using heat or mechanical methods) to meet strict tolerance requirements and ensure trouble-free assembly on site.

04/ Step 4: Installation of Stiffeners and Connection Details

Reinforcing stiffeners, web/flange plates, cleats, brackets, and other connection details are precisely fitted and welded by certified welders. This critical step enhances the load-bearing capacity and overall stability of the structural members.

05/ Step 5: Surface Preparation (Shot Blasting)



Fabricated components are thoroughly cleaned to remove mill scale, rust, oil, grease, weld spatter, and other contaminants. Automated shot-blasting (typically to SA 2.5 or equivalent standard) creates an optimal surface profile for coating adhesion and long-term corrosion protection.



06/ Step 6: Protective Coating Application

A high-performance coating system is applied to protect the steel from environmental corrosion and extend service life. The standard system typically consists of:

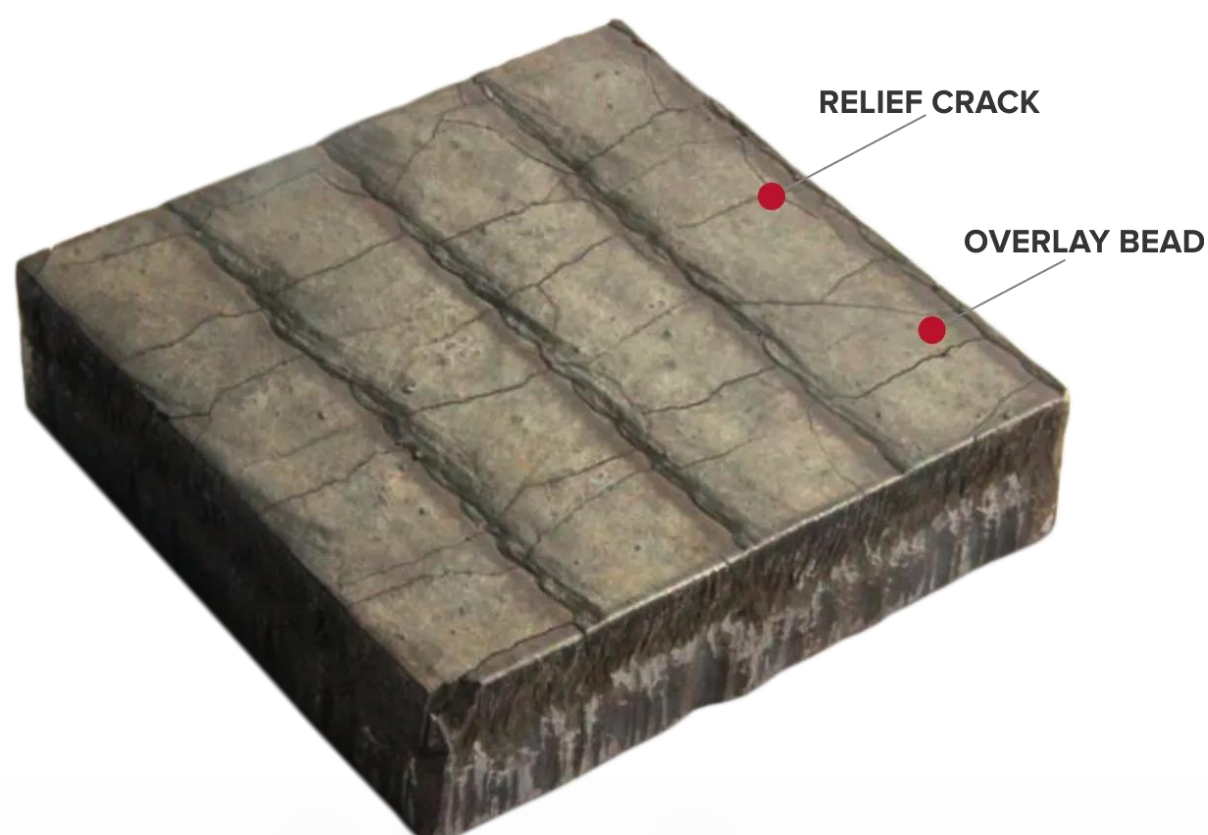
- ◆ One primer coat (usually zinc-rich or epoxy-based anti-corrosive primer)
- ◆ One or two intermediate/top coats in the client-specified color and finish

All painting is carried out in controlled conditions to ensure uniform thickness, excellent adhesion, and compliance with the required standards (e.g., ISO 12944, SSPC, or project-specific specifications).

This revised version eliminates grammatical errors, uses consistent technical phrasing, and follows the style preferred by engineering firms, fabricators, and clients in the US, UK, Australia, and other English-speaking markets.

Designed for moderate impact and severe abrasion

The overlay surface of CCO plate will consist of a series of beads with numerous hairline cracks in them. These properly spaced crosscheck cracks are a natural phenomenon and are beneficial to the material. The cracks propagate through the overlay and end at the fusion line.



Cutting

Plasma burning, air arc, abrasive saw or water jet.

Welding

Our CCO overlay plate can be joined by welding the substrate to substrate using 309 weld wire/rod.

Bending

Using a press brake, forming should be perpendicular to the weld pass direction. Plate rolling should be performed in the directions of the overlay beads.

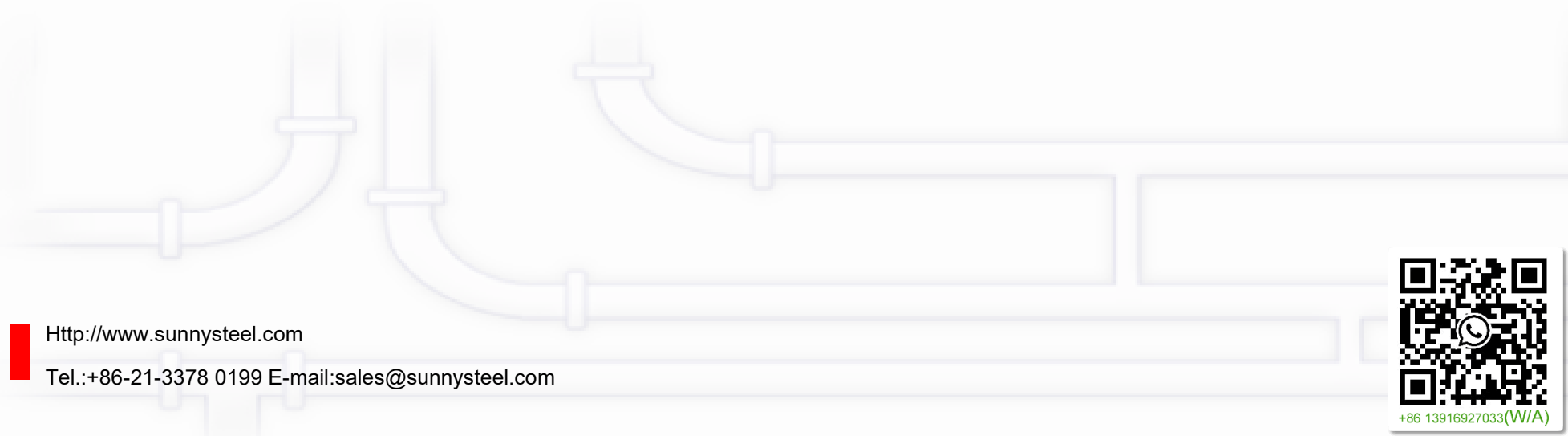




Collect steel pipe and fitting resources

Manufacturing Process

Customized size plate



[Http://www.sunnysteel.com](http://www.sunnysteel.com)

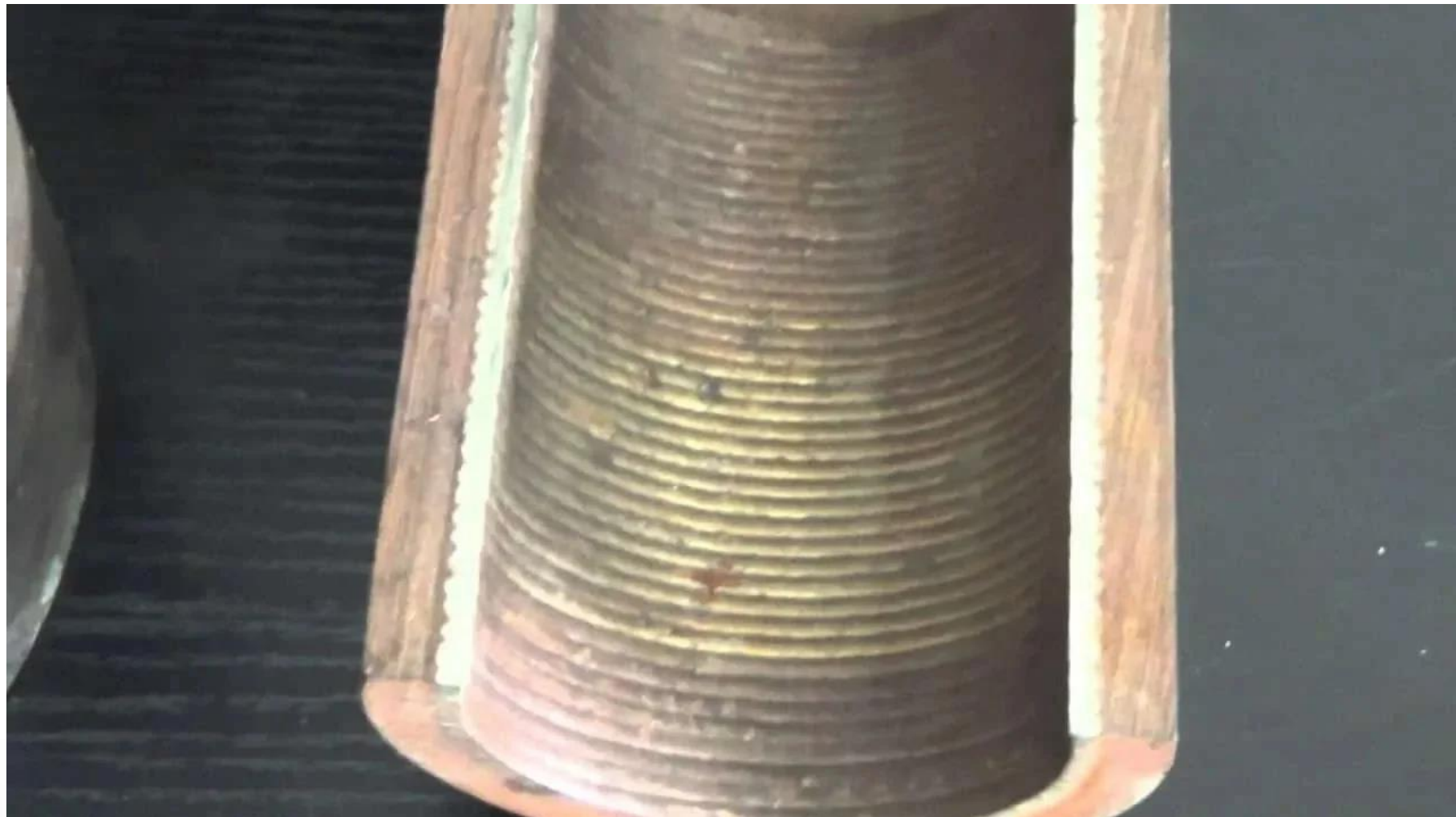
Tel.: +86-21-3378 0199 E-mail: sales@sunnysteel.com



+86 13916927033 (W/A)

Chromium Carbide Overlay Wear Pipe

Strengthen your boiler infrastructure with CCO wear tube corrosion protection, featuring hrc60 hardness and up to 800°C thermal stability to combat erosion and chemical degradation.





Applications

The backing steel plate provides CCO plates with structural integrity, which makes our overlay plates fabricated without damage to the welding overlay, regardless of the shape and complexity of the structure. CCO plate has the capability to manufacture cut to size wear parts, fabrication includes cutting, forming, welding, stud attachment, assembling, grinding or otherwise working on the product.

Ideal for strong abrasive wear environments:

- ♦ Chutes, hoppers, liners
- ♦ Bucket/truck bed liners
- ♦ Crusher/conveyor components
- ♦ Cement mill parts, fan blades
- ♦ Mining equipment (dragline buckets, excavator parts)
- ♦ Coal/power plant coal pipes and deflectors



Typical Applications by Industry

Industry	Components & Applications
Power Plants	Flue ducts and gypsum lines for sulfidation resistance.
Mining	Tailings pipes enduring silica erosion.
Cement	Kiln feeds against high-temp abrasion.
Power & Dredging	Wear plates, dredging equipment, abrasive slurry pipelines
Coal Processing	Wet slurries with dual wear/corrosion defense
Metallurgy	Ash conveyors enhancing pipeline integrity.





Get in Touch

We would absolutely love to hear from you if you are interested in our products or would like to work with us. Even if you just have a comment or suggestion, we would be delighted to hear from you.

Please get in touch for more detailed information.

Tel.:+8621 3378 0199

E-mail:sales@sunnysteel.com

Http://www.sunnysteel.com



+86 13916927033(W/A)



WeChat



+86 13916927033(W/A)