

**FORD
STEEL
COMPANY**

ABRASION RESISTANCE WHERE IT COUNTS.



Wearalloy® 400 • 450 • 500 PLATE

TYPICAL CHEMICAL ANALYSIS AND PHYSICAL PROPERTIES

	Wearalloy 400	Wearalloy 450	Wearalloy 500*
Carbon	.12/.16	.18/.26	.27/.30
Mang. (max.)	1.55	1.20	.95
Phos. (max.)	.025	.025	.025
Sulphur (max.)	.005	.005	.005
Silicon	.35/.55	.40/.55	.45/.55
Boron	.0005/.005	.0005/.005	.0005/.005
Chrome (max.)	.55	.65	.75
Nickel (max.)	.35	.35	.35
Moly (max.)	.55	.60	.65
Hardness (BHN)	388-430	444-475	477-544
Yield (psi.)	156,000	170,000	182,000
Tensile (psi.)	194,000	206,000	235,000
Elongation in 2"	19% - 23%	18% - 23%	17% - 23%
Color Code	Yellow/Red	Yellow/Blue	Yellow/Purple

Thickness: 1/8" through 4"

Widths: 48" through 96"

Lengths: 96" through 288"

* 550 BHN plate available for more severe abrasion in 1/4", 3/8", 1/2" and 3/4" thickness.



APPLICATIONS

Aggregate, Construction, and Mining

Drag Slat Conveyor Liners	Crusher Liners	Cone Crusher Main Frame Liners	Hopper Liners
Transfer Points	Screed Plates	Mold Board Liners	Underground Miners
Scraper Liners	Feeders	Skid Plates	Truck Bed Liners
Drag Line Bucket Liners	Chute Liners	Asphalt Plant Ductwork	Jaw Crusher Cheek Plates
Loader Bucket Liners	Shovel Bucket Liners	Rock Box Liners	Hammers
Screen Decks	Cutting Edges	For Pulp and Paper Industry Applications - See Page 5	

GENERAL TECHNICAL INFORMATION

Wearalloy 400, 450, and 500 are heat treated, quenched, and tempered alloy steels that are used in applications where shock and abrasion are the primary cause of failure. Wearalloy 400 (388 - 430 BHN) and Wearalloy 450 (440 - 470 BHN) provide excellent resistance to impact and sliding abrasion. Wearalloy 500 (475 - 544 BHN) handles severe abrasion and moderate impact.

DRILLING AND MACHINING:

Wearalloy 400, 450, and 500 can be machined or drilled with high speed carbide tools at low speeds. As the hardness level of the plate increases, it is necessary to decrease the cutting speed and feed depth.

WELDING:

For welding Wearalloy plate, we recommend that low hydrogen electrodes be used; such as E-70XX, E-80XX, E-90XX, E-100XX, and E-110XX. As conditions warrant, pre-heating is recommended on all thicknesses.

SHEARING AND PUNCHING:

Wearalloy 400 can be sheared or punched in thicknesses up to 1/4". flame cutting is recommended on thicker plate and on our Wearalloy 450 and 500.

FORMING

Wearalloy 400 and 450 can be cold formed in a press brake or rolls. At sharper bends, forming should be performed with the axis of bend at right angles to the rolling direction or cross grain of the plate. Remove rough edges on plate by grinding prior to forming. It is necessary to allow for a bending radius of 3 to 5 times that of ordinary steel. Minimal cold forming can be performed on our Wearalloy 500 with proper equipment.

FABRICATION:

Please contact our engineering department for quotes on any fabrications requiring our wear resistance steels.



CONVERSION TABLE

Thickness	Lbs. per Sq. Ft.
1/8"	5.11
3/16"	7.66
1/4"	10.21
3/8"	15.32
1/2"	20.42

Thickness	Lbs. per Sq. Ft.
5/8"	25.53
3/4"	30.63
1"	40.84
1 - 1/4"	51.05
1 - 1/2"	61.26

Thickness	Lbs. per Sq. Ft.
1 - 3/4"	71.47
2"	81.68
2 - 1/2"	102.10
3"	122.52
4"	163.36

Wearalloy 400 bars are hot rolled, heat treated alloy steel, and designed for applications where shock and abrasion are a factor. All bars are in 20 ft. stock lengths with a 360 - 420 brinell hardness.

1/4"	3/8"	1/2"	3/4"	1"	Square	Round
1/4 x 2	3/8 x 2	1/2 x 1-1/2	3/4 x 2	1 x 2	1"	1"
1/4 x 3	3/8 x 2-1/2	1/2 x 2	3/4 x 2-1/2	1 x 2-1/2	1-1/4"	1-1/4"
1/4 x 6	3/8 x 3	1/2 x 2-1/2	3/4 x 3	1 x 3	1-1/2"	1-1/2"
	3/8 x 4	1/2 x 3	3/4 x 4	1 x 4	2"	2"
	3/8 x 5	1/2 x 3-1/2	3/4 x 5	1 x 5		2-1/4"*
	3/8 x 6	1/2 x 4	3/4 x 6	1 x 6		2-1/2"*
		1/2 x 5	3/4 x 8	1 x 8		2-3/4"*
		1/2 x 6				3"*
		1/2 x 8				3-1/2"*

As rolled bars: 3/4" RD, 1" RD, 1/4" x 2, 1/4" x 4, 1/2" x 1-1/2"

*Length varies per size.



APPLICATIONS

- | | |
|------------------------|--------------------------|
| Bucket Liners | Truck Bed Liners |
| Rub Bars for Conveyors | Grizzly Bars |
| Pug Mill Paddles | Paving Machines |
| Tamping Equipment | Underground Miners |
| Chain Flights | Compactor Shoe Build-Ups |

Wearalloy Nickel Chrome Plus has a rich chemistry. It is a heat treated, quenched and tempered alloy steel plate. The steel is fully killed, vacuum de-gassed, fine grained, and desulfurized. The addition of nickel and chrome provides improved toughness, increased hardenability, and better corrosion resistance for shock and abrasion applications.

Carbon	Mang.	Phos.	Sulfur	Silicon	Nickel	Chrome	Moly.	Ti
.18-.26	.50-.92	.015 max.	.005 max.	.60 max.	.85 max.	1.40-1.75	.20-.30	.027

BHN Hardness	444 - 490	1/4" - 2"
Yield	180,000 - 230,000 psi.	
Tensile	216,000 - 240,000 psi.	
Elongation in 2"	14%	
Color Code	Gold	

Charpy V-Notch Data		Energy Absorbed - Ft. Lbs.			
Plate Thickness	BHN	Longitudinal		Transverse	
		70°F	-40°F	70°F	-40°F
1/2"	450	40	31	28	23
1"	450	22	19	23	14

Thicknesses: 1/4", 3/8", 1/2", 5/8", 3/4", 1", 1-1/4", 1-1/2", 2"

Widths: 48", 96" **Lengths:** 120", 240", 288"

WELDING: For welding Wearalloy Nickel Chrome Plus, we recommend that low hydrogen electrodes be used; such as E-70XX, E-80XX, E-90XXI, E-100XX, and E-110XX. Pre-heating is recommended on plates thicker than 1-1/2".

DRILLING AND MACHINING: Wearalloy Nickel Chrome Plus is a free machining plate with standard carbide indexable drills and end mills. As the hardness level of the plate increases, it is necessary to decrease the cutting speed and feed depth.

FORMING Wearalloy Nickel Chrome Plus can be formed with or perpendicular to the cross grain of the plate. At sharper bends, it is recommended that forming should be performed with the axis of bend at right angles to the rolling direction or cross grain of the plate.



APPLICATIONS

Loader Cutting Edges
Truck Bed Liners
Mold Board Liners
Chute and Ore Bin Liners
Loader Bucket Liners
Hammers
For Additional Mining Applications - See Page 2

Skid Plates
Feeder Liners
Screen Liners
Crusher Liners
Underground Miners
Cheek Plates

Pulp and Paper

Chain Flights
Chipper Hoods
Chip Feeders
Debarker Arms
Hammermill and Hog Parts
Chain Ways
Screw Conveyors

Fan Blades
Transition Sections
Bark Chutes
Chain Rub Bars
Flatbacks
Flumes
Jack Ladders

MANGANESE PLATE

Mangalloy steel is an 11-14% manganese steel that performs best in extreme impact applications. Under shock and impact it nearly triples its initial surface hardness, retains its interior toughness, and acquires a high polish. These features, combined with Mangalloy's high tensile strength, make it an ideal material for heavy impact and abrasive service. Mangalloy steel is also non-magnetic.

CHEMICAL ANALYSIS:

Carbon.....	1.13
Manganese	13.00
Sulphur	0.003
Phosphorus.....	0.017
Silicon	0.38

PHYSICAL PROPERTIES:

Tensile	145,000 psi.
Yield	55,000 psi.
BHN (Before work hardening)	200
BHN (After work hardening)	550

STOCK SIZES:

Thicknesses: 3/16", 1/4", 3/8", 1/2", 5/8", 3/4", 1", 1-1/4", 1-1/2", 2"
 Widths: 48", 60", 72", 96"
 Lengths: 120", 144", 240"

COLOR CODE:

Green

CUTTING:

Recommend using plasma or laser, but can be flame cut with oxygen acetylene and water jet.

FORMING:

Cold blending and cold roll forming can be performed.

MACHINING:

Due to Mangalloy's work hardening feature, special tooling such as carbide tipped or high speed cobalt tools are required.

WELDING:

Preheating is not advised. When welding Mangalloy to manganese use manganese welding rod, such as McKay Hardalloy 118. When welding Mangalloy to a dissimilar metal use 308, 309 or 310 stainless steel coated electrodes.



APPLICATIONS

- | | |
|-------------------------------------|------------------------|
| Shot Blast Equipment Liners | Crusher Liners |
| Abrasive, Non-Magnetic Applications | Crusher Hammers |
| RR Bolster Plates | Stock Tubes |
| Magnetic Drum Liners | Crusher Breaker Plates |

MANGANESE BARS

Our Mangalloy steel applicator bars help prolong the life of rock crusher hammers, jaws, mantles, and other areas subjected to severe impact. Metal-on-metal applications, such as pins in drag lines and shovel buckets, provide excellent use of Mangalloy bars.

FLAT BARS

1/4"		3/8"		1/2"		3/4"		1"		2"	
Inches	Est. Wt./Ft.	Inches	Est. Wt./Ft.	Inches	Est. Wt./Ft.	Inches	Est. Wt./Ft.	Inches	Est. Wt./Ft.	Inches	Est. Wt./Ft.
1/4 x 2	1.70	3/8 x 2	2.55	1/2 x 1	1.70	3/4 x 2	5.10	1 x 1-1/2	5.10	2 x 3	1.70
1/4 x 3	2.5	3/8 x 2-1/2	3.19	1/2 x 2	3.40	3/4 x 3	7.65	1 x 2	6.80	2 x 4	27.20
5/16 x 3-1/8	3.32	3/8 x 3	3.83	1/2 x 3	5.10	3/4 x 4	10.20	1 x 3	10.20		
		3/8 x 4	5.10	1/2 x 3-1/2	5.95	3/4 x 6	15.30	1 x 4	13.60		
		3/8 x 4-1/2	5.74	1/2 x 4	6.80	3/4 x 8	20.40	1 x 5	17.00		
		3/8 x 6	7.65	1/2 x 4-1/2	7.65			1 x 6	20.40		
				1/2 x 6	10.20			1 x 8	27.4		

SQUARE BARS

Inches	Est. Wt./Ft.	Inches	Est. Wt./Ft.
3/4	1.92	2	13.60
1	3.41		
1-1/2	7.65		

Available in random lengths 11' - 20' long or cut to size.

COLOR CODE: Green

ROUND BARS

Inches	Est. Wt./Ft.	Inches	Est. Wt./Ft.	Inches	Est. Wt./Ft.	Inches	Est. Wt./Ft.
3/8	.44	1-1/4	4.17	3-1/4	28.21	5-1/4	73.85
1/2	.67	1-1/2	6.01	3-1/2	32.71	5-1/2	80.78
5/8	1.04	2	10.68	4	42.73	5-3/4	88.29
3/4	1.50	2-1/4	13.52	4-1/4	48.23	6-1/4	104.31
7/8	2.04	2-1/2	16.69	4-1/2	54.26	7-1/4	140.36
1	2.67	2-3/4	20.20	4-3/4	60.45	8-1/4	181.75
1-1/8	3.38	3	24.03	5	66.76		



APPLICATIONS

- Shovel Bucket Pins
- Crusher Hammer Build-Up
- Shot Blast Hangers
- Crusher Breaker Bars
- Security Bars
- Crawler Pad Link Pins
- Grizzly Bars
- Dredge Chain Pins
- Shredder Hammers
- Bucket Hinge Pins

Super-Clad is a super-tough material that lasts up to 30 times longer than mild steel and up to 20 times longer than manganese steel in applications that demand unusually high abrasion resistance. It is manufactured by metallurgically bonding a composite of chromium-iron-carbon alloy and chromium carbides to mild steel substrate, in a process that yields a highly abrasion-resistant “overlay” material. It also has good impact capabilities.

MAJOR FEATURES AND BENEFITS:

- Outstanding abrasion resistance due to its 600 BHN matrix
- Far more cost effective than conventional abrasion resistance materials with shorter service lives
- Good impact resistance
- Can be cold or hot formed
- Less maintenance—less downtime, too
- Easily welded
- Corrosion resistant

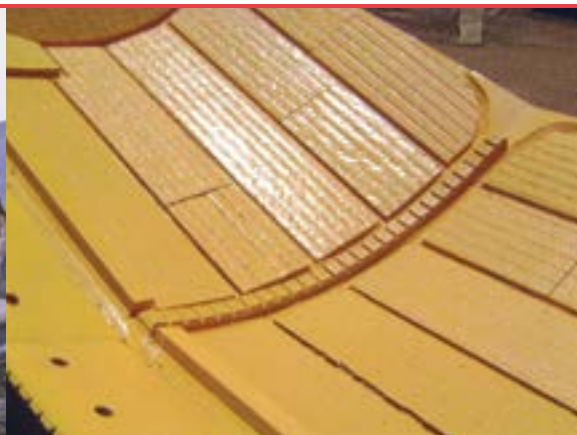
CHEMICAL AND PHYSICAL COMPOSITION:

Backing plate.....	mild steel
* Overlay: typical analysis	
Carbon.....	6.0%
Manganese	2.7%
Chrome	30.0%
Silicon	0.77%
Sulphur	0.001%
Phosphorus.....	0.001%
Moly	1.25
Boron	0.005
Hardness.....	600 BHN

*Standard deposit

MECHANICAL PROPERTIES:

Backing plate	73,000 psi. ultimate tensile strength
Overlay	11,000 psi



APPLICATIONS

- | | |
|-----------------|-------------------------|
| Grizzly Screens | Bucket Liners |
| Skip Liners | Screen Decks |
| Skirt Plates | Fan Blade Liners |
| Feeder Trays | Breaker Liners and Bars |
| Hopper Liners | Truck Bed Liners |
| Crusher Liners | Feed Nozzles |

STOCK SIZES:

Offered in 96" x 120" sheets or cut to your specific requirements. Available in 1/8" and 1/4" single overlay thicknesses and double overlay thicknesses of 5/16", 3/8", and 1/2". Standard base plate is 3/16", 1/4", 3/8", and 1/2" thick, however, 5/16", 5/8", 3/4", 7/8", and 1" is available upon request for single or double overlay plate.

CUTTING:

Use plasma or air arc. Plasma arc is preferred for factory environment. Air arc is satisfactory at on-site locations for trimming and fitting precut plates or cutting strips to length.

FORMING:

Can be cold rolled or pressed to 10" radius-hot pressed to a tighter radius. Consult our Engineering Department for further information.

HOLES:

Plasma cut holes oversize, then weld in pre-machined mild steel plug. When accuracy is required, mild steel plug should be drilled after installation. Countersink holes can be cut using Buggo machine with compatible plasma torch.

WELDING:

Strips and plates can be welded into position using mild steel electrodes to weld the base plate to a mild steel component. When welding to a dissimilar metal, use AWS E309-16 hydrogen electrode. When plates larger than 4 sq. ft. will be exposed to high impact, plug weld the central area of plates to prevent fatigue caused by micro movements. For hardfacing over low hydrogen welds, we recommend two passes with 26% to 30 % chromium content welding electrode.



APPLICATIONS

- | | |
|---|-----------------------------|
| Fan Housing Liners | Shredder Knives |
| Rotating chute Liners | Cyclone Entry Target Plates |
| Transition Sections | Cheek Plates |
| Screw Conveyors and Troughs | Flume Liners |
| Dredge Inlet Liner | Drag Slat Conveyor Liners |
| Dragline, Shovel, Loader, and Excavator Bucket Liners | Rock Grapple Liners |
| | Truck Bed Liners |

Ford Steel can fabricate any size cutting edge for your bucket. We offer straight, spade nose, duck bill, bolt-on, and slip-on cutting edges. We can also provide skid plates cut to size per your requirements. Cutting edges are available in Wearalloy Nickel Chrome, 400, 450, and 500 plate. Low hydrogen electrodes – such as AWS Spec E-70XX, E-80XX, E-90XX, E-100XX – are recommended for welding. Preheating and post-heating are recommended on thicker edges. Standard bevel is 30°.

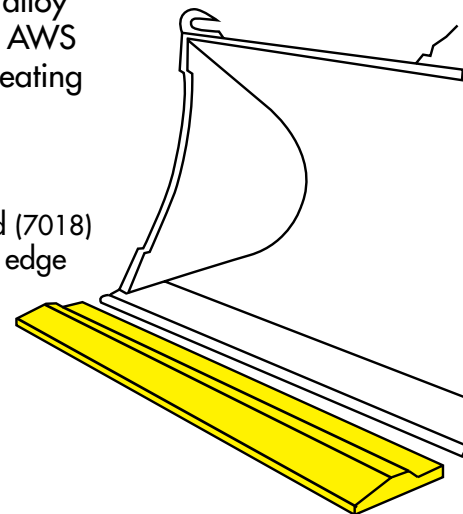
SLIP-ON CUTTING EDGES:

Heat treated steel with typical hardness of 450 BHN.

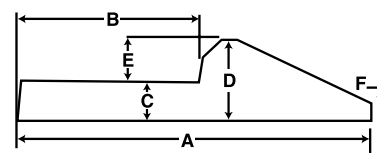
- Extends bucket life
- Easy to weld onto bucket
- Extends life of general purpose edge
- Less down-time for replacement
- Takes more abuse and wear with less weight

WELDING PROCEDURE:

1. Use low hydrogen welding rod (7018)
2. Tack weld from center to outer edge
3. Preheat to 200° – 250°F



	A	B	C	D	E	F	
S-1025	10"	5-3/16"	1-1/8"	2-1/4"	1-1/8"	7/16"	44 lbs./ft.
S-1058	10"	5-5/32"	1-9/16"	2-11/16"	1-1/8"	7/8"	60 lbs./ft.

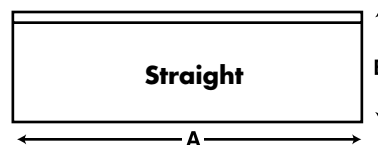
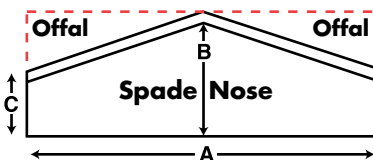
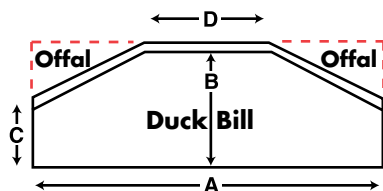


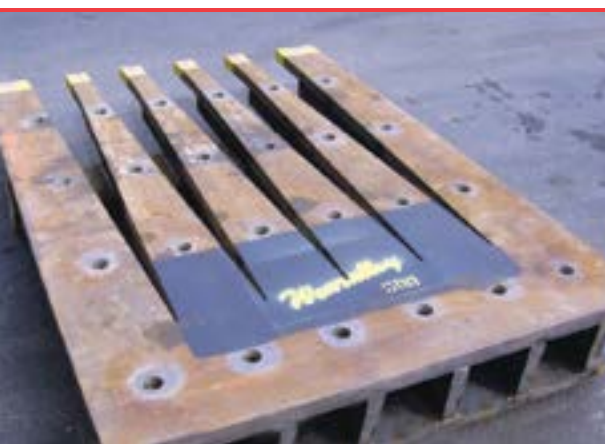
S-1025 and S-1058 available in 144" length only.*

* Maximum length. can be cut to specific length.



Cutting edges available up through 3" thickness. Custom bolt-on edges are available. All cutting edges are available with Tungston Clad carbide overlay. When ordering a duck bill or spade nose cutting edge, please indicate if offal is desired.





WE ARE FORD STEEL

LEADERS . . . When we were founded in 1945, we worked with construction and mining companies to combat wear problems with their equipment. Now, we are a global leader, carrying thousands of tons of Wearalloy and Mangalloy steel used in a wide variety of applications. We are committed to being the best in our industry, and you will find we have a wealth of expertise and physical resources.

PARTNERS . . . We work with you to improve your business by providing high quality wear-resistant products, excellent service, competitive pricing, and prompt delivery. Our highly trained sales representatives are available to provide a proven solution to your specific wear problems. With our warehouses and distribution centers stocked and managed throughout the world, our skilled and experienced professionals can help you avoid unnecessary downtime.

EXPERTS . . . We are experts in solving the challenges associated with heavy equipment and plant maintenance. With extensive drawings on file, and AutoCAD® capability, we will help you find the solution you need on everything from crusher to truck bed liners, and more. We are proud of our achievements, and would like to work with you to solve your abrasion and wear problems. Please contact us today.

“We Measure Up”

Ford Steel Products & Services

- Wearalloy 400, 450, 500 Plate
- Wearalloy 400 Bars
- Wearalloy Nickel Chrome Plus
- Wearalloy Super-Clad Overlay Plate
- Wearalloy Tungsten-Clad
- Wearalloy Super-Block
- Wearalloy Super-Hard Chrome
- Mangalloy Plates and Bars
- Wearalloy Slip -On and Custom Made Cutting Edges
- Sure Grip Grouser Bar
- Fabrications

WARRANTY

Ford Steel Company warrants its products against defective material, which will either be replaced or credited to the customer's account after an investigation by the St. Louis office.

We are not responsible for incidental or consequential damages.



**P.O. Box 54, 2475 Rock Island Blvd. • St. Louis, Missouri 63043 USA
(314) 567-4680 • Toll-Free (800) 325-4012 • Fax (314) 567-5762
E-mail: sales@fordsteel.com**

**Branch Office and Warehouse:
Elko, Nevada • (775) 738-8883 • Toll-Free (800) 939-3673 • Fax (775) 738-0155**

www.fordsteel.com