

WELD WITH COMPLETE CONFIDENCE

NIHONWELD

HARDFACING GUIDEBOOK

VOLUME II

- ◆ Cement, Brick & Clay
- ◆ Mining



Industrial Welding Corporation

Leader in Welding Technology

NIHONWELD

INTRODUCTION:

Industrial Welding Corporation (IWC) was established in 1982 by Mr. H. Ong Hai with over almost 50 years of experience in the welding industry. IWC's dedication and commitment to quality and research has made the company grow from a small producer to currently the biggest and most diverse manufacturer of welding electrodes/consumables in the Philippines.

IWC is the largest exporter of welding electrodes in the country, exporting to over 40 countries worldwide and continues to create new relationships in other countries every day. IWC believes in forming business relationships for long term business and friendship.

IWC will always strive and continue to improve existing products and develop new products for changing applications and needs. Quality is always first above everything else and IWC is proud to say that one can **"WELD WITH COMPLETE CONFIDENCE"** with our **"WORLD CLASS QUALITY"** products.



STATE OF THE ART LABORATORY EQUIPMENT AND MANUFACTURING FACILITIES REFLECTS OUR DEDICATION TO QUALITY, RESEARCH AND DEVELOPMENT OF **NIHONWELD** WELDING PRODUCTS.

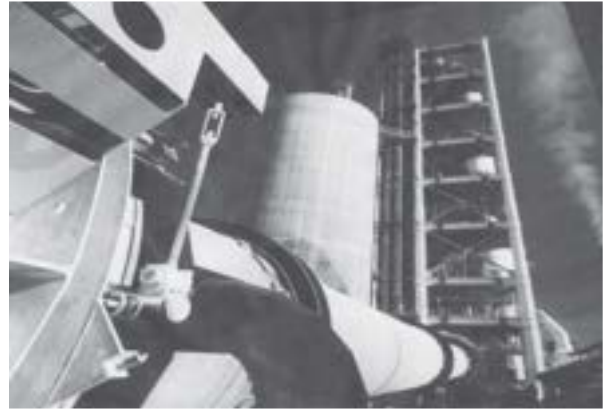


APPROVALS:



AMERICAN BUREAU OF SHIPPING
BUREAU VERITAS (FRANCE)
DET NORSKE VERITAS (NORWAY)
LLOYD'S REGISTER OF SHIPPING (UK)
NIPPON KAIJI KYOKAI (JAPAN)
GERMANISCHER LLOYD (GERMANY)

CEMENT MILL COMPONENTS



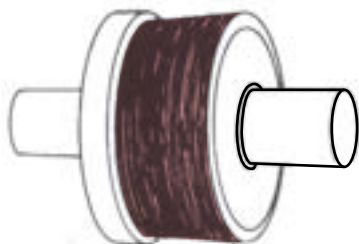
In the process of cement making, heavy duty equipment is used along the production line.

From the earth moving equipment in the lime stone quarry to the crusher plants, wear is very prominent on all machine parts. Hardsurfacing is not only extending the service life of wear parts in an economic way, it also reduces the need and the frequency of purchasing new expensive parts.

Rotary kilns work under hot conditions and carry the heavy load of the cement for days, weeks and month non-stop. Sometimes, however, stress relieve cracks or cracks due to material fatigue, make repair welding an urgent necessity.

Induction draft (ID) fans, worn out by the grinding effect of the passing cement dust also need to be protected with a high friction resistant weld overlay.

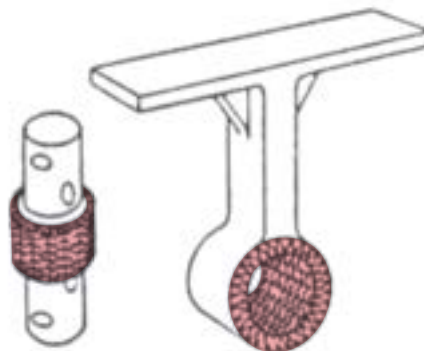
Cement factories are potential customers for many kinds of welding consumables, from cast iron to non-ferrous metals, from mild steel to high alloy, high tensile steel.

Kiln Trunnions

Applicable Submerged Arc Welding

NICOR 104/NSF-50

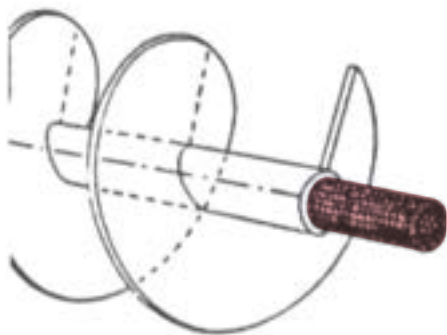
Comments: Automatic submerged arc welding is recommended for speed and economy.

Screw Flight Shaft Bearings, Hanger & Gudgeon Pins

Applicable Hardfacing Electrodes

NHF-6006
Nidurit 65

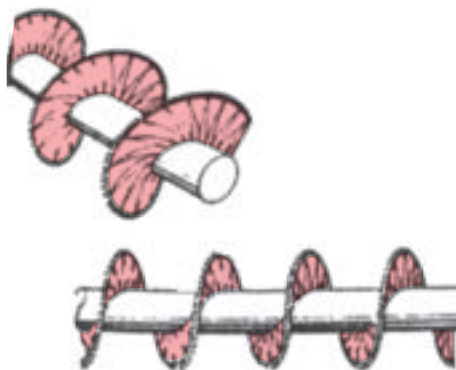
Comments: Apply hardfacing to the wear area. Finish grind as required.

Kiln Feed Screw Bearing

Applicable Hardfacing Electrodes

NHF-6006
Nidurit 65
Nidurit 61

Comments: Apply hardfacing alloy to bearing area of shaft end and to end surface. Finish grind to original dimensions.

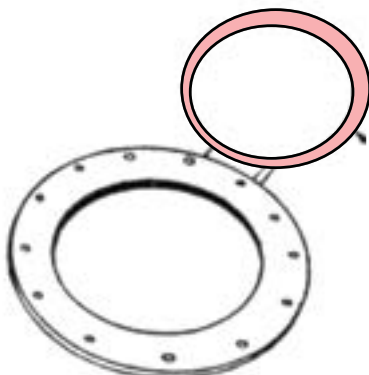
Bag Packer Screw

Applicable Hardfacing Electrodes

NHF-6006
Nidurit 65

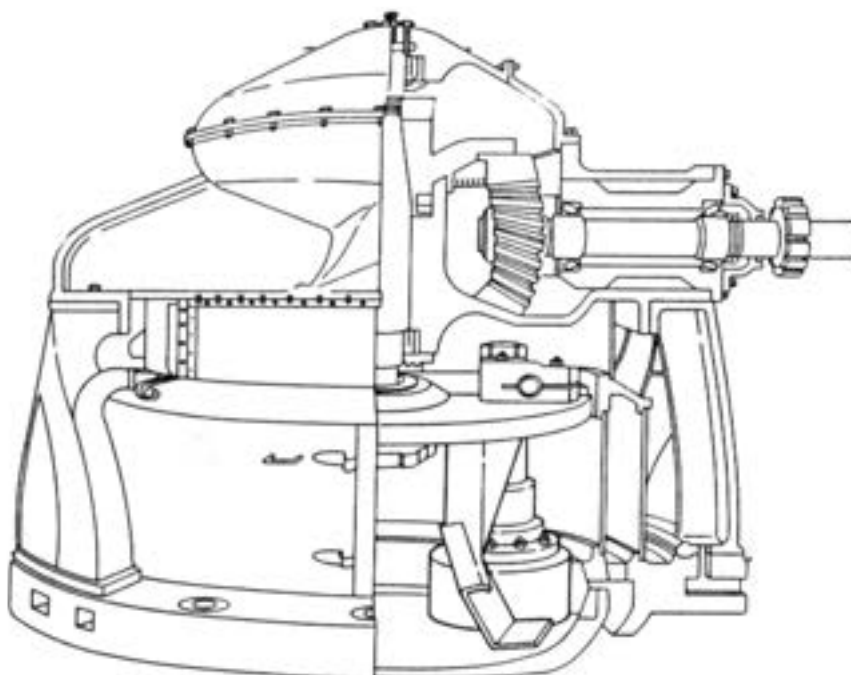
Comments: To resist severe abrasion deposit one or two layers of NHF-6006 to the worn areas of the flight faces and edges as shown in the sketch.

Flapper Valves



Applicable Hardfacing Electrodes
NHF-ST-6R
Comments: Undercut seating area 1/8" and hardface. Finish by machining with carbide tools or grinding.

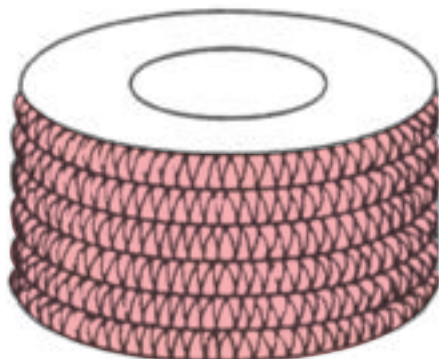
PULVERIZING MILL COMPONENTS



Four major components in pulverizing mills are subject to extreme abrasion when grinding clinker or dry, raw cement mix: (1) the roll heads, which are often hard-faced by the mill manufacturer; (2) the die ring; (3) the mill plows; and (4) the feed inlet tube. Hardfacing prolongs the service life of each part and improves mill efficiency.

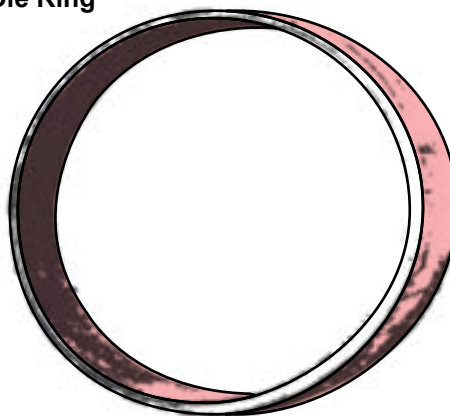
Pulverizing Mill Components:

(1) Roll Heads



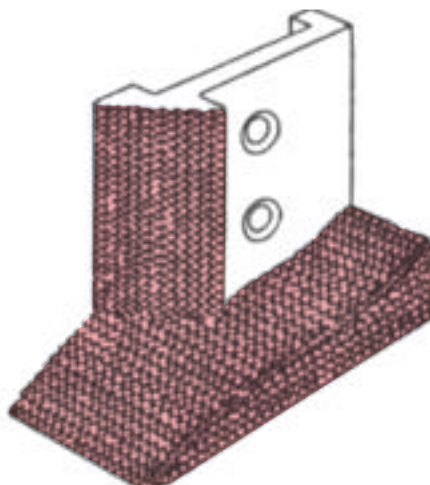
Applicable Hardfacing Electrodes
NHF-6006 Nidurit 65
Comments: Position the roll head in a rotating jig and apply Nidurit 65 circumferentially in slight weave beads.

(2) Die Ring



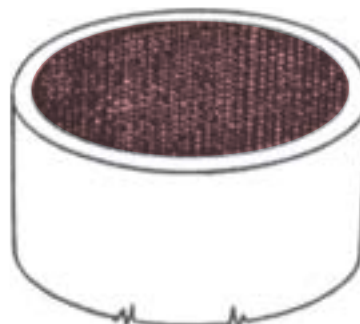
Applicable Hardfacing Electrodes
NHF-6006 Nidurit 65
Comments: Apply NHF-6606 for excellent abrasion resistance.

(3) Mill Plows

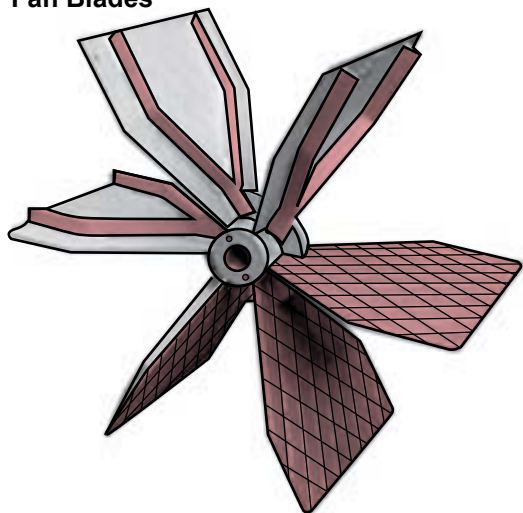


Applicable Hardfacing Electrodes
NHF-6006 Nidurit 65
Comments: Hardface new mill plows before putting them in service.

(4) Feed Inlet

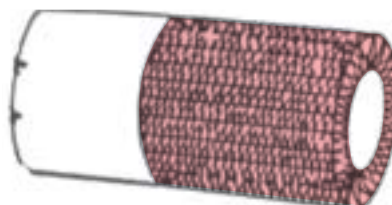


Applicable Hardfacing Electrodes
Nidurit 61 Nidurit 65 NHF-6006
Comments: Apply Nidurit 61 to inside surface of feed tubes.

Other Cement Components:**Fan Blades****Applicable Electrodes**

Nidurit 61
Nidurit 65
NHF-6006

Comments: Apply Nidurit 65 to edges and leading faces of blades according to wear pattern. Skip weld to minimize distortion.

Slurry Tank Agitator Shafts**Applicable Electrodes**

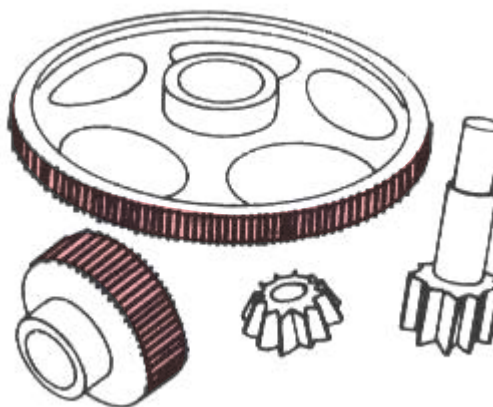
NHF-6006
Nidurit 65

Comments: Hardface the bearing area using NHF-6006. Finish by grinding as required.

Muller Tires**Applicable Electrodes**

NHF-716
NHF-6006
NHF-6700
Nidurit 61

Comments: Hardfacing new Muller tires and re-welding areas worn in service using transverse beads with NHF-6700 electrodes provides a long working life.

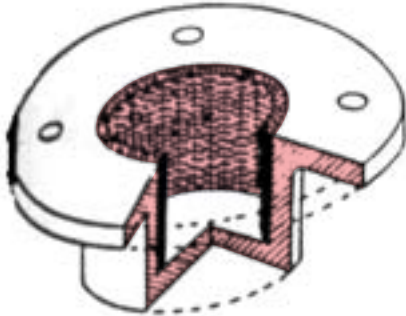
Gears**Applicable Electrodes**

NHF-350B
NHF-300
NHF-600B

Comments: Many of the various types of gears used throughout the industry can be rebuilt using NHF-600B. Finish by grinding as required.

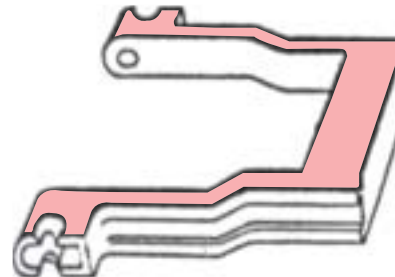
Other Components:

Agitator Bearings (Slurry Tank)



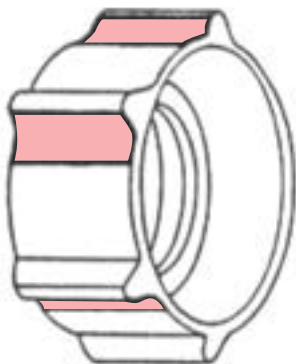
Applicable Electrodes
NHF-6006 NIDURIT 61 NIDURIT 65
Comments: Apply hardfacing to bearing surface as shown. Finish grind as required.

Drag Chain Links



Applicable Electrodes
NHF-350B NHF-300
Comments: Hardface areas indicated in sketch before links go in service; repeat application original deposit wears before through.

Drag Chain Drive Sprockets



Applicable Electrodes
NHF-350B NHF-300
Comments: Apply hardfacing as shown in sketch. Use proper preheat and postheat when necessary.

Concrete Truck



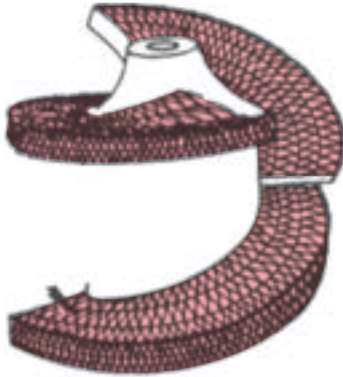
Applicable Electrodes
NHF-716 , NHF-6700 NHF-6006, NHF-600 Nidurit 65, Nidurit 61
Comments: All types of cement mixers can be hardfaced by covering the entire inside, including blending wings using NHF-6700, NHF-600 or NHF-6006. Be certain sufficient ventilation is provided to workers when inside the mixer.

Other Common Applications in the Cement/Concrete Industries:

Parts (Applications)	Applicable Electrodes
Bagging Machine Feeder Blades and Housing	NHF-950
Bolt Heads (Liner Plates)	Nidurit 61
Cement Chutes	Nidurit 61
Cement Pump Air Rings	NHF-ST-1R
Cement Pump Barrel Liners	NHF-ST-1R
Clinker Mill Liner Plates	Nidurit 61
Concrete Block Mixer Deflector Angles	NHF-950
Concrete Block Pug Mill Paddles	NHF-950
Concrete Mixer Chutes	NHF-600
Concrete Pipe Forming Shoes	NHF-450
Concrete Sewer Tile Dies	NHF-ST-1R
Drag Chain Idlers	NHF-450
Drag Chain Latches and Keepers	NHF-160MC
Drag Chain Rider Blocks	NHF-450
Drive Shaft Bearings and Bushings	NHF-450
Feed Spouts	Nidurit 61
Pump Shafts	NHF-ST-6R
Tube Mill Feeder Screws	NHF-600
Tube Mill Feeder Screens	Nidurit 61
Valves	NHF-ST-6R

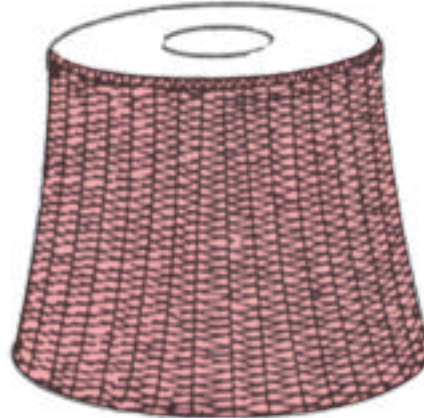
BRICK AND CLAY MANUFACTURING COMPONENTS

Pug Mill Augers



Applicable Electrodes
NHF-6006 Nidurit 65 Nidurit 61
Comments: NHF-6006 provides an extremely hard surface to resist the severe abrasive wear of this application.

Spreader Cones



Applicable Electrodes
NHF-6006 Nidurit 65 Nidurit 61
Comments: NHF-6006 provides an extremely hard surface to resist the severe abrasive wear of this application.

Feeder Blades

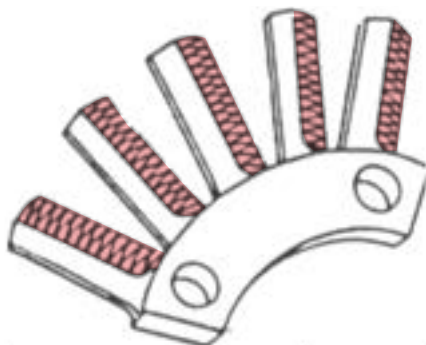


Applicable Electrodes
NHF-6006 Nidurit 65 Nidurit 61
Comments: NHF-6006 provides an extremely hard surface to resist the severe abrasive wear of this application.

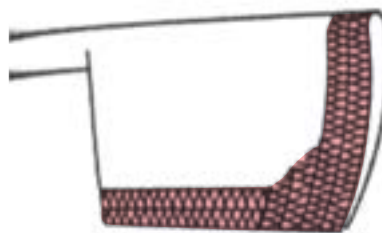
Conveyor and Vertical Mixer Screws



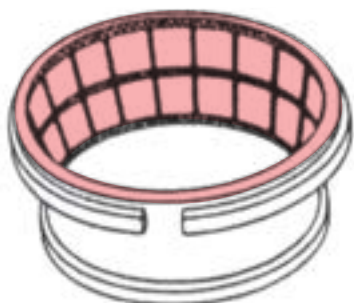
Applicable Electrodes
NHF-6006 Nidurit 65 Nidurit 61 NHF-716 NHF-6700
Comments: Hardface the screw flights to resist severe abrasion using NHF- 6006. When moderate impact accompanies the abrasive wear use Nidurit 61 or NHF-6700.

Other Brick and Clay Components:**Shredder Knives**

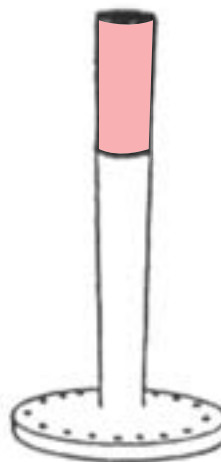
Applicable Electrodes
NHF-6006 Nidurit 65 Nidurit 61
Comments: Apply light stringer of NHF-6006 to knife edge of blade. Apply wash pass across pressure face. Begin welding from end of blade and work toward ring.

Pug Mill Knives

Applicable Electrodes
NHF-6006 Nidurit 65 Nidurit 61
Comments: Hardface leading face and edge according to wear pattern. Preheat cast iron knives to 1200°F, maintain high interpass temperature and slow cool.

Barrel Liners

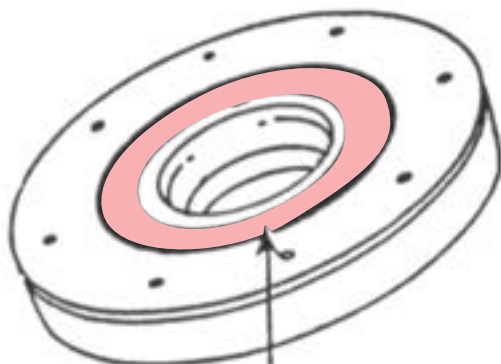
Applicable Electrodes
NHF-950
Comments: Hardface ribs in liner with stringer beads. Use proper preheat, interpass temperature and postheat when welding cast iron liners.

Arbors

Applicable Electrodes
NHF-ST-1R
Comments: Undercut wearing area 1/8" to 3/16" and apply NHF-ST-1R.

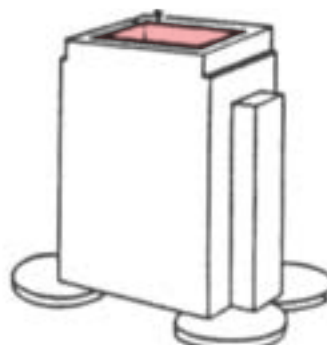
Other Brick and Clay Components:

Arbor Plates



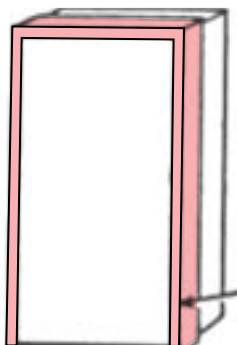
Applicable Electrodes
NHF-ST-1R
Comments: Hardface worn areas with NHF-ST-1R and grind to finish.

Arbor Dies



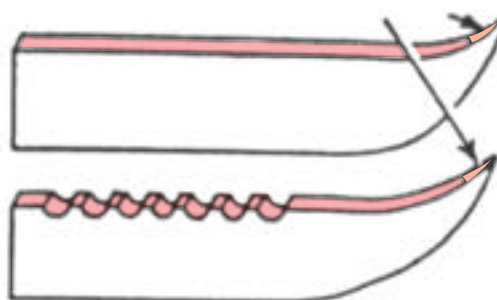
Applicable Electrodes
NHF-ST-1R
Comments: Undercut wearing edges 3/16" and rebuild to size. Grind to fine finish.

Refractory Dies



Applicable Electrodes
NHF-ST-6R
Comments: Undercut wearing edges and rebuild to size. Grind to fine finish.

Shale Planer Knives



Applicable Electrodes
NHF-950
Comments: Provide suitable fixture so knife can be tilted for downhand welding. Hardface with NHF-950.

Mining Industry Components

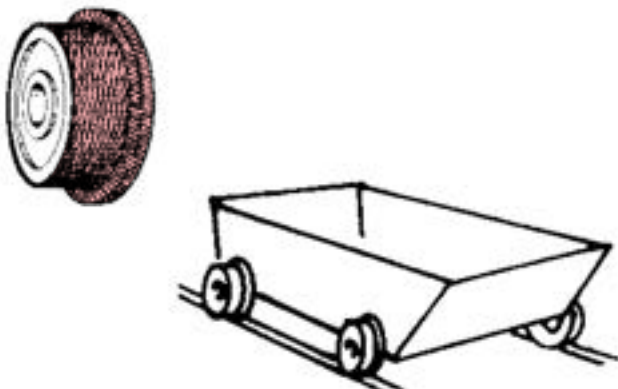
Procurring and processing material in the mining industry provides challenging applications for hardfacing products. Rock, shale, sand, etc. is worked using large equipment such as draglines. Parts must be surfaced to resist wear from mild abrasion with impact to severe abrasion.



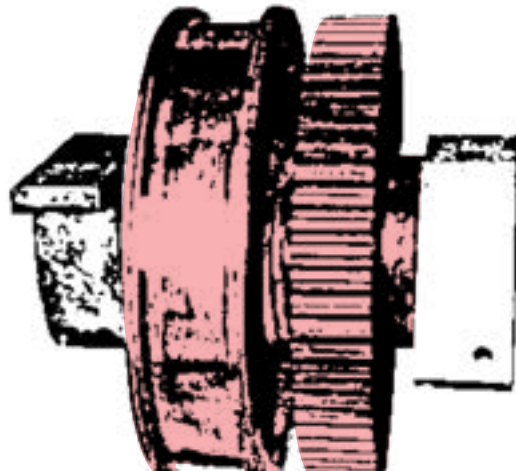
WHEELS

Methods and materials for rebuilding and hardfacing a variety of wheels used to convey mining equipment are similar; general recommendations are made to serve as a guide to successful reconditioning. Most wheels are made of weldable steel; however, some are made of cast iron or alloy steel and special care must be taken to determine wheel analysis before any welding is done. Rebuilding of cast iron wheel is not recommended.

Mine Car Wheels



Crane Wheels



WHEEL PART COMPONENTS:

Skip Hoist

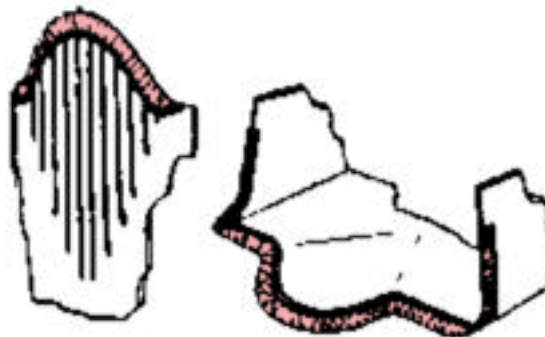


Applicable Hardfacing Electrodes

NHF-716
NHF-6006
NHF-6700
Nidurit 61

Comments: Hardface with NHF-6700 for resistance to moderate impact and moderate abrasion. In severe abrasion applications, NHF-6006 can be used.

Mechanical Loader Lips

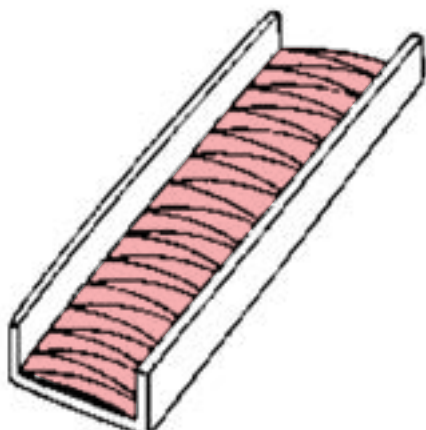


Applicable Hardfacing Electrodes

Nidurit 61

Comments: Apply hardfacing to top and bottom of lip.

Shaker Conveyor Rails

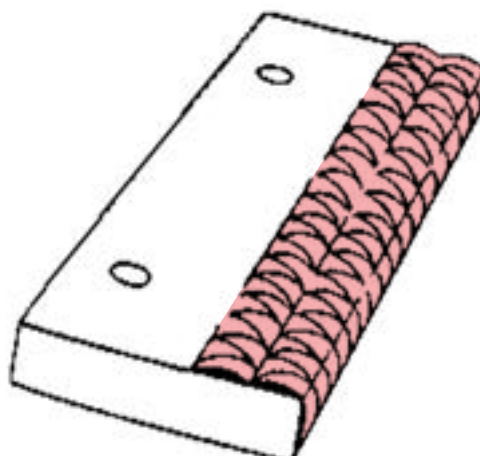


Applicable Hardfacing Electrodes

Nidurit 65
NHF-6006
Nidurit 61

Comments: Hardface wear areas and grind to desired finish.

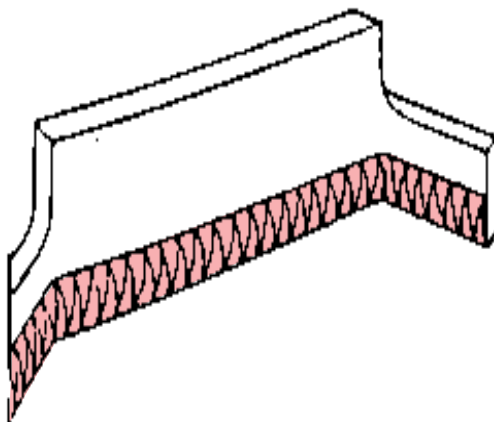
Rabble blades and discs roaster



Applicable Hardfacing Electrodes

NHF-ST-1
NHF-ST-1R

Comments: Apply NHF-ST-1 stick electrodes or NHF-ST-1R bare wire to wear areas of blades or discs.

Dragline chain feeder blades**Applicable Hardfacing Electrodes**

Nidurit 65
NHF-6006
Nidurit 61

Comments: Apply hardfacing to wear areas.

CLASSIFIERS PART COMPONENTS:**Shaker Pan Conveyors****Applicable Hardfacing Electrodes**

NHF-716
NHF-6006
NHF-6700
Nidurit 61

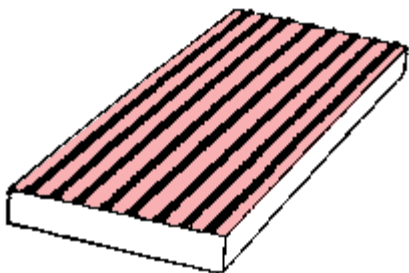
Comments: Apply stringer beads of hardfacing alloy at wearing end of pan as shown. Bolt heads which join the pan to the conveyor should also be hardfaced.

Conveyors Pipe Bends**Applicable Hardfacing Electrodes**

NHF-6006
Nidurit 61

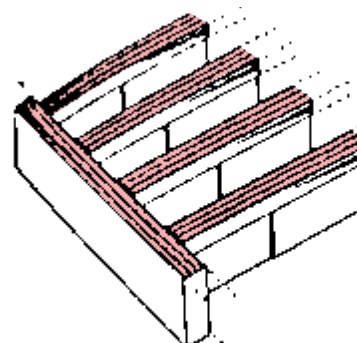
Comments: Hardface the inside of the pipe bends. Hardface the cover plugs and weld them into position, using a joining electrode.

Baffle Plates (Ore Chutes)



Applicable Hardfacing Electrodes
NHF-716 NHF-6006 NHF-6700 Nidurit 61
Comments: To resist wear in severe abrasion conditions run stringer beads with NHF-6006. Where impact is greater use NHF-6700 or NHF-716.

Grizzlies



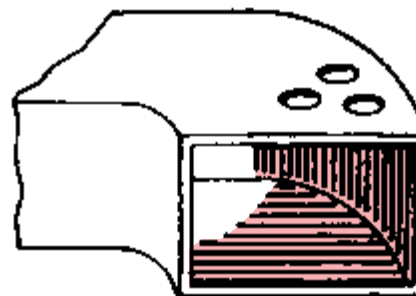
Applicable Hardfacing Electrodes
NHF-6006 Nidurit 61
Comments: Hardface grizzlies before putting them in service; re-apply hard metal as soon as old deposit has worn away.

Ball Mill Scoop Lips

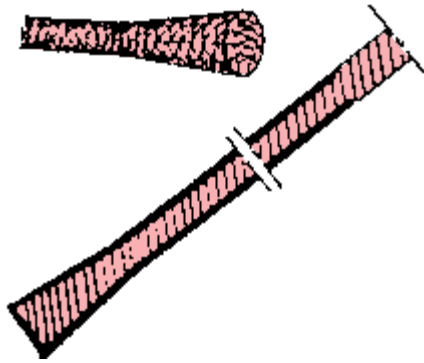


Applicable Electrodes
NHF-716 NHF-6006 NHF-6700 Nidurit 61
Comments: Overlay the working edges with NHF-6006 for best life in severely abrasive applications. Use NHF-6700 when wear is less severe.

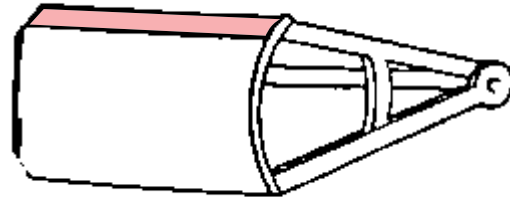
Ball Mill Scoops



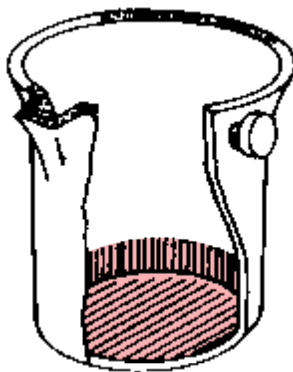
Applicable Hardfacing Electrodes
NHF-716 NHF-6006 NHF-6700 Nidurit 61
Comments: Apply weld deposit as shown in the sketch.

Tuyeres Hole Openers

Applicable Electrodes
NHF-ST-6 NHF-ST-6R
Comments: Undercut rod end and rebuild with NHF-ST-6 or NHF-ST-6R. Grind to guage, if necessary.

Arc Doors (Ore Chutes)

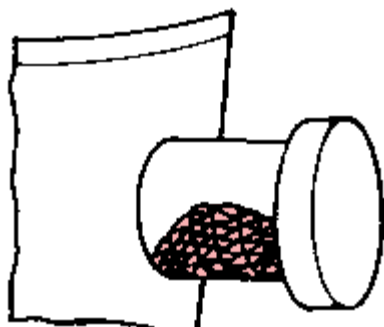
Applicable Electrodes
NHF-716 NHF-6006 NHF-6700
Comments: Hardface wear areas on door. Deposit should be 1" to 1 1/2" wide.

SLAG LADLES

A variety of welding alloys is used to recondition slag ladles; these include the nickel and cobalt base group, high alloy iron base hardfacing materials and stainless steel electrodes and wires. Procedures may vary also. In some mills new ladles are hardfaced before going in service. In others, hardfacing is applied only after the wear pattern has developed. There are some mills that don't hardface at all, but merely repair the ladles by cutting out the worn section and replacing it with steel flats or shapes. Wear conditions-amount of heat, type and condition of ore being smelted, etc.,-dictate which alloy and procedure work best.

SLAG LADLE PART COMPONENTS:

Ladle Pin



Applicable Electrodes

NHF-600
NHF-600B

Comments: Hardface the ladle pins using NHF-600 or NHF-600B to resist the metal-to-metal wear. Use proper preheat and interpass temperatures.

Bail Eyes

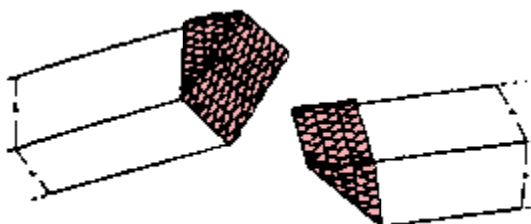


Applicable Electrodes

NHF-600
NHF-600B

Comments: Rebuild the ladle bail eyes using NHF-600 or NHF-600B to resist metal-to-metal wear. Use proper preheat and interpass temperatures.

Collar Puller Cutters

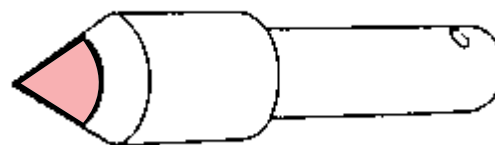


Applicable Electrodes

NHF-ST-6
NHF-ST-6R

Comments: Apply NHF-ST-6 stick electrodes or NHF-ST-6R bare wire to end of cutter.

Blister Bar Tong Bits

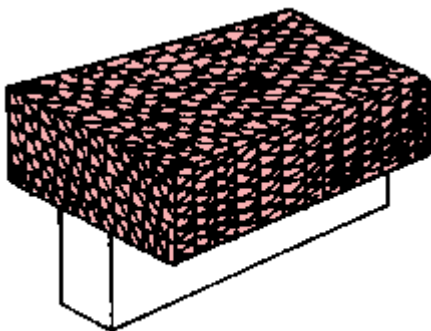


Applicable Electrodes

N-NiCrMo-5

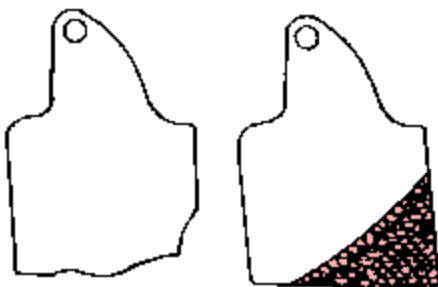
Comments: Rebuild worm bit end oversize with N-NiCrMo-5 and finish grind.

Slusher Shoes



Applicable Electrodes
For build-up : NHF-160MC, NHF-7200, NHF-NiMn For hardfacing: NHF-6006, Nidurit 65, Nidurit 61
Comments: Rebuild these manganese steel parts using NHF-160MC or NHF-7200. Two final layers of NHF-6006 provide resistance to severe abrasive wear.

Wheel Excavator Teeth

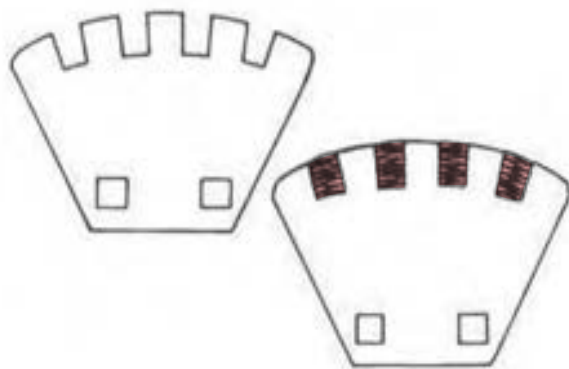


Applicable Electrodes
For build-up : NHF-160MC, NHF-7200 For hardfacing: NHF-6006, Nidurit 65, Nidurit 61
Comments: Rebuild the worn teeth using NHF-160MC or NHF-7200. Add two layers of NHF-6006 as indicated by prior wear patterns to resist abrasive wear. Badly worn teeth should be rebuilt by welding a replacement plate of the proper shape to the tooth using NHF-160MC electrodes, then hardfacing.

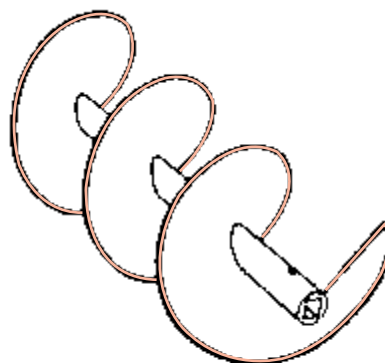
Slusher Teeth



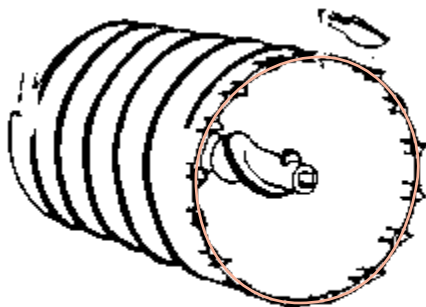
Applicable Electrodes
For build-up : NHF-160MC, NHF-7200 For hardfacing: NHF-6006, Nidurit 65, Nidurit 61
Comments: Rebuild the worn teeth to size using NHF-7200. Add two layers of NHF-6006 as indicated by prior wear patterns to resist abrasive wear. Badly worn teeth should be rebuilt by welding a replacement plate of the proper shape to the tooth using NHF-160MC then hardfacing.

Pug Maill Paddles

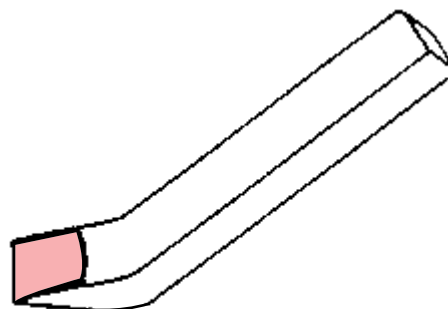
Applicable Electrodes
Nidurit 61
Comments: Abrasion resistant Nidurit 61 weld metal deposited in slots in new paddle castings increases wear life by several times.

Coal Recovery Augers

Applicable Electrodes
Nidurit 61
Comments: Hardface flight periphery.

Coal Recovery Core Barrels

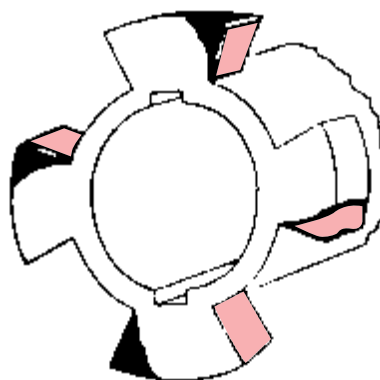
Applicable Electrodes
Nidurit 61
Comments: Apply Nidurit 61 to spiral round barrel and to flight edge of center auger.

Auger Bits

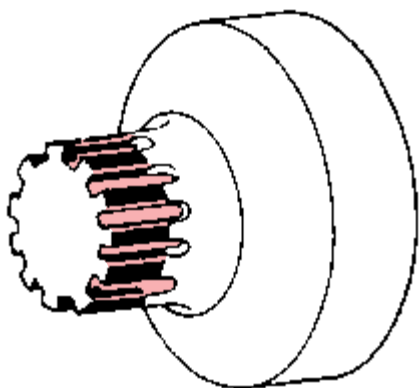
Applicable Electrodes
NHF-950 NT-WC
Comments: Construct fixture so bits can be tilted for downhand welding. Apply Nihonweld NT-WC with oxy-acetylene process 1/2" back from point.

Undercutter Bits

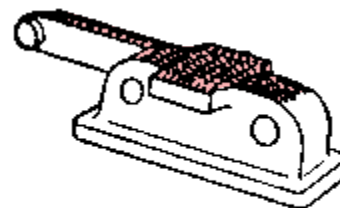
Applicable Electrodes
NHF-950 NT-WC
Comments: Construct fixture so bits can be tilted for downhand welding. Apply Nihonweld NT-WC with oxy-acetylene process 1/2" back from point.

Clutch Lugs (Loader)

Applicable Electrodes
NHF-600B
Comments: Rebuild to size with NHF-600B for excellent resistance to metal-to-metal wear. Proper preheat and slow cooling is needed to avoid cracking.

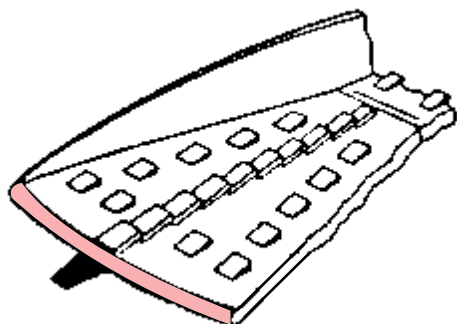
Sprocket Drums and Traveling Sprockets

Applicable Electrodes
For build-up : NHF-300, NHF-300B For hardfacing: NHF-716, NHF-600B
Comments: Rebuild to original size. Finish by machining or grinding as required.

Cutting Chain Lugs and Straps

Applicable Electrodes
NHF-6006 Nidurit 61 Nidurit 65
Comments: Hardface wear areas.

Duck Bills



Applicable Electrodes
NHF-6006 Nidurit 61 Nidurit 65
Comments: Hardface all sides of point, top, edge and bottom lip.

Digging Arms



Applicable Electrodes
NHF-6006 Nidurit 61 Nidurit 65
Comments: Hardface new arms before putting them in service and re-hardface as necessary.

Other Mining Industry Components:

Part	Recommended Manual Welding Electrodes
Wheel Excavator Buckets	NHF-6006, Nidurit 61
Continuous Miner Bearing Carrier	NHF-600, NHF-700
Loader Dragline Plates	NHF-6006, Nidurit 65, Nidurit 61
Loader Undercarriage Runners	NHF-6006, Nidurit 65, Nidurit 61
Loader Track Pads	NHF-6006, Nidurit 65, Nidurit 61

COVERED ARC WELDING ELECTRODES FOR SHIELDED METAL ARC WELDING (SMAW) FOR HARDSURFACING

Type of Coating	Brand Name	Equivalent Specifications AWS (JIS)	Type of Current	Typical All Weld Deposit Analysis (%)						Typical Hardness of all weld metal HRC (Hv)	Applications
				C	Si	Mn	Cr	Mo	Others		
LOW HYDROGEN TYPE	NHF-300	(DF2A-300B)	AC DC(+)	0.08	0.48	0.80	2.16	0.84	-	23-27 (255-280)	For light intermetallic abrasion. Hardfacing of gears, shafts, wheel and rollers.
	NHF-450	(DF2A-450B)	AC DC(+)	0.23	1.15	0.60	2.50	0.53	V 0.38	45-49 (450-500)	For intermetallic abrasion. Hardfacing of rails, cast steel rollers and parts of bulldozers.
	NHF-600	(DF2B-600B)	AC DC(+)	0.76	0.87	0.40	7.45	0.52	V 0.57	54-57 (580-630)	Hardfacing of bulldozer blades, tractor parts, scraper blades, shovel, bucket lips and dipper teeth.
	NHF-700	(DF3C-600B)	AC DC(+)	0.66	1.26	0.81	5.53	0.51	-	55-61 (600-720)	For scratching abrasion, hardfacing of mixers, cutter knives and dredgers.
	NHF-6700	DIN 8555 E6-60	AC DC(+)	0.50	2.30	0.40	9.00	-	-	56-58 (640-690)	Special applications are surfacings on die blocks, pressing, drawing and cold pressing tools, excavator parts, shear blades, slideways and guide rails.
HIGH TITANIA TYPE	NHF-300B	(DFA-300R)	AC DC(+)	0.07	0.25	0.18	0.70	1.02	-	23-29 (225-295)	For hardfacing of gears, mine rails, shovel pads, pin clutches. Rebuilding of shafts and wheel threads
	NHF-350B	(DFA-350R)	AC DC(+)	0.11	0.26	0.84	1.88	0.51	-	30-35 (300-350)	For hardfacing and rebuilding of tractor idler wheels, upper rollers and sprockets.
	NHF-600B	(DFA-600R)	AC DC(+)	0.65	0.52	0.43	8.78	5.03	-	54-58 (580-560)	Hardfacing of bulldozers, blades, bucket edges, dipper teeth.
SPECIAL COATING	NHF-950	(DFWA-700S)	AC DC(+)	2.78	0.29	3.22	0.10	0.12	W 47.30	60-69 (700-950)	For severe abrasion with light impact such as concrete cutter, pump impeller, water drilling dull bits.
SPECIAL COATING CHROMIUM CARBIDE ELECTRODE	NIDURIT 61	E FeCr-Al DIN 8555 E10-UM-60-GRZ	AC DC(+)	3.50	1.00	0.14	35.00	-	Fe Bal.	58-61 (660-720)	Hardfacing electrodes to resist strong grinding abrasion combined with medium impact such as conveyor screws, scraper blades, etc.
	NIDURIT 65	E FeCr-Al DIN 8555 E10-UM-60-GRZ	AC DC(+)	4.50	1.00	0.21	23.50	6.50	Nb 5.5 W 2.2 V 1.5	64-67 (800-900)	For hardfacing on working parts in the cement and brick industry as well as in steel mills and sintering plants.
	NHF-716	-	AC DC(+)	2.65	1.50	0.14	24.0	2.00	Ni 0.80 V 0.50 W 0.17	55-60 (630-760)	For hardfacing of parts subjected to severe abrasion but moderate impact such as sand slider, conveyor screws, mixing paddles, etc.
	NHF-6006	E FeCr-Al DIN 8555 E10-UM-60G	AC DC(+)	3.5	-	-	35.0	-	Fe Bal.	60-62 (750-790)	For hardfacing of parts subject to mineral friction wear combined with light impact such as mixer wings, conveyor screws, scraper blades, digging teeth.

COVERED ARC WELDING ELECTRODES FOR SHIELDED METAL ARC WELDING (SMAW) FOR HARDSURFACING

Type of Coating	Brand Name	Equivalent Specifications AWS (JIS)	Type of Current	Typical All Weld Deposit Analysis (%)						Typical Hardness of all weld metal HRC (Hv)	Applications
				C	Si	Mn	Cr	Mo	Others		
SPECIAL COATING AUSTENITIC MANGANESE STEEL	NHF-NiMn	E FeMn-A	AC DC(+)	0.54	0.18	13.70	0.53	0.53	Ni 3.80	As welded 91-95 HRB (200-220) work hardened 45-51 (450-530)	Work hardening properties. For hardfacing and underlaying of manganese steels, casting of carbon steel such as crusher jaws, bucket manganese teeth, etc.
	NHF-160MC		AC DC(+)	0.65	0.57	18.10	14.70	0.19	P 0.04 S 0.007	As welded 87-95 HRB (180-220) work hardened 43-49 (420-500)	Joining and surfacing of 14% Mn steels and most all hard-to-weld steels when high impact resistance and cavitation resistance is required. Buffer layer before depositing.
	NHF-7200		AC DC(+)	0.70	0.27	13.00	4.50	0.53	Ni 4.00	As welded 95-100 HRB (220-260) work hardened 43-45 (420-450)	Work hardening properties. For hardfacing worn high Mn steel parts such as excavator pins, buckets, mill hammers, crusher jaws, cones and beaters, impeller bars, etc.
SPECIAL COATING COBALT BASED ALLOYS	NHF-ST-1 (flux coated)	E CoCr-C (D CoCrE)	AC DC(+)	2.15	0.47	1.03	31.25	-	W 12.72 Co Bal.	50-56 (520-60)	For corrosion and high temperature abrasion. Hardfacing of valve heads, seal rings of high pressure pump.
	NHF-ST-6 (flux coated)	E CoCr-A (D CoCrA)	AC DC(+)	0.84	0.57	0.97	30.46	-	W 4.53 Co Bal.	38-44 (370-440)	For corrosion and high temperature abrasion. Hardfacing of valve seats, forging dies, crushers and screws.

COVERED ARC WELDING ELECTRODES FOR SHIELDED METAL ARC WELDING (SMAW) FOR NICKEL ALLOYS

Type of Metal	Brand Name	Equivalent Specifications AWS (JIS)	Type of Current	Typical All Weld Deposit Analysis (%)							Y.P. N/mm ² (Ksi)	T.S. N/mm ² (Ksi)	EL (%)	I.V.J (kgf-m)	Applications
				C	Si	Mn	Fe	Ni	Mo	Others					
SPECIAL COATING	N-NiCrMo-5	E NiCrMo-5	AC DC(+)	0.04	0.03	0.09	5	Bal	17	Cr 16 W 5	-	690 (100)	-	210 240hb after work hardening 450HB	For impact, compassion, abrasion and heat resistance in hot work tools.

SOLID WELDING WIRE FOR GAS TUNGSTEN ARC WELDING (GTAW)

Type of Metal	Brand Name	Equivalent Specifications AWS (JIS)	Size Dia. (mm)	Typical All Weld Deposit Analysis (%)						Typical Hardness of all weld metal HRC (Hv)	Applications
				C	Cr	Co	V	Ni	Si		
	FOR COBALT BASED ALLOYS	NHF-ST-1R	R CoCr-C	3.2 4.0 5.0	2.3	30	Bal	13	3 max	0.8	53-59
	NHF-ST-6R	R CoCr-A	3.2 4.0 5.0	1.1	28	Bal	4	3 max	1.1	38-46	For engine valves, pump shafts and sleeves, hot cutting and rotary knives, high pressure high temperature valves.
FOR TUNGSTEN CARBIDE	NT-WC		3.2	WC/Co 70	Cu 16	Zn 10	Ni & Others Bal			Matrix: HB 200 Carbides: Rc 77	For uses such as drills, reamers, milling tools, dredging industries, oil industries, horse shoes, stabilizers, bucket teeth, augers, brick and cement industries, earth moving industries, agricultural industries

SUBMERGED ARC WELDING FLUXES AND WIRES FOR HARDFACING

Type of Metal	Brand Name	Flux	Alloy Content	Typical All Weld Deposit Analysis (%)						Typical Hardness of all weld metal HRC	Applications
				C	Mn	Si	Mo	Cr	Fe		
For Hardfacing Submerged Arc Welding	NICOR 104	NSF-50	3%	0.13	2.0	0.80	0.20	1.05	base	30-35	Excellent resistance to impact. Deposits are crack-free and can be machined by high speed tools. Can be flame cut. Maximum thickness is unlimited. Ex.build-up prior to hardfacing of tractor rollers, idlers, trunnions, rolls, cable drums. Used as final oven.

The serviceability of a product or structure utilizing this type of information is and must be the sole responsibility of the builder/user. Many variables beyond the control of INDUSTRIAL WELDING CORPORATION affect the results obtained in applying this type of information. These variables include, but are not limited to, welding procedure, plate chemistry and temperature, weldment design, fabrication methods and service requirements.

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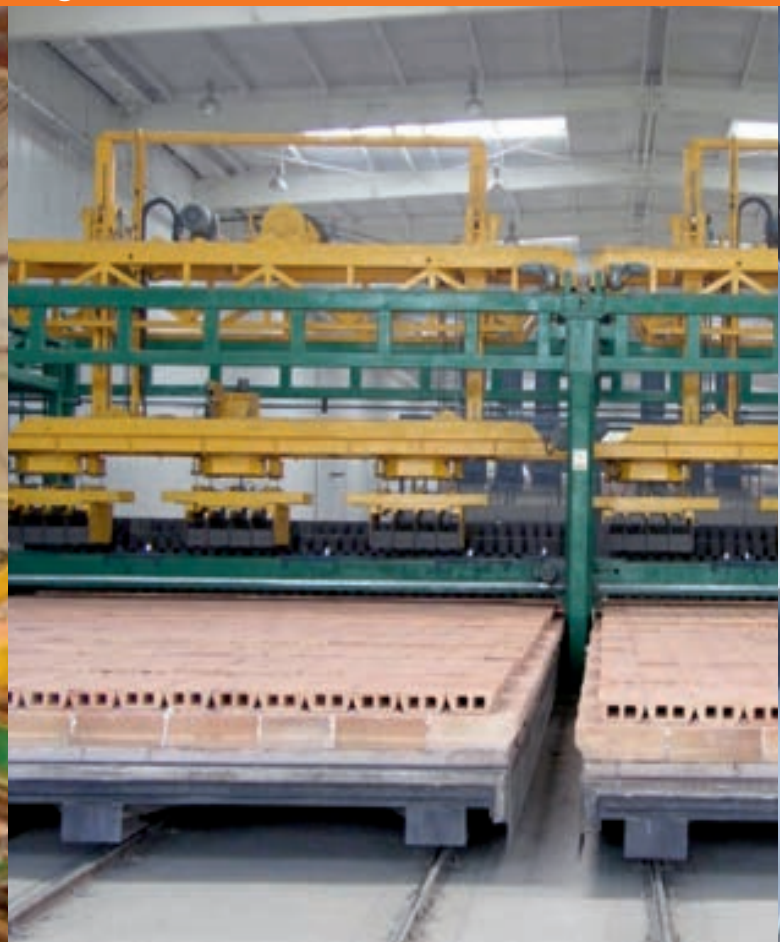
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