

SLS[®] 14% **Manganese Steel**

**Plates, Bars
and Castings**



ST. LAWRENCE
Alloys for Industry Since 1955

SLS® 14% Manganese Steel

Plates, Bars and Castings

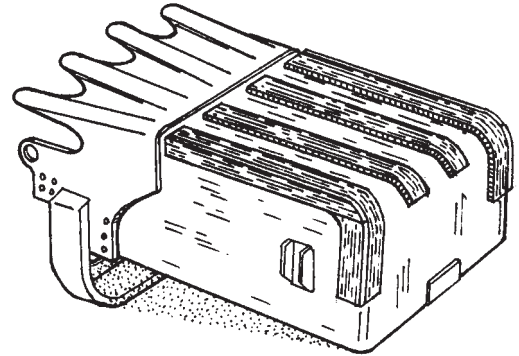
SLS 14% Manganese Steel is one of the toughest steels available. Sometimes known as "Hadfield Manganese," the basic composition has not changed except for the addition of small quantities of nickel and molybdenum to prevent embrittlement. Under cold work or impact its surface work hardens to three times its original state.

This alloy is easily weldable and will retain its toughness at all times. All of these features, plus a tensile strength in excess of 150,000 psi, make for ideal abrasive/impact resistant service.

Advantages

Special Thermal Treatment to provide Austenitic Microstructure*

- Work Hardens to 550-650 BHN
- Maximum Impact Resistance
- Easy to Weld or Torch Cut
- Non-Magnetic Properties
- Resistance to Impact-Type Abrasion
- Work Hardens Faster
- Longer Service Life (As much as 10 times ordinary steel)



Chemical and Physical Properties

Chemistry

C	Mn	Si	Cr	Mo	Ni
1.00-1.25	11.50-14.00	.15-.30	.50 max	.25 max	.40 max

Thermal coefficient of expansion
10.2 x 10⁻⁶/° F/100-300° F range.
Magnetic permeability 1.02.
(Modulus of elasticity 24-30,000,000 psi.)

Fabrication

Forging: Forge at 2100° F. This steel has good hot working characteristics and forges readily.

Annealing: **SLS 14% Manganese** should be annealed after forging. To fully anneal, heat to 1900° F and quench in water. This results in softest condition – 180/200 BHN.

Forming: **SLS 14% Manganese** can be cold formed in brake or rolled in thicknesses up to and including 1/2". A strength ratio of 2:1 on bending or rolling equipment is required compared to mild steel. More generous radii are suggested on most cold forming applications. **SLS 14% Manganese Steel** is fully treated for extensive fabrication – insures against cracks or seams following forming and machining.

Machining: **SLS 14% Manganese Steel** is not a free machining steel. Metal

Mechanical Properties (Developed)

Yield, PSI	Tensile, PSI	Elong. 2", %	Red. Area, %	Brinell
120-135,000	140-170,000	11-19	20-24	550-600

Endurance limit (polished specimen) 39,000 psi. Electrical resistivity 66 microhm/cm – 32°F.
Thermal Conductivity 93.6 BTU/sq. ft./hr./°F/in. at 70° F.

will tend to work harden just ahead of the cutting tool. Various techniques have been developed to drill or machine this type of material. Generally, the following technique or procedure has been most successful:

1. Use blunt drills – Tungsten Carbide (or) High Speed.
2. Sulphurized cutting oil.
3. Heavy Feed (once drilling or machining has started, complete operation without let-up).

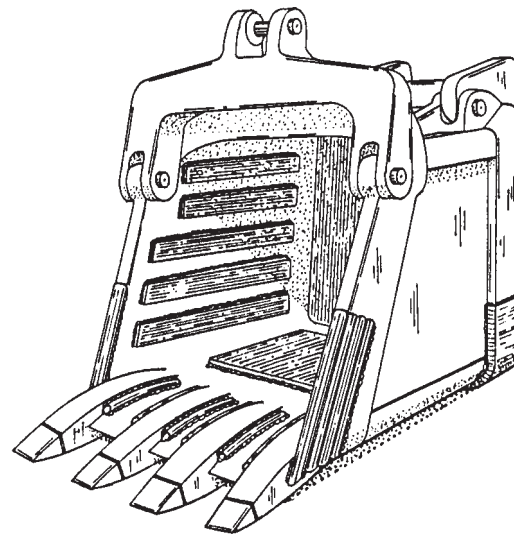
Gas Cutting: Austenitic Manganese Steels should be cut without pre- or post-heating. Use of iron powder or plasma-arc cutting, when cutting material over 1/2" thick, may help to prevent ragged edges.

Welding: Austenitic Manganese Steels should not be pre-heated nor post-heated for welding.

SLS 14% Manganese Steel lends itself to higher ductility in the weld heat-affected zone since all stock is thermally treated before shipment. Control of welding heat input is essential to minimize embrittlement. None of these steels should be given a low temperature (1000/1200° F) stress-relief after welding, due to the possibility of embrittlement. For manual metal-arc welding, several good proprietary high-manganese (AWS E-FEMN-A) electrodes are available. Best quality welds are made with austenitic stainless (AWS-E309 or 310) electrodes, although such joints may not be as abrasion-resistant as those made with high-manganese electrodes. "Stoody" twin-cote manganese rod or equivalent is recommended.

For either MIG or submerged-arc welding, stainless wire and wire-flux combinations are available. High-manganese wire is also available for submerged-arc and for open-arc welding.

Oxyacetylene gas welding is not recommended.



SLS® 14% Manganese Steel

Standard Stock Sizes

SLS 14% Manganese Bars and Plates

		BARS	
Rounds		Squares	Flats
½"	2"	1"	¾" x 2"
⅝"	2½"	1½"	½" x 2", 3", 4", 6"
¾"	3"	2"	¾" x 2", 3", 4", 6"
⅞"	3 ½"	2½"	1" x 2", 3", 4", 5", 6", 8"
1"	4"		2" x 4", 5"
1⅛"	4½"		
1¼"	5"		
1½"	5½"		
1¾"	6"		

Note: All round bars 3 ½" dia. and over are oversized (+1/8" to +3/16"). Standard lengths are 20 ft.

PLATES	
¼" x 60" x 120", 240"	¾" x 72" x 120", 240"
¼" x 72" x 120", 240"	1" x 72" x 120", 240"
⅜" x 72" x 120", 240"	1¼" x 72" x 144", 288"
½" x 48" x 96", 144", 288"	1½" x 72" x 144", 288"
½" x 72" x 120", 240"	2" x 72" x 120", 240"
½" x 96" x 144", 288"	2½" x 72" x 144"
⅝" x 72" x 120", 144", 240", 288"	3" x 72" x 120"

Castings

Custom castings from 10 lbs. to 3,000 lbs.

Color Code: Orange

Applications

Abrasion Resistant

- Screens
- Plates
- Wire Cloth

Applicator Bars, Welding

Ash

- Conveyors
- Handling Buckets
- Hoppers

Asphalt Mixer Liners

Bailing Press Liner Plates

Ball Mill Liners

Ballast Screens

Bars

- Cage Type, Crusher

Crusher Grate

- Grizzly
- Round
- Screen

Square

Bin Liners

Blades

- Bulldozer
- Drag Scraper
- Fan

Mixer

Road Grader

Scraper

Blast Furnace Hopper Liners

Blast Furnace Skip

- Hoist Bodies

Bolster Hanger Pins

Bolster Plates (Railroad)

Bolster Spring Seat Axles

Box Liners

- Journal
- Pedestal Way

Brake

- Bolts
- Pins
- Rigging Bushings
- Rigging Pins
- Rigging Wear Plates

Briquetting Machine

- Stripping Tables

Bucket

- Closing Chain
- Elevator Bolts
- Liners
- Lips (All Types)

Buckets

- Ash Handling
- Clam Shell
- Coal Handling
- Conveyor
- Elevator
- Gravel
- Materials Handling

Ore Handling
Rock
Sand
Skip Hoist

Cabinet Liners Shot Blast

Cage Bars

Chain

Bushings
Links
Pins
Shackles

Chains

Bucket Closing
Conveyor
Drag
Dredge
Flat Link
Riveted Leaf Types

Charging Bucket Spider

Shields (Blast Fce.)

Chute

Liners
Plates

Chutes

Aggregate
Car and Boat Landing
Cableway
Coal
Ore
Sand
Stone

Clam Shell Bucket

Closing Chain
Corner Bushings
Corner Pins
Lips
Shafts

Clevises

Clevis Pins

Coal Handling

Buckets
Chutes
Hoppers
Screens

Coke

Screens

Concrete

Mixer Liners
Mold Box Liners
Pipe Making Liners

Concrete Block Machine

Mold Box Liners
Separator Plates

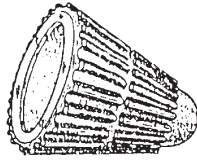
Cones, Sintering Plant

Conical Screens

Conveyor

Buckets
Flat Link Chain
Flights
Straight and Spiral

Gudgeons
Linings
Loading Spouts
Screw
Troughs



Crusher

Cone Liners
Grates, Hammer Mill
Hammers
Liner Plates
Shafts, Hammer
Spider Guards

Cylinder, Scrubber

Dipper

Doors
Hinge Pins
Lips
Teeth

Discharge Gates

Divider Plates

Concrete Block Machine

Doors

Jail Cell
Shovel Dipper

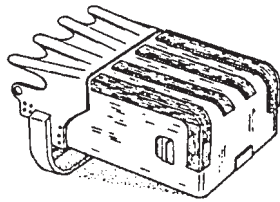
Drag

Chain
Chain Links and Pins
Scraper Blades
Scraper Shoes

Drag Line Buckets

Draw Plates

Vibrating Screen



Dredge

Bucket Lips
Chain, Flat Link
Ladder Pins and Bushings
Pipe

Drums, Non-Magnetic

Elevator

Bucket Lips
Buckets
Flat Link Chain

Face, Magnet

Feeder Pans

Flights

Flat Conveyor
Screw Conveyor

Foundry

Sand Handling Chutes
Shot Blast Cabinet
Hangers
Shot Blast Cabinet Liners

Gate Liners

Asphalt Mixers
Chance Cone
Pug Mills

Grates, Hammer Mill

Gravel

Buckets
Conveyor Chain
Dredge Chain
Dredge Wear Plates
Screens

Grinding

Machinery Parts
Mill Liners
Mill Pins
Slugs

Grizzly Bars

Rectangular
Tapered

Gudgeons, Conveyor

Hammer

Crusher Grates
Crusher Shafts
Mill Hammers

Hammers

Crusher
Feed Mill
Hammer Mill
Pug Mill
Pulverizer
Shredder

Hangers

Bolster Pins (Ry. Car)
Shot Blast Cabinet
Swing Pins (Ry. Car)

Hopper Liners Blast

Furnace

Hoppers

Ash
Cement
Ore
Sand
Stone

Jackets, Screens

Jailwork, Cells and Doors

Journal Box Liners

Liners

Asphalt Mixer
Ball Mill
Blast Furnace Hopper
Chute
Concrete Block Machine
Gate
Grinding Mill
Journal Box (Ry.)

Mold, Concrete Pipe
Pedestal (Ry.)
Plates Baling Press
Pulverizer
Sheave
Skip Hoist Bucket
Truck Gate

Lips

Conveyor Bucket
Dipper
Dredge Bucket
Loader Bucket

Mill Hammers

Crusher
Hammer

Mill Liners

Ball
Grinding
Hammer Mill
Compartment
Tube

Mill Pins, Grinding

Mining Machinery Parts

Mixer

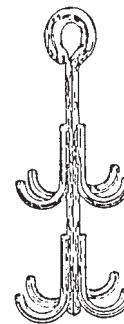
Blades
Liners

Non-Magnetic Parts

Electric Furnace Mantles
Magnet Faces
Pulley Drums

Ore

Chutes
Conveyors
Gates
Handling Buckets
Hoppers
Screens
Trays
Truck Box Liners



Perforated Plate Screens

Pins (All Kinds and Sizes)

Bolster Hanger (Car Truck)
Brake
Brake Rigging
Chain
Clevis
Coupler

Pins

Grinding Mill
Thread Pins (Power Shovel)

Plates (All Sizes)

Bolster
Bumper
Chafing
Concrete Block
Divider and Liner
Crusher
Drum
Draw (Screen)
Fabricated
Hub Liners
(Loco. Driving Wheel)
Locomotive Driving Box
Rolled
Screen Perforated
Screen Tension Grip
Trough
Wear Tension Grip

Pulley Drums, Non-Magnetic

Pulverizer

Hammers
Liners

Sand

Buckets
Chutes
Conveyors
Screens

Scarifier Teeth Scraper Blades

Screen

Bars
Flat
Round
Square
Special
Tapered
Draw Plates
Skirt Plates
Jackets
Tension Grip Plates

Screens

Abrasion Resistant
Ballast
Circular
Coal
Coke
Conical
Gravel
Grizzly
Ore
Perforated
Rod
Sand
Shaking
Sizing
Sorting
Trommel

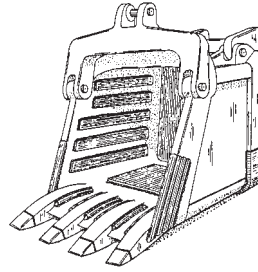
Vibrating
Washing
Welding
Woven Wire

Shot Blast

Cabinet Liners
Hangers

Shovel

Bucket Liners
Dipper Doors
Lips
Shaft Bolts
Teeth
Tread Pins



Shredder Hammers

Sintering Plant Cones

Sizing Screens

Skip Hoist Bucket Liners

Skirt Plates (Screen)

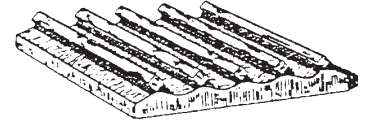
Slugs, Grinding

Sorting Screens Spider

Guards, Crusher
Shields, Charging Bucket
(Blast Furnace)

Spiral Conveyor Flights

Tables, Stripping Tops
Briquetting Machine



Trays, Ore

Tread Pins, Crawler

Trommel Screens

Troughs, Conveyor

Troughs, Plates

Truck

Bearings
Bushings
Gate Liners

Tube Mill Linings

Washing Screens

Wear Plates

All Types Railway
All Types Industrial Machine

Welding Screens

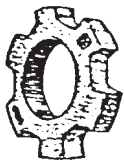
Woven Wire Screens

Casting Applications

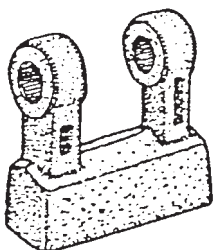
Applications by Industry

Cement

Crusher Concaves
Crusher Plates
Grinding Balls
Grates



Grizzly
Gyratory Crusher Parts
Hammer Mill
Pulverizer Balls and
Rings
Roll Heads

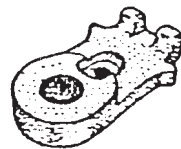


Ceramic

Crusher Rolls
Crusher Concaves
Muller Tires
Pulverizer Parts

Coal and Coke

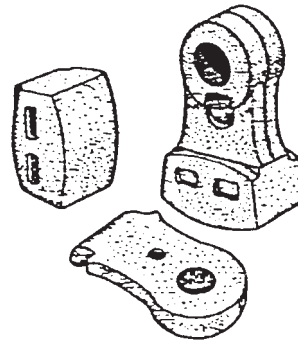
Conveyor Impact Parts
Crusher Rolls
Crusher Segments
Grizzly Discs



Jaw Crusher Parts
Wharf Plates

Construction

Cinder Crushing Rolls
Hammer Mill Parts
Impact Crusher Parts
Jaw Crushers
Slag Crusher Parts
Stone Crusher Parts

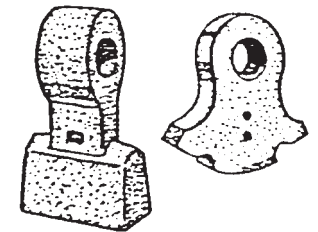


Minerals and Metals

Ball Mill Liners
Cage Mill Parts
Coke Crusher Segments
Cone Crusher Parts
Grinding Balls
Grizzly Discs
Gyratory Crusher Parts
Limestone Crusher
Plates
Metal Shredder Parts
Pug Mill Paddles

Mining

Ball Mill Grates
Ball Mill Liners
Classifier Shoes
Crushing Rolls



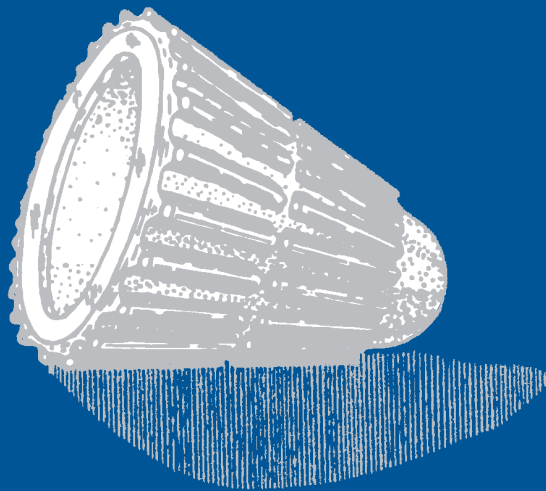
Cyclone Parts
Grizzly Bars
Rod Mill Liners
Stamp Shoes, Mortars

Miscellaneous

Ball Mill Liners
Barrel End Plates
Breaker Rods
Conveyor Flights
Hammer Mill Parts
Sand Blast Barrel Liners

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