

## Introduction

The steel industry is the backbone of modern infrastructure, producing materials used in construction, transportation, and manufacturing. This industry relies on heavy-duty machinery and equipment that undergoes extreme conditions such as high temperatures, pressure, and abrasion. Welding electrodes play a critical role in the fabrication, repair, and maintenance of steel industry equipment, ensuring operational efficiency and minimizing downtime.

## 2. Applications of Welding Electrodes in Steel Industry

Application	Details	Examples of Electrodes
Roller Repair	Hardfacing worn-out rollers used in steel rolling mills to restore their original dimensions.	Hardfacing electrodes
Furnace Repairs	Welding high-temperature components like furnace shells and refractory anchors.	Heat-resistant stainless steel electrodes
Conveyor System Maintenance	Joining and repairing conveyor belts, rollers, and frames.	Low-hydrogen electrodes (e.g., E7018)
Structural Repairs	Fabricating and repairing steel structures such as beams, supports, and platforms.	General-purpose electrodes (e.g., E6013)
Pipe Welding	Joining and repairing pipelines for water, gas, or molten metal transport.	Stainless steel electrodes (e.g., E316)
Cranes and Hoists	Strengthening and repairing load-bearing components used in material handling.	Low-hydrogen or high-strength electrodes
Overlay Welding	Depositing wear-resistant layers on abrasion-prone components such as hoppers and chutes.	Hardfacing electrodes
Joining Dissimilar Metals	Welding steel to other metals like cast iron or stainless steel in specific applications.	Nickel-based or stainless steel electrodes

## 3. Usage of "MAXIDURA" in various APPLICATIONS of STEEL INDUSTRIES

STEEL INDUSTRIES			
COMPONENTS	BASE METALS	WEAR FACTORS	RECOMMENDED ELECTRODES
GEAR	CAST STEEL	ABRASION/FRICTION	MaxiDura100
PINION OF SINTERM/C	FORGED STEEL	ABRASION/FRICTION	MaxiDura101+100
HAMMER MILL ROTOR	FORGEDSTEEL	ABRASION	MaxiDura101+100
COOLER FAN BLADE	CASTSTEEL	ABRASION/FRICTION	MaxiDura101+100
BLOWER FAN BLADE & HUB(IMPELLER)	SPECIALALLOY	ABRASION/FRICTION	MaxiDura101+100
RAIL	MN.STEEL	ABRASION/IMPACT	MaxiDura107
SUPPORT ROLLS	CAST STEEL	FRICTION	MaxiDura115
FRICTION WHEEL	FORGED	ABRASION/FRICTION	MaxiDura101

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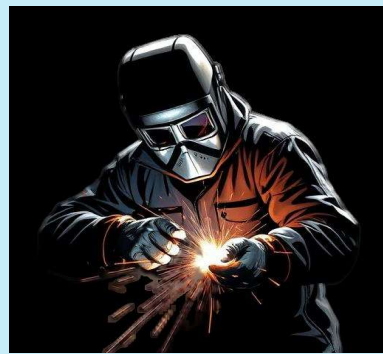
PHONE/FAX:-07714905001

OUR-BRANCES:-INDORE&HYDERABAD.

Email:-[shribalajialloyscorporation@gmail.com](mailto:shribalajialloyscorporation@gmail.com)

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<b>COKE OVEN</b>				
<b>AIR COMPRESSOR BODY</b>	CAST IRON	ACCIDENT	MaxiDura	114/115
<b>MOTOR BASE PLATE</b>	CAST IRON	ACCIDENT	MAxiDura	114/115
<b>PUMP BODY</b>	CAST IRON	ACCIDENT	MaxiDura	114/115
<b>CHUTE</b>	STAINLESSSTEEL	ABRASION	MaxiDura	SP+107
<b>FLANGE</b>	STAINLESSSTEEL	ABRASION	MaxiDura	SP+107
<b>SHAFT</b>	STAINLESSSTEEL	ABRASION	MaxiDura	SP+107
<b>GEARS</b>	CAST IRON	FRICTION	MaxiDura	101+100
<b>DOG CLUTCH</b>	CASTSTEEL	FRICTION	MaxiDura	100
<b>GEAR BOX</b>	CAST IRON	ACCIDENT	MaxiDura	114/115
<b>CONVEYOR DRUMS</b>	CASTSTEEL	FRICTION	MaxiDura	100
<b>CRUSHER JAWS HAMMER</b>	MN.STEEL	IMPACT/ABRASION	MaxiDura	133
<b>PULLEYS</b>	CAST IRON	FRICTION	MaxiDura	114/115
<b>BUCKETS</b>	MN.STEEL	IMPACT/ABRASION	MaxiDura	133
<b>GEAR WHEEL</b>	CASTSTEEL	FRICTION	MaxiDura	101(18)+SP
<b>MOTOR CASINGS</b>	CAST IRON	ACCIDENT	MaxiDura	114/115SPL
<b>TRANMISSIONGEAR</b>	CAST IRON	FRICTION	MaxiDura	107
<b>BUSH BARS</b>	COPPER	FRICTION	MaxiDura	130
<b>LIFTING BLOCKS</b>	CAST IRON	ACCIDENT	MaxiDura	114+115SPL
<b>CHAINS</b>	CASTSTEEL	FRICTION	MaxiDura	SP+107
<b>LEADER TIPS</b>	ALLOYSTEEL	FRICTION	MaxiDura	100
<b>CHASSIS</b>	CASTSTEEL	CRACK	MaxiDura	SP
<b>HYDRAULIC UNITS</b>	BRASS/BRONZE	FRICTION	MaxiDura	130
<b>WASHERY MAIN</b>	CAST IRON	ACCIDENT	MaxiDura	114+107
<b>COKE CRUSHING HAMMER</b>	CAST STEEL	IMPACT	MaxiDura	102
<b>PINION FORPUSHER RACK</b>	MN.STEEL	ABRASION/IMPACT	MaxiDura	107/S
<b>COUPLING FLANGER</b>	CAST STEEL	FRICTION	MaxiDura	101
<b>RAMBEANS OF SUPPORT</b>	CASTSTEEL	VIBRATION	MaxiDura	101
<b>COOLING MEMBERS</b>	COPPER	JOINING	MaxiDura	130
<b>SINTER BREAKER</b>	CAST STEEL	ABRASION/IMP ACT	MaxiDura	102
<b>HAMMERS</b>	CAST STEEL	ABRASION/IMP ACT	MaxiDura	1102
<b>PALLETS</b>	CAST STEEL	CRACK	MaxiDura	101
<b>PALLETS</b>	CAST IRON	CRACK	MaxiDura	115SPL/115
<b>SHAFTS</b>	STAINLESS	JOINING/SURF	MaxiDura	SP
<b>CRUSHER JAWSHAMMER</b>	MN.STEEL	ABRASION/IMPACT	MaxiDura	133/105

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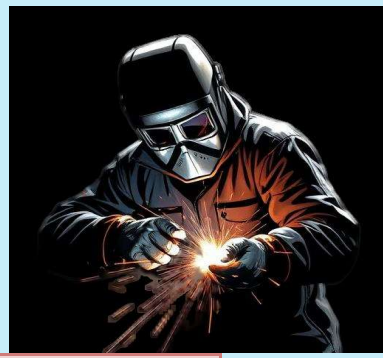
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<b>VALVES</b>	CAST IRON	ABRASION/SUR FACING	MaxiDura	114/115
<b>THROAT ARMOUR PLATES</b>	CAST STEEL	ABRASION/ERO SION	MaxiDura	106

<b>STEEL MELTINGSHOP</b>			
<b>FURNACE DOORS</b>	CAST STEEL	JOINING	MaxiDura116
<b>PUMP SHAFTS</b>	EN STEEL	JOINING/SURFACING	MaxiDuraSP
<b>PULLEY</b>	CAST IRON	BROKEN/BUILDUP	MaxiDura115/115SPL
<b>KILNSHELL</b>	CAST STEEL	JOINING	MaxiDura101
<b>LADLE TRUNION</b>	CAST STEEL	ABRASION	MaxiDura101+100
<b>CRANE RAILS</b>	CAST STEEL	ABRASION	MaxiDura7018/133
<b>ROLLERS</b>	CAST IRON	BROKEN/JOINING	MaxiDura114/115
<b>VALVES</b>	STAINLESSSTEEL	EROSION	MaxiDura139
<b>OXYGENLANCER</b>	COPPER	EROSION	MaxiDura130

<b>FOUNDRY</b>			
CRANE BEARINGPEDESTRAL	CAST STEEL	FRICTION	MaxiDura101
SAND PUMP	CAST IRON	ABRASION	MaxiDura115 SPL
IMPELLERCASING	CAST IRON	ABRASION	MaxiDura115 SPL
MIX ULLERPLOUGH	MN.STEEEL	ABRASION	MaxiDura133
IMPELLERBACKPLATE	CAST IRON	FRICTION	MaxiDura115 SPL

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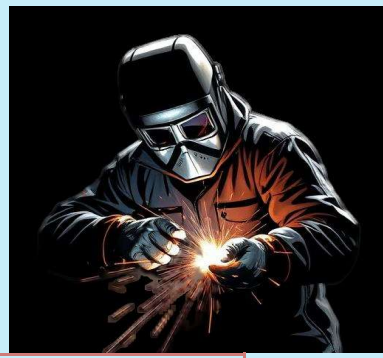
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VALVE SPINDLE OF MAX M3	BRASS	FRICTION	MaxiDura 130
ELEVATORSHAFT	STEEL	FRICTION	MaxiDura SP
FEED SCREW	CAST STEEL	ABRASION	MaxiDura103
VIBRATOR TABLE	CAST IRON	CRACK	MaxiDura114/115
MOULDING BOX	CAST IRON	CRACK	MaxiDura114/115
FEEDER HEAD	STEEL	ABRASION	MaxiDura103
ROLLERS	STEEL	FRICTION	MaxiDuraSP
MOULD DRILL	H.S.S	FRICTION	MaxiDura119
MOULD KNIFE	H.S.S	FRICTION	MaxiDura119
FAN BLADE	STEEL	ABRASION	MaxiDura103
HEAT TREATMENT GRILL	STAINLESS STEEL	HEAT	MAxiDura107+123
HEATING ELEMENTS	NICHROME	HEAT	MaxiDura140
MACHINE BASE	CAST IRON		MaxiDura114/115
MACHINE HOUSING ENGINE BLOCKS	CAST IRON		MaxiDura114/115
SAND DISCHARGE CHUTE	MILD STEEL	ABRASION	MaxiDura103
PUMP SHAFT	STEEL	FRICTION	MaxiDuraSP
MNS.LINER MOULD	MN.STEEEL	IMPACT/ABRASI ON	MaxiDura108
SCRAP BLADES	MN.STEEEL	ABRASION	MaxiDura108+103
MIXER PADDLES	MN.STEEEL	ABRASION	MaxiDura13
TACKLE INGOT MOULD	CAST IRON	CAVITATION/H EAT	MaxiDura114/115SPL



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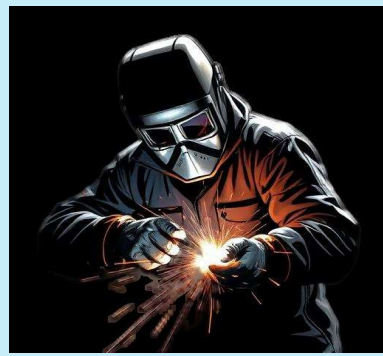
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<b>MILL</b>			
<b>IDLERS</b>	CAST IRON	FRICTION	MaxiDura115
<b>IDLERS</b>	STEEL	FRICTION	MaxiDuraSP
<b>ROLLERS</b>	CAST IRON	FRICTION	MaxiDura114/SPI115
<b>ROLLERS</b>	STEEL	FRICTION	MaxiDuraSP
<b>HOUSING</b>	CAST IRON	CRACK/JOINING	MaxiDura114/115
<b>HOUSING</b>	CAST IRON	CRACK/JOINING	MaxiDura114/115
<b>CRANE RAILS</b>	MN.STEEL	FRICTION/ABRA SION	MaxiDura114/CR MN
<b>CRANE WHEELS</b>	FORGEDSTEEL	FRICTION/ABRASION	MaxiDura100
<b>IMP ELLERS</b>	BRONZE C.IRON	ABRASION	MaxiDura130+114
<b>MAI BOR N STAND ES</b>	CAST STEEL	FRICTION	MaxiDura101
<b>FLY HOUSING ING SHEAR</b>	CAST STEEL	FRICTION	MaxiDura101
<b>HOT SHEAR BLADE</b>	HCHCR	IMPACT/FRICT ION	MaxiDuraSP
<b>HOT WORKING TOOLS</b>	HCHCR	FRICTION	MaxiDuraSP
<b>WIRE CUTTERS</b>	HSS	FRICTION	MaxiDura119

<b>REFRACTORIES</b>			
<b>SUPPORTING ROLLS OF ROTARY KILN</b>	LOW ALLOY STEEL	ABRASION/FRI CTION	MaxiDura119+105
<b>IMPACT CRUSHER</b>	LOW ALLOY STEEL	FRICTION/IMP ACT	MaxiDura119+105
<b>ROTTERS</b>	MN.STEEL	ABRASION	MaxiDura119+105
<b>CROWN GEARS</b>	CAST STEEL	FRICTION	MaxiDura100

<b>ELECTRICAL</b>			
<b>FAN COVER OF MOTORS</b>	CAST IRON	FRICTION/ACC IDENT	MaxiDura
<b>MOTOR FOUNDATION</b>	CAST IRON	ACCIDENT	MaxiDura
<b>ARMATURE SHAFT</b>	STEEL	FRICTION	MaxiDura
<b>BEARINGSEATING</b>	CAST STEEL	FRICTION	MaxiDura 100
<b>HOUSING</b>	CAST IRON	FRICTION	MaxiDura 115
<b>COPPER BUSHES</b>	COPPER	FRICTION	MaxiDura 130

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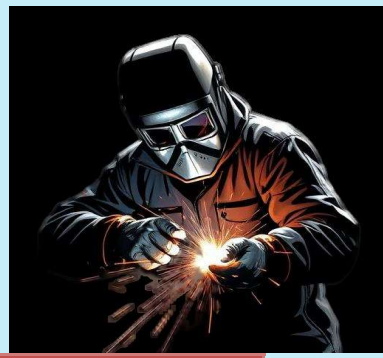
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<b>CRANE WHEEL</b>			
<b>MACHINE BEDS HOUSING</b>	CAST IRON	JOINING	MaxiDura114/115 SPL
<b>CRANE WHEEL</b>	CAST STEEL	ABRASION	MaxiDura101
<b>HOUSING</b>	CAST STEEL	ABRASION	MaxiDura101
<b>WHEEL PUNCH</b>	CAST STEEL	ABRASION	MaxiDura105
<b>SHEAR BLADES</b>	ALLOY STEEL	IMPACT/HEAT	MaxiDura123+121
<b>PUNCH&amp; DIE FOR SLEEPER</b>	ALLOY STEEL	IMPACT /HEAT	MaxiDura123+121
<b>HAMMER PALLETS</b>	MN.STEEL	IMPACT	MaxiDura10
<b>WEIGHING PLATES</b>	CARBON STEEL	ABRASION	MaxiDura101+100
<b>SPINDLE</b>	CARBON STEEL	FRICION	MaxiDura101

#### ***4. Key Considerations for Electrode Selection***

<b>Consideration</b>	<b>Details</b>
Material Compatibility	Ensure the electrode matches the base material to avoid weak or brittle welds.
Operating Conditions	Consider factors like temperature, pressure, and exposure to wear or corrosion.
Weld Quality Requirements	High-stress components require electrodes that provide deep penetration and strong bonds.
Welding Position	Choose electrodes suited for specific positions (e.g., flat, vertical, overhead).
Preheating and Post-Weld Treatment	Preheating minimizes thermal stress, and post-weld treatment enhances weld durability.
Manufacturer Guidelines	Follow the electrode manufacturer's recommendations for amperage, polarity, and usage.



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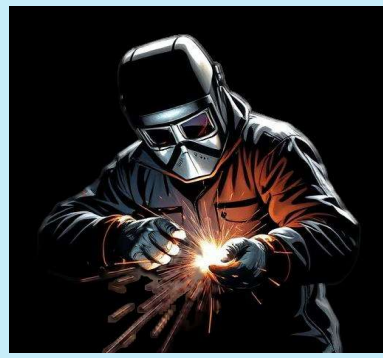
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## 5. Common Challenges and Solutions

Challenge	Details	Solution
Weld Cracking	Caused by improper electrode selection or insufficient preheating.	Use low-hydrogen electrodes and ensure preheating.
Abrasion Resistance	Components wear out quickly in abrasive environments.	Apply hardfacing electrodes to affected areas.
Corrosion Resistance	Components exposed to moisture or chemicals degrade over time.	Use stainless steel or nickel-based electrodes.
Dissimilar Metal Welding	Weak joints may form when welding different metals.	Use compatible electrodes like nickel-alloy.
Heat Distortion	Excessive heat input can distort thin metal components.	Use controlled heat and appropriate welding techniques.

## 6. Conclusion

Welding electrodes are vital to the steel industry, ensuring the fabrication, maintenance, and repair of critical equipment and structures. Proper selection and use of welding electrodes enhance productivity, reduce downtime, and extend the lifespan of machinery and components. Adopting the latest welding technologies and techniques can help steel industries meet modern challenges and maintain operational efficiency.

## 7. Recommendations

- Train welding personnel on advanced welding techniques and electrode types.
- Maintain an inventory of specialized electrodes for high-wear and high-temperature applications.
- Establish a regular maintenance schedule for critical components.
- Collaborate with electrode manufacturers to develop customized solutions for unique challenges.
- Implement quality assurance protocols to ensure consistent weld integrity in critical applications.

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