



Stick Welding

The Performance You Need.
The Quality You Expect. SM

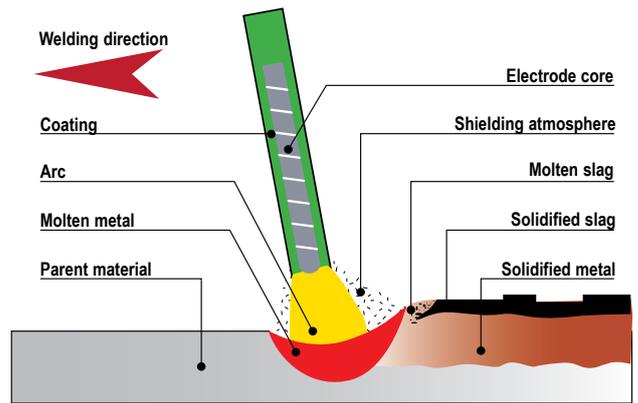
www.lincolnelectric.eu

LINCOLN®
ELECTRIC
THE WELDING EXPERTS®

In this welding process, an electric arc is created between a coated consumable electrode and the work piece to be welded, causing the parent material to be fused together and the electrode to melt. The electrode is of a similar material to the parent material and by melting both together it provides the weld (or joint) with a reinforcing filler material.

The electrode has a flux coating of either a basic, rutile or cellulose type, as the coating burns it protects the arc and weld pool from the surrounding atmosphere with a gaseous shroud. The slag which solidifies over the newly deposited weld also protects it from the atmosphere whilst cooling.

Manual Metal Arc Welding



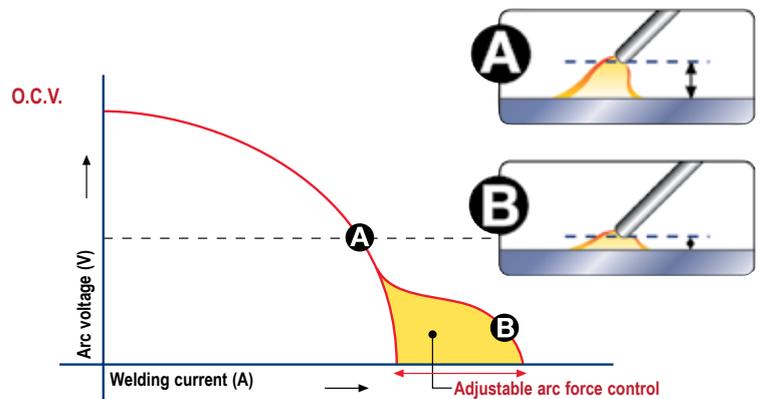
FEATURES

Arc Force



This prevents the electrode from sticking during welding. Arc force is a temporary increase of the output current during welding when the arc is too short. This feature supports production with consistently excellent arc performance. It also enhances simple position welding making the job easier. In order to produce an outstanding weld performance on a variety of electrodes (Rutile, Basic or Cellulose) the Arc Force can be finely adjusted with a simple knob. To have a smooth arc with less spatter, set the knob to minimum (Rutile, Basic). For a more crisp arc, with more penetration, set it to maximum.

Arc Force Control



Hot start



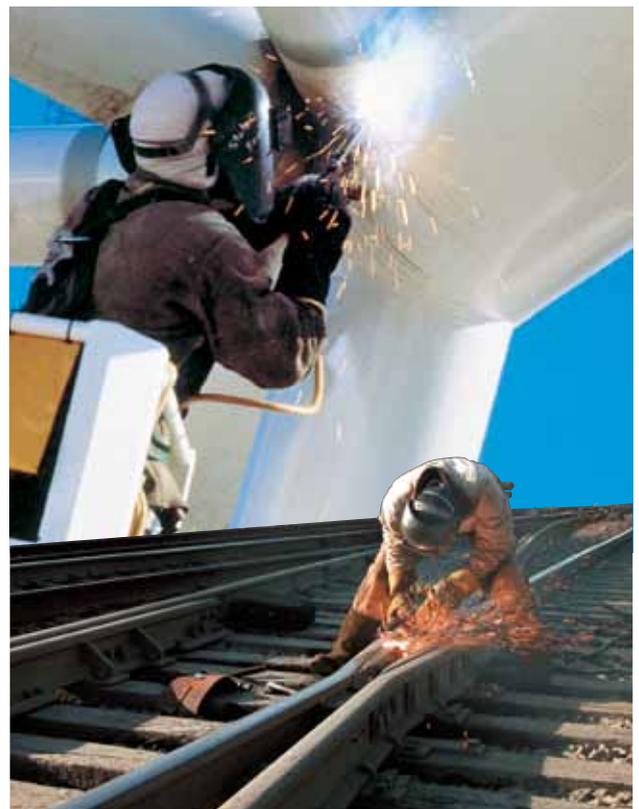
This is the temporary increase of the output current (0,5s) during the start of a weld, this helps ignite the arc quickly and reliably. Hot Start provides excellent arc ignition without the electrode sticking and avoiding any metallurgical defect in the weld.

Anti-sticking

This electronic device minimizes the short circuit current in the event of the electrode sticking to the work piece for a prolonged period. If a short circuit does occur, it will be easy to remove the electrode from the work piece and the electrode gun and cable will remain undamaged. It also serves as a safety device in protecting the operator.

AIR ARC GOUGING

An industrial stick welder with adequate power and voltage load can be used to cut and perform surface removal. This includes cutting grooves and removing cracks on steel, cast iron and copper alloys. This process is known as Air Carbon Arc Cutting or ARC AIR gouging. It makes use of a special electrode gun which directs a violent jet of compressed air on the electric arc area removing the molten material. The electrode consists of compressed graphite and alloys with a copper coating.



Applications

- Small maintenance
- Light construction
- Light metal fabrication
- Repair on site
- Outside and work shop welding jobs
- Hobby

Applied material

- Steel
- Stainless steel
- Thickness from 1.5 to 7mm

Equipment requirements

- Excellent welding characteristics and user friendly features
- Portability, to be able to use the machine everywhere
- Low and medium amperage, to weld with max 4mm stick electrode
- Low input voltage (230V-1ph), to connect the machine everywhere
- High reliability and low serviceability, to be absolutely sure the product will do the job!
- Motor generator capability, to use it on site applications
- Lift TIG features, for occasional TIG welding

Stick electrode features

- For general purpose welding
- All position
- Easy to use
- With excellent start and restart properties
- Smooth weld appearance
- Producing few spatters



The Lincoln Solution

Invertec® 135S, 150S, 170S



- Inverter technology, compact, lightweight and portable
- Excellent arc characteristics to weld all kind of electrodes up to 4mm with:
 - Hot Start for excellent arc ignition.
 - Arc force control for outstanding behaviour (150S & 170S)
 - Power surplus : additional power for superior arc control.
- 230V-1Ph 16A input power to connect virtually everywhere with:
 - Line voltage compensation
 - Motor generator capability (150S & 170S)
- Rugged design for robust, impact resistance:
 - Recessed control panel
 - Thermostatic protection
 - Fan on demand
 - 2 year warranty
- Lift TIG device for occasional TIG application with valve torch.

Consumables

Rutile: all position electrodes, including vertical down
OMNIA® 46

- Smaller diameters excellent for hobby application

- Applicable for clean structural steel

PANTAFIX®

- Excellent in pipe welding and construction

- Good start and restart behaviour

Basic: all position low hydrogen electrodes

BASO® 48SP

- Excellent start and restart properties

- Very stable arc at low amperage

BASO® G

- Excellent for site welding application

- Good impact values at -40°C

Stainless steel all position electrodes

LIMAROSTA® (304L, 309S, 316L...)

- Highly resistant to porosity

- Self releasing slag

AROSTA® (304L, 309S, 316L...)

- Highly resistant to intergranular corrosion

- Easy to use in vertical up welding

Applications

- Pipeline
- Shipbuilding
- Heavy fabrication
- Hardfacing
- Plant construction
- Process industry
- Pressure vessels
- Air-Arc gouging
- Nuclear power station

Applied material

- Steel
- Stainless steel
- Limited Aluminium
- Large thickness plates

Equipment requirements

- Excellent welding characteristics and high power output, for heavy duty applications
- Digital display, for precise settings and reading of the welding current
- Portability and Manoeuvrability, to be able to use the machine in the most hazardous environments
- Motor generator capability, suitable for site applications
- Reliability, the product has to do the job!

Stick electrode features

- Good mechanical properties
- Excellent X-ray weld quality
- Medium and high recovery
- Also Available in moisture resistant vacuum sealed packaging



The Lincoln Solution

Invertec® 160SX, 270SX & 400SX / Rectifiers LINC405/635, R3R600-I & HOT ROD



160SX



270SX



400SX



LINC 405-S(A) / LINC 635-S(A)



Idealarc® R3R600-I



Hot Rod 500S

- Excellent arc characteristics for a wide range of electrode type
 - with adjustable Hot Start & Arc force control
- Welding capabilities on high recovery rutile, basic and cellulose electrodes
- Ammeter
- Lightweight, portable (160SX/270SX/400SX)
- Easy maneuverability (R3R600-I/LINC)
- 400V-3Ph input connection 270SX/400SX
- 115/230V-1ph input connection 160SX
- 230/400V-3Ph input connection : R3R600-I/LINC
- 380/415-3Ph input connection (Hot Rod 500S)
 - Input voltage compensation
 - Motor generator capability
- Rugged design
- Recessed control panel
- 3 year warranty (2 years for Linc 405/635)

Consumables

On the following pages you will find a summary of the available stick electrodes. This summary is just a small selection from a wide range produced to support any application. For every electrode mentioned in the summary, application remarks have been given to ease the selection process.

PRODUCT APPLICATION CHART

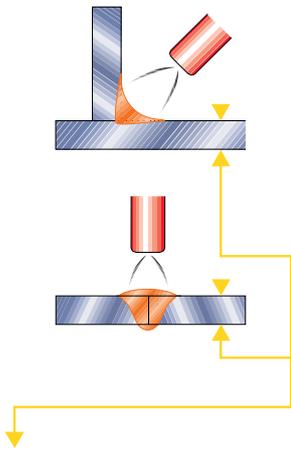
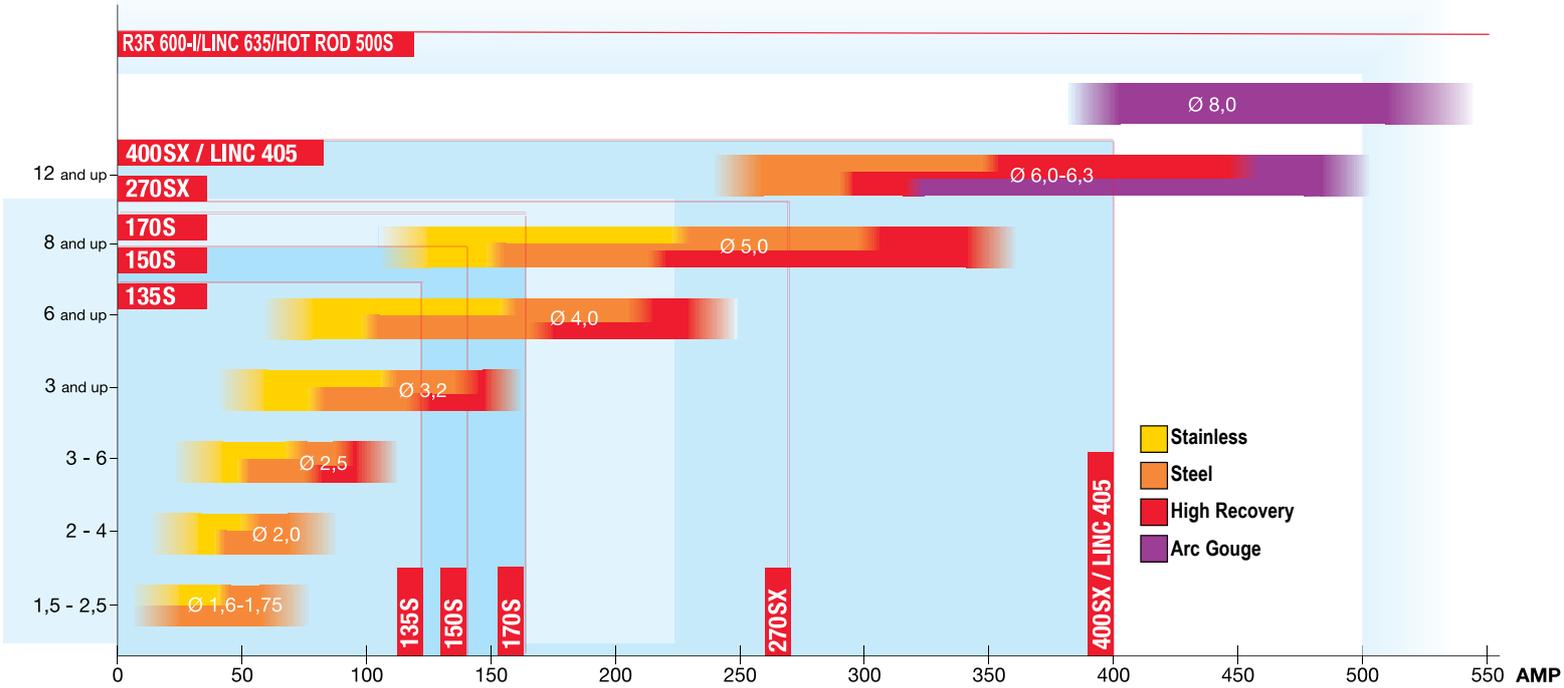


Plate thickness (mm)



Technical specifications

Models	Input voltage	Current range (A)	Output current	Stick	Touch TIG	TIG scratch	Gouging	Electrode diameter (mm)	Generator compatible	Meters	Hot start	Arc force	Weight (kg)	Dimensions HxWxD (mm)
Invertec® 135S	230V-1Ph	10-120	120A @ 25%	■		●		0-3.2	No	No	No	No	4.6	224x148x315
Invertec® 150S	230V-1Ph	10-140	140A @ 30%	■	■			0-3.2	Yes	No	Yes	Yes	6.7	244x148x365
Invertec® 170S	230V-1Ph	10-160	160A @ 35%	■	■			0-4.0	Yes	Yes	Yes	Yes	7.0	244x148x365
Invertec® 160SX	115/230V-1Ph	5-160	160A @ 30%	■	■			0-4.0	Yes	Yes	Yes	Yes	9.0	224x148x385
Invertec® 270SX	400V-3Ph	5-270	270A @ 35%	■	■			0-5.0	Yes	Yes	Yes	Yes	22.0	389x247x502
Invertec® 400SX	400V-3Ph	5-400	400A @ 35%	■	■			0-6.3	Yes	Yes	Yes	Yes	36.0	455x301x632
Linc 405-S	230/400V-3Ph	15-400	400A @ 35%	■		◆		0-6.3	Yes	No	Yes	Yes	126	640x580x700
Linc 405-SA	230/400V-3Ph	15-400	400A @ 35%	■		◆	●	0-6.3	Yes	Yes	Yes	Yes	126	640x580x700
Linc 635-S	230/400V-3Ph	15-670	670A @ 35%	■		◆	●	0-6.3	Yes	No	Yes	Yes	150	670x580x700
Linc 635-SA	230/400V-3Ph	15-670	670A @ 35%	■		◆	●	0-6.3	Yes	Yes	Yes	Yes	150	670x580x700
R3R 600-I	230/380/440V-3Ph	75-625	600A @ 35%	■		◆	●	0-6.3	Yes	Yes	Yes	Yes	209	700x565x840
HOT ROD 500S	380/415V-3Ph	50-625	600A @ 35%	■		◆	●	0-6.3	Yes	Yes	Yes	Yes	203	795x566x813

■ Excellent ◆ Possible ● Option

Examples of Lincoln Electric Europe electrodes commonly used in heavy industry. The list is meant to give examples; the available range is much wider.

Product	AWS/ISO	Welding positions	Packaging	Application remarks
Rutile electrodes				
Supra®	E6012 / E38 0 RC 11		Carton Box	<ul style="list-style-type: none"> The preferred choice when rust covered and painted materials need to be welded. Requires only one current setting for all positions.
Omnia® 46	E6013 / E 42 0 RC 11		Carton Box Linc Pack	<ul style="list-style-type: none"> All purpose & all position rutile electrode for general construction work. Used for «clean» structural steel. Very suitable for low OCV transformers (min OCV 42V)
Pantafix®	E6013 / E 38 0 RC 11		Carton Box Linc Pack	<ul style="list-style-type: none"> General purpose rutile electrode. Soft arc making it suitable to weld relatively thin plate and bridging wide gaps. Good start and restart behaviour
Universalis®	E6013 / E 42 0 RR 12		Carton Box	<ul style="list-style-type: none"> Heavy coated rutile electrode for optimum weldability in the down hand position. Self releasing slag and very smooth arc and weld appearance
Basic electrodes				
Baso® ONE	E7018 H8 E42 4 B 42 H5		Carton Box	<ul style="list-style-type: none"> All purpose basic electrode for general construction work. Excellent weldability even for positional welding. Good impact properties down to -40°C
Baso® 48SP	E7018-1 H8 E46 3 B 32 H10		Carton Box, SRP	<ul style="list-style-type: none"> All position basic-rutile electrode with excellent start and re-start properties. Very stable arc, even at low welding current. Combines the weldability of rutile electrodes with mechanical properties of a basic electrode
Lincoln 7018-1	E7018-1 E46 3 B 32 H5		Carton Box	<ul style="list-style-type: none"> All purpose & all position basic electrode for general construction work. Excellent weldability even for positional welding. Good impact properties down to -40°C
Conarc® 49C	E7018-1 H4R E46 4 B 32 H5		Carton Box, SRP	<ul style="list-style-type: none"> Extremely low hydrogen basic electrode. Consistent impact properties down to -50°C and CTOD values at -10°C. Excellent X-ray soundness.
Stainless steel electrodes				
Limarosta® 304L	E308L-17 E19 9 L R 12		Carton Box, SRP, Linc Pack	<ul style="list-style-type: none"> Stainless steel electrode for 304L and similar stainless grades. Easy to weld with self releasing slag. Suitable for DC and AC current. Very smooth arc.
Limarosta® 316L	E316L-17 E19 12 3 L 12		Carton Box, SRP, Linc Can™, Linc Pack	<ul style="list-style-type: none"> Stainless steel electrode for 316L and similar stainless grades. Easy to weld with self releasing slag. Suitable for DC and AC current. Very smooth arc.
Limarosta® 309S	E309L-17 E23 12 L R 32		Carton Box + SRP + Linc Can™	<ul style="list-style-type: none"> Stainless steel electrode developed to weld mild steel to 304L and 316L stainless steel. Easy to weld with self releasing slag. Suitable for DC and AC current. Very smooth arc.
Limarosta® 312	E312-17 E 29 9 R 12		Carton Box, SRP, Linc Pack	<ul style="list-style-type: none"> All-round electrode for repair welding. Welds «difficult to weld steel» such as high carbon steel, high Mn-Steel, armour plate. Excellent weldability on DC and AC.
Repair electrodes				
RepTec Cast 1	ENi-CI E C Ni-CI 1		PE tube, Linc Pack	<ul style="list-style-type: none"> Nickel electrode for repair welding of lamellar cast iron. Soft and machinable weldmetal with hardness of ~175HB. Welding on DC- gives the best results
RepTec Cast 3	ENiFe-CI E C NiFe-CI 1		PE tube	<ul style="list-style-type: none"> Nickel-Iron electrode for cold welding of cast iron. Specially developed for good peen- and machinable seems. Welding on DC+ is advised to introduce lowest heat into the work piece
RepTec Cast 31	ENiFe-CI E C NiFe-CI 1		PE tube, Linc Pack	<ul style="list-style-type: none"> Nickel-Iron electrode for cold welding of cast iron with special bi-metallic core wire. Particularly applicable for nodular cast iron. Allows higher current due to bi-metal core wire. Suitable for AC and DC-
Hardfacing electrodes				
Wearshield® MM	E Fe2		Carton Box	METAL TO METAL: <ul style="list-style-type: none"> All position hardfacing electrode producing a crack free deposit (45-57HRc). Designed for resistance to sliding, rolling and metal to metal wear with resistance to mild abrasion.
Wearshield® ME (e)	E Fe14		Carton Box	METAL TO EARTH: <ul style="list-style-type: none"> High deposition hardfacing electrode (55-60HRc). Provides good resistance in applications that combine abrasion and impact. Suitable for application going to 600°C
Wearshield® BU30	E Fe1		Carton Box	BUILD-UP: <ul style="list-style-type: none"> Versatile hardfacing electrode that can be used as well as build-up electrode (31-38HRc). Combines resistance to moderate abrasion and friction wear as well as resistance to impact. Ideally suitable for rolling, sliding and metal to metal wear
Wearshield® MI (e)	E Fe6		Carton Box	METAL-IMPACT: <ul style="list-style-type: none"> Basic coated hardfacing electrode (45-58HRc) Designed for applications that need to withstand impacts. Also provides resistance to metal to metal wear as well as mild abrasion.

Your Lincoln Electric Distributor :