



STAINLESS STEEL ELECTRODES

LINCOLN[®]
ELECTRIC





TABLE OF CONTENTS

THE LINCOLN ELECTRIC COMPANY	4
STAINLESS STEEL SMAW	6
CORROSION	7
TECHNOLOGY FEATURES	8
CUSTOMERS REQUIREMENTS	10
ADVANTAGES AGAINST COMPETITION	12
PRODUCT RANGE	14
PACKAGING OPTIONS	16
RECOMMENDED EQUIPMENT	17

STRONG GLOBAL BRAND AND MARKET LEADER **– 120 YEARS YOUNG, KNOWN WORLDWIDE** **FOR QUALITY, PERFORMANCE AND PRODUCTIVITY**

Visit us @ www.lincolnelectric.eu

LINCOLN[®]
ELECTRIC
THE WELDING EXPERTS[®]



LINCOLN ELECTRIC

10 000 employees

160 active in 160 countries

48 manufacturing locations for consumables and equipment

19 manufactured in 19 countries

2.9 billion USD revenue in 2013



THE LINCOLN ELECTRIC COMPANY

Lincoln Electric is a world leader in the design, development and manufacture of arc welding products, robotic arc welding systems, and plasma and oxyfuel cutting equipment, and occupies a leading position on the global brazing and soldering alloys market. The company has a global network of manufacturing, distribution, sales and technical support centers in more than 160 countries. Lincoln Electric was founded by John C. Lincoln in 1895, and is headquartered in Cleveland, Ohio, USA.

INNOVATION

With a long history of innovation in arc welding equipment and consumables, Lincoln Electric has been providing cutting-edge products and comprehensive and welding solutions for nearly 120 years. We operate the industry's most comprehensive research and product development program, supported by our R&D centers around the world.

CUSTOMER COMMITMENT AND SUPPORT

High quality products and great customer service are important aspects of the Lincoln Electric story, but it's our unmatched welding expertise that truly sets us apart. If there's a better way for you to weld, we'll help you find it. If automation can improve your bottom line, we'll guide you through the decision-making process. If there's a method that can help you reduce costs, we'll show you how – and why.





STAINLESS STEEL SMAW

The basic advantage of stainless steel is that it can be applied in a corrosive environment due to the formation of a thin protective layer of Chromium oxide that is formed on the surface of steels containing more than 12% Cr. The main application of stainless steels is to withstand aqueous corrosive solutions. Furthermore, specific stainless steels have been developed to withstand high temperatures (oxidation), high stresses at high temperatures (creep) and extreme low temperatures (cryogenic applications).

STAINLESS STEEL 3XX AISI RANGE		
Cr	Ni	Mo
17-18%	8-13%	0-5%

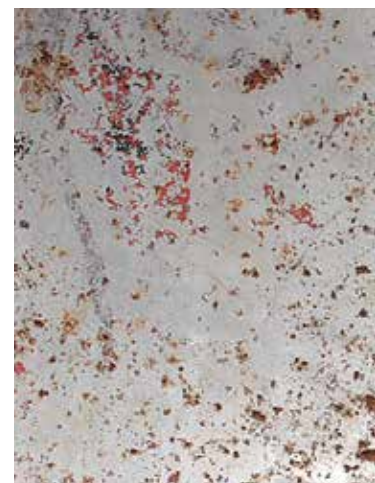
The most common stainless steels contain 17 ÷ 18% Cr, 8 ÷ 13% Ni, 0 ÷ 5% Mo (3XX AISI range). These materials have an austenitic structure that makes the material tough and ductile. They are considered to have good weldability.

The basic austenitic stainless steel is AISI 304L (EN 10088-1 X2CrNi 19-11, Material Nr. 1.4306). This material gives protection to general corrosion. When chlorine ions are present in the corrosive environment, AISI 304L is not resistant to the special type of corrosion that occurs: pitting. AISI 316L (EN 10088-1 X2CrNiMo 17-12-2, M.Nr. 1.4404), which contains 2 ÷ 2.5% of molybdenum, is more resistant to this type of corrosion. Based on these two grades, a whole range of different compositions has been developed with specific properties.

Besides the austenitic 3XX stainless steels, there are ferritic, martensitic, ferritic-austenitic (duplex) and fully austenitic stainless steels which all have their own specific advantages. Lincoln Electric Europe has outstanding consumables for each of these special stainless steel ranges and for nickel base alloys. Although they are not further discussed in this document, your local Lincoln Electric representative or distributor can provide you with more information or transfer your questions to the product specialists of Lincoln Electric Europe.

CORROSION

The type of corrosion that may occur depends on the composition of the applied steel grade, the corrosive medium and process temperature. Whether a metal (base material or weld metal) can withstand corrosion is in principle determined by its chemical composition. However, imperfections in the construction (crevices, local oxidation or remaining slag due to welding) can affect the corrosion properties of a material.



General corrosion

Uniform decrease of material thickness.



Pitting corrosion

The material shows small (local) pits, that may deepen rapidly. Locally the protective passive oxide layer of the material has disappeared.



Crevice corrosion

This form of corrosion occurs in crevices: locations where no oxygen can penetrate in the liquid. There is no oxygen to form the passive protective layer, thus giving corrosion.



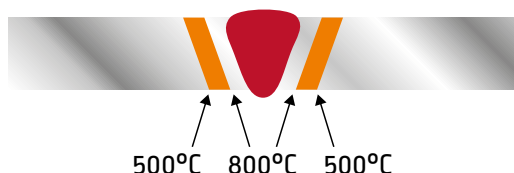
Contact or galvanic corrosion

When a "noble" material is combined with a "less-noble" material in a conductive liquid, the "less-noble" material will corrode. Prevent small "less-noble" parts in a large "noble" construction.



Stress corrosion

Stresses combined with e.g. hot solutions containing chlorine or sulphide ions can cause stress corrosion cracking. Ferritic-austenitic (duplex) stainless steels are used for this application.



Inter-crystalline corrosion

3XX with more than 0.03% C may suffer from the formation of chromium carbides and hence Cr depletion in the HAZ, giving intercrystalline corrosion. 3XXL or Nb/Ti-stabilised types prevent this phenomenon.

TECHNOLOGY FEATURES

Porosity, caused by coating moisture is no longer an issue: Lincoln Electric Europe has eliminated this problem by developing a coating that limits moisture absorption.

This prevents porosity in general, but also the well-known starting porosity. Welders no longer have to overcome starting porosity by short-circuiting the electrode; this had the risk of losing a part of the electrode coating when breaking the short circuit.



ECONOMY

The most economic welds are achieved by:

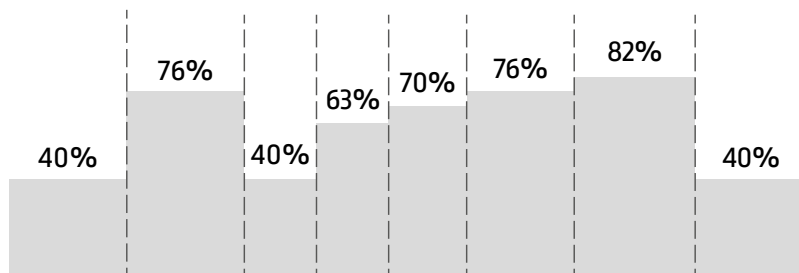
- Welders that appreciate the electrode they use. [They will show a higher productivity].
- Long electrodes (350/450 mm) with short stub ends: reduce the amount you throw away, and increase the duty cycle.
- High quality products with balanced chemical analysis and microstructure.



PROTECTION AGAINST

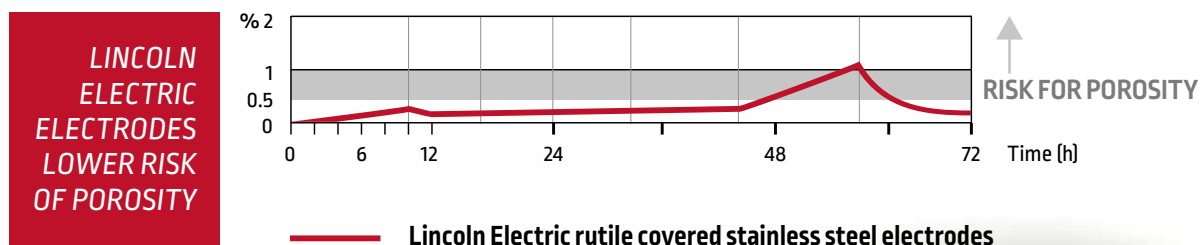
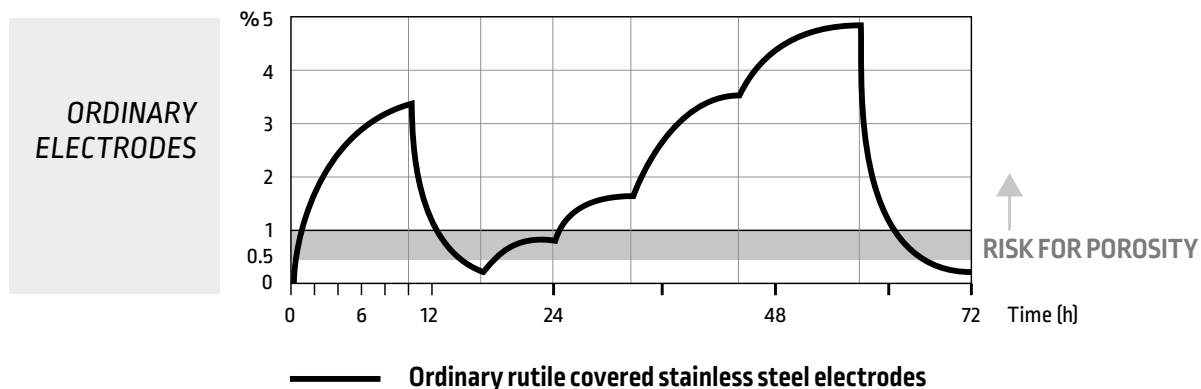
RISK OF POROSITY

Relative humidity

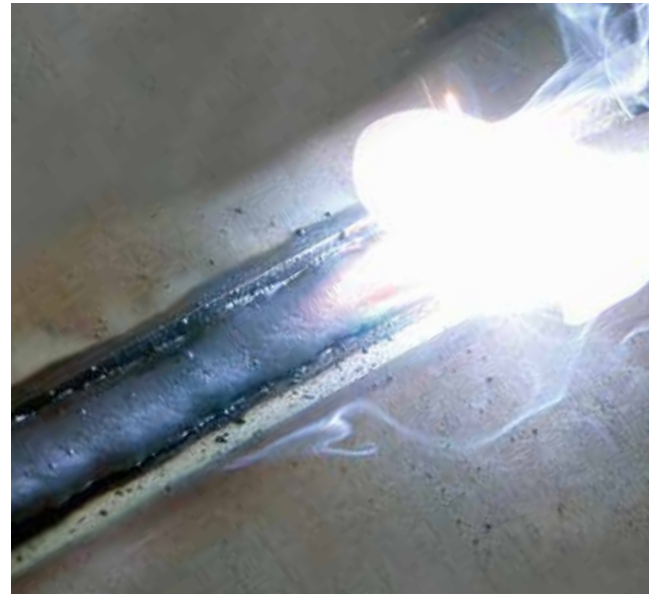


Moisture absorption of the coating at 25°C of ordinary rutile covered stainless steel electrodes and of Lincoln Electric rutile covered stainless steel electrodes.

Moisture content of electrode coating



MOISTURE



CUSTOMERS REQUIREMENTS

The success of a stainless steel covered electrode is determined by the appreciation of both welders and welding engineers/management. Both groups have different requirements: welders want a user friendly electrode that does the job; welding engineers and the management want an economic solution for the quality requirements they have to fulfil.

The most important requirements are:

- Electrode easy to bend slightly, without cracking of the coating
- Easy striking, no sticking electrodes / extinguishing arc
- Stable arc that is easy to direct
- No spatter
- Good side wall wetting, no undercut
- Good slag detachability, no shooting slag
- Pore free weld metal

Lincoln Electric stainless steel electrodes have been designed to meet all requirements of both the welders and the welding engineers/management. Of course, both ranges have specific features that make them the optimum choice for different applications.

NO SHOOTING SLAG



NO SPATTER

For more specific applications the Jungo® range (basic electrodes, for high restraint welds or when excellent low temperature notch toughness properties are required) and the Vertarosta® range (for vertical down welding) have been specially designed to provide optimum performance. The table below provides the basic information which of the Lincoln Electric Europe stainless steel electrode ranges give optimum results in which general application:

Application	Electrode/weld metal characteristics	Preferred electrode range
Downhand fillets and filling of joints	Excellent bead shape / slag release	Limarosta®
All position welding	Excellent side wall wetting / arc stability	Arosta®
High restraint welding conditions	Excellent low temperature toughness properties	Jungo®
Vertical down welding	Fillet welds and open roots	Vertarosta®

Apart from electrodes for generic applications, Lincoln Electric Europe has developed special electrodes for special steel compositions such as:

- Duplex / super duplex stainless steels
- Supermartensitic stainless steels
- Fully austenitic stainless steels.
- Nickel base alloys

ADVANTAGES AGAINST COMPETITION



BENDING TEST

No coating breaking or crumbling after bending: the guarantee of quality welds



SLAG REMOVAL

Slag easily detachable and smooth bead appearance



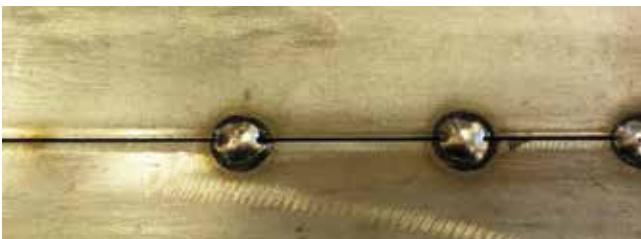
TRANSFORMER MACHINE

Stable welding performance even for very low ampere values and transformer welding machines



ARC STRIKING

Very stable and directed arc



TACK WELDING

Ease of use especially for tack welding with its simplified striking property



THIN MATERIAL

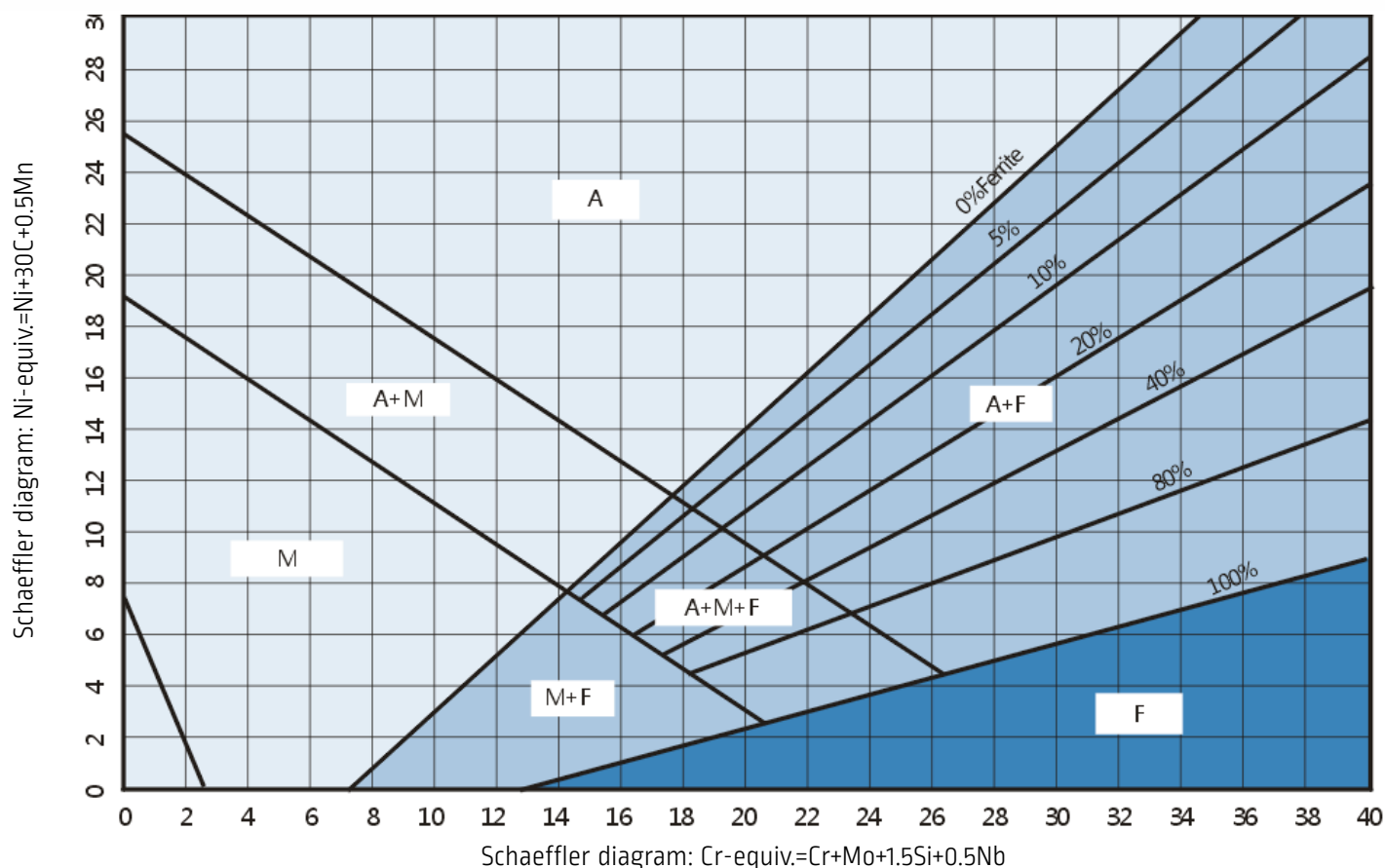
Advantage of welding with low current provides capability of easy welding of very thin materials



POSITIONAL WELDING

Superior weldability in positional welding





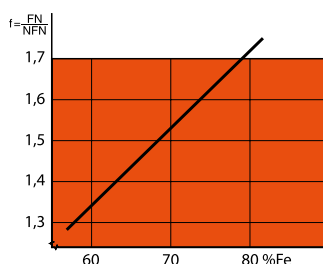
Ferrite determination

- Optical scanning Accuracy depends on etching and equipment. Related standard: ASTM E 562 - 99
- Magnet tearing-off force Standards for Ferrite Number (FN) determination: ISO 8249 and AWS A4.2 - 97. Cover range of FN 0-85. Torsion balance [e.g. Magne Gage] calibrated with coating thickness standards (NIST). Other devices, to be calibrated on secondary standards.
- Magnetic Induction Devices as Fisher Ferritoscope, to be calibrated on secondary standards.
- The measurement of Ferrite Number (FN) in Real Weldments. Final Report of IIW Round Robin /7/
- Chemical composition, position in structure diagrams
 - Schaeffler Diagram /1/ - WRC 1988 Diagram /3/
 - DeLong Diagram /2/ - WRC 1992 Diagram /4/

Lincoln Electric Europe combined the latest and most accurate WRC 1992 diagram with the basis, the Schaeffler Diagram for optimal estimation of structure and ferrite content.

Correlation % Ferrite & Ferrite Number

Volumetric % Ferrite (estimated NFN) correlates with Ferrite Number: $NFN = \frac{FN}{f}$

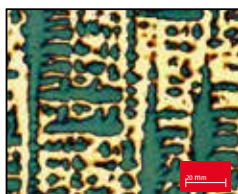


Factor f, depends on iron content (%Fe) in weld metal /5/

References

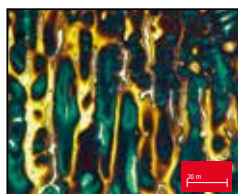
- Schaeffler A.L. 1949. Metal progress, 56 (11) p.680-680B
- DeLong W.T. 1974. Welding Journal, 53 (8) p. 273s-286s
- Siewert T.A., McCowan C.N., Olson D.L. 1988. Welding Journal 12 (1988) p. 289s-298s
- Kotecki D.J., Siewert T.A. 1992. Welding Journal 5 (1992) p. 171s-178s
- Kotecki D.J. 1982. Welding Journal Nov. (1982) p.352s-361s
- Schafmeister P., Ergang R. 1939. Arch. Eisenhüttenwesen 12 (1939) p. 459-464
- Farrar J.C.M. 2004. IIW DOC II-1531-04

FERRITE IN THE WELD METAL STRUCTURE



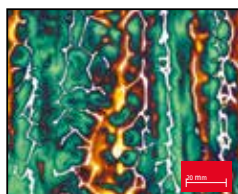
Arosta 4439

FN=0 Solidification mode: A



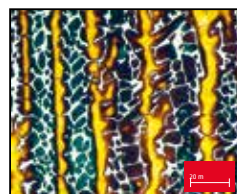
Arosta 309H

FN=3 Solidification mode: AF



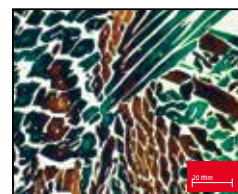
Arosta 316L

FN=7 Solidification mode: FA



Limarosta 309S

FN=15 Solidification mode: FA



Arosta 4462

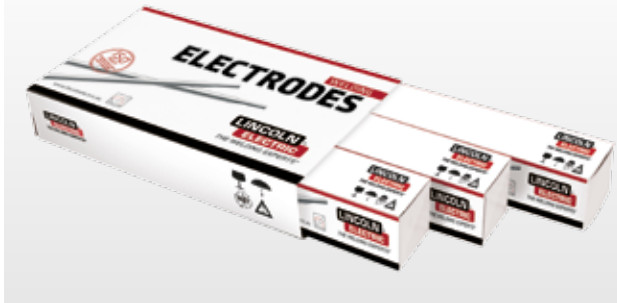
FN=35 Solidification mode: F

PRODUCT NAME	COATING TYPE	AWS (A5.4)	EN ISO (ISO 3581-A)	CUR- R- ENT TYPE	CHEMISTRY										TYPICAL FERRITE		
					C	Mn	Si	Cr	Ni	Mo	Nb	Cu	N	WRC -92	RP0.2	RM	
Arosta® 304L	Rutile-Basic	E308L-16	E 19 9 L R 12	AC/DC +/-	0.02	0.80	0.80	19.5	9.7	-	-	-	-	4-10	440	580	
Limarosta® 304L	Rutile-Basic	E308L-17	E 19 9 L R 12	AC/DC +/-	0.025	0.75	0.95	19.0	9.7	-	-	-	-	4-10	440	600	
Vertarosta® 304L	Rutile-Basic	E308L-15	E 19 9 L R 2 1	DC +	0.02	0.8	0.7	20.0	9.8	-	-	-	-	4-10	440	600	
Jungo® 304L	Basic	E308L-15	E 19 9 L B 2 2	DC +	0.025	1.8	0.4	19.0	10.0	-	-	-	-	4-10	400	600	
Arosta® 347	Rutile-Basic	E347-16	E 19 9 Nb R 12	AC/DC +/-	0.03	0.8	0.8	19.5	9.8	-	0.35	-	-	6-12	500	630	
Jungo® 347	Basic	E347-15	E 19 9 Nb B 2 2	DC +	0.02	1.6	0.5	20.0	10.0	-	0.40	-	-	6-12	500	630	
Arosta® 316L	Rutile-Basic	E316L-16	E 19 12 3 L R 12	AC/DC +/-	0.02	0.8	0.8	18.0	11.5	2.85	-	-	-	4-10	450	580	
Limarosta® 316L	Rutile-Basic	E316L-17	E 19 12 3 L R 12	AC/DC +/-	0.02	0.8	1.0	18.0	11.5	2.8	-	-	-	4-10	450	580	
Vertarosta® 316L	Rutile-Basic	E316L-15	E 19 12 3 L R 2 1	AC/DC +	0.02	0.7	0.85	18.0	11.5	2.8	-	-	-	4-10	500	620	
Jungo® 316L	Basic	E316L-15	E 19 12 3 L B 2 2	DC +	0.025	1.6	0.4	18.5	11.0	2.7	-	-	-	4-10	450	650	
Limarosta® 316L-130	Rutile-Basic	E316L-17	E 19 12 3 L R 5 3	AC/DC +	0.02	0.65	1.0	18.0	11.5	2.8	-	-	-	4-10	450	580	
Arosta® 318	Rutile-Basic	E318-16	E 19 12 3 Nb R 12	AC/DC +/-	0.03	0.8	0.85	18.0	11.5	2.7	0.35	-	-	6-12	500	630	
Jungo® 4465	Basic	E310Mo-15*	E 25 22 2 N L B 2 2*	DC +	0.03	4.5	0.4	25.0	22.0	2.2	-	-	0.13	0	400	620	
Jungo® 4500	Basic	E385-16*	E 20 25 5 Cu N L R 12	DC +	0.02	1.2	0.9	20.0	25.0	5.0	-	1.5	-	0	410	620	
Arosta® 4462	Rutile-Basic	E2209-16*	E 22 9 3 N L R 3 2	AC/DC +/-	0.02	0.8	1.0	22.5	9.5	3.2	-	-	0.16	30-55	650	800	
Jungo® 4462	Basic	E2209-15	E 22 9 3 N L B 2 2	DC +	0.025	1.6	0.5	23.5	9.0	3.0	-	-	0.15	30-60	650	800	
Jungo® 309L	Basic	E309L-15	E 23 12 L B 2 2	AC/DC +	0.025	1.5	0.4	23.0	13.0	-	-	-	-	10-20	470	570	
Arosta® 309S	Rutile-Basic	E309L-16	E 23 12 L R 3 2	AC/DC +	0.02	0.8	0.8	23.5	12.5	-	-	-	-	12-20	480	560	
Limarosta® 309S	Rutile-Basic	E309L-17	E 23 12 L R 3 2	AC/DC +	0.02	0.8	1.0	23.0	12.5	-	-	-	-	10-20	480	560	
Arosta® 309Mo	Rutile-Basic	E309LMo-16	E 23 12 2 L R 3 2	AC/DC +	0.02	0.8	0.8	23.0	12.5	2.7	-	-	-	15-25	580	700	
Nichroma	Rutile-Basic	E308LMo-16	E 20 10 3 R 3 2	AC/DC +	0.025	0.8	1.0	20.0	9.5	2.3	-	-	-	20	500	720	
Nichroma 160	Rutile-Basic	E309Mo-26	E 23 12 2 LR 53*	AC/DC +	0.05	0.7	1.0	23.7	12.8	2.4	-	-	-	15	550	740	
Limarosta® 312*	Rutile-Basic	E312-17	E 29 9 R 12	AC/DC +	0.11	0.9	1.0	29.0	9.0	-	-	-	-	-	700	800	
Arosta® 307	Rutile-Basic	E307-16*	E 18 8 Mn R 12	AC/DC +	0.09	5.0	0.6	18.5	8.5	-	-	-	-	0	450	650	
Arosta® 307-160	Rutile	E307-26*	E 18 8 Mn R 5 3	AC/DC +	0.06	6.0	1.0	18.0	8.0	-	-	-	-	-	425	650	
Jungo® 307	Basic	E307-15*	E 18 8 Mn B 2 2	AC/DC +	0.08	5.5	0.3	19.0	8.5	-	-	-	-	-	500	650	
Arosta® 304H	Rutile-Basic	E308H-16	E 19 9 H R 12	AC/DC +/-	0.05	0.75	0.85	18.5	9.5	-	-	-	-	3-7	450	600	
Arosta® 309H	Rutile-Basic	E309H-16*	E 23 12 R 3 2*	AC/DC +/-	0.10	0.8	1.6	22.0	11.0	-	-	-	-	3-8	500	700	
Intherma® 310	Basic	E310-16	E 25 20 R 12	AC/DC +	0.12	2.5	0.5	26.0	20.5	-	-	-	-	0	440	600	
Intherma® 310B	Basic	E310-15*	E 25 20 B 12	DC +	0.1	3.0	0.3	25.0	21.0	-	-	-	-	0	440	600	

TYPICAL MECHANICAL		APPROVALS	APPLICATION DESCRIPTION	PACKAGING TYPE			
ELONGA- TION [%]	IMPACT TOUGHNESS			CARTON	CAN	PRO- TECH	SRP
43	60 J @ -20°C	BV, TÜV, DB	General Purpose - all position stainless steel electrode for 304L or equivalent steels	●			●
45	60 J @ -20°C	DNV/GL, LR, RMRS, TÜV	General Purpose - all position stainless steel electrode for 304L or equivalent steels	●	●		●
40	40 J @ -120°C	TÜV, DB	Vertical down stainless steel electrode for 304L or equivalent steels	●			
40	40 J @ -196°C	TÜV	Basic coated electrode for low temperature applications [304L] with good impact properties down to -196°C	●			
35	35 J @ -60°C	TÜV, DB	Niobium stabilized stainless steel electrodes used for the welding of types 347 and 321 stainless and stainless clad steels	●			
35	40 J @ -120°C	TÜV	Niobium stabilized stainless steel electrodes used for the welding of types 347 and 321 stainless and stainless clad steels	●			
39	40 J @ -120°C	ABS, BV, DNV/GL, LR, RINA, RMRS, TÜV, DB	General Purpose - all position stainless steel electrode for 316L or equivalent steels	●	●		●
40	40 J @ -105°C	DNV/GL, LR, RMRS, TÜV	General Purpose - all position stainless steel electrode for 316L or equivalent steels	●	●		●
35	35 J @ -60°C	ABS, BV, DNV/GL, LR, TÜV	Vertical down stainless steel electrode for 316L or equivalent steels	●			
35	35 J @ -196°C	BV	Basic coated electrode for low temperature applications [316L] with good impact properties down to -196°C	●			
40	40 J @ -105°C		High recovery (%130) all position stainless steel electrode for 316L or equivalent steels				●
38	35 J @ -60°C	TÜV	Rutile basic all position stainless steel electrodes for welding Ti or Nb stabilized 316 or equivalent steels	●			
35	50 J @ -196°C	TÜV	Basic high CrNiMo-alloyed fully austenitic all position electrode with excellent corrosion resistance in strong oxydizing and slightly reducing media	●			
40	50 J @ -60°C	TÜV	Designed for welding alloy 904L for applications in phosphoric acid and sulphuric acid and paper mill equipment	●			
27	40 J @ -40°C	BV, DNV/GL, RINA, TÜV	Rutile-basic electrode for duplex stainless steel welding with high resistance to general corrosion, pitting and stress corrosion [PREN ~35]				●
28	45 J @ -50°C	DNV/GL	Basic electrode for duplex stainless steel welding with high resistance to general corrosion, pitting and stress corrosion [PREN ~35]	●			●
40	40 J @ -196°C		Basic high CrNi alloyed buffer electrode for welding stainless steel to mild steel and root passes in clad steel	●			
40	40 J @ -120°C	ABS, BV, RMRS, TÜV	Rutile-basic high CrNi alloyed buffer electrode for welding stainless steel to mild steel and root passes in clad steel	●			●
40	50 J @ -50°C	DNV/GL, LR, RMRS, TÜV	Rutile-basic high CrNi alloyed buffer electrode for welding stainless steel to mild steel and root passes in clad steel	●	●		●
30	45 J @ -60°C	ABS, BV, DNV/GL, LR, RINA, RMRS, TÜV, DB	High CrNiMo alloyed all position rutile-basic electrode specially developed for welding stainless steel to mild steel and root runs in cladding	●			●
30	60 J @ -20°C	BV, DNV/GL, TÜV, DB	General purpose electrode for repair welding as well as welding dissimilar joints	●			
28	45 J @ -20°C	ABS, BV, DNV/GL, RINA, RMRS	High recovery (160%) electrode for welding carbon steel to stainless steel in the down hand position in shipbuilding	●			
20	50 J @ -20°C	DB	High CrNi-alloyed all position electrode for repair welding. Especially developed for steels difficult to weld, such as armour plates, austenitic Mn-steels and high C-steels	●			●
35	75 J @ -60°C	TÜV, DB	Rutile- basic all position 5% Mn-alloyed stainless steel electrode, especially developed for steels difficult to weld, such as armour plates, austenitic Mn-steels and high C-steels	●			
35	60 J @ -10°C		Rutile 6%Mn-alloyed stainless steel electrode, especially developed for steels difficult to weld, such as armour plates, austenitic Mn-steels and high C-steels	●			
35	35 J @ -120°C		Fully basic all position 5% Mn-alloyed stainless steel electrode, especially developed for steels difficult to weld, such as armour plates, austenitic Mn-steels and high C-steels	●			●
44	50 J @ -20°C		Specially developed for high temperature applications (up to 730°C) - e.g. AISI 304H or Mat. Nr 1.4948	●			
30	50 J @ +20°C		Specially developed for high temperature applications like industrial furnaces (ovens). High resistance to oxidation up to 1050°C	●			
30	80 J @ +20°C		Rutile-basic electrode with fully austenitic weld metal which has high Cr and Ni content for very high service temperature. High resistance against oxidation and scaling up to 1200°C	●			
30	100 J @ +20°C		Basic electrode with fully austenitic weld metal which has high Cr and Ni content for very high service temperature. High resistance against oxidation and scaling up to 1200°C	●			

★
★
★
★
GOOD

CARTON BOX



PACKAGING OPTIONS

The packaging selection is based on concrete technical aspects and customer requirements. Required product performance, product behavior and welding specification requirements are some parameters which can lead to a selection of real protective technical packaging solutions:

★
★
★
★
BETTER

LINC CAN



PACKAGING OPTIONS

CARTON BOX

- Universal package for stick electrodes

LINC CAN

- Robustness against mechanical damage

SRP

- The most puncture resistant vacuum packaging in the welding industry
- Ensures extreme slow moisture pick-up
- Vacuum sealed packaging with high leak resistance
- Small packaging, minimal waste of electrodes

★
★
★
★
PREMIUM

SRP



RECOMMENDED EQUIPMENT

Lincoln Electric offers a complete range of welding equipment: both inverters and conventional rectifiers.

Inverters use modern light weight technology; this allows for portable machines with excellent welding characteristics.

Within the range, the maximum output current varies from approx. 120A (135-S) to 400A (400-SX).

The range is completed with the conventional rectifiers LINC 405-S/SA and LINC 635-S/SA with respectively 400A and 670A output.

Inverter	Inverter® 135S, 150S, 170S Small, powerful and robust	Inverter® 160SX Professional performance. industrial innovation	Inverter® V205-S Smart switching, full flexibility	Inverter® 270SX, Inverter® 400SX Professional welders for tough conditions
	Conventional	LINC 405-S & SA, LINC 406, LINC 635-S & SA The rugged and distinguished workhorses	Inverter® V350 PRO Design smart, Built tough	

	Mode	Polarity	Output Range (A)	Voltage (V)	Stick	Lift TIG	TIG Scratch	Arc Gouge	Auto-sensing/PFC	Hot Start	Arc Force	Meters	Warranty (years)
Inverter					PROCESS				FEATURES				
Inverter® 135S	CC	DC	10-120	230	●		○						2
Inverter® 150S	CC	DC	10-140	230	●	●				■	■		2
Inverter® 170S	CC	DC	10-160	230	●	●				■	■	■	2
Inverter® 160SX	CC	DC	5-160	115/230	●	●			■	■	■	■	3
Inverter® V205-S	CC	DC	5-200	230/400	●	●			■	■	■	■	2
Inverter® 270SX	CC	DC	5-270	400	●	●				■	■	■	3
Inverter® 400SX	CC	DC	5-400	400	●	●		○		■	■	■	3
Conventional													
LINC 405-S	CC	DC	15-400	230/400	●		○	○		■	■		2
LINC 405-SA	CC	DC	15-400	230/400	●	●		○		■	■	■	2
LINC 406	CC	DC	30-400	220/380/440	●		○	▲		■	■	■	2
LINC 635-S	CC	DC	15-670	230/400	●		○	▲		■	■		2
LINC 635-SA	CC	DC	15-670	230/400	●	●		▲		■	■	■	2
Inverter® V350 PRO	CC/cv	DC	4-425	200/220/380/415	●	●	●	●					3

KEY: ● Excellent ○ Good ▲ Possible



CUSTOMER ASSISTANCE POLICY

The business of The Lincoln Electric Company® is manufacturing and selling high quality welding equipment, consumables, and cutting equipment. Our challenge is to meet the needs of our customers and to exceed their expectations. On occasion, purchasers may ask Lincoln Electric for information or advice about their use of our products. Our employees respond to inquiries to the best of their ability based on information provided to them by the customers and the knowledge they may have concerning the application. Our employees, however, are not in a position to verify the information provided or to evaluate the engineering requirements for the particular weldment. Accordingly, Lincoln Electric does not warrant or guarantee or assume any liability with respect to such information or advice. Moreover, the provision of such information or advice does not create, expand, or alter any warranty on our products. Any express or implied warranty that might arise from the information or advice, including any implied warranty of merchantability or any warranty of fitness for any customers' particular purpose is specifically disclaimed.

Lincoln Electric is a responsive manufacturer, but the selection and use of specific products sold by Lincoln Electric is solely within the control of, and remains the sole responsibility of the customer. Many variables beyond the control of Lincoln Electric affect the results obtained in applying these types of fabrication methods and service requirements.

Subject to Change – This information is accurate to the best of our knowledge at the time of printing. Please refer to www.lincolnelectric.com for any updated information.