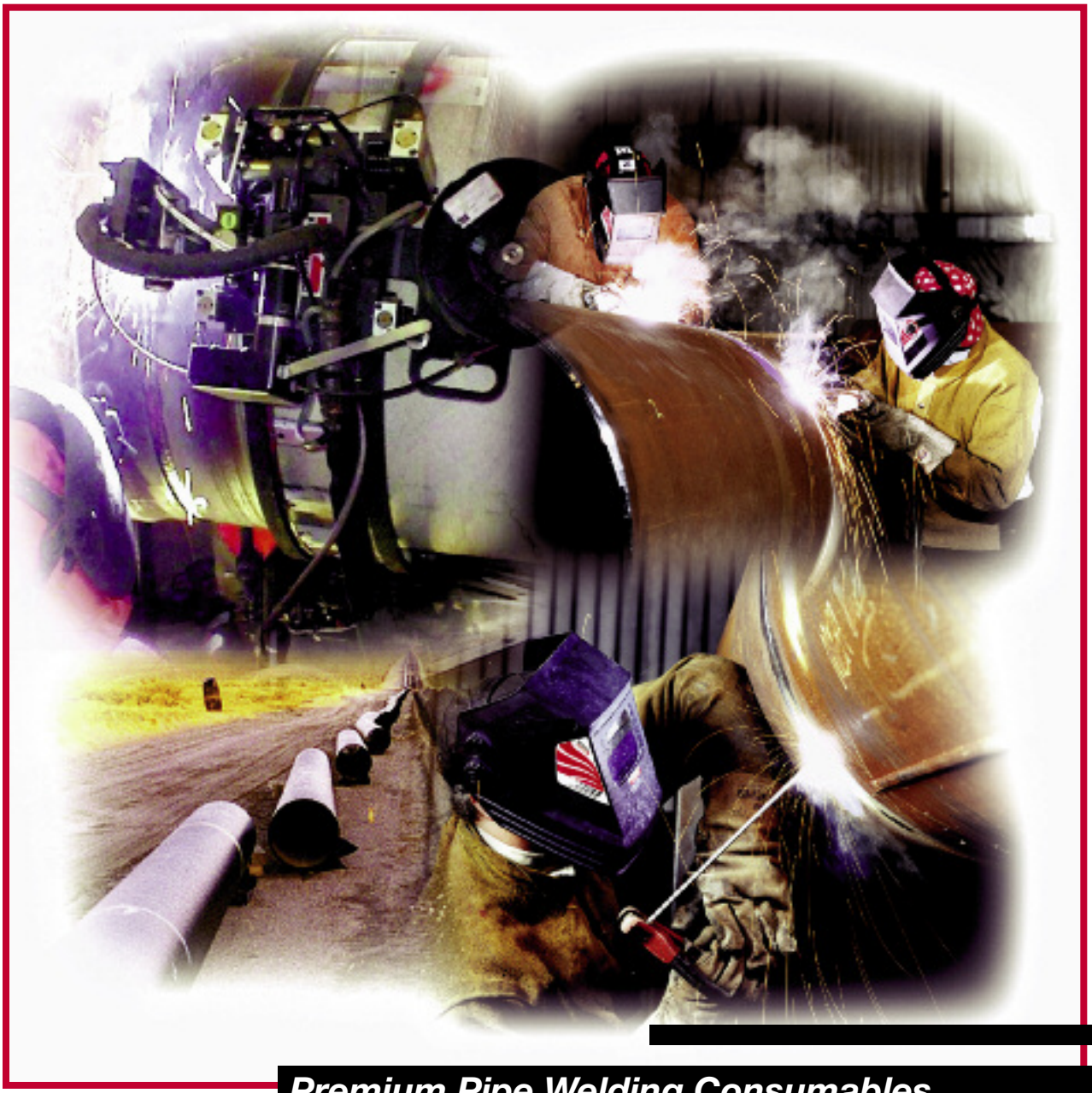
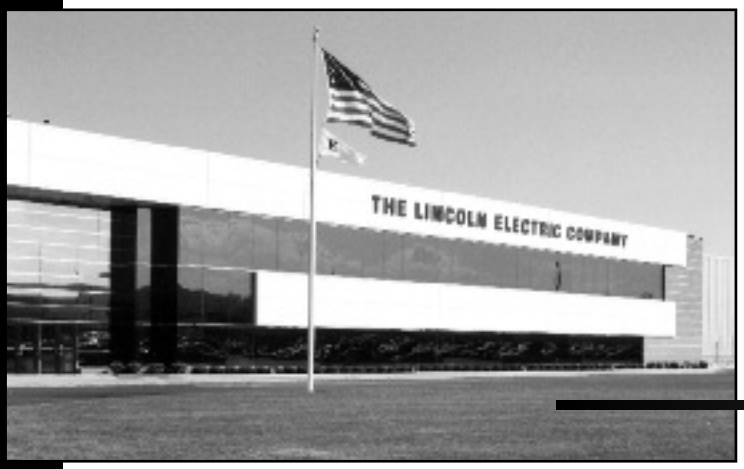
PIPELINER®



Premium Pipe Welding Consumables

LINCOLN® ELECTRIC

THE WELDING EXPERTS



About The Lincoln Electric Company

Lincoln Electric is the world's premier manufacturer of welding equipment and consumables. No company on earth is more focused on the ever-changing needs of the welding professional. Our business is all about helping companies make their welding operations more effective, more efficient, more profitable. Lincoln is truly your "One Source" when it comes to welding. We're a company that continually rededicates itself to the equally important goals of exceptional quality, and exceptional service. Our field support team — with hundreds of field sales engineers and thousands of knowledgeable and responsive Lincoln distributors in countries all over the world — is the largest in the industry. Innovative thinking. A quality and service-first attitude. Fresh approaches to design, manufacturing, and packaging. Worldwide strength. That's Lincoln Electric.

Pipeliner® – The Clear Choice For Pipe Welding

Pipeliner is the world's premier group of pipe welding consumables.

Pipeliner is Lincoln Electric's family of premium Stick (SMAW), MIG (GMAW), Flux-Cored (FCAW) and Submerged Arc (SAW) consumables developed specifically to meet the rigorous demands of the global pipe welding industry. They are the most thoroughly tested pipe welding consumables on the market today.

Consistent performance

Performance consistency tops the list of what contractors want from pipe consumables – and Pipeliner delivers. Lincoln Electric's Pipeliner manufacturing operations throughout the world are tightly controlled, and routinely pass quality-assurance audits by agencies and pipe welding professionals. This extraordinary emphasis on the integrity of Pipeliner's manufacturing processes results in consumables with unmatched performance characteristics and consistency.

All Pipeliner products are lot-controlled and lot-tested, with actual certified test results.

Packaging to meet the pipe industry's needs

The world's best pipe electrodes deserve to be protected accordingly. So, Pipeliner electrodes are packaged in hermetically-sealed, moisture-resistant containers that ensure consistent performance — even when stored in the harshest environments.

Global support

Pipe contractors need to mobilize and deploy resources quickly and efficiently — no matter to what corner of the world the next job calls them. That's why Lincoln Electric's global network of manufacturing and distribution facilities is such an important part of the Pipeliner story. Wherever your project, Lincoln is there with the products and support you need.

Complete pipe solutions from the name you trust.

By partnering with a single, comprehensive welding resource, pipe contractors find that they can improve efficiencies and maintain strong accountability.

For many of the world's most successful pipe contractors, Lincoln Electric has become that single-source welding partner. Why? Because Lincoln offers an exceptional array of well-designed and well-built pipe welding products, as well as the deepest pool of welding expertise and experience on earth.

Behind those products and that expertise is Lincoln's unique total process engineering approach to welding. It means that every Pipeliner consumable has been designed to work in harmony with all other Lincoln Electric pipe welding products — every Lincoln Electric wire feeder, power source, gun and cable assembly and accessory has been engineered with an eye on efficient, synergistic, system-wide performance.

That translates to less downtime, improved production rates, and higher profit potential on every pipe project.

Contents **Page**

Pipe Grades

The primary pipe grades are classified in accordance with the API 5L:2000 specification. This specification establishes requirements for two product specification levels – PSL 1 and PSL 2. PSL 1 includes mandatory requirements for chemistry, ductility, minimum yield strength and minimum tensile strength. PSL 2 adds mandatory requirements for maximum yield strength, maximum tensile strength and Charpy impacts.

PSL1

Grade	Yield Strength Minimum psi	Yield Strength Minimum MPa	Ultimate Tensile Strength Minimum psi	Ultimate Tensile Strength Minimum MPa
A25	25,000	(172)	45,000	(310)
A	30,000	(207)	48,000	(331)
B	35,000	(241)	60,000	(414)
X42	42,000	(290)	60,000	(414)
X46	46,000	(317)	63,000	(434)
X52	52,000	(359)	66,000	(455)
X56	56,000	(386)	71,000	(490)
X60	60,000	(414)	75,000	(517)
X65	65,000	(448)	77,000	(531)
X70	70,000	(483)	82,000	(565)

PSL2

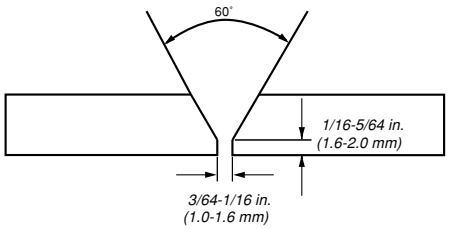
Grade	Yield Strength Minimum psi	Yield Strength Minimum MPa	Yield Strength Maximum psi	Yield Strength Maximum MPa	Ultimate Tensile Strength Minimum psi	Ultimate Tensile Strength Minimum MPa	Ultimate Tensile Strength Maximum psi	Ultimate Tensile Strength Maximum MPa
B	35,000	(241)	65,000	(448)	60,000	(414)	110,000	(758)
X42	42,000	(290)	72,000	(496)	60,000	(414)	110,000	(758)
X46	46,000	(317)	76,000	(524)	63,000	(434)	110,000	(758)
X52	52,000	(359)	77,000	(531)	66,000	(455)	110,000	(758)
X56	56,000	(386)	79,000	(544)	71,000	(490)	110,000	(758)
X60	60,000	(414)	82,000	(565)	75,000	(517)	110,000	(758)
X65	65,000	(448)	87,000	(600)	77,000	(531)	110,000	(758)
X70	70,000	(483)	90,000	(621)	82,000	(565)	110,000	(758)
X80	80,000	(552)	100,000	(690)	90,000	(621)	120,000	(827)

Joint Design

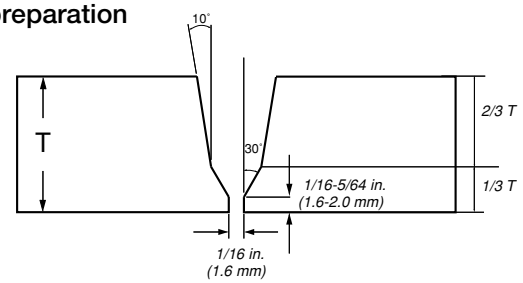
A customary joint preparation is commonly called an "API" fitup. While this is not actually an API 1104 requirement, the figures shown in the specification are drawn to have a 60 degree included angle with a 1/16" (1.6 mm) land and 1/16" (1.6 mm) gap.

As an alternative, for thicker wall pipe (>3/4", >20 mm), a compound bevel can be used. The amount of material required to fill a compound bevel joint is less than a 60 degree included angle preparation, so productivity may be increased.

Recommended joint preparation



Wall thickness <3/4 in. (<20mm)



Wall thickness >3/4 in. (>20mm)

Product Selection

The table below can be used as a product selection guide for each pipe grade. This table is for guidance only and should be referenced against the appropriate construction standard for each contract.

		API 5L Pipe Grades											
Products	**AWS Class**	**A**	**B**	**X42**	**X46**	**X52**	**X56**	**X60**	**X65**	**X70**	**X80**	**X90**	**X100**
Cellulosic All Position Stick (SMAW) Electrodes													
Pipeliner 6P+	**E6010**												
Pipeliner 8P+	**E8010-P1**												
Low Hydrogen Stick (SMAW) Electrodes													
Pipeliner 16P	**E7016 H4**												
Pipeliner 18P	**E8018-G H4**												
MIG (GMAW) Electrodes													
Pipeliner 70S-G	**ER70S-G**												
Innershield® Self-Shielded Flux-Cored (FCAW-S) Electrodes													
Pipeliner NR-207+	**E71T8-K6**												
Pipeliner NR-207XP	**E71T8-K6**												
Outershield® Gas-Shielded Flux-Cored (FCAW-G) Electrodes													
Pipeliner G70M	**E71T-1MJH8**												
	E71T-9MJH8												
Pipeliner Autoweld G70M	**E71T-1MJH8**												
	E71T-9MJH8												

Product Selection

Root Pass Welding Only

CONSUMABLE SELECTION GUIDE

Electrode Name	AWS Class	Recommended Polarity	General Description	Page No.
Cellulosic All Position Stick (SMAW) Electrodes				
Pipeliner 6P+	E6010	DC+	**Pipeliner 6P+ is an all-position cellulosic pipe electrode designed especially for vertical down root pass welding.** This electrode is based on a long-time favorite among cross-country pipeline welders.	8
Pipeliner 8P+	E8010-P1	DC+	**Here's an electrode that makes short work of even the most challenging high silicon pipe applications!** Pipeliner 8P+ is an outstanding choice for API 5L-X56 through X70 grade pipe. This electrode features high stacking efficiency – formulated to carry and deposit weld metal in difficult vertical down out-of-position applications.	9
Low Hydrogen Stick (SMAW) Electrodes				
Pipeliner 16P	E7016 H4	DC+ AC	**We designed this quality electrode for optimum performance for vertical up welding of pipe up to API 5L-X65 – especially where a low hydrogen deposit is desired.** Obtain Charpy V-Notch impact values down to temperatures of -20°F (-29°C).	10
Pipeliner 18P	E8018-G H4	DC+ AC	**A real workhorse for vertical up welding jobs up to X80 pipe!** Lincoln 18P offers low temperature impact properties down to -50°F (-46°C).	11

CONSUMABLE SELECTION GUIDE

Electrode Name	AWS Class	Recommended Polarity/ Shielding Gas	General Description	Page No.
MIG (GMAW) Electrodes				
Pipeliner 70S-G	ER70S-G		**Pipeliner 70S-G MIG (GMAW) wire electrode is especially intended and packaged for the needs of semiautomatic and automatic root pass pipe welding.** Delivering low hydrogen deposits, 70S-G exhibits an extremely fluid puddle for outstanding wash-in at the weld toes and uniform bead shape. Well-suited for use on API 5L-X56 through X70 pipe.	14
Innershield® Self-Shielded Flux-Cored (FCAW-S) Electrodes				
Pipeliner NR-207+	E71T8-K6	DC-	**Optimum performance on vertical down hot, fill and cap passes on standard cross-country pipelines and arctic grade pipe.** Excellent crack resistance, CTOD, and Charpy V-Notch properties. Recommended for API Pipe Grades X42 through X70.	15
Pipeliner NR-207XP	E71T8-K6	DC-	**For consistently high impact values, choose 207XP.** Optimum performance on vertical down, hot, fill and cap passes on standard cross-country pipelines and arctic grade pipe. Recommended for API Pipe Grades X42 through X70.	16
Outershield® Gas-Shielded Flux-Cored (FCAW-G) Electrodes				
Pipeliner G70M	E71T-1MJH8 & E71T-9MJH8	DC+ 75-80% Ar /balance CO_2	**Pipeliner G70M is designed to deliver outstanding weld properties for semi-automatic applications.** Robust impacts mean consistently high CVN values.	17
Pipeliner Autoweld G70M	E71-T-1MJH8 & E71T-9MJH8	DC+ 75-80% Ar /balance CO_2	**Pipeliner Autoweld G70M is specifically designed for use with the Autoweld pipe welding system to deliver outstanding weld properties.**	18

Pipeliner 6P+ is an all-position cellulosic pipe electrode designed especially for vertical down root pass welding. This electrode is based on a long-time favorite among cross-country pipeline welders.

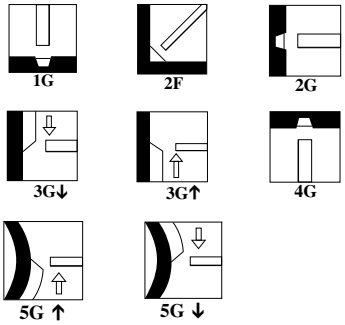
ADVANTAGE LINCOLN

- All-position; particularly good for vertical and overhead.
- Light slag with little slag interference for easy arc control. Easy slag removal, smooth bead.
- Deep penetration with maximum dilution.
- Capable of x-ray quality welds, even out-of-position.
- Manufactured under a quality system certified to ISO 9001 requirements.
- Manufactured to actual lot control. Actual certificates of conformance are available upon request.

TYPICAL APPLICATIONS

- Designed especially for all-position vertical down root pass welding.

WELDING POSITIONS



CONFORMANCE

AWS A5.1: E6010
ASME SFA-5.1: E6010
CSA W48.01: E41010
EN499: E 42 3 C 25

MECHANICAL PROPERTIES - *As Required per AWS A5.1-91*

	Yield Strength psi (MPa)	Tensile Strength psi (MPa)	Elongation (%)	Charpy V-Notch ft•lbf (Joules) @ -20ºF (-29ºC)
Required AWS E6010 (as-welded)	48,000 (330) min.	60,000 (410) min.	22 min.	20 (27) min.
Typical Results				
As-welded	57,000 - 76,000 (393 - 524)	72,900 - 86,200 (503 - 594)	24 - 33	38 - 63 (51 - 85)
Stress-relieved[1] 1 hr @ 1150°F (612°C)	51,000 - 64,000 (352 - 579)	67,000 - 78,000 (462 - 538)	30 - 34	45 - 53 (61 - 72)

[1] Data provided for information only – not part of AWS classification.

NOTE: Pipeliner electrodes are manufactured under lot control. A Certificate of Test showing actual deposit chemistry and mechanical properties per AWS A5.1 (DC+ only) is available on request from the factory for every lot of electrode. (Fax 216-383-8386).

DIAMETERS / PACKAGING

Diameter in.	(mm)	10 Lb. (4.5 kg) Easy Open Cans [60 lb. (27.2 kg) Master]	50 Lb. (22.7 kg) Easy Open Cans
1/8	(3.2)	ED030845	ED030848
5/32	(4.0)	ED030846	ED030849
3/16	(4.8)	ED030847	ED030850

Manufactured in metric diameters, U.S. Customary sizes are approximate.

TYPICAL OPERATING PROCEDURES

Polarity	Current (Amps) 1/8" (3.2mm)	5/32" (4.0mm)	3/16" (4.8mm)
DC+	65 - 130	90 - 175	140 - 225

DEPOSIT COMPOSITION - *As Required per AWS A5.1-91*

	%C	%Mn	%Si	%S	%P
Requirements AWS E6010			Not Specified		
Typical Results	.10-.20	.40-.65	.11-.30	.009-.020	.005-.025

NOTE: This AWS electrode classification is not required to deposit weld metal that is low in diffusible hydrogen. Therefore, these electrodes should not be used in applications where the hydrogen content of the weld metal is required to be controlled.

Here's an electrode that makes short work of even the most challenging high silicon pipe applications! Pipeliner 8P+ is an outstanding choice for API 5L-X56 through X70 grade pipe. This electrode features high stacking efficiency – formulated to carry and deposit weld metal in difficult vertical down out-of-position applications.

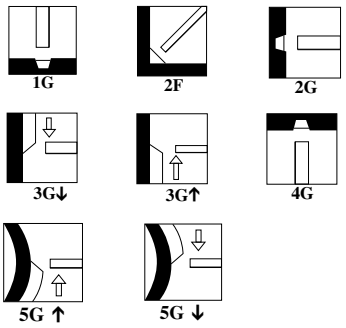
ADVANTAGE LINCOLN

- Manufactured to metric electrode diameters – use anywhere in the world.
- Fill and Cap Consistency – Approved manufacturing sites deliver industry-leading consistency in composition and arc action.
- Excellent Resistance to Porosity – Repeated x-ray testing shows outstanding results.
- High Stacking Efficiency – Formulated to carry and deposit weld metal in difficult vertical down out-of-position applications. Fill joints in fewer passes.
- Exceptional mechanical properties – Consistent best-in-class performance.
- Manufactured to actual lot control. Actual certificates of conformance are available upon request.

TYPICAL APPLICATIONS

- Typical applications include high-yield pipe steels.

WELDING POSITIONS



CONFORMANCE

AWS A5.5: E8010-P1
ASME SFA-5.5: E8010-P1
ABS: E8010-P1
CSA W48-01: E55010-P1
EN499: E 46 4 1Ni C 25

MECHANICAL PROPERTIES *- As Required per AWS A5.5-96*

	Yield Strength psi (MPa)	Tensile Strength psi (MPa)	Elongation (%)	Charpy V-Notch ft.-lbs. (Joules) @ -20ºF (-29ºC)	@ -50°F (-46°C)
Required AWS E8010-P1	67,000 (460) min.	80,000 (550) min.	19 min.	20 (27) min.	Not Required
Typical Results As-welded	67,000-81,000 (460-559)	80,000-98,000 (550-676)	19-27	46-73 (62-99)	34-62 (46-84)

NOTE: Pipeliner electrodes are manufactured under lot control. A Certificate of Test showing actual deposit chemistry and mechanical properties per AWS A5.5 (DC+ only) is available on request from the factory for every lot of electrode. (Fax 216-383-8386).

DIAMETERS / PACKAGING

Diameter mm	(in.)	4.5 kg (10 Lb.) Easy Open Cans [27.2 kg (60 lb.) Master]	22.7 kg (50 Lb.) Easy Open Cans
3.2	(1/8)	ED030829	ED030826
4.0	(5/32)	ED030830	ED030827
5.0	(3/16)	ED030831	ED030828

Manufactured in metric diameters, U.S. Customary sizes are approximate.

TYPICAL OPERATING PROCEDURES

Polarity	Current (Amps) 3.2mm (1/8")	4.0mm (5/32")	5.0mm (3/16")
DC+	75 - 130	100 - 185	140 - 225

DEPOSIT COMPOSITION *- As Required per AWS A5.5-96*

	%C	%Mn	%Si	%Ni	%Cr	%Mo	%V	%S	%P
Requirements AWS E8010-P1	.20 max.	1.20 max.	.60 max.	1.00 max.	0.30 max.	.50 max.	0.10 max.	0.03 max.	0.03 max.
Typical Results	.15 -.19	.60 -.85	.15 -.32	.67 -.85	.01 -.04	.15 -.30	< .01	.005 -.010	.008 -.015

NOTE: This AWS electrode classification is not required to deposit weld metal that is low in diffusible hydrogen. Therefore, these electrodes should not be used in applications where the hydrogen content of the weld metal is required to be controlled.

We designed this quality electrode for optimum performance for vertical up welding of pipe up to API 5L-X65 – especially where a low hydrogen deposit is desired. Obtain Charpy V-Notch impact values down to temperatures of -20°F (-29°C).

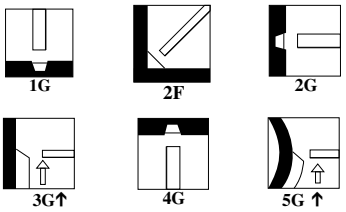
ADVANTAGE LINCOLN

- Excellent low temperature impact properties.
- Square burnoff makes welding easier, especially in critical pipe welding applications.
- Manufactured under a quality system certified to ISO 9001 requirements.
- Manufactured to actual lot control. Actual certificates of conformance are available upon request.

TYPICAL APPLICATIONS

- Primarily designed for vertical up root and fill pass welding of high strength pipe up to and including API 5L-X65.
- Open gap root pass welding with 2.5mm (3/32") and 3.2mm (1/8") diameters using DC± polarity.

WELDING POSITIONS



CONFORMANCE

AWS A5.1: E7016 H4
ASME SFA-5.1: E7016 H4

MECHANICAL PROPERTIES *- As Required per AWS A5.1-91*

	Yield Strength psi (MPa)	Tensile Strength psi (MPa)	Elongation (%)	Charpy V-Notch ft•lbf (Joules) @ -20ºF (-29ºC)
Required AWS E7016 H4	58,000 (400) min.	70,000 (480) min.	22 min.	20 (27) min.
Typical Results As-welded	65,000 - 82,000 (448 - 566)	80,000 - 93,000 (550 - 641)	25 - 32	40 - 90 (54 - 122)

NOTE: Pipeliner electrodes are manufactured under lot control. A Certificate of Test showing actual deposit chemistry and mechanical properties per AWS A5.1 (DC+ only) is available on request from the factory for every lot of electrode. (Fax 216-383-8386).

DIAMETERS / PACKAGING

Diameter mm	(in.)	22.7 kg (50 lb.) Easy Open Cans
2.5	(3/32)	ED030916
3.2	(1/8)	ED030917
4.0	(5/32)	ED030918

Manufactured in metric diameters, U.S. Customary sizes are approximate.

TYPICAL OPERATING PROCEDURES

Polarity	Current (Amps) 2.5mm (3/32")	3.2mm (1/8")	4.0mm (5/32")
DC+	55 - 80	75 - 120	120 - 160
AC	60 - 80	80 - 120	120 - 160

DIFFUSIBLE HYDROGEN

As Required per AWS A5.1-91

	(mL/100g weld deposit)
Requirements AWS E7016 H4	4
Typical Results	2 - 4

DEPOSIT COMPOSITION *- As Required per AWS A5.1-91*

	%C	%Mn	%Si	%S	%P	%Cr	%Mo	%Ni	%V
Requirements AWS E7016 H4	Not Specified	1.60 max.	.75 max.	Not Specified	Not Specified	.20 max.	.30 max.	.30 max.	.08 max.
Typical Results	.05-.08	1.0-1.5	.40-.60	.010-.020	.008-.015	.02-.05	.01-.03	.01-.05	.01-.03

A real workhorse for vertical up welding jobs up to X80 pipe!
Lincoln 18P offers low temperature impact properties down to -50°F (-46°C).

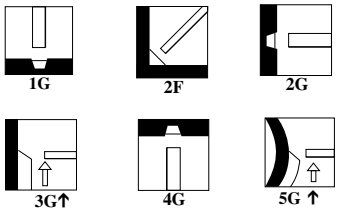
ADVANTAGE LINCOLN

- Low temperature impact properties down to -50°F (-46°C).
- Square burnoff makes welding easier, especially in critical pipe welding applications.
- Manufactured under a quality system certified to ISO 9001 requirements.
- Manufactured to actual lot control. Actual certificates of conformance are available upon request.

TYPICAL APPLICATIONS

- Primarily designed for vertical up fill and cap pass welding of high strength pipe up to and including API 5L-X80.

WELDING POSITIONS



CONFORMANCE

AWS A5.5: E8018-G H4
ASME SFA-5.5: E8018-G H4

MECHANICAL PROPERTIES - *As Required per AWS A5.5-96*

	Yield Strength psi (MPa)	Tensile Strength psi (MPa)	Elongation (%)	Charpy V-Notch ft•lbf (Joules) @ -20°F (-29°C)	Charpy V-Notch ft•lbf (Joules) @-50°F (-46°C)
Required AWS E8018-G H4R	67,000 (460) min.	80,000 (550) min.	19 min.	Not Required	Not Required
Typical Results As-welded	88,000 - 94,000 (607 - 648)	99,000 - 105,000 (683 - 724)	28	74 - 83 (100 - 112)	57 - 59 (77 - 80)

NOTE: Pipeliner electrodes are manufactured under lot control. A Certificate of Test showing actual deposit chemistry and mechanical properties per AWS A5.5 (DC+ only) is available on request from the factory for every lot of electrode. (Fax 216-383-8386).

DIAMETERS / PACKAGING

Diameter mm	Diameter (in.)	22.7 kg (50 lb.) Easy Open Cans
3.2	(1/8)	ED030919
4.0	(5/32)	ED030920

Manufactured in metric diameters, U.S. Customary sizes are approximate.

TYPICAL OPERATING PROCEDURES

Polarity	Current (Amps) 3.2mm (1/8")	Current (Amps) 4.0mm (5/32")
DC+	90 - 140	130 - 170
AC	100 - 140	140 - 180

NOTE: Preferred polarity is listed first.

DIFFUSIBLE HYDROGEN - *As Required per AWS A5.5-96*

	(mL/100g weld deposit)
Requirements AWS E7016 H4	4
Test Results	1 - 3

DEPOSIT COMPOSITION - *As Required per AWS A5.5-96*

	%C	%Mn[1]	%Si[1]	%S	%P	%Cr[1]	%Mo[1]	%Ni[1]	%V[1]	%Cu[1]
Requirements AWS E8018-G H4	Not Specified	1.00 min.	.80 min.	Not Specified	Not Specified	.30 min.	.20 min.	.50 min.	.10 min.	.20 min.
Typical Results	.04-.08	1.30-1.60	.30-.60	.005-.020	.005-.020	.03-.07	.30-.45	.70-.95	.005-.015	.03-.08

(1) Weld deposit must meet the minimum requirement of at least one of the elements listed.

Pipeliner 70S-G MIG wire electrode is especially intended and packaged for the needs of semiautomatic and automatic root pass pipe welding. Delivering low hydrogen deposits, 70S-G exhibits an extremely fluid puddle for outstanding wash-in at the weld toes and uniform bead shape. Well-suited for use on API 5L-X56 through X70 pipe.

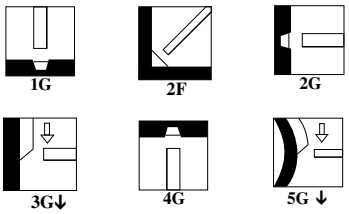
ADVANTAGE LINCOLN

- Clean weld deposit.
- Uniform bead shape.
- Fluid puddle provides good wash-in at the weld toes.
- Manufactured to actual lot control and testing. Actual certificates of conformance are available upon request.
- Foil bag packaging guards against moisture.
- Manufactured under a quality system certified to ISO 9001 requirements.

TYPICAL APPLICATIONS

- Primarily intended for all-position root pass welding on pipe steels such as API 5L, 5L-X56 through 5L-X70
- Capable of consistent x-ray quality welds.
- Typical applications include high-yield pipe steels.

WELDING POSITIONS



CONFORMANCE

AWS A5.18-2001: ER70S-G
ASME SFA-5.18: ER70S-G

MECHANICAL PROPERTIES - *As Required per AWS A5.18:2001*

	Yield Strength psi (MPa)	Tensile Strength psi (MPa)	Elongation (%)	Charpy V-Notch ft•lbf (Joules) @ 0ºF (-18ºC)
Required AWS ER70S-G As welded with CO_2	58,000 (400) min.	70,000 (480) min.	22 min.	Not Required
Typical Results As welded with CO_2	63,700 (439)	76,200 (525)	30	70 (95)

NOTE: Pipeliner electrodes are manufactured under lot control. A Certificate of Test showing actual deposit chemistry and mechanical properties per AWS A5.18 is available on request from the factory for every lot of electrode. (Fax 216-383-8386).

DIAMETERS / PACKAGING

Diameter in.	(mm)	10 Lb. (4.5 kg) Plastic Spool in Foil Bag	30 Lb. (13.6 kg) Plastic Spool in Foil Bag
.045	(1.1)	ED030904	ED030905

ELECTRODE COMPOSITION - *As Required per AWS A5.18:2001*

	%C	%Mn	%Si	%S	%P	%Cu
Requirements AWS A5.18	Not Specified					
Typical Results Typical Range	.06-.15	.90-1.40	.45-.75	.035 max.	.025 max.	.50 max.

TYPICAL OPERATING PROCEDURES

Parameters	Diameter .045 in. (1.1 mm)
Polarity	DC+
CTWD[1] – in (mm)	1/2-3/4 (12-19)
Wire Weight – lbs/in (g/m)	NA
Wire Feed Speed – in/min (m/min)	125-500 (3.2-12.7)
Arc Voltage (volts)	19-30
Approx. Current (amps)	145-340
Melt-off Rate – lbs/hr (kg/hr)	3.4-13.2 (1.5-6.0)
Deposition Rate – lbs/hr (kg/hr)	NA

[1] CTWD (Contact Tip to Work Distance). Subtract 1/4" to calculate Electrical Stickout.

Optimum performance on vertical down hot, fill and cap passes on standard cross-country pipelines and arctic grade pipe. Excellent crack resistance, CTOD, and Charpy V-Notch properties. Recommended for API Pipe Grades X42 through X70.

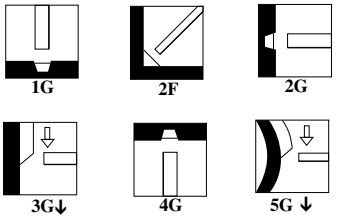
ADVANTAGE LINCOLN

- Produces quality welds in moderate wind conditions with no tenting.
- Our quality driven manufacturing system – certified to ISO 9001 – and our exceptionally high grade raw materials mean every coil of Innershield delivers great arc characteristics and superior feedability.
- Manufactured to actual lot control. Actual certificates of conformance are available upon request.

TYPICAL APPLICATIONS

- Standard cross country pipelines.
- Arctic grade pipe.
- Use these wires instead of stick for improved productivity on pipeline projects.

WELDING POSITIONS



CONFORMANCE

AWS A5.29-98: E71T8-K6
ASME SFA-5.29: E71T8-K6

MECHANICAL PROPERTIES - *As Required per AWS A5.29-98*

	Yield Strength psi (MPa)	Tensile Strength[1] psi (MPa)	Elongation[1] (%)	Charpy V-Notch ft•lbf (Joules) @ -20°F (-29°C)	Charpy V-Notch ft•lbf (Joules) @-40°F (-40°C)	Hardness Rockwell B
Requirements AWS E71T-K6	58,000 (400) min.	70,000 - 90,000 (483 - 620)	20 min.	20 (27) min.	Not Required	Not Required
Typical Results	58,000 - 64,000 (400 - 441)	75,000 - 80,000 (517 - 551)	20 - 33	103 - 116 (176 - 230)	109 (147)	84 - 90

NOTE: Pipeliner electrodes are manufactured under lot control. A Certificate of Test showing actual deposit chemistry and mechanical properties per AWS A5.29 is available on request from the factory for every lot of electrode. (Fax 216-383-8386).

[1] The strength and elongation properties reported were obtained from a .505" tensile specimen artificially aged at 220°F (104°C) for 48 hours, as permitted by AWS A5.29-98. A naturally aged tensile specimen may take months to achieve the specified properties. The time required for the natural aging of weld deposits is dependent upon ambient conditions, weldment geometry, the metallurgical structure of the weld deposit and other factors.

DIAMETERS / PACKAGING

Diameter in. (mm)	14 Lb. (6.3 kg) Coil [56 Lb. (25.4 kg) Master Sealed Pail]
5/64 (2.0)	ED030924

TYPICAL OPERATING PROCEDURES

Parameters	Diameter 5/64 in. (2.0 mm)
Polarity	DC-
CTWD[1] – in (mm)	3/4 (19)
Wire Weight – lbs/in (g/m)	1.04/1000 (18.57)
Wire Feed Speed – in/min (m/min)	70-130 (1.7-3.3)
Arc Voltage (volts)	18-21
Approx. Current (amps)	210-305
Melt-off Rate – lbs/hr (kg/hr)	4.3-8.1 (2.0-3.7)
Deposition Rate – lbs/hr (kg/hr)	3.6-6.7 (1.6-3.0)

[1] CTWD (Contact Tip to Work Distance). Subtract 1/4" to calculate Electrical Stickout.

DEPOSIT COMPOSITION - *As Required per AWS A5.29-98*

	%C	%Mn	%P	%S	%Si	%Al	%Ni	%Cr	%Mo	%V
Requirements AWS E71T8-K6	.15 max.	.50-1.50	.03 max.	.03 max.	.80 max.	1.80 max.	.40-1.00	.20 max.	.15 max.	.05 max.
Typical Results	.06	1.21	.007	<.003	.25	.96	.82	.03	.02	<.01

For consistently high impact values, choose 207XP. Optimum performance on vertical down, hot, fill and cap passes on standard cross-country pipelines and arctic grade pipe. Recommended for API Pipe Grades X42 through X70.

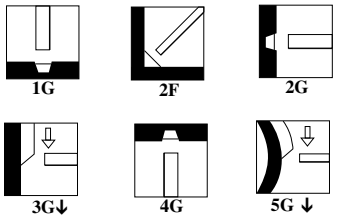
ADVANTAGE LINCOLN

- Consistently high CVN properties, even down to -40˚F (-40˚C).
- Virtually eliminates CVN values below 42 ft•lbf (56 joules).
- Self-shielded, flux-cored. No need for external gas or flux.
- Produces quality welds in moderate wind conditions with no tenting.
- Our quality driven manufacturing system – certified to ISO 9001 – and our exceptionally high grade raw materials mean every coil of Innershield delivers great arc characteristics and superior feedability.
- Manufactured to actual lot control. Actual certificates of conformance are available upon request.

TYPICAL APPLICATIONS

- Suggested for use on applications demanding consistently high toughness.
- Standard cross country pipelines.
- Arctic grade pipe.

WELDING POSITIONS



CONFORMANCE

AWS A5.29-98: E71T8-K6
ASME SFA-5.29: E71T8-K6

MECHANICAL PROPERTIES *- As Required per AWS A5.29-98 (Standard AWS Test Plate)*

	Yield Strength psi (MPa)	Tensile Strength[1] psi (MPa)	Elongation[1] (%)	Charpy V-Notch ft•lbf (Joules)[2] @ -20°F (-29°C)	@-40°F (-40°C)	Hardness Rockwell B
Requirements AWS E71T8-K6	58,000 (400) min.	70,000 - 90,000 (483 - 620)	20 min.	20 (27) min.	Not Required	Not Required
Typical Results	63,000 (434)	79,000 (545)	30	173 - 251 (234 - 340)	147 (199)	NA

NOTE: Pipeliner electrodes are manufactured under lot control. A Certificate of Test showing actual deposit chemistry and mechanical properties per AWS A5.29 is available on request from the factory for every lot of electrode. (Fax 216-383-8386).

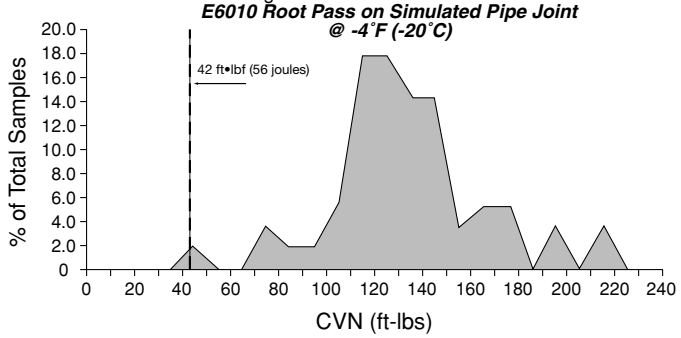
[1] The strength and elongation properties reported were obtained from a .505" tensile specimen artificially aged at 220°F (104°C) for 48 hours, as permitted by AWS A5.29-98. A naturally aged tensile specimen may take months to achieve the specified properties. The time required for the natural aging of weld deposits is dependent upon ambient conditions, weldment geometry, the metallurgical structure of the weld deposit and other factors.
[2] Standard testing completed to AWS test plate specifications.
Figure 1 below shows results on a simulated pipe joint.

DIAMETERS / PACKAGING

Diameter in. (mm)	14 Lb. (6.3 kg) Coil [56 Lb. (25.4 kg) Master Sealed Pail]
5/64 (2.0)	ED030925

Typical Operating Procedures – See page 15.

Figure 1 – CVN Distribution
E6010 Root Pass on Simulated Pipe Joint @ -4˚F (-20˚C)



NR-207XP virtually eliminates CVN values below 42 ft•lbf (56 joules).

DEPOSIT COMPOSITION *- As Required per AWS A5.29*

	%C	%Mn	%P	%S	%Si	%Al	%Ni	%Cr	%Mo	%V
Requirements AWS E71T8-K6	.15 max.	.50-1.50	.03 max.	.03 max.	.80 max.	1.80 max.	.40-1.00	.20 max.	.15 max.	.05 max.
Typical Results	.055	.98	.009	<.003	.07	.80	.61	.04	.03	<.003

Pipeliner G70M is designed to deliver outstanding weld properties for semi-automatic applications. Robust impacts mean consistently high CVN values.

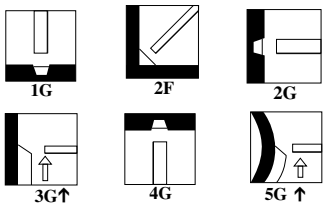
ADVANTAGE LINCOLN

- Impacts are typically in the 60 ft•lbf @ -20°F (-29°C), as-welded.
- Smooth, spray type arc transfer and low spatter level.
- Slag system provides for puddle support, good wetting and bead shape in all positions.
- Manufactured under a quality system certified to ISO 9001 requirements.
- Manufactured to actual lot control. Actual certificates of conformance are available upon request.

TYPICAL APPLICATIONS

- All position single and multiple pass wire designed to join pipe up to X70.

WELDING POSITIONS



SHIELDING GAS

75-80% Ar / Balance CO_2
Flow Rate 40-50 CFH (19-24 l/min.)

CONFORMANCE

AWS A5.20-95: E71T-1MJH8
E71T-9MJH8
ASME SFA-5.20: E71T-1MJH8
E71T-9MJH8

MECHANICAL PROPERTIES *- As Required per AWS A5.20-95*

	Yield Strength psi (MPa)	Tensile Strength psi (MPa)	Elongation (%)	Charpy V-Notch ft•lbf (Joules) @ -40ºF (-40ºC)
Required AWS E71T-1MJH8 & E71T-9MJH8	58,000 (400) min.	70,000 (480) min.	22 min.	20 (27) min.
Typical Results 75% Ar / 25% CO_2	80,000 (550)	89,000 (612)	26	78 (106)

NOTE: Pipeliner electrodes are manufactured under lot control. A Certificate of Test showing actual deposit chemistry and mechanical properties per AWS A5.20 is available on request from the factory for every lot of electrode. (Fax 216-383-8386).

DIAMETERS / PACKAGING

Diameter in. (mm)	10 Lb. (4.5 kg) Plastic Spool Foil Bag	25 Lb. (11 kg) Plastic Spool Foil Bag
.045 (1.1)	ED030926	ED030927

DEPOSIT COMPOSITION *-As Required per AWS A5.20-95*

	%C	%Mn	%P	%S	%Si	%Ni
Requirements AWS E71T-1MJH8 AWS E71T-9MJH8	.18 max.	1.75 max.	.03 max.	.03 max.	.90 max.	.50 max.
Typical Results 75% Ar / 25% CO_2	.05	1.60	.013	.011	.45	.36

TYPICAL OPERATING PROCEDURES

Parameters	Diameter .045 in. (1.1mm)
Polarity	DC+
CTWD[1] – in. (mm)	3/4 (19)
Wire Weight – lbs/in. (g/m)	.361/1000 (6.45)
Wire Feed Speed – in/min (m/min)	175-525 (4.4-13.3)
Arc Voltage (volts)	23-30
Approx. Current (amps)	130-275
Melt-off Rate – lbs/hr (kg/hr)	3.9-11.9 (1.8-5.4)
Deposition Rate – lbs/hr (kg/hr)	3.2-9.8 (1.4-4.4)

DIFFUSIBLE HYDROGEN

- As Required per AWS A5.20-95

	(mL/100g weld deposit)
Requirements E71T-1MJH8 & E71T-9MJH8	8
Typical Results 75-80% Ar/CO_2	4 - 8

[1] CTWD (Contact Tip to Work Distance). Subtract 1/4" to calculate Electrical Stickout.

Pipeliner Autoweld G70M is specifically designed for use with the Autoweld pipe welding system to deliver outstanding weld properties.

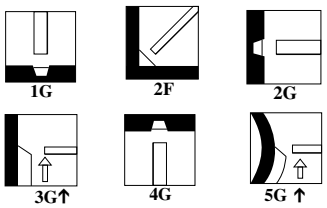
ADVANTAGE LINCOLN

- Specifically designed for use with Autoweld™ pipe welding system on pipe up to X70.
- Tightly controlled cast and helix assure proper wire placement every time.
- Excellent mechanical properties — impacts are normally in the 60 ft•lbf @ -20°F (-29°C), as welded.
- Smooth, spray type arc transfer and low spatter level.
- Slag system provides for puddle support, good wetting and bead shape in all positions.
- Manufactured under a quality system certified to ISO 9001 requirements.
- Manufactured to actual lot control. Actual certificates of conformance are available upon request.

TYPICAL APPLICATIONS

- All position wire designed to weld pipe up to X70.

WELDING POSITIONS



SHIELDING GAS

75-80% Ar / Balance CO_2
Flow Rate 40-50 CFH (19-24 l/min.)

MECHANICAL PROPERTIES *- As Required per AWS A5.20-95*

	Yield Strength psi (MPa)	Tensile Strength psi (MPa)	Elongation (%)	Charpy V-Notch ft•lbf (Joules) @ -40ºF (-40ºC)
Required AWS E71T-1MJH8 & E71T-9MJH8	58,000 (400) min.	70,000 (480) min.	22 min.	20 (27) min.
Typical Results 75% Ar / 25% CO_2	82,700 (570)	93,200 (642)	26	63 (85)

NOTE: Pipeliner electrodes are manufactured under lot control. A Certificate of Test showing actual deposit chemistry and mechanical properties per AWS A5.20 is available on request from the factory for every lot of electrode. (Fax 216-383-8386).

DIAMETERS / PACKAGING

Diameter in. (mm)	10 Lb. (4.5 kg) Plastic Spool Foil Bag
.052 (1.3)	ED030928

DEPOSIT COMPOSITION *-As Required per AWS A5.20-95*

	%C	%Mn	%P	%S	%Si	%Ni
Requirements AWS E71T-1MJH8 AWS E71T-9MJH8	.18 max.	1.75 max.	.03 max.	.03 max.	.90 max.	.50 max.
Typical Results 75% Ar / 25% CO_2	.05	1.62	.01	<.01	.46	.39

TYPICAL OPERATING PROCEDURES

Parameters	Diameter .052 in. (1.3 mm)
Polarity	DC+
CTWD[1] – in. (mm)	3/4 (19)
Wire Weight – lbs/in. (g/m)	.482/1000 (8.61)
Wire Feed Speed – in/min (m/min)	150-450 (3.8-11.4)
Arc Voltage (volts)	22-31
Approx. Current (amps)	155-315
Melt-off Rate – lbs/hr (kg/hr)	4.4-13.3 (2.0-6.0)
Deposition Rate – lbs/hr (kg/hr)	3.6-10.9 (1.6-4.9)

[1] CTWD (Contact Tip to Work Distance). Subtract 1/4" to calculate Electrical Stickout.

DIFFUSIBLE HYDROGEN *- As Required per AWS A5.20-95*

	(mL/100g weld deposit)
Requirements E71T-1MJH8 & E71T-9MJH8	8
Typical Results 75-80% Ar/CO_2	4 - 8

TEST RESULTS

Test results for mechanical properties, deposit or electrode composition and diffusible hydrogen levels were obtained from a weld produced and tested according to prescribed standards, and should not be assumed to be the expected results in a particular application or weldment. Actual results will vary depending on many factors, including, but not limited to, weld procedure, plate chemistry and temperature, weldment design and fabrication methods. Users are cautioned to confirm by qualification testing, or other appropriate means, the suitability of any welding consumable and procedure before use in the intended application.

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 advice or information about their use of our products. We respond to our customers based on the best information in our possession at that time. Lincoln Electric is not in a position to warrant or guarantee such advice, and assumes no liability, with respect to such information or advice. We expressly disclaim any warranty of any kind, including any warranty of fitness for any customer's particular purpose, with respect to such information or advice. As a matter of practical consideration, we also cannot assume any responsibility for updating or correcting any such information or advice once it has been given, nor does the provision of information or advice create, expand or alter any warranty with respect to the sale of our products.

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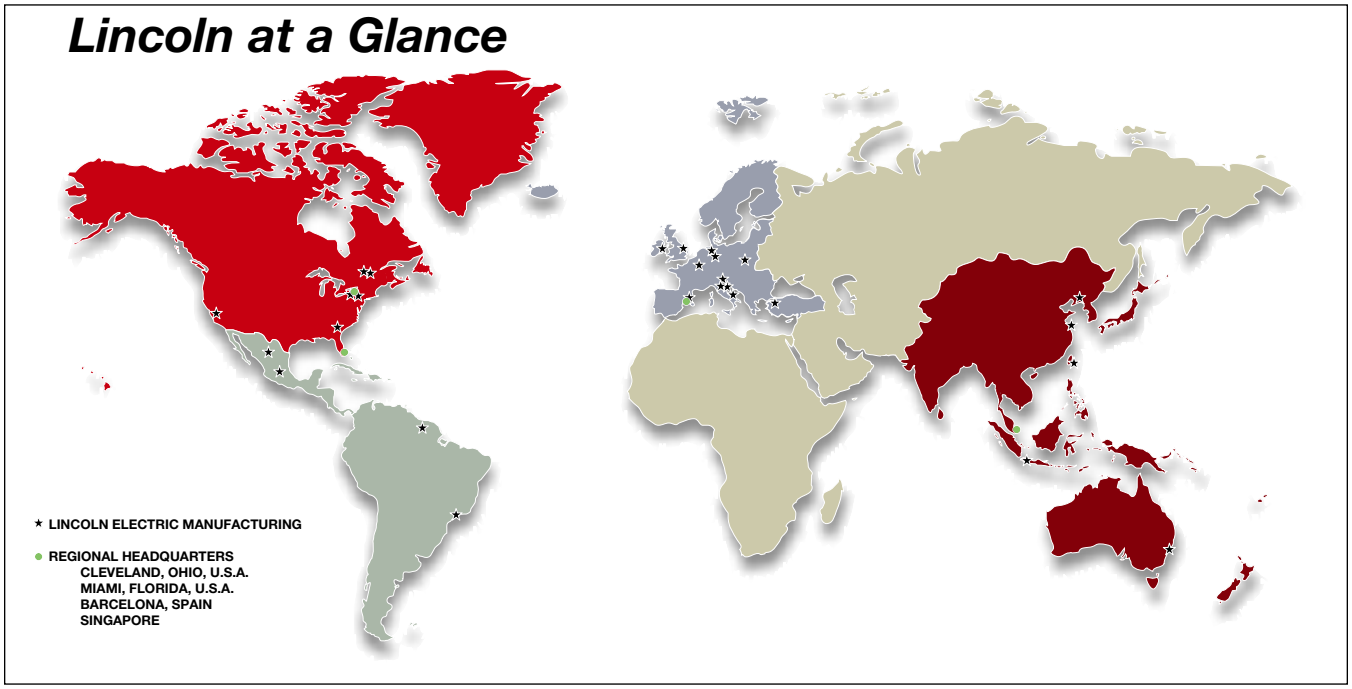

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