

Welding Materials

NOTE: All Standard AWS sizes are included for each material unless otherwise noted. This QPL includes welding materials for both field and shop fabrication.

Welding of A588 steel using Shielded Metal Arc Welding(SMAW) shall be performed using E8018-C1,C2,C3 electrodes except that single pass fillet welds up to 6 mm (1/4") max. & 6 mm (1/4") groove welds made with a single pass or a single pass on each side, may be made using an E70## low hydrogen electrode.

Electrodes in AWS Class E60## and meeting AWS Specification A5.1 are not low hydrogen electrodes and are not approved for welding on bridge steel or to bridge steel.

Field or Shop Welding

ESAB Welding and Cutting Products

<u>Brand</u>	<u>AWS Class</u>	<u>AWS Spec</u>
Atom Arc 7018	E7018-H4R	A5.1

Hobart Brothers Company

<u>Brand</u>	<u>AWS Class</u>	<u>AWS Spec</u>
7018 XLM	E7018-1-H4R	A5.1
Hobart 418	E7018-1-H4R	A5.1

The Lincoln Electric Company

<u>Brand</u>	<u>AWS Class</u>	<u>AWS Spec</u>
Excalibur 7018MR	E7018-H4R	A5.1
Excalibur 7028	E7028-H8	A5.1
Excalibur 8018-C1 MR	E8018-C1-H4R	A5.5
Excalibur 8018-C3 MR	E8018-C3-H4R	A5.5
Jet LH-78MR	E7018-H4R	A5.1
Jetweld LH-70	E7018-H4R	A5.1

Shop Welding

ESAB Welding and Cutting Products

<u>Brand</u>	<u>AWS Class</u>	<u>AWS Spec</u>
Spoolarc 29S - OK Flux 429	F7A2-EM13K-H8	A5.17
Spoolarc 75 - OK Flux 10.71	F8A4-ENi1K-Ni1-H8	A5.23
Spoolarc 75 - OK Flux 10.72	F8A4-ENi1K-Ni1-H8	A5.23
Spoolarc 75 - OK Flux 429	F8A4-ENi1K-Ni1-H8	A5.23

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ESAB Welding and Cutting Products

<u>Brand</u>	<u>AWS Class</u>	<u>AWS Spec</u>
Spoolarc 81 - OK Flux 10.62	F7A8-EM12K-H8	A5.17
Spoolarc 81 - OK Flux 10.71	F7A5-EM12K-H8	A5.17
Spoolarc 81 - OK Flux 350	F7A2-EM12K-H8	A5.17
Spoolarc 81 - OK Flux 429	F7A2-EM12K-H8	A5.17

Hobart Brothers Company

<u>Brand</u>	<u>AWS Class</u>	<u>AWS Spec</u>
FabCO 803	E81T1-Ni2C/MJ H4	A5.29
FabCO 811N1	E81T1-Ni1C/MJ H8	A5.29
FabCO 81N1	E80T1-Ni1C/MJ-H8	A5.29
FabCO EXCEL-ARC 71	E71T-1/9C/M H8	A5.20
FabCO RXR	E70T-1/9C	A5.20
FabCO TR-70	E70T-1/9C-H8	A5.20
FabCO TRIPLE 7	E71T-1C/M H8	A5.20
FabCO XL-525	E71T-1/12MJ-H8	A5.20
Formula XL-550	E71T-1/12CJ H4	A5.20
TM-771	E71T-1C/12CJ H8	A5.20

The Lincoln Electric Company

<u>Brand</u>	<u>AWS Class</u>	<u>AWS Spec</u>
Lincolnweld 761/L-60	F7A2-EL12-H8	A5.17
Lincolnweld 780/L-61	F7A2-EM12K	A5.17
Lincolnweld 860/L-50	F7A2-EM13K-H8	A5.17
Lincolnweld 860/L-61	F7A4-EM12K-H8	A5.17
Lincolnweld 880M/LAC Ni2	F7A10-ECNi2-Ni2-H8	A5.23
Lincolnweld 960/L-61	F7A2-EM12K-H8	A5.17
Lincolnweld 960/LA-75	F8A2-ENi1K-Ni1-H8	A5.23
Lincolnweld 980/LA-75	F7A2-ENi1K-Ni1-H8	A5.23
Lincolnweld AXXX10/L-61	F7A4-EM12K-Ni1-H8	A5.23
Outershield 70	E70T-1	A5.20
SuperArc L-56	ER70S-6	A5.18
SuperArc LA-75	ER80S-Ni1	A5.28

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Shop Welding

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<u>Brand</u>	<u>AWS Class</u>	<u>AWS Spec</u>
UltraCore 70C	E70T-1C-H8	A5.20
UltraCore 712C	E71T-12C-JH8	A5.36
UltraCore 71A85	E71T-1M-H8	A5.20
UltraCore 71C	E71T-1C-H8	A5.20

Method of Documentation of Acceptance:

- By AWS classification and specification markings.
- Resident Engineer records in diary.

The brand and manufacturer if not listed above must be approved by the Materials Division prior to use.

Method of Approval:

Qualification of welding materials is based on the submittal of the manufacturer's certified yearly tests in accordance with AWS.

Electrode Information & Usage: Bridge field welding will generally be by Shielded Metal Arc Welding Type (SMAW) which meets AWS specification A5.1 and A5.5. The electrode will have a designation E####-x. The code for this designation is:

E####-x - Electrode

E####-x - Minimum tensile strength in 1000 psi--For bridge welding must be 70 or greater

E####-x - Approved welding position; 1,2 or 4; 1-all positions, 2-flat position & horizontal fillet welds, 4-vertical-down welding & flat, overhead, horizontal

E####-x - Type coating, 0-8; also shows approved current type

E####-x - Chemical composition of weld metal deposit.

All E70## and E80## SMAW electrodes shall be stored in unopened hermetically sealed containers or in holding ovens at 120°C (250°F). If not taken from a sealed container or a holding oven:

AWS 5.1 electrodes must be dried at least 2 hours at 230°C - 260°C (450°- 500°F) (Max exposure time is 4 hours)

AWS 5.5 electrodes must be dried at least 1 hour at 370°C - 430°C (700° 800°F) (Max exposure time is 4 hours for E70## & 2 hrs. for E80##)

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If during use electrodes are exposed for less than the maximum exposure time they may be redried once at a minimum of 120°C (250° F) for 4 hours.

If during use electrodes are exposed for more than the maximum exposure time they may be redried once at a minimum of 230°C - 260°C (450°-500°F) for 2 hours.

Electrodes that have been wet shall not be used.

Other electrodes listed and meeting AWS codes AWS 5.17, A5.18, A5.20, A5.23, A5.28, A5.29 are for use with Submerged Arc Welding (SAW-A5.17 & A5.23), Flux Cored Arc Welding (FCAW- A5.20 & A5.29), or Gas Metal Arc Welding (GMAW- A5.18 & A5.28). These are normally shop fabrication techniques.

No information contained in these lists is to be used for promotional purposes.

The manufacturer of privately labeled products must be disclosed.