

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

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

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 XL525 | E71T-1/12MJ-H8 | A5.20 |

Welding Materials

Shop Welding

Hobart Brothers Company

| <u>Brand</u> | <u>AWS Class</u> | <u>AWS Spec</u> |
|----------------|------------------|-----------------|
| Formula XL 550 | E71T-1/12CJ H4 | A5.20 |
| TM 771 | E71T-1C/12CJ H8 | A5.20 |

The ESAB Group, Inc.

| <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 |
| 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 |

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 |
| 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 |

Welding Materials

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##)

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.

Welding Materials

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.