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June 23, 2009

Ref. No. 435.2911

We are enclosing a new revised list of approved brands of electrodes for which satisfactory reports have been made within the last year.

Any fabricator purchasing electrodes from this list does not need to furnish a certification from the electrode manufacturers to us for approval.

This list is furnished to all steel fabricators who are doing work for the Iowa Department of Transportation, Highway Division and is available at all District Materials Engineers Offices as well as the Office of Construction and the Office of Materials in Ames, Iowa.

All fabricators are responsible for the proper storage and use of all coated electrodes, wires, fluxes and shielding gases. Electrode manufacturer's recommendations must be followed at all times. Inspectors representing the Iowa Department of Transportation may refuse the use of any material that is not in compliance with the specifications or the electrode manufacturer's recommendations.

A list is furnished to each electrode manufacturer whenever their name appears on the list. This list is also available on the Internet at <http://www.dot.state.ia.us/>.

Sincerely,

Kevin B. Jones  
Testing Engineer

KBJ/AD:kv

Enc.

cc: J. Berger  
J. Smythe  
S. Moussalli  
N. McDonald  
Dist. Materials Engineers  
V. Rink  
T. Meyer  
Council Bluffs Lab  
Davenport Lab (2)  
B. Spanier  
A. DeFrancisco  
K. Frame  
J. Lamantia  
J. Luedeke  
K. Oppold

Esab Welding & Cutting Products  
ITW Hobart Brothers  
(Includes Tri-Mark, Corex,  
Hobart and McKay Products)  
Lincoln Electric Company  
(Includes Airco & Murex)  
National Standard LLC

Brookfield Fabr. Corp  
P.O. Box 406  
Brookfield, MO 64628

Capital Contractors, Inc.  
P.O. Box 80098  
Lincoln, NE 68501

Carolina Steel Corp  
9035 West Market St.  
Colfax, NC 27235

D.S. Brown  
300 E. Cherry St.  
North Baltimore, OH 45872

DeLong's, Inc.  
P.O. Box 479  
Jefferson City, MO 65101

DeLong's, Inc.  
131 South Harding St.  
Sedalia, MO 65301

Eagle Iron Works  
P.O. Box 934  
Des Moines, IA 50304-0934

Egger Steel Company  
P.O. Drawer E  
Sioux Falls, SD 57101

Hawkeye Fabrication  
500-1/2 Ash St.  
Ida Grove, IA 51445

Hurt Fabricating Corp.  
P.O. Box 128  
Marceline, MO 64658

Industrial Steel Const., Inc.  
86 North Bridge St.  
Gary, IN 46404

Industrial Steel Const., Inc.  
6120 River Road  
Hodgins, IL 60525

Iron Works  
A Division of PCI  
13995 Industrial Ave.  
Becker, MN 55308

J.H. Botts, Inc.  
P.O. Box 128  
Joliet, IL 60434-0128

Johnson Machine Works  
318 North Eleventh St.  
Chariton, IA 50049

Merklin Welding, Inc.  
913 Siloam Ave.  
Iowa Falls, IA 50126

Metal Pros  
4323 Bounous  
Wichita, KS 67209

Millerbernd Manufacturing Co., Inc.  
622 6<sup>th</sup> St. South  
Winsted, MN 55395

Missouri Fabricators  
3226 County Rd 257  
Fulton, MO 65251-3101

Pacal Industries, LLC  
400 Car St.  
LaCrosse, WI 54603

PDM Bridge, LLC  
2800 Melby St.  
Eau Claire, WI 54703

PDM Bridge, LLC  
3526 W. Sherman St.  
Wausau, WI 54401

Rev-Tech  
5267 NE 15<sup>th</sup> St.  
Des Moines, IA 50313

Roscoe Steel & Culvert Co.  
2847 Hesper Rd.  
Billings, MT 59102

Stupp Bridge Co.  
445 Century St.  
Bowling Green, KY 42101

Union Metal Corp.  
1001 Oakridge Park  
Overland Park, KS 66212

Valmont Industries, Inc.  
Josh Mayne  
P.O. Box 358  
Valley, NE 68064

White Oak Metals  
PO Box 737  
Dalton, MN 56324-0737

Woerner Wire Works, Inc  
P.O. Box 11449  
Omaha, NE 68111

IOWA DEPARTMENT OF TRANSPORTATION  
HIGHWAY DIVISION  
Office of Materials

The following filler metals, listed in the Bridge Welding Code AASHTO/AWS D1.5M/D1.5-02 may be listed on the Iowa Department of Transportation, Highway Division approved list.

|  | Base Metal   |  | Welding Process                                     |  |  |
|--|--|--|---|--|--|
|  | AASHTO (ASTM) Designation                                  | Shielded Metal-Arc   | Submerged Arc                                       | Gas Metal-Arc  | Flux Cored Arc   |
| Table 1<br>In<br>Accordance<br>with 5.12   | M270<br>(A709)<br>Gr. 36                                   | SMAW<br>AWS A5.1<br>E7016, 18, or 28<br>A5.5<br>E7016-X,E7018-X  | SAW<br>AWS A5.17<br>F6A0-EXXX<br>F7A0-EXXX          |  | FCAW-G<br>AWS A5.20<br>E6XT-1,5<br>E7XT-1,5                                      |
|  | M270<br>(A709)<br>Gr. 50<br>Type 1, 2 or 3                 | SMAW<br>AWS A5.1<br>E7016, E7018<br>A5.5<br>E7016-X, E7018-X   | SAW<br>AWS A5.17<br>F7A0-EXXX                       |  | FCAW-G<br>AWS A5.20<br>E7XT-1, 5   |
|  | M270<br>(A709)<br>Gr. 50W<br>4 in. and<br>under            | SMAW<br>AWS A5.1<br>E7016,E7018,E7028<br>A5.5<br>E7016-X, E7018-X<br>E7018-W1<br>E7015, 16, 18, C1L, C2L<br>E8016, 18-C1, C2<br>E8016, 18-C3<br>E8018-W2 | SAW<br>AWS A5.17 or A5.23<br>F7A0-EXXX<br>F8A0-EXXX |  | FCAW-G<br>AWS A5.20 or A5.29<br>E7XT-1,5<br>E8XT-1,5-NiX, W                      |
|  | M270<br>(A709)<br>Gr. 70W                                  | SMAW<br>AWS A5.5<br>E9018-M  | SAW<br>AWS A5.23<br>F9A0-EXXX-X                     |  | FCAW-G<br>AWS A5.29<br>E9XT1-X<br>E9XT5-X  |
|  | M270<br>(A709)<br>Gr. 100,<br>100W Over<br>2-1/2 in. thick | SMAW<br>AWS A5.5<br>E10018-M   |   |  |  |
| Table 4.2<br>In<br>Accordance<br>with 5.13 | M270 (A709)<br>Gr. 36                                      |  |   | GMAW<br>AWS A5.18<br>ER70S-2, 3, 6, 7                        | FCAW-S<br>AWS A5.20<br>EX6T-6, 8<br>E7XT-6, 8<br>AWS A5.29<br>E6XT8-X<br>E7XT8-X |
|  | M270 (A709)<br>Gr. 50                                      |  |   | GMAW<br>AWS A5.18<br>ER70S-2,3,6,7                           | FCAW-S<br>AWS A5.20<br>E7XT-6,8<br>AWS A5.29<br>E7XT8-X                          |
|  | M270(A709)<br>Gr. 50W<br>4 in. and<br>under                |  |   | GMAW<br>AWS A5.18<br>ER70S-2,3,6,7<br>AWS A5.28<br>ER80S-NiX | FCAW-S<br>AWS A5.20<br>E7XT-6, 8<br>AWS A5.29<br>E7XT8-NiX                       |

Table 4.2 continued on next page.

|   |  |  |  |   |   |
|---|--|--|--|---|---|
|   | M270(A709)<br>Gr. 70W                                      | As Approved by Engineer (see Table 4.1)  |  |   |   |
| Table 4.2<br>Cont'd.                        | M270(A709)<br>Gr. 100,<br>100W<br>Over 2-1/2" thick        |  | SAW<br>AWS A5.23<br>F10A4-EM2-M2   | GMAW<br>AWS A5.28<br>ER100S-1<br>ER100S-2   | FCAW-G<br>AWS A5.29<br>E100T5-K3<br>E101T1-K7   |
|   | M270 (A709)<br>Gr. 100,<br>100W<br>2-1/2" thick<br>or less | SMAW<br>AWS A5.5<br>E11018-M   | SAW<br>AWS A5-23<br>F11A4-EM3-M3   | GMAW<br>AWS A5.28<br>ER110S-1   | FCAW-G<br>AWS A5.29<br>E110T5-K3, K4<br>E111T1-K4   |
| Table 4.3<br>Exposed<br>Bare<br>Application | M270(A709)<br>Gr. 50W                                      | All electrodes that<br>deposit weld metal<br>meeting a C1, C1L,<br>C2, C2L, C3 or W<br>analysis per A5.5 | All electrode-flux<br>combinations that<br>deposit weld metal<br>with a Ni1, Ni2,<br>Ni3, Ni4 or W<br>analysis per 5.23. | All electrodes that<br>deposit weld metal<br>with a Ni1, Ni2,<br>Ni3, Ni4 or W<br>analysis per A5.28. | All electrodes that<br>meet filler metal<br>composition requirements<br>of Ni1, Ni2, Ni3<br>analysis per A5.29. |

Note: Tables 4.1, 4.2 and 4.3 have important footnotes, which are applicable but were not included in this summary sheet.

Certifications for welding electrodes covered by AWS A5.1-04 (Covered Carbon Steel Arc Welding Electrodes) and AWS A5.5-06 (Low Alloy Steel Covered Arc Welding Electrodes).

| <u>AWS Electrode Classification</u>            | <u>Test Date</u> | <u>Electrode's Trade Name</u> |
|--|------------------|-------------------------------|
| Manufacturer - Esab Welding & Cutting Products |                  |                               |
| E-7018-H4R                                     | 9-12-08          | Atom-Arc 7018                 |
| E-8018-C3H4R                                   | 2-13-09          | Atom-Arc 8018                 |
| E-11018-MH4                                    | 3-2-09           | Atom-Arc T                    |

Manufacturer - Lincoln Electric Company

|              |         |                      |
|--------------|---------|----------------------|
| E7018-H4-R   | 2-20-09 | Jetweld LH70         |
| E7018-H4-R   | 3-10-09 | Jet-LH-78MR          |
| E-7018-H4-R  | 5-27-09 | Excalibur 7018-MR    |
| E8018-C3-H4R | 2-25-09 | Excalibur 8018-C3 MR |
| E7018-C1-MR  | 3-10-09 | Excalibur 8018-C1 MR |
| E7028-H8     | 3-4-09  | Excalibur 7028       |

Certifications for welding electrodes covered by AWS A5.18-05 (Carbon Steel Filler Metals for Gas Shielded Arc Welding), AWS A5.28-05 (Low Alloy Steel Filler Metals for Gas Shielded Arc Welding), AWS A5.20-05 (Carbon Steel Electrodes for Flux Cored Arc Welding) and AWS A5.29-05 (Low Alloy Steel Electrodes for Flux Cored Arc Welding)

| <u>AWS Electrode Classification</u>            | <u>Test Date</u> | <u>Electrode's Trade Name</u> | <u>Shielding Gas</u>                       |
|--|------------------|-------------------------------|--|
| Manufacturer - Esab Welding & Cutting Products |                  |                               |  |
| E71T-1C/T-1M                                   | 1-27-09          | Dual Shield 7000              | CO <sub>2</sub> , 75%AR 25%CO <sub>2</sub> |
| E81T1-W2/W2M                                   | 3-6-09           | Dual Shield 8100W             | CO <sub>2</sub>                            |
| E71T-1M/T-9M                                   | 2-26-09          | Dual Shield 70 Ultra Plus     | 75% AR 25% CO <sub>2</sub>                 |
| E70C-6M  | 4-16-09          | CoreWeld C6                   | 75% AR 25% CO <sub>2</sub>                 |
| ER70S-6H4                                      | 1-26-09          | Spoolarc 86-A1                | CO <sub>2</sub>                            |

Manufacturer - Lincoln Electric Company

|                 |          |                              |                 |
|-----------------|----------|------------------------------|-----------------|
| ER70S-3         | 8-28-08  | Super Arc L-50               | CO <sub>2</sub> |
| ER70S-6         | 12-1-08  | Super Arc L-56               | CO <sub>2</sub> |
| E71T-8J-H16     | 12-3-08  | Inner Shield NR-203MP**      | NA              |
| E70T-6-H16      | 10-31-08 | Inner Shield NR-305**        | NA              |
| E71T8-Nil-H16   | 4-23-09  | Inner Shield NR-203 Nil 1%** | NA              |
| E70T-1C,9C-H16  | 4-30-09  | Outershield 70               | CO <sub>2</sub> |
| E71T-1C,9C,1CH, | 5-14-09  | Outershield 71M              | CO <sub>2</sub> |
| E71T-1CH8       | 4-13-09  | Ultracore 71C                | CO <sub>2</sub> |

\*\* Self Shielding

Manufacturer - Tri-Mark (Hobart)

|                |         |                       |  |
|----------------|---------|-----------------------|--|
| E71T-1C H8     | 6-16-09 | Triple 7              | CO <sub>2</sub>                            |
| E71T-1MJ-H8    | 6-16-09 | TM-770                | 80%Ar 20% CO <sub>2</sub>                  |
| E71T-1,E71T-1M | 6-16-09 | Excel-Arc 71 (Hobart) | CO <sub>2</sub> , 75%AR 25%CO <sub>2</sub> |
| E70C-6MH4      | 6-16-09 | Metalloy 76           | 75%AR 25% CO <sub>2</sub>                  |
| E70C-6MH4      | 6-16-09 | Metal-COR 6L          | 75% AR 25% CO <sub>2</sub>                 |

| <u>AWS Electrode Classification</u> | <u>Test Date</u> | <u>Electrode's Trade Name</u> | <u>Shielding Gas</u> |
|-------------------------------------|------------------|-------------------------------|----------------------|
|-------------------------------------|------------------|-------------------------------|----------------------|

Manufacturer - National Standard Company

|         |         |        |                 |
|---------|---------|--------|-----------------|
| ER70S-3 | 8-18-08 | NS-101 | CO <sub>2</sub> |
|---------|---------|--------|-----------------|

Classifications for welding electrodes covered by AWS A5.17-97 (Carbon Steel Electrodes and Fluxes for Submerged Arc Welding)

| <u>AWS Flux Classification</u> | <u>Test Date</u> | <u>Electrode</u> | <u>Flux</u> |
|--------------------------------|------------------|------------------|-------------|
|--------------------------------|------------------|------------------|-------------|

Manufacturer - Lincoln Electric Company

|               |         |      |     |
|---------------|---------|------|-----|
| F7A2-EM12K-8H | 8-20-08 | L-61 | 860 |
| F7A2-EM12K-8H | 4-27-09 | L-61 | 960 |
| F7A6-EM13K-H8 | 4-22-09 | L-50 | 882 |
| F7A2-EM12K-H8 | 3-12-09 | L-61 | 980 |

Classifications for welding electrodes covered by AWS A5.23-97 (Low Alloy Steel Electrodes and Fluxes for Submerged Arc Welding)

| <u>AWS Flux Classification</u> | <u>Test Date</u> | <u>Electrode</u> | <u>Flux</u> |
|--------------------------------|------------------|------------------|-------------|
|--------------------------------|------------------|------------------|-------------|

Manufacturer - Lincoln Electric

|                   |         |       |              |
|-------------------|---------|-------|--------------|
| F7A2-EM12K-H8     | 4-20-09 | L61   | AXXX10       |
| F8A2-ENi1K-Ni1-H8 | 8-21-08 | LA-75 | 960          |
| F9A4-ENi5-G-H2    | 4-2-09  | LA-85 | MIL800H-HPNi |
| F7A2-ENi1K-Ni1-H8 | 4-15-09 | LA-75 | 860          |

