

AWS A5.1 E6013  
CSA W48-01 E4313  
JIS Z3211 D4313

**Welding Electrodes for Mild Steel**

AWS A5.1 E6013 is the most popular steel welding rods with high titania potassium type coating. It is able to provide excellent welding performance and satisfactory weld can be obtained in all position welding. It is widely used in ordinary tensile strength mild steel structures especially suitable for intermittent welding to sheet steel and small work pieces as well as cosmetic welding with smooth and shiny appearance.



**Chemical Composition of Deposited Metal (%)**

|                 | C     | Mn    | Si    | S      | P      | Ni    | Cr    | Mo    | V     |
|-----------------|-------|-------|-------|--------|--------|-------|-------|-------|-------|
| <b>Standard</b> | ≤0.20 | ≤1.20 | ≤1.00 | ≤0.035 | ≤0.040 | ≤0.30 | ≤0.30 | ≤0.30 | ≤0.08 |
| <b>Typical</b>  | 0.070 | 0.41  | 0.26  | 0.021  | 0.023  | 0.018 | 0.027 | 0.002 | 0.001 |

**Mechanical Properties of Deposited metal (AW)**

|                 | Yield Point<br>Reh (Mpa) | Tensile Strength<br>Rm (Mpa) | Elongation<br>A4 (%) | Impact Value(J) |     |
|-----------------|--------------------------|------------------------------|----------------------|-----------------|-----|
|                 |                          |                              |                      | 20°C            | 0°C |
| <b>Standard</b> | ≥306                     | 400-560                      | ≥22                  | —               | ≥47 |
| <b>Typical</b>  | 395                      | 480                          | 29                   | 110             | 80  |

**Sizes, Pieces & Recommended Current (AC or DC)**

| Size(mm)    |      | 2.5×300 | 2.5×350 | 3.2×350 | 4.0×400 | 4.0×450 | 5.0×400 | 5.0×450 |
|-------------|------|---------|---------|---------|---------|---------|---------|---------|
| Pieces(5kg) |      | ≈300    | ≈255    | ≈157    | ≈90     | ≈80     | ≈59     | ≈52     |
| Current(A)  | F,H  | 60-90   | 60-90   | 80-130  | 150-190 | 150-190 | 180-250 | 180-250 |
|             | V,OH | 50-80   | 50-80   | 80-110  | 130-170 | 130-170 | ---     | ---     |

| Approvals    | CCS | LR | ABS | BV | GL | DNV | NK   | CWB   |
|--------------|-----|----|-----|----|----|-----|------|-------|
| <b>Grade</b> | 2   | 2N | 2   | 2  | 2  | 2   | KMW2 | E4313 |

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AWS A5.1 E7018

JIS Z3212 D56016

BS EN ISO 2560-B-E4918-1A

**Welding Rod for High Tensile Steel**

AWS E7018 is an outstanding quality all position welding electrode covered with extra low hydrogen potassium type coating for high tensile strength mild steels and low alloy steels. Its nominal welding efficiency is about 110% due to iron powder is contained. The weld metal shows an excellent low temperature toughness and high crack-resistance, It is widely used in important projects of ship



boilers, high pressure vessels, bridges, skyscrapers, offshore drilling platforms, nuclear power plants and so on. The groove of base metal should be cleared impurities away and the electrode must be baked at 400°C then be held 1-2 hours before welding, 2.5mm or less one should be done by 350°C then be held 1 hour.

**Chemical Composition of Deposited Metal (%)**

|                 | C     | Mn    | Si    | S      | P      | Ni    | Cr    | Mo    | V     |
|-----------------|-------|-------|-------|--------|--------|-------|-------|-------|-------|
| <b>Standard</b> | ≤0.15 | ≤1.60 | ≤0.75 | ≤0.035 | ≤0.040 | ≤0.30 | ≤0.20 | ≤0.30 | ≤0.08 |
| <b>Typical</b>  | 0.068 | 1.36  | 0.51  | 0.010  | 0.016  | 0.022 | 0.016 | 0.010 | 0.012 |

**Mechanical Properties of Deposited metal (AW)**

|                 | Yield Point | Tensile Strength | Elongation | Impact Value(J) |
|-----------------|-------------|------------------|------------|-----------------|
|                 | ReH (Mpa)   | Rm (Mpa)         | A4 (%)     | -20 °C          |
| <b>Standard</b> | ≥375        | 490-660          | ≥22        | ≥47(Average)    |
| <b>Typical</b>  | 440         | 540              | 30         | 150             |

**Sizes, Pieces & Recommended Current (AC or DC)**

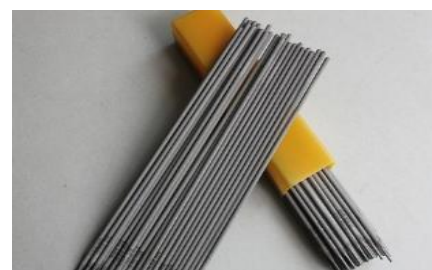
| Size(mm)           | 2.5×350    | 3.2×350 | 4.0×400 | 4.0×450 | 5.0×400 | 5.0×450 |         |
|--------------------|------------|---------|---------|---------|---------|---------|---------|
| <b>Pieces(5kg)</b> | ≈248       | ≈145    | ≈85     | ≈75     | ≈51     | ≈45     |         |
| <b>Current(A)</b>  | <b>F,H</b> | 70-100  | 100-140 | 140-170 | 140-170 | 190-240 | 190-240 |

|                  |     |    |     |    |    |     |      |
|------------------|-----|----|-----|----|----|-----|------|
| <b>Approvals</b> | CCS | LR | ABS | BV | GL | DNV | NK   |
| <b>Grade</b>     | 2   | 2N | 2   | 2  | 2  | 2   | KMW2 |

AWS A5.1 E6011  
JIS Z3211 D4311  
GB/T 5117 E4311

### Vertical-down Welding Rod for Mild Steel

ASW A5.1 E6011 is a high cellulose potassium type welding rods for mild steel. It is suitable for vertical-down welding and lap welding for sheet structures. Such as smoke pipes, wind pipes, oil tanks of transformer, outside coer of vehicles, etc. It is not good for wide weave when welding and it is not suitable for multi-layer or face welding.



### Chemical Composition of Deposited Metal (%)

|                 | C     | Mn    | Si    | S      | P      | Ni    | Cr    | Mo    | V     |
|-----------------|-------|-------|-------|--------|--------|-------|-------|-------|-------|
| <b>Standard</b> | ≤0.20 | ≤1.20 | ≤1.00 | ≤0.035 | ≤0.040 | ≤0.30 | ≤0.20 | ≤0.30 | ≤0.08 |
| <b>Typical</b>  | 0.096 | 0.67  | 0.20  | 0.024  | 0.024  | 0.008 | 0.041 | 0.001 | 0.012 |

### Mechanical Properties of Deposited metal (AW)

|                 | Yield Point | Tensile Strength | Elongation | Impact Value(J) |
|-----------------|-------------|------------------|------------|-----------------|
|                 | Reh (Mpa)   | Rm (Mpa)         | A4 (%)     | - 30 °C         |
| <b>Standard</b> | ≥330        | ≥430             | ≥22        | ≥27(Average)    |
| <b>Typical</b>  | 405         | 500              | 30         | 75              |

### Sizes, Pieces & Recommended Current (AC or DC)

| Size(mm)    | 2.5×300 | 3.2×350 | 4.0×350 | 5.0×350 |
|-------------|---------|---------|---------|---------|
| Pieces(5kg) | ≈328    | ≈185    | ≈120    | ≈76     |
| Current(A)  | OH,VD   | 30-50   | 70-100  | 90-140  |
|             |         |         |         | 150-200 |

|                  |     |    |     |    |    |     |    |
|------------------|-----|----|-----|----|----|-----|----|
| <b>Approvals</b> | CCS | LR | ABS | BV | GL | DNV | NK |
|------------------|-----|----|-----|----|----|-----|----|

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|              |   |    |   |   |   |   |      |
|--------------|---|----|---|---|---|---|------|
| <b>Grade</b> | 2 | 2N | 2 | 2 | 2 | 2 | KMW2 |
|--------------|---|----|---|---|---|---|------|

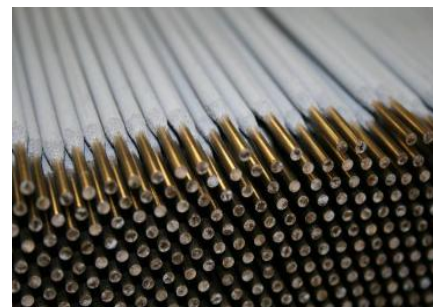
AWS A5.1 E6010

CSA W48-01 E4310

BS EN ISO 2560-B-E43 10A

### Vertical-down Welding Rod for Mild Steel

AWS E6010 is a high cellulose sodium type welding rods. It shows a very good performance in welding of all positions, vertical down and overhead. The rod forms on double sides by one side welding. Its is suitable for welding root passes, hot passes, filler and cover passes as well as for capping of general pipes and similar structures. Keeping the rods in dry condition and the rods do not need to re-brake before welding. In welding small current is recommended and swaying breadth should be less than 2.5 times of diameter of the steel core of rod.



### Chemical Composition of Deposited Metal (%)

|                 | C     | Mn    | Si    | S      | P      | Ni    | Cr    | Mo    | V     |
|-----------------|-------|-------|-------|--------|--------|-------|-------|-------|-------|
| <b>Standard</b> | ≤0.20 | ≤1.20 | ≤1.00 | ≤0.035 | ≤0.040 | ≤0.30 | ≤0.20 | ≤0.30 | ≤0.08 |
| <b>Typical</b>  | 0.091 | 0.55  | 0.17  | 0.010  | 0.011  | 0.011 | 0.022 | 0.001 | 0.03  |

### Mechanical Properties of Deposited metal (AW)

|                 | <b>Yield Point</b> | <b>Tensile Strength</b> | <b>Elongation</b> | <b>Impact Value(J)</b> |
|-----------------|--------------------|-------------------------|-------------------|------------------------|
|                 | <b>ReH (Mpa)</b>   | <b>Rm (Mpa)</b>         | <b>A4 (%)</b>     | <b>-20 °C</b>          |
| <b>Standard</b> | ≥330               | ≥430                    | ≥22               | ≥27                    |
| <b>Typical</b>  | 400                | 500                     | 29                | 80                     |

### Sizes, Pieces & Recommended Current (AC or DC)

| <b>Size(mm)</b>    |              | 2.5×300 | 3.2×350 | 4.0×350 | 5.0×350 |
|--------------------|--------------|---------|---------|---------|---------|
| <b>Pieces(5kg)</b> |              | ≈355    | ≈192    | ≈125    | ≈78     |
| <b>Current(A)</b>  | <b>F,H</b>   | 60-90   | 70-110  | 110-150 | 150-200 |
|                    | <b>OH,VD</b> | 50-80   | 60-100  | 100-140 | 140-180 |

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|                  |     |    |     |    |    |     |      |
|------------------|-----|----|-----|----|----|-----|------|
| <b>Approvals</b> | CCS | LR | ABS | BV | GL | DNV | NK   |
| <b>Grade</b>     | 2   | 2N | 2   | 2  | 2  | 2   | KMW2 |

**Welding Rods for Carbon Steel & High Tensile Strength Steel**

**AWS A5.1 E7015**

| Standard & Typical Chemical Composition of Deposited Metal(%) |                 |  |                          |                  |                  |  |               |               |
|---|-----------------|--|--------------------------|------------------|------------------|--|---------------|---------------|
| C   | Mn              | Si   | S                        | P                | Cr               | Ni   | Mo            | V             |
| ≤0.16<br>0.078  | ≤1.60<br>1.21   | ≤0.9<br>0.51   | ≤0.035<br>0.010          | ≤0.040<br>0.020  | ≤0.2<br>0.037    | ≤0.3<br>0.014  | ≤0.3<br>0.002 | ≤0.08<br>0.01 |
| Welding position  | Type of Current | Standard & Typical Mechanical Properties of Deposited Metal(AWI) |                          |                  |                  | Application  |               |               |
|   |                 | Yield Point ReL(Mpa)   | Tensile Strength Rm(Mpa) | Elongation A4(%) | Akv Value(J)     |  |               |               |
| F,V,<br>OH,H  | DC <sup>+</sup> | ReH≥375<br>440   | 490-660<br>540           | ≥22<br>31        | -20°C ≥47<br>160 | Suitable for welding important structures made of low alloy steel with corresponding grade of tensile strength, such as ships and heavy machinery. |               |               |

**AWS A5.1 E7016**

| Standard & Typical Chemical Composition of Deposited Metal(%) |                 |  |                          |                  |                |                |                |                |
|---|-----------------|--|--------------------------|------------------|----------------|----------------|----------------|----------------|
| C   | Mn              | Si   | S                        | P                | Cr             | Ni             | Mo             | V              |
| ≤0.15<br>0.069  | ≤1.60<br>1.11   | ≤0.75<br>0.53  | ≤0.035<br>0.007          | ≤0.035<br>0.020  | ≤0.20<br>0.037 | ≤0.30<br>0.013 | ≤0.30<br>0.002 | ≤0.08<br>0.010 |
| Welding position  | Type of Current | Standard & Typical Mechanical Properties of Deposited Metal(AWI) |                          |                  |                | Application    |                |                |
|   |                 | Yield Point ReL(Mpa)   | Tensile Strength Rm(Mpa) | Elongation A4(%) | Akv Value(J)   |                |                |                |

|              |                 |             |             |           |                  |   |
|--------------|-----------------|-------------|-------------|-----------|------------------|---|
| F,V,<br>OH,H | DC <sup>+</sup> | ≥400<br>440 | ≥490<br>550 | ≥22<br>31 | -30°C ≥27<br>170 | Welding important structures made of low alloy steel with corresponding grade of tensile strength, such as ships and heavy machinery. |
|--------------|-----------------|-------------|-------------|-----------|------------------|---|

**AWS A5.1 E7018**

| Standard & Typical Chemical Composition of Deposited Metal(%) |                              |  |                          |                  |                  |   |                |                |
|---|------------------------------|--|--------------------------|------------------|------------------|---|----------------|----------------|
| C   | Mn                           | Si   | S                        | P                | Cr               | Ni  | Mo             | V              |
| ≤0.15<br>0.068  | ≤1.60<br>1.38                | ≤0.75<br>0.41  | ≤0.035<br>0.012          | ≤0.035<br>0.015  | ≤0.20<br>0.011   | ≤0.30<br>0.035  | ≤0.30<br>0.001 | ≤0.08<br>0.002 |
| Welding position  | Type of Current              | Standard & Typical Mechanical Properties of Deposited Metal(AWI) |                          |                  |                  | Application   |                |                |
|   |                              | Yield Point ReL(Mpa)   | Tensile Strength Rm(Mpa) | Elongation A4(%) | Akv Value(J)     |   |                |                |
| F,V,<br>OH,H  | AC≥70V<br>or DC <sup>+</sup> | ≥400<br>465  | ≥490<br>560              | ≥22<br>29        | -30°C ≥27<br>130 | Suitable for welding important low alloy structures, which belong to the same grade of tensile strength such as boilers, pressure vessels, pipe lines ,offshore drilling platform etc |                |                |

**AWS A5.1 E5003**

| Standard & Typical Chemical Composition of Deposited Metal(%) |                 |  |                          |                  |               |  |               |               |
|---|-----------------|--|--------------------------|------------------|---------------|--|---------------|---------------|
| C   | Mn              | Si   | S                        | P                | Cr            | Ni   | Mo            | V             |
| ≤0.15<br>0.085  | ≤1.25<br>0.54   | ≤0.9<br>0.19   | ≤0.035<br>0.017          | ≤0.040<br>0.027  | ≤0.2<br>0.015 | ≤0.3<br>0.05   | ≤0.3<br>0.005 | ≤0.08<br>0.01 |
| Welding position  | Type of Current | Standard & Typical Mechanical Properties of Deposited Metal(AWI) |                          |                  |               | Application  |               |               |
|   |                 | Yield Point ReL(Mpa)   | Tensile Strength Rm(Mpa) | Elongation A4(%) | Akv Value(J)  |  |               |               |
| F,V,<br>OH,H  | AC or DC        | ≥375<br>440  | ≥490<br>530              | ≥20<br>27        | 0°C ≥27<br>75 | For welding structures fabricated by low alloy steels. |               |               |

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