

# UltraCore® 91K2M-H Plus

Low Alloy, All Positions • AWS E91T1-K2M-JH4

## Key Features

- ▶ Innovative design capable of superior toughness at -60°F
- ▶ Designed to meet AWS strength and toughness requirements in both the as-welded and stress-relieved conditions
- ▶ Designed for welding with 75-80% Argon/ Balance CO<sub>2</sub> shielding gas
- ▶ H4 diffusible hydrogen levels
- ▶ Q2 Lot® - Certificate showing actual deposit chemistry and mechanical properties per lot available online
- ▶ ProTech® foil bag packaging

## Welding Positions

All

## Conformances

|            |                   |
|------------|-------------------|
| AWS A5.29: | E91T1-K2M-JH4     |
| AWS A5.36: | E91T1-M21A6-K2-H4 |
| AWS A5.36: | E91T1-M21P4-K2-H4 |
| ABS:       | 4YQ500SAH5        |
| DNV Grade: | IVY50MSH5         |

## Shielding Gas

75-80% Argon / Balance CO<sub>2</sub>  
Flow Rate: 40-50 CFH

## Typical Applications

- ▶ Offshore drilling rigs
- ▶ Ship building
- ▶ Low temperature storage tanks
- ▶ Construction

## DIAMETERS / PACKAGING

| Diameter<br>in (mm) | 33 lb (15 kg)<br>Plastic Spool |
|---------------------|--------------------------------|
| 0.045 (1.1)         | ED035378                       |
| 0.052 (1.3)         | ED035379                       |
| 1/16 (1.6)          | ED035380                       |

## MECHANICAL PROPERTIES<sup>(1)</sup>

|  | Yield Strength <sup>(2)</sup><br>MPa (ksi) | Tensile Strength<br>MPa (ksi) | Elongation<br>(%) | Charpy V-Notch<br>J (ft•lbf) |               |
|--|--|-------------------------------|-------------------|------------------------------|---------------|
|  |  |                               |                   | -40°C (-40°F)                | -51°C (-60°F) |
| <b>Requirements</b>  |  |                               |                   |                              |               |
| AWS A5.29 E91T1-K2M-JH4<br>As-Welded with 75% Ar / 25% CO <sub>2</sub>   | 540 (78) min                               | 620-760 (90-110)              | 17 min            | 27 (20) min                  | -             |
| AWS A5.36 E91T1-M21A6-K2-H4<br>As-Welded with 75% Ar / 25% CO <sub>2</sub>                                     | 540 (78) min                               | 620-760 (90-110)              | 17 min            | -                            | 27 (20) min   |
| AWS A5.36 E91T1-M21P4-K2-H4<br>Stress Relieved with 75% Ar / 25% CO <sub>2</sub><br>for 1 hr. @ 620°C (1150°F) | 540 (78) min                               | 620-760 (90-110)              | 17 min            | 27 (20) min                  | -             |
| <b>Typical Results<sup>(3)</sup></b>   |  |                               |                   |                              |               |
| As-Welded with 75% Argon / 25% CO <sub>2</sub>   | 615-630 (89-91)                            | 670-685 (97-99)               | 23-24             | 84-88 (62-65)                | 65-69 (48-51) |
| Stress Relieved with 75% Ar / 25% CO <sub>2</sub><br>for 1 hr. @ 620°C (1150°F)                                | 570-585 (83-85)                            | 635-655 (92-95)               | 24-27             | 71-80 (52-59)                | -             |

<sup>(1)</sup> Typical all weld metal. <sup>(2)</sup> Measure with 0.2% offset. <sup>(3)</sup> See test results disclaimer below.

THE LINCOLN ELECTRIC COMPANY  
22801 St. Clair Avenue • Cleveland, OH • 44117-1199 • U.S.A.  
Phone: +1.216.481.8100 • www.lincolnelectric.com



**UltraCore® 91K2M-H Plus**

(AWS E91T1-K2M-JH4)

**DEPOSIT COMPOSITION<sup>(1)</sup>**

|   | %C        | %Mn       | %Si       | %S          | %P  |
|---|-----------|-----------|-----------|-------------|---|
| <b>Requirements</b><br>AWS A5.29 E91T1-K2M-JH4<br>AWS A5.36 E91T1-M21A6-K2-H4,<br>E91T1-M21P4-K2-H4 | 0.15 max  | 0.50-1.75 | 0.80 max  | 0.030 max   | 0.030 max                                     |
| <b>Typical Results<sup>(3)</sup></b><br>As-Welded with 75% Argon / 25% CO <sub>2</sub>              | 0.04-0.05 | 1.50-1.66 | 0.30-0.35 | 0.006-0.012 | 0.008-0.010                                   |
|   | %Ni       | %Cr       | %Mo       | %V          | Diffusible Hydrogen<br>(mL/100g weld deposit) |
| <b>Requirements</b><br>AWS A5.29 E91T1-K2M-JH4<br>AWS A5.36 E91T1-M21A6-K2-H4,<br>E91T1-M21P4-K2-H4 | 1.00-2.00 | 0.15 max  | 0.35 max  | 0.05 max    | 4.0 max                                       |
| <b>Typical Results<sup>(3)</sup></b><br>As-Welded with 75% Argon / 25% CO <sub>2</sub>              | 1.44-1.58 | 0.04-0.05 | 0.24-0.27 | 0.00        | 4 max   |
|   |           |           |           |             | 1-3   |

**TYPICAL OPERATING PROCEDURES**

| Diameter, Polarity<br>Shielding Gas                              | CTWD <sup>(4)</sup><br>mm (in) | Wire Feed Speed<br>m/min (in/min) | Voltage<br>(Volts) | Approx.<br>Current<br>(amps) | Melt-Off<br>Rate<br>kg/hr (lb/hr) | Deposition Rate<br>kg/hr (lb/hr) | Efficiency<br>(%)  |       |
|--|--------------------------------|-----------------------------------|--------------------|------------------------------|-----------------------------------|----------------------------------|--------------------|-------|
| <b>0.045 in (1.1 mm), DC+</b><br>75% Argon / 25% CO <sub>2</sub> | Optimal Settings               | 19 (3/4)                          | 8.9 (350)          | 27                           | 220                               | 1.9-5.2 (4.1-11.5)               | 1.7-4.6 (3.7-10.2) | 85-88 |
|  | Min - Max                      | 19-25 (3/4-1)                     | 4.4-12.7 (175-500) | 24-33                        | 127-280                           |                                  |                    |       |
| <b>0.052 in (1.3 mm), DC+</b><br>75% Argon / 25% CO <sub>2</sub> | Optimal Settings               | 19 (3/4)                          | 7.0 (275)          | 27                           | 235                               | 2.1-5.6 (4.6-12.4)               | 1.7-4.7 (3.8-10.4) | 85-88 |
|  | Min - Max                      | 19-25 (3/4-1)                     | 3.8-10.2 (150-400) | 24-33                        | 150-300                           |                                  |                    |       |
| <b>1/16 in (1.6 mm), DC+</b><br>75% Argon / 25% CO <sub>2</sub>  | Optimal Settings               | 19 (3/4)                          | 7.0 (275)          | 27                           | 255                               | 2.9-6.8 (6.3-15.0)               | 2.4-5.7 (5.2-12.6) | 85-88 |
|  | Min - Max                      | 19-25 (3/4-1)                     | 3.8-8.9 (150-350)  | 25-32                        | 142-300                           |                                  |                    |       |

<sup>(1)</sup> Typical all weld metal. <sup>(2)</sup> See test results disclaimer below. <sup>(3)</sup> To estimate ESO, subtract 1/4 in (6.0 mm) from CTWD.

**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 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 information or advice about their use of our products. Our employees respond to inquiries to the best of their ability based on information provided to them by the customers and the knowledge they may have concerning the application. Our employees, however, are not in a position to verify the information provided or to evaluate the engineering requirements for the particular weldment. Accordingly, Lincoln Electric does not warrant or guarantee or assume any liability with respect to such information or advice. Moreover, the provision of such information or advice does not create, expand, or alter any warranty on our products. Any express or implied warranty that might arise from the information or advice, including any implied warranty of merchantability or any warranty of fitness for any customers' particular purpose is specifically disclaimed.

Lincoln Electric is a responsive manufacturer, but the selection and use of specific products sold by Lincoln Electric is solely within the control of, and remains the sole responsibility of the customer. Many variables beyond the control of Lincoln Electric affect the results obtained in applying these types of fabrication methods and service requirements.

Subject to Change – This information is accurate to the best of our knowledge at the time of printing. Please refer to [www.lincolnelectric.com](http://www.lincolnelectric.com) for any updated information.