## OK Tigrod 13.38

A non copper coated, low-alloyed, ( 9 CrMoVN ), rod for GTAW of high-temperature steels and steels for hot hydrogen service especially in oil refineries. Preferably used for $9 \% \mathrm{Cr}$ steels as e.g. P 91/T 91 steels. The alloy is modified as regards limits of impurity elements and is extremely "clean". This to receive improved strength levels both at room temperature and at higher temperatures. AWS have changed the classification for this product, earlier classification was A5.28 ER90SB9.

| Specifications | EN ISO 21952-A : W CrMo91 <br> Classifications <br>  <br> EN ISO 21952-B : W 62 I1 9C1MV <br> SFA/AWS A5.28 : ER90S-B91 |
| :--- | :--- |
| Approvals | CE : EN 13479 <br> NAKS/HAKC : 2.0-2.4 mm <br> UKCA : EN 13479 <br> VdTÜV : 07686 |

Approvals are based on factory location. Please contact ESAB for more information.

| Alloy Type | Alloyed steel (9\% Cr-1\% Mo-V - N) "9CrMoVN" |
| :--- | :--- |
| Shielding Gas | I1 (EN ISO 14175) |


| Typical Tensile Properties |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Condition | Conditional Statement | Yield Strength | Tensile Strength | Elongation |
| Ar (I1) AWS |  |  |  |  |
| PWHT <br> 2 hour(s) $760^{\circ} \mathrm{C}$ | Tested at $450^{\circ} \mathrm{C}$ | 750 MPa | 850 MPa | 20 \% |
| Ar (11) EN |  |  |  |  |
| PWHT <br> (Tested | Tested at $482^{\circ} \mathrm{C}$ | 500 MPa | 560 MPa | 16 \% |
| PWHT <br> (Tested | Tested at $450^{\circ} \mathrm{C}$ | 510 MPa | 580 MPa | $14 \%$ |
| Ar (11) EN |  |  |  |  |
| PWHT <br> (Tested | Tested at $560^{\circ} \mathrm{C}$ | 420 MPa | 450 MPa | 22 \% |
| PWHT <br> (Tested | Tested at $20^{\circ} \mathrm{C}$ | 670 MPa | 760 MPa | 20 \% |
| PWHT <br> (Tested | Tested at $20^{\circ} \mathrm{C}$ | 690 MPa | 785 MPa | 20 \% |


| Typical Charpy V-Notch Properties |  |  |  |  |  | Testing Temperature | Impact Value |
| :--- | :--- | :--- | :---: | :---: | :---: | :---: | :---: |
| Condition |  |  |  |  |  |  |  |
| Ar (I1) AWS | $20^{\circ} \mathrm{C}$ | 95 J |  |  |  |  |  |
| PWHT |  |  |  |  |  |  |  |
| Ar (I1) EN | $-60^{\circ} \mathrm{C}$ | 30 J |  |  |  |  |  |
| PWHT | $0^{\circ} \mathrm{C}$ | 180 J |  |  |  |  |  |
| PWHT | $20^{\circ} \mathrm{C}$ | 210 J |  |  |  |  |  |
| PWHT | $-20^{\circ} \mathrm{C}$ | 130 J |  |  |  |  |  |
| PWHT | $-40^{\circ} \mathrm{C}$ | 60 J |  |  |  |  |  |
| PWHT | $0^{\circ} \mathrm{C}$ | 190 J |  |  |  |  |  |
| PWHT | $-60^{\circ} \mathrm{C}$ | 70 J |  |  |  |  |  |
| PWHT | $20^{\circ} \mathrm{C}$ | 200 J |  |  |  |  |  |
| PWHT | $-40^{\circ} \mathrm{C}$ | 90 J |  |  |  |  |  |
| PWHT | $-20^{\circ} \mathrm{C}$ | 150 J |  |  |  |  |  |
| PWHT |  |  |  |  |  |  |  |

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| Typical Wire Composition \% |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| C | Mn | Si | Ni | Cr | Mo | V | N |
| 0.1 | 0.5 | 0.3 | 0.5 | 8.7 | 0.9 | 0.20 | 0.05 |


| Typical Weld Metal Analysis \% |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| C | Mn | Si | S | P | Ni | Cr | Mo | V | Cu |
| 0.1 | 0.5 | 0.3 | 0.002 | 0.004 | 0.8 | 8.7 | 0.9 | 0.2 | 0.1 |


| Typical Weld Metal Analysis \% |  |
| :--- | :--- |
| $\mathbf{N}$ | $\mathbf{N b}$ |
| 0.04 | 0.06 |

