

Welding Consumables for Pressure Vessel

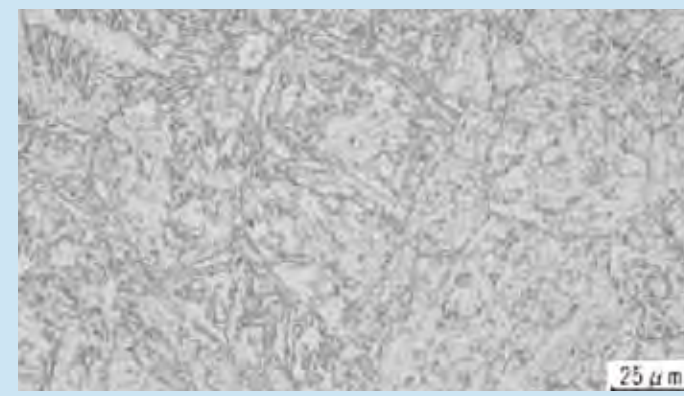
Type of Welding Consumables

Welding Consumables for Cr-Mo steels

Applicable Temperature : 400~480°C

<Required Specification>

- Tensile strength at high temp
- Notch toughness (Charpy Impact Property)
- Temper Embrittlement*1
- Stable Macrostructure under high temperature/pressure



Microstructure of Cr-Mo steel weld metal

* 1: Temper embrittlement test method

Welding Consumables for Mn-Mo-Ni steels

Applicable Temperature : ~350°C

<Required Specification>

- Tensile strength
- Notch toughness (Charpy Impact Property)
- Crack extension resistance (Drop weight property)
- Irradiation embrittlement



Microstructure of Mn-Mo-Ni steel weld metal

Application



Cr-Mo steel petroleum refinery reactor

Product Line

Welding Consumables for Cr-Mo steels

| Type of Steel | Welding Process | Polarity | Product | ASME / AWS | |
|--------------------|--------------------|----------|--|---|---|
| 1.25Cr-0.5Mo Steel | SAW | AC | TRUSTARC™ TRUSTARC™ PF-200 / US-511N | SFA / A5.23 F8P2-EG-B2 | |
| | | DCEP | TRUSTARC™ TRUSTARC™ PF-200D / US-511ND | SFA / A5.23 F8P2-EG-B2 | |
| | SMAW | AC | TRUSTARC™ CM-A96MB | SFA / A5.5 E8016-B2 | |
| | | DCEP | TRUSTARC™ CM-A96MBD | SFA / A5.5 E8016-B2 | |
| | GTAW | DCEN | TRUSTARC™ TG-S1CM | SFA / A5.28 ER80S-G | |
| 2.25Cr-1Mo Steel | SAW | AC | TRUSTARC™ TRUSTARC™ PF-200 / US-521S | SFA / A5.23 F9P2-EG-B3 | |
| | | DCEP | TRUSTARC™ TRUSTARC™ PF-200D / US-521S | SFA / A5.23 F9P2-EG-B3 | |
| | SMAW | AC | TRUSTARC™ CM-A106N | SFA / A5.5 E9016-B3 | |
| | | DCEP | TRUSTARC™ CM-A106ND | SFA / A5.5 E9016-B3 | |
| | | GTAW | DCEN | TRUSTARC™ TG-S2CM | SFA / A5.28 ER90S-G |
| | 2.25Cr-1Mo-V Steel | SAW | AC | TRUSTARC™ TRUSTARC™ PF-500 / US-521H | SFA / A5.23 F9P2-EG-G (ASME Sec.VIII Div.2) |
| DCEP | | | TRUSTARC™ TRUSTARC™ PF-500D / US-521HD | SFA / A5.23 F9P2-EG-G (ASME Sec.VIII Div.2) | |
| SMAW | | AC | TRUSTARC™ CM-A106H | SFA / A5.5 E9016-G (ASME Sec.VIII Div.2) | |
| | | DCEP | TRUSTARC™ CM-A106HD | SFA / A5.5 E9016-G (ASME Sec.VIII Div.2) | |
| | GTAW | DCEN | TRUSTARC™ TG-S2CMH | SFA / A5.28 ER90S-G (ASME Sec.VIII Div.2) | |

Welding Consumables for Mn-Mo-Ni steels

| Type of Steel | Welding Process | Polarity | Product | ASME / AWS |
|----------------------------|-----------------|-----------|-------------------------------------|------------------------|
| 80ksi Class Mn-Mo-Ni Steel | SAW | AC / DCEP | TRUSTARC™ TRUSTARC™ PF-200 / US-56B | SFA / A5.23 F9P4-EG-G |
| | SMAW | AC / DCEP | TRUSTARC™ BL-96 | SFA / A 5.5 E9016-G |
| | GTAW | DCEN | TRUSTARC™ TG-S56 | SFA / A5.28 ER80S-G |
| 90ksi Class Mn-Mo-Ni Steel | SAW | AC / DCEP | TRUSTARC™ TRUSTARC™ PF-200 / US-63S | SFA / A5.23 F10P2-EG-G |
| | SMAW | AC / DCEP | TRUSTARC™ BL-106 | SFA / A5.5 E10016-G |
| | GTAW | DCEN | TRUSTARC™ TG-S63S | SFA / A5.28 ER90S-G |

Product Line for 347 Type Corrosion Resistant Cladding

Welding Consumables

| Type | Layer of Cladding | Strip | Flux |
|-----------------------------------|-------------------|-----------------------|------------------|
| Multi-layer | 1st layer | PREMARC™ US-BQ309L | PREMARC™ AF-B7FK |
| | 2nd layer | PREMARC™ US-BQ347LD | |
| Single-layer & High speed welding | — | PREMARC™ US-B24.13LNb | |
| Single-layer | — | PREMARC™ US-B21.11LNb | |

Specification

| | Product | AWS A5.9 | EN ISO 14343 A |
|-------|-----------------------|----------|------------------|
| Strip | PREMARC™ US-BQ309L | EQ309L | B23 12 L |
| | PREMARC™ US-BQ347LD | EQ347L | B19 9Nb |
| | PREMARC™ US-B24.13LNb | — | B23 12Nb |
| | PREMARC™ US-B21.11LNb | — | — |
| Flux | PREMARC™ AF-B7FK | — | EN760 SA FB 2 DC |

Welding condition

| Product | Strip size | Current [A] | Speed [cm/min] | Base metal |
|---------------------------------|---------------|-------------|----------------|-----------------|
| PREMARC™ US-B21.11LNb / AF-B7FK | 0.5mm x 60mmw | 1200 | 24 | ASTM A387-Gr.22 |
| PREMARC™ US-B24.13LNb / AF-B7FK | 0.5mm x 90mmw | 2300 | 32 | |

Chemical composition of overlaid weld metal

| Product | C | Si | Mn | P | S | Cu | Ni | Cr | Mo | Nb | N | FN by WRC1992 |
|---------------------------------|-------|------|------|-------|-------|------|------|-------|------|------|-------|---------------|
| PREMARC™ US-B21.11LNb / AF-B7FK | 0.029 | 0.40 | 1.22 | 0.019 | 0.005 | 0.05 | 9.61 | 18.47 | 0.18 | 0.50 | 0.045 | 7 |
| PREMARC™ US-B24.13LNb / AF-B7FK | 0.042 | 0.39 | 1.47 | 0.015 | 0.005 | 0.05 | 9.54 | 18.41 | 0.29 | 0.53 | 0.040 | 6 |



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