Technical specifications

Group-I (Alloy Steel weld Wire EF2 & its Flux)

1. **Requirement:**

Sl. No.	Item Description	Size	Mat Code	Req. Qty. (Kg)	Standard/ specification
i)	Alloy Steel weld Wire/ welding spool arc wire for SAW (Submerged Arc Welding)	1/8" / 3.2 mm	140001405	5475	As per AWS/ASME SFA- A.5.23, Weld classification: EF2
ii)	Alloy Steel Weld Wire/ welding spool arc wire for SAW (Submerged Arc Welding)	3/32" / 2.4 mm	140001404	425	As per AWS/ASME SFA- A.5.23, Weld classification: EF2
iii)	Alloy steel Welding Flux for submerged arc welding (corresponding flux for above specified weld wire for using during SAW)	-------	140001411	4800	As per AWS/ SFA 5.23 Weld classification: F9 P0- EF2

2. **Testing requirements for Weld Material**

For Alloy Steel weld Wire EF2 & its Flux

- **For Flux-Solid wire combination as per AWS SF A 5.23 standards: AWS 5.23; F9 P0- EF2**

Testing Criteria:

01	Chemical Analysis of Weld Metal	Out of the Sample from the reduced section of the fractured tension test specimen from the weld pad as per Sec. 10.2 & Fig.:2 of SFA 5.23
02	Radiographic Test	As per Sec. 11 of SFA 5.23
03	Tension Test	As per Sec. 12 of SFA 5.23
04	Impact Test	As per Sec. 13 of SFA 5.23

Retest Criteria: If the results of any test fail to meet the requirement, that test shall be repeated twice. The results of both retests shall meet the requirement. Material, specimens, or samples for retest may be taken from the original test assembly or sample or from one or two new test assemblies or samples.

Testing of Coupons:

- For testing of Welding material AISI 4130 Welding Test Coupons shall be used with the specifications below:

Sr.	Criteria	Details
1	Material Designation	Min. 60K Grade
2	Yield Strength (0.2% Offset) (Min.)	414 MPa/ 60,000 psi
3	Tensile Strength (min.)	586 MPa/ 85,000 psi
4	Elongation in 50mm (min.)	18%
5	Reduction of Area (min.)	35%

- Welded Test coupons at supplier /manufacturer premises shall be metallurgically tested as per above specifications at NABL approved laboratory. Lab reports shall be submitted to ONGC along with welding material.
- For Alloy Steel Butt welding with testing plates 150x 450x30 mm with V notch angle 60^{o} root face-2mm and root gap-2mm.

Note: AISI-4130 welding test plates shall be in the scope of supplier. Material Test Certificate with mechanical properties of test plates shall also be required to be submitted with final report of NABL Laboratory.

Group-II (SS Spool wire and flux)

1. **Requirement:**

S. No.	Item Description	Size	Mat Code	Req. Qty	Standard specification
i)	SS weld wire/ coil spool for SAW (Submerged Arc Welding)	3/32" (2.4 mm)	140001407	475 kg	As per AWS/ SFA: A.5.9/ ER316L
ii)	SS Flux for submerged arc welding (Corresponding flux for above specified weld wire for using during SAW)	-----	140001410	725 Kg	As per ISO 14174; Flux Designation: S A AF 2 56 54 DC

2. **Testing requirements for Weld Material**

For SS Spool wire and flux:

Testing Criteria of SS SAW Welding Material:

- Stainless Steel Wire and Flux shall be tested using AISI 4130 Test Plate as per ONGC Welding Parameters/ASME Section IX requirements.
- Testing shall be witnessed by ONGC representative at supplier's location.
- Testing Parameters are as below:

a. For SS welding coil spool: As per AWS SF A 5.9 standards

Chemical analysis of the solid wire 316L (as per Table-1 of AWS SFA5.9) is required for classification of products under the specification.

b. For SS Welding Flux: As per ISO 14174 standards; Flux Designation: SA AF 2 56 54 DC

Symbol	Details	Remarks
S	SAW Process	-----
A	Agglomerated Flux	A or F Flux both may be applied to get sound weld metal and required chemical composition
AF	Aluminate Floride Basic	Characteristic Chemical Constituents as per Table-1 of EN ISO 14174
2	Class-2 Flux	

56	Pick-up 0.008% (by mass) for C(5); pick-up 0.2% (by mass) for si(6)	As per Table-4 of ISO 14174
54	burn-out 0.7% (by mass) for cr (5); burn-out 0.08% (by mass) for Nb (4)	
DC	Usable with Direct Current	

Weld Test shall be executed only by using AISI 4130 Plate (Min. designation – 60k) of dimensions 200mm x 200mm x 20mm as overlay to achieve min 3mm finished (machined) SS deposit. Plate shall be arranged by supplier on their expenses.

Testing Criteria: Requires the following tests as per Section 7 of ISO 14174: 2019:

1. Chemical analysis,
2. Liquid/Die Penetrant Test
3. Radiographic Tests of welded samples to determine any lack of fusion/disbanding/Weld defect

Retest Criteria:

If any test fails to meet the requirement(s), that test shall be repeated twice.

The results of both retests shall meet the requirement.

Specimens for the retest may be taken from the original test assembly or sample or from one or two new test assemblies.

For chemical analysis, retests need only be for those specific elements that failed to meet the requirement.

Testing of Coupons:

- For testing of Welding material AISI 4130 Welding Test Coupons shall be used with the specifications below:

Sr.	Criteria	Details
1	Material Designation	Min. 60K Grade
2	Yield Strength (0.2% Offset) (Min.)	414 MPa/ 60,000 psi
3	Tensile Strength (min.)	586 MPa/ 85,000 psi
4	Elongation in 50mm (min.)	18%
5	Reduction of Area (min.)	35%

Note: AISI-4130 welding test plates shall be in the scope of supplier. Material Test Certificate with mechanical properties of test plates shall also be required to be submitted with final report of NABL Laboratory.