

The Pre-qualification criteria given below shall be filled separately for each consumable being offered by the supplier.

| S No | Pre –Qualification Criteria | Bidder remarks |
|------|--|----------------|
| 1 | Bidder shall be a manufacturer of Welding Consumables being tendered or an agent of the same. If the offer is quoted by agent, letter of authorization duly signed by the manufacturer is required. | |
| 2 | Bidder shall have successfully supplied ER70S-2 GTAW electrodes to any govt. Organizations/ PSUs/ Public Ltd./ Company/Reputed Industries, as per ASME SEC.II.C. Purchase orders copies (01.01.2017 or later is only acceptable) and related material test certificates to be submitted along with offer. Note: Successfully supplied means – supplied and accepted. | |
| 3 | Welding Consumables brand name and its data sheet shall be provided along with offer. | |
| 4 | The Lot Classification of the consumable shall be Lot Class S2, as defined in ASME Section II Part C. Supplier shall confirm. | |
| 5 | Manufacturing plant address of the quoted electrode shall be provided along with offer. | |
| 6 | BHEL/End customer reserve the right to inspect the item ordered at vendor's works. | |
| 7 | Suppliers shall submit manufacturing process flow chart (Raw material to finished product) along with offer. | |
| 8 | Supplier shall have NPCIL's brand approval for the product being offered. In the absence of NPCIL's brand approval, suppliers shall submit a valid ISO 9001 certificate and Quality Management System (QMS) Manual along with the offer. The acceptance of such offers is subject to acceptance of supplier's QMS by BHEL's customer NPCIL. | |
| 9 | Bidder shall confirm to meet WCPS RH 02 rev 00. Any deviations shall be specified with offer. Acceptance of such offers is subject to acceptance by BHEL's customer NPCIL. | |



**BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPALLI-620 014**

SPECIFICATION NO : WCPS - RH 02, R00

**CARBON STEEL BARE SOLID GTAW FILLER ROD (ER 70S-2)
(For Work Order Nos.: D139-142 - Reactor Header)**

WCPS RH 02

| Rev. No. | 00 | 01 | 02 | 03 | 04 | 05 |
|---------------------------|--------------------|----|----|----|----|----|
| Prepared By | <i>[Signature]</i> | | | | | |
| Reviewed By | <i>[Signature]</i> | | | | | |
| Approved By (BHEL) | <i>[Signature]</i> | | | | | |
| Approved By (CUSTOMER) | | | | | | |

Nature of Revision

न्युक्लियर पावर कॉर्पोरेशन ऑफ इंडिया लिमिटेड
NUCLEAR POWER CORPORATION OF INDIA LTD.

अनुमोदित / APPROVED

[Signature]
25/07/11

समीक्षा/Reviewed *[Signature]* 25/07/11

जाँच किया गया/Checked *[Signature]*

किष्ट जानेवाले कार्य के परिनिर्धारण का विक्रेता को विवरण की सटीकता के दायित्वों से मुक्त नहीं करता है।

This Approval of interpretation of the work to be done does not relieve the seller of responsibility of accuracy of details.



WELDING CONSUMABLE PURCHASE SPECIFICATION

WCPS – RH02, R00

page 1 of 3

1.0 SCOPE

This specification prescribes the requirements for carbon steel bare solid filler rod for Gas Tungsten Arc Welding (GTAW) that conforms to ASME, Section. II.C, SFA 5.1, SFA- 5.18 and AWS A 5.18, Class ER 70S-2.

2.0 GENERAL

- 2.1 The proposed GTAW rod should have the suitability for use on SA420 Gr. WPL6, SA350 LF2 class1, SA 333 Gr.6 carbon steel materials.
- 2.2 The rods shall be supplied in sizes and quantity specified in the Purchase Order.
- 2.3 Every heat or lot of filler rod shall be tested and test certificate shall be provided. The total quantity delivered shall be in least number of lot. Each lot shall be defined in ASME NB-2420 (d).
- 2.4 The filler rod should be manufactured and controlled according ASME II Part C, SFA 5.18 (SFA 5.1) Section III NB 2400 of ASME Code the 2010 Edition.
- 2.5 General Purchase Specification (RH-TDC-01-R00) shall be applied (enclosed)

3.0 CHEMICAL COMPOSITION (as per NB 2432.2)

The chemical composition of the rod and weld metal shall be as follows :-

| | |
|----|-------------------------------|
| C | 0.07 % max |
| Mn | 0.50 -1.40 % |
| Si | 0.40 – 0.70 % |
| S | 0.035 % max |
| Cu | 0.50 % max (includes coating) |
| Ni | 0.15 % max |
| P | 0.025 % max |
| Mo | 0.15% |
| Cr | 0.15% |
| V | 0.03% |
| Ti | 0.05 – 0.15 |
| Zr | 0.02 – 0.12 |
| Al | 0.05 – 0.15 |

Additionally Chemical composition of weld metal (as-welded) shall be reported. A heat of bare filler rod is defined as either the material produced from same melt of metal or the material produced from one type and size of filler rod when produced in continuous period not to exceed 24 hours and 45,000 kgs, from chemically controlled material.



4.0 USABILITY, VOLUMETRIC EXAMINATION AND STRENGTH

4.1 The rod when used as Filler in Gas Tungsten Arc Welding with 100% Argon shielding shall deposit weld metal that flows freely and uniformly without sputtering or other defects. The resultant weld metal shall be smooth and uniform with no visible evidence of cracks or porosity and shall meet radiographic soundness or ultrasonic test requirements on plate, pipe or tube or forgings specified in ASME Section IX, Section II-C, SFA 5.1 and SFA 5.18.

4.2 The mechanical properties of all weld metal tensile specimen (longitudinal tensile) deposited using the filler rod after post-weld heat treatment (PWHT) the test plate assembly at $600 \pm 10^{\circ}\text{C}$ for six hours soaking time shall be as follows. The minimum preheat of 125°C and maximum inter-pass temperature of 245°C , PWHT soaking time (six hours), peak temperature range ($600 \pm 10^{\circ}\text{C}$) and the maximum cooling rate as per NB-4623 ($150^{\circ}\text{C} / \text{hour}$) used for test coupon welding, are to be mentioned in the test certificate. All weld metal longitudinal tensile test shall be carried out and mechanical test results shall meet the requirement as given below : a), b), c), d) , e) & f)

| Properties | As-welded | After PWHT |
|---|---|---|
| a) Yield strength | : 250 MPa (minimum) | : 250 MPa (minimum) |
| b) Tensile strength | : 485 – 655 MPa | : 485-655 MPa |
| c) Elongation in 50 mm | : 22% (minimum) | : 22% (minimum) |
| d) Impact strength | : 68 J at temp.not $> 18^{\circ}\text{C}$: (0.90 lateral expansion) | : 68 J at temp.not $> 18^{\circ}\text{C}$: (0.90 lateral expansion) |
| e) Absorbed Energy: at -45°C | 27 Joules average (Charpy V-Notch Test) | : 27 Joules average at -45°C |
| f) Drop weight test | : at -15°C : no break performance for 2 Nos | |

Testing Procedure to be employed for verifying compliance to para 4.2 above shall be as specified in ASME Sec.II.C, SFA 5.1, SFA-5.18 as per NB2431.1(d).

4.3 Heat Input condition (welding parameters) should be given. Drop weight test is required at -15°C . The quantity of filler rod per lot to be indicated in the test certificate. Test certificates to be sent to BHEL for approval before despatch.

5.0 FORM, SIZE, FINISH AND IDENTIFICATION

5.1 FORM AND SIZE

The Rods shall be supplied in straight lengths of 1000 ± 5 mm and in diameters 1.60 mm, 2.00 mm or 2.40 mm as specified in the Purchase order. The tolerance on diameter shall be $+0.01$, -0.04 mm.



WELDING CONSUMABLE PURCHASE SPECIFICATION

WCPS – RH02, R00

page 3 of 3

5.2 FINISH AND UNIFORMITY

The Rods shall have a smooth finish that is free from slivers, depressions, scratches, scale, seams, laps and foreign matter that would adversely affect the welding characteristics or properties of weld metal. The Rods shall be uniformly copper coated and shall have a glossy finish. The copper coating shall be well adhered without any flaking so as to prevent rusting during long duration storage.

5.3 IDENTIFICATION

Each rod shall have the designation 'ER70S-2' marked and heat number embossed in both ends for positive identification.

6.0 PACKAGING

- 6.1 Rods of the same size and lot completely devoid of moisture shall be packed in moisture proof tube shaped plastic cartons so as to ensure against rusting or any deterioration in rod quality during long duration storage.
- 6.2 Each tube carton shall weight not more than 5 kg. The plastic tube carton shall be provided with moisture proof lids so as to be moisture proof.
- 6.4 The tube cartons shall have product information as given below legibly marked so as to be visible on the outside of the packing.
- a) AWS Specification.
 - b) Designation "ER 70S-2".
 - c) Heat / Lot number
 - d) Size
 - e) Net Weight
 - f) Date of Manufacture
- 6.5 Tube cartons shall be packed in waterproof wooden crates so as to ensure against damage during shipment and normal storage conditions. Weight of each crate shall not exceed 100 kgs.

7.0 CERTIFICATION AND TESTING

- 7.1 Each consignment of rods supplied shall preferably be from one lot only.
- 7.2 One copy of test certificate shall contain all the required tests results as per NB 2420, SFA 5.1, SFA 5.18 along with approval no. and date which was accepted by BHEL, Trichy.
- a) Chemical composition of filler rod and weld metal (deposit)
 - b) Test for Mechanical Properties as-welded and after PWHT.
 - c) Other requirements in this specification
- 7.3 Purchaser has a right to access supplier's facility and records for inspection or audit.