



BHARATH HEAVY ELECTRICALS LIMITED
TIRUCHIRAPALLI-620 014
WELDING TECHNOLOGY CENTRE

Welding Consumable Purchase Instruction

Doc. Number:

WCPI – 156

Revision:

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Date: 21/01/2010

Page 01 of 03

PURCHASE INSTRUCTION OF BARE LOW ALLOY STEEL SOLID WIRE FOR GAS METAL
ARC WELDING TO ASME SEC.II.C, SFA-5.28 CLASS: ER 90S-G.

1.0 SCOPE:

- 1.1 This Purchase Instruction prescribes the requirements for Bare Low Alloy Steel Solid Wire for Gas Metal Arc Welding that conforms to ASME Section II.C.SFA-5.28, Class: ER 90S-G.

2.0 GENERAL:

- 2.1 The Wire shall comply with requirements specified in the Latest Edition and Addenda (Applicable on the date of Issue of Purchase Order) of ASME Sec.II.C.SFA-5.28, ER 90S-G and all tests, Acceptance Criteria shall be in accordance with this. Additional requirements specified in this document shall also be complied with.
- 2.2 The Wire shall be precision layer wound in plastic spools and shall be supplied in sizes and Quantities as specified in the Purchase Order.
- 2.3 The Wires are intended for use as a Welding Electrode for butt-welding of tubes in pulsed GMAW process with Argon plus 5% to 20% Co₂ gas shielding in Automatic Straight Tube Butt Welding machine and as a rod for butt welding of tubes in Orbital TIG Welding with 100 % Argon shielding for Radiography Quality high pressure boiler components.
- 2.4 Every batch of wire shall be inspected & test certificates countersigned by Inspecting Authority approved by IBR for country of origin (Latest).

3.0 CHEMICAL COMPOSITION:

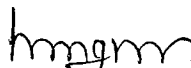
- 3.1 The chemical composition of the Wires shall conform to the following.

Carbon	0.15 % Max	Chromium	2.10 -2.70 %
Manganese	0.87-1.50%	Molybdenum	0.90 – 1.20%
Silicon	0.40 – 0.70%	Copper	0.40% Max
Sulphur	0.025% Max.	Phosphorus	0.025 % Max

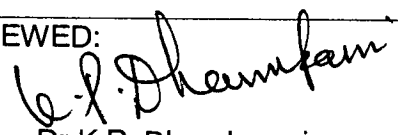
4.0 USABILITY AND RADIOGRAPHIC SOUNDNESS:

- 4.1 The Wire when used as electrode in Gas Metal Arc Welding with Argon plus 5% to 20% Co₂ shielding in Automatic Straight Tube Butt Welding machine and in Orbital Tig Welding with 100% Argon shielding

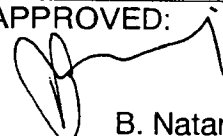
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Doc. Number:

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WCPI – 156

00

Page 02 of 03

shall deposit Weld metal that flows freely, uniformly without sputtering or other defects and shall exhibit excellent wetting characteristics. The resultant Weld metal shall be smooth and uniform with no visible evidence of cracks/porosity or other defects and shall meet Radiographic Soundness requirements specified in ASME Sec.II.C.SFA-5.28, ER 90S-G.

- 4.1 Weld metal produced using the wire with 95 % Argon plus 5% Co₂ /100 % Argon shielding shall meet tensile requirements after PWHT at 690±15°C with one hour soaking as follows.

YIELD STRENGTH	540 Mpa (Minimum)
TENSILE STRENGTH	620 Mpa (Minimum)
% ELONGATION	17 (Minimum)

- 4.2 The base metal for weld test assembly and testing procedure to be employed for verifying compliance to 4.1 & 4.2 above shall be as specified in ASME Sec.II.C.SFA-5.28, ER 90S-B3.

5.0 FORM, SIZE, FINISH AND IDENTIFICATION:

- 5.1 **FORM & SIZE:** The Wire shall be supplied in diameters 0.8 mm, 1.0 mm or 1.2 mm as specified in the Purchase Order. The tolerance on diameter shall be + 0.01, -0.04mm.
- 5.2 **FORM:** The Wire shall be supplied in plastic spools of dimensions and weight as given below. Spools shall be such material and design so as to provide adequate protection against damage or distortion of themselves and of the wire due to normal handling or use. Spools shall be sufficiently clean and dry to maintain cleanliness of the wire. Spools shall electrically insulate the wire from wire feed spindle. Spools should also rotate freely without any jerks when mounted on the machine.

APPLICATION	GMAW	GTAW
Barrel Inner Dia. (Bore dia.)	50.5 mm +2.5,-0 mm	16 mm +1,-0 mm
Spool Outer Dia. (Flange OD) Max	305 mm	100 mm
Spool Width	103 mm +0,-3 mm.	46 mm + 0,-2 mm
Distance between axes	44.5 mm ± 0.5 mm	-----
Driving Hole Diameter	10 mm + 1,-0 mm	-----
Net Weight	10/12.5/15 Kg.	700 /1000 gm.

- 5.3 **FINISH & UNIFORMITY:** The Wire shall be uniformly copper coated and shall have a smooth & glossy finish that is free from slivers, depressions, scratches, scales, seams, laps, drawing fluids and foreign matter that would adversely affect the welding characteristics, the operation of Welding equipment, or properties of Weld metal. The copper coating shall be well adhered without any flaking so as to ensure against any rusting during long storage and also ensuring good electrical conductivity.
- 5.4 Each Spool shall contain one continuous length of wire from single heat of metal and no splices are permitted.
- 5.5 **WINDING:** The Wire shall be precision layer wound on spools so that kinks, waves, sharp bends, overlapping or wedging are not encountered, leaving the wire free to unwind without restriction. The outside end of the wire (The end with which welding is to begin) shall be identified so that it can be located readily and shall be fastened to avoid unwinding.



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00

Page 03 of 03

5.5 The spooling shall be rigid without any intermeshing of wire layers. The outer most layer of spooled wire shall not be closer than 3.0 mm to the outside of flanges.

5.6 The cast helix and temper of wire on spools shall be such that the filler wire will feed in an uninterrupted manner in an automatic high output welding system.

5.7 **IDENTIFICATION:** Adhesive labels containing following product information shall be securely affixed in prominent location on the outside of at least one flange of the spool.

- a) ASME Specification & Classification designation.
- b) Brand Name.
- c) Batch Number/Heat Number.
- d) Size and Net Weight.

6.0 PACKAGING:

6.1 The spools completely devoid of moisture shall be packed in moisture proof cartons so as to prevent any rusting or any deterioration in weld quality during long storage.

6.2 The cartons shall have product information as required in 5.8 above legibly marked so as to visible from outside of each carton.

6.3 The appropriate precautionary information as specified in ANSI Z 49.1 latest edition (as minimum) or its equivalent shall be prominently displayed in legible print on all packages including unit packages.

6.4 Spools shall be packed in wooden crates lined with waterproof material so as to ensure against damage during shipment and normal storage conditions. The net weight of each crate shall not exceed 1000 Kg.

7.0 TESTING & CERTIFICATION:

7.1 Each consignment of wire spools shall be from one batch only.

7.2 Batch /Lot classification shall be "Class S1" as per Section 5.0 of SFA-5.01 Filler metal procurement guidelines of ASME Sec.II.C. (Latest Edition & Addenda)

7.3 The Level of Testing shall be "Schedule K" of Section 6.0 of SFA-5.01 Filler metal procurement guidelines of ASME Sec.II.C. (Latest Edition & Addenda)

7.4 Three copies of Original Test certificates in English countersigned by Inspecting Authority (Latest) approved by IBR for country of origin giving details of following tests done for compliance to this Purchase Instruction and ASME Sec.II C, SFA-5.28, ER90S-G shall be sent.

7.5 The Testing Authority shall certify that supplies made against the batch conforms to the requirements of the Latest Edition & Addenda (Applicable on the date of issue of Purchase Order) of ASME Sec.II.C.SFA-5.28 ER 90S-G.

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