



BHARATH HEAVY ELECTRICALS LIMITED
TIRUCHIRAPALLI-620 014
WELDING TECHNOLOGY CENTRE


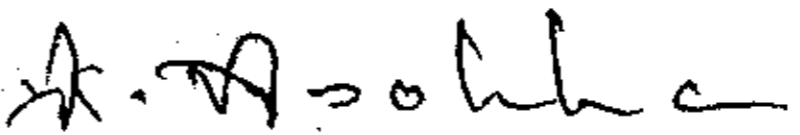
Doc. Number:	Revision:
WCPI - 245	05
Date: 11/08/2011	
Page 01 of 04	

Welding Consumable Purchase Instruction

**PURCHASE INSTRUCTION FOR NON SYNTHETIC SMAW ELECTRODE
ASME SEC.II.C, SFA 5.5, CLASS E9015-B9.**

- 1.0 SCOPE:**
- 1.1 This purchase instruction prescribes the requirements for a Non Synthetic Shielded Metal Arc Welding Electrode that conforms to ASME SEC II, Part C, SFA- 5.5, and E9015-B9.
- 2.0 GENERAL:**
- 2.1 Electrodes shall be supplied in sizes and quantities as specified in the Purchase Order.
- 2.2 The Electrode shall comply with requirements called for in the latest edition and Addenda (Applicable on the date of issue of Purchase order) of ASME Sec II C, SFA 5.5, Class E9015-B9 and all tests, acceptance criteria etc. referred in this document shall be in accordance with this. Additional requirements specified in this document are also to be complied
- 2.3 The Electrode shall be suitable for Radiography Quality Butt Joint welding of boiler pressure parts of SA387 Gr91-Plate, SA335 P91-Pipe & SA213 T91-Tube material for high temperature creep resistant service.
- 2.4 Every batch of electrode shall be inspected & test certificates countersigned by inspecting Authority approved by IBR for country of origin (to be concurred by BHEL).
- 2.5 The weld metal deposited by this electrode shall meet minimum 10,000 hours creep rupture test at 600°C and 100 MPa without failure. The results of the tests are to be furnished. The test shall be continued for 30,000 hours and the results shall be reported later. Extrapolated creep properties for 100,000 hours at 600°C to be made available. Test shall be conducted at any Government Lab/NABL Approved Lab/Corporate R&D, BHEL, Hyderabad Lab. Tests shall be certified by the Inspecting Authorities (Ref Annex-A). The Indian offices of agencies listed from SI No 29 to SI No 46 wherever available are also authorized to certify the tests (even though it is indicated otherwise in the attachment).
- 2.6 The electrode shall be of Non-Synthetic type with a fully core wire that matches with weld metal chemistry.

3.0 CHEMICAL COMPOSITION:
The chemical composition of the undiluted weld metal deposited using the Electrode shall be as follows.

PREPARED:  (S.SINGARAVELU) DGM / WTC	REVIEWED & APPROVED :  (Dr.K.ASOKKUMAR) AGM/WTC
---	--



Carbon	0.08-0.13	Molybdenum	0.85-1.20
Manganese	1.20 Max	Vanadium	0.15-0.30
Silicon	0.30 max	Copper	0.25 Max
Sulphur	0.01 Max	Aluminium	0.04 Max
Phosphorus	0.01 Max	Niobium	0.02-0.10
Nickel	0.8 Max	Nitrogen@	0.02-0.07
Chromium	8.0-10.5	Mn+ Ni	1.20 Max

@ Minimum (0.5 × Aluminium Content+0.03)%

4.0 RADIOGRAPHIC SOUNDNESS:

- 4.1 The Electrodes with DCEP shall deposit weld metal, which meets Radiographic Soundness requirements specified in ASME Sec.II C, SFA-5.5, E9015-B9.
- 4.2 The Electrodes shall produce acceptable Radiography Quality Pipe and Tube welds in all Positions joints.

5.0 MECHANICAL PROPERTIES:

- 5.1 The Mechanical Properties of weld metal deposited using the electrode after stress relieving the test plate assembly at $760 \pm 15^\circ\text{C}$ for 120 minutes shall be as follows. (Tests as per ASME Sec II C, SFA-5.5, E 9015-B9)
- a) Yield strength at 0.2% offset : 530 Mpa (Minimum)
 - b) Tensile strength : 620 Mpa (Minimum)
 - c) Elongation : 17% (Minimum)
 - d) Absorbed Energy at +20°C : 27 Joules Average(Minimum)
(Charpy 'V' Notch Impact test) (Single value should be ≥ 20 Joules)
 - e) Hardness of weld metal&HAZ : 195 -320 HV.

6.0 FILLET WELD TEST:

- 6.1 Fillet Weld Test done using the electrode shall meet requirements specified in ASME Sec II C, SFA 5.5, E9015-B9.

7.0 MOISTURE CONTENT OF COVERING:

- 7.1 Moisture content of the electrode covering shall not exceed the limit specified in ASME Sec II C, SFA 5.5, E9015-B9.



8.0 DIFFUSIBLE HYDROGEN CONTENT OF WELD METAL:

8.1 Diffusible Hydrogen content of weld metal deposited using the electrode shall be 4 ml /100 grams maximum. Test to be done as per ASME Sec II C, SFA 5.5 E 9015-B9.

9.0 SIZE, COVERING, ARC END & GRIP END AND IDENTIFICATION:

9.1 SIZE:

Electrodes shall be supplied in diameters and lengths as specified in the Purchase order.

9.2 COVERING:

The core wire and covering shall be free of defects and should ensure uniform deposition of weld metal. Coating shall be uniform and concentric around the core wire and no taper burning is permitted.

9.3 ARC END & GRIP END:

The Arc end of each Electrode shall be sufficiently bare and covering sufficiently tapered to permit easy striking of the Arc. The Grip end shall be bare for a length that is sufficient to provide electrical contact with the Electrode Holder.

9.4 IDENTIFICATION:

All electrodes shall be identified by providing at least one imprint of the Electrode Classification near the grip end. The numbers and letters of the imprint shall be of bold block type and of a size large enough to be legible.

The ink used for imprint shall provide sufficient contrast with the electrode covering so that the imprint shall remain legible after drying and welding.

10.0 PACKING AND MARKING OF PACKAGES:

10.1 PACKAGING:

A standard quantity of electrodes such that the nett weight of each package does not exceed 5 Kg shall be packed in hermetically sealed containers or moisture proof Cardboard-Polythene encapsulated pockets.

Electrode pockets shall be shipped in wooden crates lined with waterproof material. Nett weight of each crate shall not exceed 1000kg.



BHARATH HEAVY ELECTRICALS LIMITED
TIRUCHIRAPALLI-620 014
WELDING TECHNOLOGY CENTRE

Doc. Number:

Revision

WCPI - 245

05

Page 04 of 04

10.2 MARKING OF PACKAGES:

The following product information shall be legibly marked/labeled on the outer side of each packet/container.

- a) AWS Specification and Classification designation.
- b) Supplier's Name and Brand.
- c) Size, Quantity of Electrodes and Net weight.

11.0 CERTIFICATION AND TESTING:

11.1 Batch/Lot classification shall be Class C1 as per Section 5.1.1 of SFA-5.01 Filler metal procurement guidelines of ASME Sec.II. Part C.

11.2 The level of testing shall be Schedule K as per Section 6.7 of SFA 5.01 Filler metal procurement guidelines of ASME Sec.II. Part -C.

11.3 Three copies of Original Test certificates in English countersigned by Inspecting Authority approved by IBR for country of origin (to be concurred by BHEL) giving details of following tests done for compliance to this Purchase Instruction and ASME Sec.II.C, SFA-5.5, Class E9015-B9 shall be sent.

- a) Chemical composition of Weld Metal.(For all diameters)
- b) Test for Radiographic Soundness.(For diameter 3.2 and above)
- c) Test for Mechanical Properties after SR as per Sec 5.1. (For diameter 3.2 and above)
- d) Impact Test. (For diameter 3.2 and above)
- e) Fillet weld Test. (For diameter 3.2 and above)
- f) Moisture Test. (For diameter 3.2 and above)

11.5 The testing authority shall certify that supplies made against the Batch conforms to the requirements of the Latest Edition and Addenda (Applicable on the date of issue of purchase order) of ASME Sec II C, SFA 5.5, E9015-B9 and this Purchase instruction.

=====