



BHARAT HEAVY ELECTRICALS LIMITED
TIRUCHIRAPALLI-620 014
WELDING TECHNOLOGY CENTRE

Doc. Number:

WCPI – 245

Revision:

07

Date: 17.08.2015

Welding Consumable Purchase Instruction

**WELDING CONSUMABLE PURCHASE INSTRUCTION FOR
NON-SYNTHETIC SMAW ELECTRODE AS PER ASME SEC.II.C, SFA 5.5, CLASS E9015-B91**

1.0 SCOPE:

This purchase instruction prescribes the requirements for non-synthetic Shielded Metal Arc Welding (SMAW) electrode that conforms to ASME SEC II C, SFA- 5.5, E9015-B91.

2.0 GENERAL:

2.1 Electrodes shall be supplied in size and quantity as specified in the purchase order.

2.2 The electrode shall comply with requirements as specified in the latest edition and addenda (applicable on the date of issue of purchase order) of ASME Sec II C, SFA 5.5, E9015-B91, all tests and acceptance criteria referred in this document. Additional requirements specified in this document shall also be complied.

2.3 The electrode shall be suitable for radiography quality butt joint welding of boiler pressure parts using SA387Gr91-Plate, SA335P91-Pipe, SA213T91-Tube, SA182F91-Forging and SA217C12A-Casting for high temperature creep resistant service.

2.4 Every batch of electrode shall be inspected and Certified Material Test Report (CMTR) 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 100MPa without failure. The results of the tests shall 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 shall be made available. Test shall be conducted at any government lab/NABL approved lab/corporate R&D, BHEL, Hyderabad. Tests shall be certified by the inspecting authorities mentioned in Annexure-A.

2.6 The electrode shall be non-synthetic type with alloyed core wire that matches with weld metal chemistry.

Prepared:

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Engineer/WTC

Reviewed and approved:

S. Singaravelu
SDGM/WTC



3.0 CHEMICAL COMPOSITION:

The chemical composition of the undiluted weld metal deposited using the electrode shall be as follows.

Carbon	0.08-0.13%	Molybdenum	0.85-1.20 %
Manganese	1.20 % Maximum	Vanadium	0.15-0.30 %
Silicon	0.30 % Maximum	Copper	0.25 % Maximum
Sulphur	0.01 % Maximum	Aluminium	0.04 % Maximum
Phosphorus	0.01 % Maximum	Niobium	0.02-0.10 %
Nickel	0.80 % Maximum	Nitrogen*	0.02-0.07 %
Chromium	8.0-10.5 %	Mn+ Ni	1.2 % Maximum
*Minimum=(0.5 x Aluminium content + 0.03) % Elements Sb, Sn and As shall be reported			

4.0 RADIOGRAPHIC SOUNDNESS:

4.1 The electrode welded with DCEP shall deposit weld metal that meets radiographic soundness requirements specified in ASME Sec.II C, SFA-5.5, E9015-B91.

4.2 The electrodes shall produce acceptable radiographic quality pipe and tube welds in all positions.

5.0 MECHANICAL PROPERTIES:

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. (Test to be done as per ASME Sec II C, SFA-5.5, E 9015-B91)

- a) Yield strength at 0.2% offset : 530 MPa (Minimum)
- b) Tensile strength : 620 MPa (Minimum)
- c) Elongation : 17% (Minimum)
- d) Absorbed Energy at $+20^{\circ}\text{C}$: 27 Joules Average(Minimum)
(Charpy 'V' Notch Impact test) (Single value shall be ≥ 20 Joules)
- e) Hardness : 195 HV to 320 HV

6.0 FILLET WELD TEST:

Fillet weld test done using the electrode shall meet requirements specified in ASME Sec II C, SFA 5.5, E9015-B91.

7.0 MOISTURE CONTENT OF COVERING:

Moisture content of the electrode covering shall not exceed the limit specified in ASME Sec II C, SFA 5.5, E9015-B91.



8.0 DIFFUSIBLE HYDROGEN CONTENT OF WELD METAL:

Diffusible hydrogen content of weld metal deposited using the electrode shall be maximum of 4ml per 100 grams. Test shall be done as per ASME Sec II C, SFA 5.5, E9015-B91.

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

9.1 SIZE:

Electrodes shall be supplied in diameter and length as specified in the purchase order.

9.2 COVERING:

The core wire and covering shall be free of defects and shall ensure uniform deposition of weld metal. The flux coating shall be uniform and concentric around the core wire such that the performance of welding is not affected in any position and no tapered burning of electrode is permitted. Covering shall not exhibit any cracking during welding at maximum current recommended by manufacturer. The electrode shall not become red hot upon continuous welding through the length of electrode.

9.3 ARC END AND GRIP END:

The arc end of each electrode shall be sufficiently bare and flux coating sufficiently tapered permitting easy striking of arc. The grip end shall be bare for a length that is sufficient to provide electrical contact with the electrode holder. Clause 21 of ASME SEC IIC, SFA-5.5, E9015-B91 shall be complied.

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 bold block type and size shall be large enough to be legible.

The ink used for imprint shall provide sufficient contrast with the electrode coating such that the imprint shall remain legible even after drying and welding. Clause 22.1 of ASME SEC II C, SFA-5.5, E9015-B91 shall be complied.

10.0 PACKING AND MARKING OF PACKAGES:

10.1 PACKAGING:

A standard quantity of electrodes with the net weight of each package not exceeding 5Kg shall be packed in hermetically sealed containers or moisture proof cardboard with polythene encapsulated packets.

Electrode packets shall be shipped in wooden crates lined with waterproof material. Net weight of each crate shall not exceed 1000Kg.



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10.2 MARKING OF PACKAGES:

The package shall be marked clearly with AWS Specification, brand name, classification, lot number, manufacturer name, size and quantity of electrodes with net weight, health and safety warnings.

11.0 CERTIFICATION AND TESTING:

11.1 Batch or Lot classification shall be Class C1 as per Section 4.3.1 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 5.6 of SFA 5.01 Filler metal procurement guidelines of ASME Sec.II. Part -C.

11.3 Three copies of original Certified Material Test Report (CMTR) in English countersigned by Inspecting Authority approved by IBR for country of origin (to be concurred by BHEL) giving details about tests in compliance with this purchase instruction and ASME Sec IIC, SFA-5.5, E9015-B91 shall be sent. In addition, CMTR shall contain purchase order number with date, quantity and customer name.

11.4 The testing authority shall certify that the batch supplied 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-B91 and this purchase instruction.

(As on 30/09/2014)

INSPECTING AUTHORITIES**NAME OF THE AUTHORITY****AREA OF OPERATION**

1.	Director of Boilers, Andhra Pradesh	Andhra Pradesh
2.	Chief Inspector of Boilers, Arunachal Pradesh	Arunachal Pradesh
3.	Chief Inspector of Boilers Assam	Assam
4.	Chief Inspector of Boilers Bihar	Bihar
5.	Chief Inspector of Boilers Chhattisgarh	Chhattisgarh
6.	Chief Inspector of Boilers, Delhi	N.C.T.D.
7.	Chief Inspector of Boilers, Goa.	Goa
8.	Director of Boilers, Gujarat.	Gujarat, Daman & Diu and Dadra & Nagar Haveli
9.	Chief Inspector of Boilers, Haryana.	Haryana & Chandigarh
10.	Chief Inspector of Boilers, Himachal Pradesh.	Himachal Pradesh
11.	Chief Inspector of Boilers,, Jharkhand.	Jharkhand
12.	Director of Boilers, Karnataka.	Karnataka
13.	Director of Boilers, Kerala.	Kerala
14.	Director of Boilers, Madhya Pradesh.	Madhya Pradesh
15.	Director of Boilers, Maharashtra.	Maharashtra
16.	Chief Inspector of Boilers, Meghalaya	Meghalaya
17.	Chief Inspector of Boilers, Manipur	Manipur

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18. Chief Inspector of Boilers, Mizoram	Mizoram
19. Chief Inspector of Boilers, Nagaland	Nagaland
20. Director of Boilers, Orissa	Orissa
21. Director of Boilers, Punjab	Punjab
22. Chief Inspector of Boilers, Labour Department, Government of Puducherry, Puducherry	Puducherry
23. Chief Inspector of Boilers, Rajasthan.	Rajasthan
24. Director of Boilers Tamil Nadu	Tamil Nadu
25. Director of Boilers Telangana	Telangana
26. Chief Inspector of Boilers, Tripura	Tripura
27. Director of Boilers, Uttar Pradesh	Uttar Pradesh
28. Chief Inspector of Boilers Uttarakhand	Uttarakhand
29. Chief Inspector of Boilers, West Bengal	West Bengal
30. M/s. Lloyd's Register Asia 63-64, Kalpataru Square, 6 th Floor, Kondivita Lane, Off. Andheri-Kurla Road, Mumbai-400 059	Tamil Nadu, Maharashtra Karnataka, Gujarat, Haryana, Himachal Pradesh, Punjab, Andhra Pradesh, Telangana & Odisha
31. M/s Bureau Veritas (India) Private Limited, Marwah Centre, 6 th Floor, Opp. Ansa Inds. Estate, K. Marwah Marg, Off. Sakhi-Vihar Road, Andheri (East), Mumbai-400 072	Chhattisgarh, Gujarat , Haryana , Madhya Pradesh, Maharashtra , Odisha , Tamil Nadu, Bihar, Jharkhand, Sikkim & West Bengal
32. M/s ABS Industrial Verification (India) Pvt. Limited, 10 th Floor, Lakhani's Centrum, Sector-15, Plot No. 27, CBD Belapur (E), Navi Mumbai-400 614	Maharashtra, Odisha & West Bengal

Annexure-A to WCPI-245/07 dated 17.08.2015

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| 33. M/s TUV India Pvt. Limited
(TUV Nord Group)
801, Raheja Plaza-1,
L.B.S. Marg,
Ghatkopar(W)
Mumbai-400 086 | Andhra Pradesh, Gujarat,
Maharashtra, Himachal Pradesh,
TamilNadu, Telangana & Karnataka |
| 34. M/s. TUV Nord Systems GmbH Co.KG.
Langemarckstr 20
451141 Essen
GERMANY. | Europe, Brazil, China, Korea
and Thailand |
| 35. M/s RSA
(Formerly Royal & Sun Alliance plc)
17 York Street,
Manchester, M2 3RS,
United Kingdom | Europe |
| 36. M/s. Japan Inspection Company Limited,
No.10-7, 1-Chome, hatchobori, Chou-ku,
Tokyo, 104-0032, Japan | All countries in Asia except
India |
| 37. M/s. S.G.S. Korea Company Limited,
Industrial Division,
647-2, Sinpyeong-dong,
Saha-gu, Busan,
KOREA (604-030). | Korea & Japan |
| 38. M/s Bureau Veritas,
67-71, Boulevard du Chateau,
92200 Neuilly-sur-Seine,
FRANCE | All countries except India. |
| 39. M/s. Lloyds Register Verification Ltd.,
71, Fenchurch Street,
London EC 3M, U.K. | All countries except India. |
| 40. M/s. Velosi Certification Bureau Ltd.,
Unit 1 Woodside Business Park,
Whitley Wood Lane,
Reading, Berkshire, RG2 8LW
United Kingdom | Europe, Middle East
Countries, China, Malaysia
Singapore & USA |
| 41. M/s TUV Rheinland AG
Am Grauen stein, D-51105 Koln,
Germany | All countries except India |
| 42. M/s OOO "TekhnoLogicheskieEnergosistime"
1. Kalinia St. Belgorod, 308001
Russia | Russia, China, Ukraine, USA
& Germany |

43	M/s Engineering Bureau Franke International, 55, Amurskaya St., Dnepropetrovsk 49108, Ukraine	Ukraine, Russia, Belarus, China , Uzbekistan, Poland, Belgium, Romania, & Czech Republic
44.	M/s. ARISE Boiler Inspection & Insurance Company Risk Retention Group, Grand Bay 1, 7000 South Edgerton Road, Suite 100, Brecksville, OH 44141 USA	USA & Canada
45.	M/s Tata Projects Limited, Quality Service Division, 2 nd Floor, Varun Towers-1, Begumpet, Hyderabad-500 016	All countries except India
46.	M/s TUV SUD Industrie Service GmbH, Wstendstr. 199, 80686 Munich, Germany	All countries except India
47.	M/s Germanischer Lloyd Industrial Services GmbH, Steinhoeft 9, 20459 Hamburg, Germany	All countries except India
48	M/s. TUV Thuringen e.V., Business Division Steam and Pressure Technology, Melchendorfer Str. 64, 99096 Erfurt, Germany	Europe
49.	M/s. SGS-CSTC Standards Technical Services Co. Ltd. 9 th Building, No. 69, KangQiao Industrial Park, Block 1159, KangQiao East Road, Pudong District, Shanghai-201 319 China	China
50	M/s Intertek Inspection Services UK Limited (Formerly M/s Moody International Limited) Hayworthe House, Market Place, Haywards Heath, West Sussex, United Kingdom	All countries except India
51.	M/s ABSG Consulting Inc., 16855 Northchase Drive, Houston, TX 77060 United States of America	All countries except India

Annexure-A to WCPI-245/07 dated 17.08.2015

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| 52. M/s. Hartford Steam Boiler Inspection and Insurance Company of Connecticut,
One State Street, 8 th Floor
Hartford, CT 06141-0299
U.S.A. | All countries except India
and China |
| 53. M/s. Certification Engineers International Limited,
D 101-106, First Floor,
International Technology Centre,
CBD Belapur Station Complex, Navi Mumbai-400 614 | All countries in Europe,
Middle East & China |
| 54. M/s. Det Norske Veritas AS,
Veritasveien 1, PO Box 300,
N-1322, Hovik,
Norway | Europe, South & North
America and Asia (except India) |

Sl. No.	Pre –Qualification Criteria		Bidder remarks
1	Bidder shall be a manufacturer of Welding Consumables / an authorized dealer of Welding Consumables.	Write: Manufacturer or Agent	
2	If the offer is quoted by agent, letter of authorization and agreement duly signed by the manufacturer is required to consider the offer	Supporting Document if quoted by Agent	
3	Bidder shall have successfully supplied, quoted SMAW E9015-B91 welding Consumables to any govt. Organizations/ PSUs/ Public Ltd./ Company/Reputed Industries. Purchase orders copies and self-declaration (for successfully supplied) to be submitted along with offer to consider the offer. Note: Successfully supplied means – supplied and accepted	Supporting Document	
4	Bidder shall confirm to the WCPI 245/07	To Confirm	
5	Welding Consumables brand name shall be provided along with offer	Brand Name With Catalogue	
6	Mill (Manufacturing plant) address shall be provided along with offer.	Supporting Document	
7	Suppliers shall submit manufacturing process flow chart (Raw material to finished product) along with offer.	Supporting Document	
8	Suppliers shall submit a valid ISO 9001 certificate or Quality management system certificate or Written down procedure.	Supporting Document	
9	Delivery Schedule: For Dia4.00mm 1 st Lot (4000 Kg): Within 4 weeks from the PO Date 2nd Lot (8000 Kg): Within 8 weeks from the PO Date 3rd Lot (8000 Kg): Within 12 weeks from the PO Date Else the offer will not be considered	To Confirm	

Signature and Seal