

BHARAT HEAVY ELECTRICALS LIMITED

TIRUCHIRAPPALLI-620014

WELDING TECHNOLOGY CENTRE

NUMBER:

WCPI-235

PAGE 1

REV:

05

OF 4

PURCHASE INSTRUCTION FOR NON SYNTHETIC SMAW ELECTRODE ASME SEC. II-C, SFA-5.5, CLASS E 9018-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-C, SFA-5.5, E 9018-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-E 9018-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.

2.4 The Electrode shall be of the Non-Synthetic type with a fully alloyed core wire.

3.0 Chemical composition.

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

Carbon	: 0.08 - 0.13 %	Manganese	: 1.25 % Maximum
Chromium	: 8.00 - 10.50 %	Nitrogen	: 0.02 - 0.07 %
Nickel	: 1.00 % Maximum	Copper	: 0.25 % Maximum
Molybdenum	: 0.85 - 1.20 %	Vanadium	: 0.15 - 0.30 %

APPROVED:

(G.SUBRAMANIAN)  
SR.MANAGER/WTC

DATE

23/02/1998

PREPARED:

(A.WILFRED JOSEPH)  
DY.MANAGER/WTC

DATE

23/02/1998



Silicon : 0.30 % Maximum

Niobium : 0.02 - 0.10 %

Phosphorous: 0.01 % Maximum

Aluminium : 0.04 % Maximum

Sulphur : 0.01 % Maximum

## 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, E 9018-B9.

4.2 The Electrodes shall produce acceptable Radiography Quality Pipe and Tube welds in All Positions.

## 5.0 Mechanical Properties:

5.1 The Mechanical Properties of weld metal deposited using the Electrode after Stress Relieving the test plate assembly at  $745 \pm 15^\circ\text{C}$  for 120 minutes shall be as follows. (Tests as per ASME Sec II-C, SFA 5.5 E 9018-B9).

- a) Yield strength at 0.2% offset: 530 MPa (Min.)
- b) Tensile strength : 620 MPa (Min.)
- c) Elongation : 17% (Min.)
- d) Absorbed Energy at  $0^\circ\text{C}$  : 35 Joules (Min.)  
(Charpy 'V' Notch Impact test)
- e) Hardness : 300 BHN (Max.)

## 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, E 9018-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, E 9018-B9.

## 8.0 Size, Covering, Arc End &amp; Grip end and Identification:

## 8.1 Size

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

## 8.2 Covering

The core wire and covering shall be free of defects that would interfere with uniform deposition of weld metal.



<p><b>BHARAT HEAVY ELECTRICALS LIMITED</b></p> <p><b>TIRUCHIRAPPALLI-620014</b></p> <p><b>WELDING TECHNOLOGY CENTRE</b></p>	<table border="1"> <tr> <td><b>NUMBER:</b></td> <td><b>REV:</b></td> </tr> <tr> <td>WCPI- 235</td> <td>05</td> </tr> <tr> <td>PAGE 3</td> <td>OF 4</td> </tr> </table>	<b>NUMBER:</b>	<b>REV:</b>	WCPI- 235	05	PAGE 3	OF 4
<b>NUMBER:</b>	<b>REV:</b>						
WCPI- 235	05						
PAGE 3	OF 4						

**8.3 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.

**8.4 Identification**

All electrodes shall be identified by providing imprints of the Electrode Classification and Brand 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 imprinting shall provide sufficient contrast with the electrode covering so that the imprint shall remain legible after drying and welding.

**9.0 Packaging and Marking of Packages.**

**9.1 Packaging**

Electrodes in standard quantity shall be wrapped tightly in a corrugated paper and then packed in moisture proof polythene bags and sealed. These shall be further packed either in hermetically sealed containers or in cardboard packets and then packed in polythene bags and sealed.

The number of electrodes per packet shall be such that the Net weight of each packet does not exceed 5 kg. Packets shall be further packed in cardboard cartons each weighing not more than 25 kg. Each cartons shall contain electrode packets of one size and batch only.

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

**9.2 Marking on Packages.**

The following product information shall be legibly marked/labelled on the outside of each packet/container.

- AWS Specification and Classification designation.
- Supplier's Name and Brand.
- Size, Quantity of Electrodes and Nett weight.
- Batch No and Date of manufacture.



BHARAT HEAVY ELECTRICALS LIMITED TIRUCHIRAPPALLI-620014 WELDING TECHNOLOGY CENTRE[	<table border="1"> <tr> <td>NUMBER:</td> <td>REV:</td> </tr> <tr> <td>WCPI- 235</td> <td>05</td> </tr> <tr> <td>PAGE 4</td> <td>OF 4</td> </tr> </table>	NUMBER:	REV:	WCPI- 235	05	PAGE 4	OF 4
NUMBER:	REV:						
WCPI- 235	05						
PAGE 4	OF 4						

10.0 Certification and Testing

10.1 Each consignment of electrodes shall preferably be from one batch only.

10.2 Batch/Lot Classification shall be Class C4 as per Section 5.0 of SFA-5.01 Filler Metal Procurment Guidelines of ASME Sec II, Part C.

10.3 The Level of testing shall be Schedule K asper Section 6.0 of SFA 5.01 Filler Metal Procurement Guidelines of ASME Sec-II,Part C.

10.4 Three copies of Test certificates giving details of following tests done for compliance to this Purchase instruction and ASME Sec II, Part C, SFA-5.5, E 9018-B9 shall be sent.

a) Chemical composition of Weld Metal.

b) Test for Radiographic Soundness.

c) Test for Mechanical properties after SR asper Sec 5.1.

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, E 9018-B9 and this Purchase Instruction.



BHARAT HEAVY ELECTRICALS LIMITED

TIRUCHIRAPPALLI-620014

WELDING TECHNOLOGY CENTRE[

NUMBER:

WCPI- 235

PAGE 4

REV:

05

OF 4

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	<b>PAGE 01 OF 06</b>	

**PURCHASE INSTRUCTION FOR WELDING CONSUMABLES – GENERAL – REGARDING RECOGNISED INSPECTING AUTHORITIES FOR WELDING CONSUMABLES.**

**1.0 SCOPE**

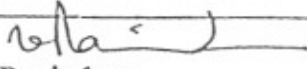
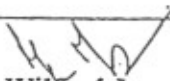
- 1.1 This document gives the list of Inspecting authorities for certification of test reports of batch testing of welding consumables to be supplied to BHEL. The welding consumable is to be used for applications under the purview of Indian Boiler Regulations. (IBR)
- 1.2 The Inspecting authorities listed are recognised by Central Boilers Board, Ministry of Industry, Government of India.

**2.0 TESTING AND CERTIFICATION**

- 2.1 Every batch of welding consumable to be supplied to BHEL shall be tested for compliance to the relevant WCPI-XXX/XX Viz. Welding Consumable Purchase Instruction for the item.
- 2.2 The batch classification, level of testing and required tests for the welding consumable shall be as detailed in the relevant WCPI-XXX/XX.
- 2.3 The batch test reports shall be certified by an Inspecting Authority for the relevant area recognised by Central Boilers Board, Ministry of Industry, Government of India, as per list given in Clause 3.0 below.
- 2.4 Certified copies of batch test reports shall be sent to BHEL along with the consignment for Receipt Inspection and Acceptance.

**3.0 LIST OF INSPECTING AUTHORITIES**

The list of recognised Inspecting Authorities is given below.

<b>APPROVED BY:</b>  <b>V. Ravindran</b> <b>DGM/WTC</b>	<b>DATE:</b> 29/11/2000
<b>PREPARED BY:</b>  <b>A. Wilfred Joseph</b> <b>Manager/WTC</b>	<b>DATE:</b> 29/11/2000



BHARATH HEAVY ELETRICALS LIMITED  
TIRUCHIRAPALLI  
WELDING TECHNOLOGY CENTRE

NUMBER: WCPI-GO3  
REV: 00  
PAGE 01 OF 06

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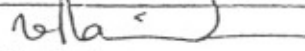
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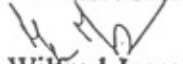
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Manager/WTC

DATE: 29/11/2000



BHARATH HEAVY ELETRICALS LIMITED

TIRUCHIRAPALLI

WELDING TECHNOLOGY CENTRE

NUMBER:

REV:

WCPI-GO3

00

PAGE 02 OF 06

<u>Name of Authority</u>	<u>Area of Operation</u>
1. Chief Inspector of Boilers Assam.	Assam, India
2. Chief Inspector of Boilers West Bengal.	West Bengal, India
3. Chief Inspector of Boilers Bihar.	Bihar, India
4. Director of Boilers Maharashtra.	Maharashtra, India
5. Chief Inspector of Boilers Gujarat.	Gujarat, India
6. Chief Inspector of Boilers Delhi.	Delhi, India
7. Chief Inspector of Boilers Tamil Nadu.	Tamil Nadu, India
8. Director of Boilers Madhya Pradesh.	Madhya Pradesh, India
9. Director of Boilers Punjab.	Punjab, India
10. Chief Inspector of Boilers Orissa.	Orissa, India
11. Director of Boilers Uttar Pradesh.	Uttar Pradesh, India
12. Director of Boilers Andhra Pradesh.	Andra Pradesh, India
13. Shri K.S.Gopal Deputy Chief Inspector of Boilers Karnataka.	Karnataka, India
14. Chief Inspector of Boilers Rajasthan.	Rajasthan, India





**BHARATH HEAVY ELETRICALS LIMITED**  
**TIRUCHIRAPALLI**  
**WELDING TECHNOLOGY CENTRE**

**NUMBER:**      **REV:**  
**WCPI-GO3**      **00**  
**PAGE 03 OF 06**

<u>Name of Authority</u>	<u>Area of Operation</u>
15. Chief Inspector of Boilers Kerala.	Kerala, India
16. Chief Inspector of Boilers Haryana.	Haryana, India
17. Dy.Chief Inspector of Boilers Pondicherry Administration Pondicherry.	Pondicherry, India
18. Chief Inspector of Boilers Himachal Pradesh,	Himachal Pradesh, India
19. Chief Inspector of Boilers Goa.	Goa, India
20. M/s.Germanischer Lloyd AG, Vorsetzen 32, 20459 Hamburg, Germany.	All countries except India.
21. M/s. S.G.S. Far East Limited, New State Yokohama 17F, 1-1-32, Shin Urashima-cho, Kanagawa-ku, Yokohama 221-0031. Japan.	Japan and Thailand.
22. The Hartford Steam Boiler Inspection And Insurance Company, One State Street , Hartford, Connecticut 06102, U.S.A	Australia, Argentina, Canada, Columbia, Czech Republic, France, Germany, Hungary, Indonesia, Israel, Japan, Korea, Malaysia, Mexico, People's Republic of China, Philippines, Russia, Singapore, Sweden, Taiwan,. UAE, U.K., USA and Venezuela.
23. M/s.INSPECKTA a.s. PRAHA, Olbrachtova 1, 140 62 Prague 4, Czech Republic.	Czech Republic and Slovak Republic.



BHARATH HEAVY ELETRICALS LIMITED

TIRUCHIRAPALLI

WELDING TECHNOLOGY CENTRE

NUMBER:

REV:

WCPI-GO3

00

PAGE 04 OF 06

Name of Authority

Area of Operation

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| 24. M/s. ABS Group, Inc.<br>16855, Northchase Drive,<br>Houston, Texas-77060-6008<br>USA.  | All countries except India                       |
| 25. M/s. Engineers India Limited,<br>EIL House, 6th Floor, R.K.Puram,<br>Ring Road, New Delhi.   | France, Germany, Italy,<br>Japan, Spain and U.K. |
| 26. M/s. Plant Safety Limited<br>825A Wilmslow Road, Didsbury,<br>Manchester M20 8RE, England.   | Europe and USA.                                  |
| 27. M/s. RWTUV e.v.<br>STEUBENSTRASSE 53,<br>D-45138 Essen, Germany.   | All countries except India                       |
| 28. M/s. Royal & Sunalliance Engineering,<br>17, York Street, Manchester<br>England.   | Europe   |
| 29. M/s. Moody International Limited,<br>Cuckfield House, High Street,<br>Cuckfield, Haywards Heath,<br>West Sussex,<br>RH17 5EL, England.       | All countries except India                       |
| 30. M/s. P.B. Power Limited,<br>Amber Court, William Armstrong Drive,<br>New Castle Business Park,<br>New Castle upon tyne,<br>NE4 7YQ, England. | France, Ireland, Italy,<br>Netherlands and U.K.  |
| 31. M/s. Urząd Dozoru Technicznego<br>Szczeliwicka 34,<br>02-353 Warsaw, Poland.   | Europe.  |
| 32. M/s. Japan Inspection Company Limited,<br>No.5-7, 1-Chome,<br>Kameido, Koto-Ku, Tokyo-136,<br>JAPAN.   | Japan  |



BHARATH HEAVY ELECTRICALS LIMITED

TIRUCHIRAPALLI

WELDING TECHNOLOGY CENTRE

NUMBER

WCPI-G03

REV.

00

PAGE 05 OF 06

Name of Authority

Area of Operation

33. M/s. Intertek Testing Services (Japan) KK,  
Eishin Building, 2-31-1 Eitai,  
Koto-Ku, Tokyo-135-0034,  
Japan.

Japan

34. M/s. S.G.S. Korea Company Limited,  
Industrial Division  
Yoochang Building  
25-2, 4-Ka, Jungang-Dong Jung-Gu,  
Busan,  
KOREA.

Korea.

35. M/s. Bureau Veritas,  
17 bis, place des Reflets,  
La Defense 2,  
92400 Courbevoie,  
France.

All countries except India

36. M/s. Det Norske Veritas,  
Veritasveien 1, P.O. Box 300,  
N-1322, Hovik,  
Norway.

Argentina, Australia, Austria,  
Belgium, Brazil, Denmark,  
Finland, France, Germany,  
Italy, Japan, Norway, South  
Korea, Spain, Sweden,  
Switzerland, Netherlands,  
U.K and U.S.A.

37. M/s. Lloyds Register of Shipping,  
71, Fenchurch Street,  
London EC 3M 4BS,  
U.K.

All countries except India.

38. M/s. Technischer Überwachungs Verein  
Saarland e.V.,  
Saarbrucker Strabe 8,  
66280 Sulzbach,  
GERMANY.

France and Germany





BHARATH HEAVY ELECTRICALS LIMITED

TIRUCHIRAPALLI

WELDING TECHNOLOGY CENTRE

NUMBER

WCPI-G03

REV.

00

PAGE 06 OF 06

Name of Authority

Area of Operation

39. M/s. Japan Quality Assurance Organisation  
1-9-5, Akasaka,  
Minako-ku,  
Tokyo  
JAPAN.

JAPAN

40. M/s. Ceten Apave International,  
191, Rue de Vaugirard,  
75015 Paris  
FRANCE.

France and other  
European countries

